

SECTION 03 30 53
(SHORT-FORM) CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 DESCRIPTION:

- A. This Section specifies cast-in-place structural concrete and material and mixes for other concrete.

1.2 RELATED WORK:

- A. Materials testing and inspection during construction: Section 01 45 29.

1.3 TOLERANCES:

- A. ACI 117.
- B. Slab Finishes: ACI 117, F-number method in accordance with ASTM E1155.

1.4 REGULATORY REQUIREMENTS:

- A. ACI SP-66 ACI Detailing Manual
- B. ACI 318 - Building Code Requirements for Reinforced Concrete.

1.5 SUBMITTALS:

- A. Submit in accordance with Section 01 33 23.
- B. Concrete Mix Design.
- C. Shop Drawings: Reinforcing steel: Complete shop drawings.
- D. Manufacturer's Certificates: Air-entraining admixture, chemical admixtures, curing compounds.

1.6 APPLICABLE PUBLICATIONS:

- A. Publications listed below form a part of this Specification to extent referenced. Publications are referenced in text by basic designation only.
- B. American Concrete Institute (ACI):
 - 117R-06.....Tolerances for Concrete Construction and Materials
 - 211.1-91(R2002)Proportions for Normal, Heavyweight, and Mass Concrete
 - 211.2-98(R2004)Proportions for Structural Lightweight Concrete
 - 301-05Specification for Structural Concrete
 - 305R-06Hot Weather Concreting
 - 306R-2002Cold Weather Concreting
 - SP-66-04ACI Detailing Manual

318/318R-05 Building Code Requirements for Reinforced Concrete

347R-04 Guide to Formwork for Concrete

C. ASTM International (ASTM):

A185-07 Steel Welded Wire, Fabric, Plain for Concrete Reinforcement

A615/A615M-08 Deformed and Plain Billet-Steel Bars for Concrete
Reinforcement

A996/A996M-06 Standard Specification for Rail-Steel and Axle-Steel Deformed
Bars for Concrete Reinforcement

C31/C31M-08 Making and Curing Concrete Test Specimens in the Field

C33-07 Concrete Aggregates

C39/C39M-05 Compressive Strength of Cylindrical Concrete Specimens

C94/C94M-07 Ready-Mixed Concrete

C143/C143M-05 Standard Test Method for Slump of Hydraulic Cement Concrete

C150-07 Portland Cement

C171-07 Sheet Material for Curing Concrete

C172-07 Sampling Freshly Mixed Concrete

C173-07. Air Content of Freshly Mixed Concrete by the Volumetric Method

C192/C192M-07 Making and Curing Concrete Test Specimens in the Laboratory

C231-08 Air Content of Freshly Mixed Concrete by the Pressure Method

C260-06 Air-Entraining Admixtures for Concrete

C330-05 Lightweight Aggregates for Structural Concrete

C494/C494M-08 Chemical Admixtures for Concrete

C618-08 Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in
Concrete

D1751-04. Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction
(Non-extruding and Resilient Bituminous Types)

D4397-02 Polyethylene Sheeting for Construction, Industrial and
Agricultural Applications

E1155-96(2008) Determining FF Floor Flatness and FL Floor Levelness Numbers

PART 2 - PRODUCTS

2.1 FORMS:

Wood, plywood, metal, or other materials, approved by Owner, of grade or type suitable to obtain type of finish specified.

2.2 MATERIALS:

- A. Portland Cement: ASTM C150, Type I or II.
- B. Fly Ash: ASTM C618, Class C or F including supplementary optional requirements relating to reactive aggregates and alkalis, and loss on ignition (LOI) not to exceed 5 percent.
- C. Coarse Aggregate: ASTM C33, Size 67. Size 467 may be used for footings and walls over 300 mm (12 inches) thick. Coarse aggregate for applied topping and metal pan stair fill shall be Size 7.
- D. Fine Aggregate: ASTM C33.
- E. Lightweight Aggregate for Structural Concrete: ASTM C330, Table 1
- F. Mixing Water: Fresh, clean, and potable.
- G. Air-Entraining Admixture: ASTM C260.
- H. Chemical Admixtures: ASTM C494.
- I. Vapor Barrier: ASTM D4397, 0.25 mm (10 mil).
- J. Reinforcing Steel: ASTM A615 or ASTM A996, deformed. See structural drawings for grade.
- K. Welded Wire Fabric: ASTM A185.
- L. Expansion Joint Filler: ASTM D1751.
- M. Sheet Materials for Curing Concrete: ASTM C171.
- N. Abrasive Aggregates: Aluminum oxide grains or emery grits.
- O. Grout, Non-Shrinking: Premixed ferrous or non-ferrous, mixed and applied in accordance with manufacturer's recommendations. Grout shall show no settlement or vertical drying shrinkage at 3 days or thereafter based on initial measurement made at time of placement, and produce a compressive strength of at least 18mpa (2500 psi) at 3 days and 35mpa (5000 psi) at 28 days.

