

**SECTION 03 48 26
CONCRETE MEMORIAL WALL UNITS**

SPEC WRITER NOTES:

1. Use this section only for NCA projects.
2. Delete between // --- // if not applicable to project. Also delete any other item or paragraph not applicable in the section and renumber the paragraphs.

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

- A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 1 - GENERAL REQUIREMENTS, which are hereby made part of this Section of the Specifications.

SPEC WRITER NOTES:

1. Modify the following paragraphs to indicate whether the memorial wall is to be a precast concrete product, manufactured offsite, and set into place on a foundation, or whether it memorial wall is to be cast-in-place concrete.
2. Coordinate these specifications with the drawings, details and notes for either the precast concrete or cast-in-place method of construction, depending upon factors like project location, availability of quality manufacturer or quality of the labor force, and discussion with the PM.

1.1 DESCRIPTION

- A. This section covers the manufacture and installation of //precast concrete//cast-in-place// memorial wall units, as shown on the plans and specified herein, including, but not limited to, the applicable steel reinforcement, steel embedment plates, pins, required sleeves, and fasteners.

SPEC WRITER NOTES:

1. Modify, add or delete, the items of work indicated in the following paragraph to reflect the project specific work.

1.2 RELATED WORK

- A. Cast-in-place concrete work: Section 03 30 00, CAST-IN-PLACE CONCRETE.
- B. Workmanship for sealant application- Section 07 92 00, JOINT SEALANTS.
- C. Memorial Wall Cap - Section 04 72 00, CAST STONE MASONRY.
- D. Decorative Gravel-Section 32 90 00, PLANTING.

E. Installation of memorial wall markers: Section 04 73 10, MEMORIAL WALL MARKERS.

F. Plaster Finish: Section 09 24 00, PORTLAND CEMENT PLASTERING

SPEC WRITER NOTES:

1. Modify the following by selecting the appropriate paragraph "A" for the selected method of construction and delete the other.

1.3 MANUFACTURER / INSTALLER QUALIFICATIONS

//A. Precast concrete memorial wall units shall be product of manufacturer/installer who has a minimum of 3 years experience in fabrication and installation of precast concrete units similar in material, design features, manufacturing tolerances and product quality, to the extent indicated on the drawings and specified herein.//

//A. Cast-in-place concrete wall units shall be constructed by a company that has at least three years of experience in constructing similar cast-in-place installations with the same or higher quality and installation tolerances as for this work. The Company that is to perform the work for the construction of the memorial wall concrete core, to which the attachment hardware is to be installed, shall demonstrate compliance with the qualifications through submittal of adequate and acceptable documentation in the submittal process.//

1.4 ALLOWABLE TOLERANCES

A. Manufacturing and installation tolerances shall be as follows:

1. Variation of location for the anchors and fasteners for memorial marker attachment brackets from the dimensions specified - within 1200 microns (3/16")
2. Variation in overall dimensions of precast element (height and width and depth inside and outside) - 3 mm (1/8-inch)
3. Variation in thickness of walls of precast units - 3 mm (1/8-inch)
4. Maximum vertical and horizontal differential between adjacent units in installed position - 3 mm (1/8-inch)

1.5 SUSTAINABILITY REQUIREMENTS

A. Materials in this section may contribute towards contract compliance with sustainability requirements. See Section 01 81 11, SUSTAINABLE DESIGN REQUIRMENTS, for project // local/regional materials // low-emitting materials, // recycled content, // certified wood // _____// requirements.

- B. Blended Cement: It is the intent of this specification to reduce CO2 emissions and other environmentally detrimental effects resulting from the production of portland cement by requiring that all concrete mixes, in aggregate, utilize blended cement mixes to displace portland cement typically included in conventional construction. Provide the following submittals:
1. Copies of concrete design mixes for all installed concrete.
 2. Copies of typical regional baseline concrete design mixes for all compressive strengths used on the Project.
 3. Quantities in cubic yards of each installed concrete mix.
- C. Biobased Material: For products designated by the USDA's BioPreferred® program, provide products that meet or exceed USDA recommendations for biobased content, subject to the products compliance with performance requirements in this Section. For more information regarding the product categories covered by the BioPreferred® program, please visit <http://www.biopreferred.gov/>.

1.6 REGULATORY REQUIREMENTS FOR RECYCLED CONTENT

- A. Products and Materials with Post-Consumer Content and Recovered Materials Content:
1. Contractor is obligated by contract to satisfy Federal mandates for procurement of products and materials meeting recommendations for post-consumer content and recovered materials content; the list of designated product categories with recommendations has been compiled by the EPA - refer to <http://www.epa.gov/wastes/conserves/tools/cpg/products/>
 2. Materials or products specified by this section may be obligated to satisfy this Federal mandate and Comprehensive Procurement Guidelines program.
 3. The EPA website also provides tools such as a Product Supplier Directory search engine and product resource guides.
- B. Fulfillment of regulatory requirements does not relieve the Contractor of satisfying sustainability requirements stipulated by Section 01 81 11, SUSTAINABLE DESIGN REQUIREMENTS, as it relates to recycled content; additional product and material selections with recycled content may be required, as determined by Contractor's Sustainability Action Plan.