2.3 CONCRETE MIXES:

- A. Design of concrete mixes using materials specified shall be the responsibility of the Contractor as set forth under Option C of ASTM C94.
- B. Compressive strength at 28 days shall be not less than 4000 psi.

- C. Establish strength of concrete by testing prior to beginning concreting operation. Test consists of average of three cylinders made and cured in accordance with ASTM C192 and tested in accordance with ASTM C39.
- D. Maximum slump for vibrated concrete is 100 mm (4 inches) tested in accordance with ASTM C143.
- E. Cement and water factor (See Table I):

TABLE I - CEMENT AND WATER FACTORS FOR CONCRETE

Concrete: Strength	Non-Air-Entrained		Air-Entrained	
Min. 28 Day Comp. Str. MPa (psi)	Min. Cement kg/m ³ (lbs/yd ³)	Max. Water Cement Ratio	Min. Cement kg/m ³ (lbs/yd ³)	Max. Water Cement Ratio
35 (5000) ^{1,3}	375 (630)	0.45	385 (650)	0.40
30 (4000) ^{1,3}	325 (550)	0.55	340 (570)	0.50
25 (3000) ^{1,3}	280 (470)	0.65	290 (490)	0.55
25 (3000) ^{1,2}	300 (500)	*	310 (520)	*

- 1. If trial mixes are used, the proposed mix design shall achieve a compressive strength 8.3 MPa (1200 psi) in excess of f'c. For concrete strengths above 35 MPa (5000 psi), the proposed mix design shall achieve a compressive strength 9.7 MPa (1400 psi) in excess of f'c.
 - 2. Lightweight Structural Concrete. Pump mixes may require higher cement values.
 - 3. For concrete exposed to high sulfate content soils maximum water cement ratio is 0.44.
 - * Determined by Laboratory in accordance with ACI 211.1 for normal concrete or ACI 211.2 for lightweight structural concrete.
- F. Air-entrainment is required for all exterior concrete. Air content shall conform to the following table:

**TABLE I - TOTAL AIR CONTENT
FOR VARIOUS SIZES OF COARSE AGGREGATES (NORMAL CONCRETE)**

Nominal Maximum Size of Coarse Aggregate	Total Air Content Percentage by Volume
10 mm (3/8 in)	6 to 10
13 mm (1/2 in)	5 to 9
19 mm (3/4 in)	4 to 8
25 mm (1 in)	3 1/2 to 6 1/2
40 mm (1 1/2 in)	3 to 6

2.4 BATCHING & MIXING:

- A. Store, batch, and mix materials as specified in ASTM C94.
 - 1. Job-Mixed: Concrete mixed at job site shall be mixed in a batch mixer in manner specified for stationary mixers in ASTM C94.
 - 2. Ready-Mixed: Ready-mixed concrete comply with ASTM C94, except use of non-agitating equipment for transporting concrete to the site will not be permitted. With each load of concrete delivered to project, ready-mixed concrete producer shall furnish, in duplicate, certification as required by ASTM C94.
 - 3. Mixing structural lightweight concrete: Charge mixer with 2/3 of total mixing water and all of the aggregate. Mix ingredients for not less than 30 seconds in a stationary mixer or not less than 10 revolutions at mixing speed in a truck mixer. Add remaining mixing water and other ingredients and continue mixing. Above procedure may be modified as recommended by aggregate producer.

PART 3 - EXECUTION

3.1 FORMWORK:

- A. Installation shall conform to ACI 347. Sufficiently tight to hold concrete without leakage, sufficiently braced to withstand vibration of concrete, and to carry, without appreciable deflection, all dead and live loads to which they may be subjected.
- B. Treating and Wetting: Treat or wet contact forms as follows:
 - 1. Coat plywood and board forms with non-staining form sealer. In hot weather cool forms by wetting with cool water just before concrete is placed.

2. Clean and coat removable metal forms with light form oil before reinforcement is placed. In hot weather cool metal forms by thoroughly wetting with water just before placing concrete.
3. Use sealer on reused plywood forms as specified for new material.
- C. Inserts, sleeves, and similar items: Flashing reglets, masonry ties, anchors, inserts, wires, hangers, sleeves, boxes for floor hinges and other items specified as furnished under this and other Sections of Specifications and required to be in their final position at time concrete is placed shall be properly located, accurately positioned and built into construction, and maintained securely in place.
- D. Construction Tolerances:
 1. Contractor is responsible for setting and maintaining concrete formwork to assure erection of completed work within tolerances specified to accommodate installation or other rough and finish materials. Remedial work necessary for correcting excessive tolerances is the responsibility of the Contractor. Erected work that exceeds specified tolerance limits shall be remedied or removed and replaced, at no additional cost to the Owner .
 2. Permissible surface irregularities for various classes of materials are defined as "finishes" in Specification Sections covering individual materials. They are to be distinguished from tolerances specified which are applicable to surface irregularities of structural elements.

3.2 REINFORCEMENT:

Details of concrete reinforcement, unless otherwise shown, in accordance with ACI 318 and ACI SP-66. Support and securely tie reinforcing steel to prevent displacement during placing of concrete.

3.3 PLACING CONCRETE:

- A. Remove water from excavations before concrete is placed. Remove hardened concrete, debris and other foreign materials from interior of forms, and from inside of mixing and conveying equipment. Obtain approval of Owner before placing concrete. Provide screeds at required elevations for concrete slabs.
- B. Before placing new concrete on or against concrete which has set, existing surfaces shall be roughened and cleaned free from all laitance, foreign matter, and loose particles.
- C. Convey concrete from mixer to final place of deposit by method which will prevent segregation or loss of ingredients. Do not deposit in work concrete that has attained its initial set or has

contained its water or cement more than 1½ hours. Do not allow concrete to drop freely more than 1500 mm (5 feet) in unexposed work nor more than 900 mm (3 feet) in exposed work.

Place and consolidate concrete in horizontal layers not exceeding 300 mm (12 inches) in thickness. Consolidate concrete by spading, rodding, and mechanical vibrator. Do not secure vibrator to forms or reinforcement. Vibration shall be carried on continuously with placing of concrete.

- D. Hot weather placing of concrete: Follow recommendations of ACI 305R to prevent problems in the manufacturing, placing, and curing of concrete that can adversely affect the properties and serviceability of the hardened concrete.
- E. Cold weather placing of concrete: Follow recommendations of ACI 306R, to prevent freezing of thin Sections less than 300 mm (12 inches) and to permit concrete to gain strength properly, except that use of calcium chloride shall not be permitted without written approval from Owner.

3.4 PROTECTION AND CURING:

- A. Protect exposed surfaces of concrete from premature drying, wash by rain or running water, wind, mechanical injury, and excessively hot or cold temperature. Curing method shall be subject to approval by Owner.

3.5 FORM REMOVAL:

- A. Forms remain in place until concrete has a sufficient strength to carry its own weight and loads supported. Removal of forms at any time is the Contractor's sole responsibility.

3.6 SURFACE PREPARATION:

- A. Immediately after forms have been removed and work has been examined and approved by Owner, remove loose materials, and patch all stone pockets, surface honeycomb, or similar deficiencies with cement mortar made with 1 part portland cement and 2 to 3 parts sand.

3.7 FINISHES:

- A. Owner Slab Finishes:
 - 1. Floating: Allow water brought to surface by float used for rough finishing to evaporate before surface is again floated or troweled. Do not sprinkle dry cement on surface to absorb water.
 - 2. Float Finish: Ramps, stair treads, and platforms, both interior and exterior, equipment pads, and slabs to receive non-cementitious materials, except as specified, shall be screened and floated to a smooth dense finish. After first floating, while surface is still soft, surfaces shall

be checked for alignment using a straightedge or template. Correct high spots by cutting down with a trowel or similar tool and correct low spots by filling in with material of same composition as floor finish. Remove any surface projections on floated finish by rubbing or dry grinding. Refloat the slab to a uniform sandy texture.

3. Broom Finish: Finish all exterior slabs, ramps, and stair treads with a bristle brush moistened with clear water after the surfaces have been floated.
4. Finished slab flatness (FF) and levelness (FL) values comply with the following minimum requirements:

Slab on grade & Shored suspended slabs	Unshored suspended slabs
Specified overall value $F_F 25/F_L 20$	Specified overall value $F_F 25$
Minimum local value $F_F 17/F_L 15$	Minimum local value $F_F 17$

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SECTION 03 48 24
PRECAST CONCRETE COLUMBARIUM UNITS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes furnishing and installation of precast concrete columbarium units, as shown on the Drawings and specified, including but not limited to: steel reinforcement, steel embedment plates, required sleeves, finished exposed surfaces, preparation of setting surface, adhesive, columbarium fasteners, and niche cover anchor clip assemblies.
- B. Acceptable designs of the columbarium units' components are provided as shown on the Drawings. The Contractor may use this design for this Work or may propose alternate designs of the corresponding components as follows:
 - 1. Design for alternate columbarium units shall comply with the design criteria in accordance with subsection 1.3.F.
 - 2. Unless indicated otherwise, all provisions of this Specification shall apply to the Contractor's proposed design.
- C. The National Cemetery Association (NCA) may accept or reject part or all of any design proposed by the Contractor.
- D. This Section includes preparation, cleaning and finishing of exposed faces of the columbarium units as indicated on drawings or described herein.
- E. This section covers acceptance and installation of the Government provided niche covers, one for each niche of the new columbarium units

1.2 RELATED DOCUMENTS

- A. Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES
- B. Section 03 30 53 - CAST-IN-PLACE CONCRETE (SHORT FORM)
- C. Section 04 72 10 – STONE MASONRY
- D. Section 10 14 00 – EXTERIOR SIGNAGE

1.3 QUALITY ASSURANCE

- A. Manufacturer's and Installer's Qualifications: Prior to commencement of the Work, Contractor shall submit documentation regarding the experience of the precast concrete supplier and installer in the design, manufacture and installation of Precast Concrete structures and custom units.
- B. Precast concrete manufacturer's qualified Registered Professional Structural Engineer shall certify that precast reinforced concrete conforms to specified requirements.

- C. Codes and regulations of the Federal, State and County authorities shall apply.
- D. Fabricate to dimensions shown or approved. Replace or correct columbarium units that do not comply with the individual dimensions and tolerances.
- E. Before starting production of precast concrete columbarium units, furnish at the site, two complete precast concrete columbarium units, to demonstrate quality of construction. Commence production of columbarium units only after written approval has been obtained from the COTR.
- F. Design Criteria:
 - 1. The columbarium units shall be of the following type, style, and size:
 - a. Type: Precast concrete, reinforced.
 - b. Size: Interior and exterior dimensions as indicated on the Drawings.
 - 2. Columbarium top shall be capable of structurally supporting imposed service live load of no less than 50 pounds per square foot (lb./ ft²), and dead loads based on cap (coping) thickness and heights, including material composition and element section properties, mortar and grout, and dead loads based on concrete top element sectional properties.
 - 3. Submit to the COTR, for review and approval, five sets of design documentation showing structural design of the complete Columbarium. This documentation shall include dimensions, methods of construction, and calculations. All design calculations and drawings shall be signed and sealed by qualified Professional Structural Engineer registered in the State of Georgia.

1.4 MANUFACTURER AND INSTALLER QUALIFICATIONS

- A. Precast concrete columbarium units shall be the product of a manufacturer who has a minimum of three years of experience in fabrication of precast concrete columbarium units similar in material, design, and quantity to that indicated on the Drawings and specified herein.
- B. Precast concrete columbarium units installer shall have been regularly engaged for at least three years in installation of precast concrete similar to this project.
- C. Supply and installation of fastener system shall be by product manufacturers and installers, both whom have had a minimum of three years of experience in installation of similar design to that indicated on the Drawings.

1.6 ALLOWABLE TOLERANCES

- A. In addition to tolerances of individual elements required by applicable industry standards, erection tolerances shall be as follows:

1. Variation of anchors and fasteners from dimensions specified:
1/8 inch
2. Variation in overall dimensions of precast element (height and width): 1/8 inch
3. Maximum differential between adjacent units in erected position:
1/8 inch
4. Variation in thickness of precast panels and elements:
1/8 inch
5. Maximum vertical differential between adjacent columbarium units in installed position: 1/8 inch

1.7 SUBMITTALS

- A. In accordance with Section 01 33 23, furnish the following:
 1. Samples of all fastening systems, mounting hardware and exposed surface finishes including, but not limited to, the following:
 - a. Stainless Steel Angle with threaded spring clip to receive the Tamper Proof Stainless Steel Bolt
 - b. Stainless Steel Bolt, Nut and Washers
 - c. Tamper Proof Stainless Steel Bolt
 - d. Stainless Steel Rosette
 - e. Stainless Steel Expansion Anchors, Bolts and pins
 - f. Stainless Steel Ferrule loop insert.
 - g. Shims
 - h. Exposed front of columbarium with coating applied (If coating is required).
 2. Samples of two complete precast concrete columbarium units, to demonstrate quality of construction, delivered to the site to be approved prior to production.
 3. Samples of adhesives and grouts.
 4. Samples of concrete repair and/or patching materials.
 5. Shop Drawings: Complete shop and erection drawings of all precast concrete columbarium units, showing:
 - a. All dimensions and details of construction.
 - b. Installation and relation to adjoining work.
 - 1) Show the individual units open ended against closed ended, where applicable and that web centerline distance is maintained across the joint between units.

- 2) Show that the overall length of the wall, with multiple precast units is to be set with the indicated overall in place length, within the allowable tolerances (show the installation tolerances).
 - 3) For back to back precast niche units show that the web centerlines for the back to back units will align, for the locations below the cap joints, within the allowable tolerances.
 - 4) Detail where the precast niche units are to be set in the field so the centerline of niche webs will align with the centerline of cap joints above, within the allowable tolerances, when the drawings or details indicate this alignment.
 - c. Reinforcements, anchorage, attachments, inserts, location of all pre-drilled sleeves and other items to be installed in the work of other trades.
 - d. Joint treatment, joint alignment coordinated with cap stone joints.
 - e. Any other work required for a complete installation.
 - f. Provide evidence that the Contractor to be installing the cast-in-place concrete foundations for the columbarium and pier units has been contacted prior to any work relating to the footings for the columbarium construction, and that the construction of the concrete support (foundations) work has been coordinated with the precast columbarium unit manufacturer and installer.
6. Production Drawings:
- a. Elevation view of each structural element.
 - b. Planametric view of unit.
 - c. Sections and details to show quantities and position of reinforcing steel, anchors, inserts, and essential embedded and non-embedded hardware for fabrication, handling, transportation and installation.
 - d. Lifting and erection inserts.
 - e. Dimensions and finishes.
 - f. Method of transportation.
 - g. Method of erection and handling.
7. Erection Drawings:
- a. Elevation view of each typical wall segment of interconnected precast niche units, with the overall in place length and position of the precast niche assembly.
 - b. Section view of the precast niche units, as they are to be installed, with the critical alignment elements and field placed dimensions indicated. For double sided units, as an example, the face of niche unit to face of backed up niche unit

shall be indicated with the construction tolerances for the in place units indicated. Clearly indicate how the units are going to be set in the field to achieve the intended installed conditions.

- c. Provide setting drawing(s) that indicate how the precast niche units are to be positioned on the foundations, to meet the design drawings. The setting drawings shall be submitted based upon the field conditions for the foundations for the segments upon which the precast niche units are to be set. Any discrepancies that exist greater than 1/4" from the design drawings shall be clearly indicated as the foundations are to be constructed within this tolerance. The setting of the precast concrete niche units shall not begin until this information has been provided and approved by the RE/COR, or adjustments made to the foundations that are acceptable to the RE/COR.
 - d. Provide coordination drawings indicating the locations for the weld plates in the precast niche units as well as in the foundations, and coordinate this information so the weld plates are installed in the correct locations to align within allowable tolerances.
8. Manufacturer's Literature and Data:
- a. Each type of concrete fastener, including adhesive and anchor devices.
 - b. Instructions for final cleaning
 - c. Concrete stain/coating, including color charts of manufacturers' standard color palette (if applicable for this project.)
 - d. Written instructions of how the exposed concrete of the precast niche units is to be cleaned and prepared prior to application of the approved stain/coating indicated above.
9. Certificates: Manufacturer's qualifications specifying precast concrete columbarium units meet the requirements of applicable industry standards and as specified.
10. Certificates: Installer's qualifications documenting the quality and quantity of experience of the precast concrete installer in the installation of precast concrete structures and custom units.
11. Certificates: Manufacturer of the precast niche units shall provide a written certification, prior to shipping the materials, that the products being shipped have been checked and that they meet the dimensional criteria as indicated, within the allowable tolerances for individual units, and that they can be assembled as part of the identified wall segments, within the allowable in place dimensions indicated,

within the allowable tolerances indicated. The above manufacturing certifications shall be provided no later than immediately before the units are offloaded at the site. Units that do not meet these criteria shall either be returned or marked in such a manner that indicates they are not to be used for the project work. It is the Contractor's responsibility to ensure that all units that are installed in the project work have been certified by the manufacturer of the units. The Contractor shall be responsible for disposal of any units that are not acceptable for installation in the project work at no cost to the Government.

1.8 DELIVERY AND STORAGE

- A. Ship precast concrete columbarium units to the site with adequate protection to prevent chipping, breaking and other damage. Materials shall be marked giving proper identifications and location. Store materials in protected areas to prevent damage including vandalism, injurious effects of weather and inclusion of foreign matter.
- B. Provide access to the units for field verification of the manufacturing dimensions and whether the units are within allowable tolerances.

1.9 COORDINATION

- A. Coordinate the manufacture and erection of precast concrete columbarium units with related work of other sections of the Specifications. Provide templates for inserts and other devices for anchoring precast concrete columbarium units to the work of other trades, in sufficient time to be built into adjoining construction. Perform cutting, fitting and other related work in connection with erection of precast concrete columbarium unit work. See Section 01 33 23 for details regarding the coordination of work.

1.10 GUARANTEE

- A. Guarantee precast concrete columbarium unit work, including anchorage, joint treatment and related components to be free from all defects in materials and workmanship, including cracking and spalling, and after erection, completed work will be subject to terms of the Contract, "except that guarantee period is one year.

1.11 APPLICABLE PUBLICATIONS

- A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in text by the basic designation only. Comply with the latest edition of all referenced publications unless otherwise specified.
- B. Federal Specifications (Fed. Spec.):
 - QQ-S-766C (5) Steel Plates, Sheets, and Strip-Corrosion Resisting
 - QQ-W-423B Wire, Steel, Corrosive-Resisting

TT-S-00227E (3)	Sealing Compound Elastomeric Type, Multi-Component (For Caulking, Sealing, And Glazing In Building And Other Structures)
TT-S-00230C (2)	Sealing Compound: Elastomeric Type, Single Component (For Caulking, Sealing and Glazing In Building and Other Structures)

D. ASTM International (ASTM):

A36/A36M	Standard Specification for Carbon Structural Steel
A615/A615M	Standard Specification for Deformed and Plain Carbon- Steel Bars for Concrete Reinforcement.
A240	Standard Specification for Chromium and Chromium- Nickel Stainless Steel Sheet, Plate, and for General Applications
A666	Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar
A1064/A1064M	Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete.
C33/C33M	Standard Specification for Concrete Aggregates
C150/C150M	Standard Specification for Portland Cement
C920	Standard Specification for Elastomeric Joint Sealants

E. American Welding Society (AWS) Publications:

AWS D1.1/D1.1M-12(e11)	Structural Welding Code
AWS D1.4/D1.4M-11	Welding Reinforcing Steel

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURER

- A. Manufacturers that have previously completed at least one successful NCA columbarium project are deemed to be acceptable for processing their units through the procedures according to these Specifications and the Drawings.
- B. Manufacturers that do not have previous successful experience for a NCA columbarium project may be selected by the Contractor for the project. Contractor is hereby notified that the submittal process for a manufacturer with no previous NCA experience with a successful columbarium project typically takes longer to process.

2.2 COARSE AGGREGATE

- A. Hard durable aggregate carefully graded from coarse to fine in proportions required to match approved samples of precast concrete columbarium units.

2.3 AGGREGATE FOR BACK-UP MIX (FINE AND COARSE AGGREGATE LIGHTWEIGHT):

- A. Conform to ASTM C 33. Limit gradation as required to produce the specified appearance and quality of concrete.

2.4 PORTLAND CEMENT

- A. Conform to ASTM C150, Type I and Type II; Color as required.

2.5 STRUCTURAL STEEL

- A. Conform to ASTM A36.

2.6 STEEL FABRIC REINFORCEMENT

- A. Conform to ASTM A1064, galvanized.

2.7 STEEL WIRE REINFORCEMENT

- A. Conform to ASTM A1064, cold drawn.

2.8 REINFORCING STEEL

- A. Conform to ASTM A615, deformed, Grade 60.

2.9 STAINLESS STEEL INSERTS AND WELD PLATES

- A. Weld plates shall be 304L stainless steel conforming to ASTM A240 and ASTM A666.

2.10 MARBLE NICHE COVERS

- A. Marble niche covers will be furnished by the Owner and delivered to the site on pallets and shall be of size, type, finish and quantities required for this project. Contractor and Owner's Representative shall inspect the niche covers upon delivery to the site. The general quantity and condition shall be observed and an adequate count to cover all the installed columbarium units, plus required spares shall be verified. Once the niche covers are accepted at the site, they shall become the Contractor's responsibility until installed and the installation is accepted by the Owner's Representative.

2.11 COLUMBARIUM UNIT CAPS

- A. Columbarium unit caps shall be stone, conforming to the requirements of Section 04 72 10, Stone Masonry.

2.12 COLUMBARIUM IDENTIFICATION PLAQUES

- A. Identification plaques shall be bronze, conforming to the requirements of Section 10 14 00, Exterior Signage.

2.13 NICHE COVER ATTACHMENT HARDWARE (ROSETTES)

A. VA NCA standard stainless steel rosette, mounting brackets, and bolts for complete attachment of the niche covers to the precast columbarium units shall be as shown on the Drawings and specified below.

1. Rosettes:
 - a. ASTM A666, Type 316 stainless steel sheet goods, 0.100 inch thick.
 - b. Die stamp, producing an eight-petal flower pattern as shown on the Drawings, one-inch diameter with slight convex; center hole of 0.218 inch, concentric to outer edge, with shoulder recess of 0.400 inch diameter and 0.035 inch depth.
 - c. Luster finish.
2. Interior mounting and attachment elements:
 - a. ASTM A666, Type 304 or 316 stainless steel tamper-resistant bolts, nuts, washers, anchors, mounting brackets, inserts and the like.

2.14 BACK-UP MATERIAL

A. Furnish closed cell neoprene, butyl, polyurethane, vinyl or polyethylene foam rods, diameter approximately 1-1/3 times the joint width.

2.15 BOND BREAKERS (IF USED)

A. Furnish type and material recommended by sealant manufacturer.

2.16 SEALING COMPOUND (IF USED)

A. Conform to Fed. Spec. TT-S-00230 C, Type II, Class A, or ASTM C 920, Type S, Grade NS, Class 25.

2.17 FABRICATION

- A. Precast concrete columbarium units shall NOT be: fabricated, delivered or incorporated in the work until samples have been approved. Precast concrete shall comply with applicable industry standards and as specified in the following paragraphs.
1. Concrete for precast columbarium units shall have minimum compressive strength of 5,000 psi at 28 days.
 2. Provide additional steel reinforcing as required for casting, handling and erection loads.
 3. Back-up Mix: Porosity, strength, weight and gradation of coarse aggregate shall be as required to produce specified characteristics.
 4. Columbarium units shall be cast in steel forms designed to suit shape and finish required and to withstand high frequency vibration. Concrete shall be deposited in oiled forms. Form oil shall be non-staining type. Vibrations, where required, shall be

- continuous during process of casting to attain through compaction, complete embedment of reinforcement and to assure concrete of uniform and maximum density without segregation of mix and full thickness of precast element is attained.
- a. Anchors, lifting devices, provisions for cutouts and openings, dovetail slots, notches, reglets, inserts and similar items required for the work of other trades shall be accurately positioned in forms before casting elements.
 - b. Fastener location holes, including those for anchoring of units and attachment of niche covers, shall be cast into units. Drilling into precast concrete columbarium units after fabrication shall not be acceptable, except where pins are to be inserted through the tops of the units into the caps above, or where pins are to be inserted through the bottom of the precast niche units into the foundation below.
5. Cement, aggregate and water shall be obtained from single sources for facing mix of precast concrete work in order to assure regularity of appearance and uniformity of color.
 6. Finish: Exposed faces shall have smooth natural concrete finish, unless otherwise noted. The face of the units shall be processed by the manufacturer following removal from the forms to insure that the discoloration and blemishes on the niche faces are removed before shipping to the site.
 - a. Back side of single columbarium units, with back exposed to view shall have surface finish as indicated on the Drawings.
 - b. Specified surface finish for the exposed back of the columbarium units shall be applied during the appropriate time of fabrication and curing. Seal coating of exposed back of units shall be applied as per manufacturer's recommendations.
 7. Curing: Precast concrete shall be cured as required to develop specified structural characteristics and shall be stored in a manner that will permit all surfaces to cure equally and minimize warping, without staining the exposed faces.

2.18 STAIN AND FINISH EXPOSED EDGES

- A. Finish for all exposed faces and edges of columbarium units shall be coated with a color coat suitable for cured concrete, which has been used successfully on at least one columbarium project for a National Veteran Cemetery. Color and texture to be approved by Owners Designated Representative prior to application of coating. Manufacturer's literature and color charts shall be submitted as part of the submittal process as well as the listing of previous project(s).

PART 3 - EXECUTION

3.1 HANDLING AND INSTALLATION

- A. Before beginning installation, inspect work of other trades in-so-far as it affects the work of this Section. Install units by competent installation crews meeting the requirements of this Section. Commencing installation of precast concrete columbarium units will be construed as acceptance, as suitable, of such work of other trades. Concrete base for the columbarium units shall be inspected and modified as required, grinding off high spots, to become an acceptable base upon which to install the units. Columbarium units shall be handled in a nearly vertical plane at all times and stacked vertically on wood supports of adequate strength, until erected. Cover and protect precast concrete columbarium units against staining and other damage. Reinstall, realign and otherwise correct improperly installed units.
- B. Accurately place and securely anchor precast concrete columbarium units to adjoining construction in accordance with approved shop and erection drawings.

3.2 SETTING

- A. Each precast element shall be set level and true to line with uniform joints as specified within the allowable tolerances, and as needed to result in the overall length of the wall assembly being the specified dimension, within the allowable construction tolerances. Joints that are required to have sealants shall be kept free of dirt and other contaminants for at least the depth to the contact points of the backer rod. Precautions shall be taken to protect precast concrete work from being damaged and soiled during and after installation. Wedges, spacers or other appliances which are likely to cause staining shall be removed from joints.
- B. Setting of the precast niche units is intended to meet the requirements of the Drawings within the allowable construction tolerances indicated. There are certain visual relationships that are most critical in the final installation to achieve the design intent. Generally, the consistency of the cap overhang in front of the precast niches, as well as the symmetry of the overhang distance are critical. For double sided columbarium units, as an example, the distance from the face of niche unit to the face of niche units, when installed back to back, is a critical dimension when setting the units. Maintaining this dimension in setting the units, especially at the top of the precast niche units, will allow that the caps be manufactured the same width, and the placement should produce the correct overhang and be symmetrical. The distance from the center of vertical webs on adjoining units, especially across the joints between precast niche units where open and

closed end units are joined, are critical as maintaining these allows the proper setting of the niche covers.

- C. Refer to the Drawings for additional information, if any, regarding the critical element relationships to be used during the creation of the foundations and setting of the precast units.
- D. Where shown, joints shall be filled with sealant. Surfaces and other joints for precast concrete columbarium units shall be cleaned of all dust, dirt and other foreign matter.

3.3 SEALING OF JOINTS

- A. Where shown and/or wherever required to make the work watertight, joints between precast concrete columbarium units and between other precast elements and adjoining masonry, concrete and other materials shall be filled with back-up material for depth extending as required to form joint of depth as shown or recommended by sealant manufacturer. Provide bond breakers, at base of sealant where space for back-up does not exist and to prevent sealant from bonding to material at base of joint.

3.4 CLEANING

- A. After erection is complete, clean precast columbarium units using materials, equipment and methods recommended by manufacturer.

3.5 REPLACEMENT AND REPAIR

- A. Precast concrete columbarium units which are damaged, cracked, stained, improperly fabricated or otherwise defective shall be removed and be replaced. Precast units having minor defects not affecting serviceability or appearance may be repaired when approved by the COTR. Repaired work shall be sound, permanent, flush with adjacent surfaces and of color and texture matching similar adjoining surfaces and shall show no line of demarcation between original and patched surfaces. Replacement and repairs shall be done at no additional cost to the NCA.

3.6 FINISHING OF EXPOSED FACES

- A. Apply coating to complete, cleaned exposed concrete back and sides in accordance with manufacturer's standard specifications and recommendations.

3.7 INSTALLATION OF NICHE COVERS

- A. Install niche covers plumb and level as shown so that exposed faces of niche covers lie in the same plane and that rows of niche covers align both horizontally and vertically. Tighten fasteners to achieve snug fit but do not over tighten to the point where they may crack or break niche covers. Due to the manufacturing tolerances in the niche covers and the allowable deviations from the nominal dimensions, it will be impossible to install

the niche covers perfectly. Coordinate the installation procedures with the COTR and establish the critical visual line for which the best alignment is to be established.

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