1.7 SUBMITTALS

- A. In accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES, furnish the following:

1. Samples: Submit sample of all fastening systems and mounting hardware including, but not limited to, the following:

SPEC WRITER NOTES:

1. Modify, add or delete, the items of work indicated in the following if other than the Stainless Steel Sinner Bros. attachment is to be used.
 2. Modify as needed to include all of the materials to be used in the installation of the wall marker attachment and installation hardware, including the products to be used to attach to the concrete core, when cast in place anchors are not being utilized.
- a. Stainless Steel Angle (rosette plates of varying sizes depending on position of Government provided //marble//granite// wall markers on memorial wall- see drawings).
 - b. Stainless Steel Bolt and Washers
 - c. Stainless Steel Spring Plate
 - d. Tamperproof Stainless Steel Bolt
 - e. Stainless Steel Rosette
 - f. Stainless Steel Expansion Anchors and Bolts
2. Shop Drawings: Complete //fabrication// and installation drawings of all //precast//cast-in-place// concrete memorial wall units, showing all dimensions, sizes of units, and details of construction, //form bracing// installation and relation to adjoining work, joint locations and details, reinforcements, anchorage, attachments, inserts, location of all predrilled sleeves (see paragraph "Fabrication" in Part 2) and other trades, joint treatment, finishes, and other work required for a complete installation.
3. Manufacturer's Literature and Data:
 - a. Each type of fastener or anchorage
 - b. Instructions for final cleaning
 - //c. Coating and/or sealers//
4. Certificates:
 - //a. Manufacturers qualifications specifying precast concrete memorial wall units meet the requirements of ACI 533.3R as specified.//
 - //b. Manufacturers qualifications regarding performance of similar acceptable work.//
 - c. Installers qualification.

SPEC WRITER NOTES:

1. Delete the following two paragraphs and renumber if memorial wall is to be cast-in-place and not precast concrete.

1.8 //DELIVERY, STORAGE

- A. Ship precast concrete memorial wall units to site with adequate protection to prevent chipping, breaking and other damage. Provide lifting devices that will allow the units to be set without the use of lifting straps that wrap around the unit. Materials shall be marked giving proper identification and location. Store materials in protected areas to prevent damage, injurious effects of weather and inclusion of foreign matter.//

1.9 //COORDINATION

- A. Coordinate the manufacture and installation of precast concrete memorial wall units with related work of other sections of the Specifications. Provide templates for inserts and other devices for anchoring precast concrete memorial wall units to the work of other trades, //or other adjoining units, // in sufficient time to be built into adjoining construction. Perform cutting, fitting and other related work in connection with erection of precast concrete memorial wall unit work.//

1.10 GUARANTEE

- A. Guarantee //precast//cast-in-place// concrete memorial wall 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, for a period of not less than 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 applicable provisions and recommendations of the following, except as otherwise shown or specified.

SPEC WRITER NOTES:

1. Remove reference citations that do not remain in Part 2 or Part 3 of edited specification.
2. Verify and make dates indicated for remaining citations the most current at date of submittal; determine changes from date indicated on the TIL download of the section and modify requirements impacted by the changes.

- 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)
- C. American Concrete Institute (ACI) Publications:
- ACI 533.3R-70 Fabrication, Handling And Erection of Precast Concrete.
- D. American Society for Testing Materials (ASTM) Standards:
- A36/A36M-12 Structural steel.
- A82/A82M-07 Steel Wire, Plain, for Concrete Reinforcement
- A185/A185M-07 Welded Steel Wire Fabric for Concrete Reinforcement.
- A615/A615M-12 Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
- C33/C33M-13 Concrete aggregates.
- C 150/C150M-12 Portland Cement.
- E. American Welding Society (AWS) Publications:
- AWS D1.1/D1.1M-10 Structural Welding Code
- AWS D1.4/D1.4M-11 Welding Reinforcing Steel

SPEC WRITER NOTES:

1. Modify the following as needed based upon which method of construction for the concrete core of the memorial wall is to be used.

PART 2 - PRODUCTS**2.1 COARSE AGGREGATE**

- A. Hard durable aggregate carefully graded from coarse to fine in proportions required to match approved samples.

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

- A. ASTM C33. Limit gradation as required to produce specified appearance and quality of concrete.

2.3 PORTLAND CEMENT

- A. ASTM C150, Type I and Type III; Color as required to match existing.

2.4 WATER

A. Water shall be clean, fresh and potable.

2.5 STRUCTURAL STEEL

A. ASTM A36.

2.6 STEEL FABRIC REINFORCEMENT

A. ASTM A185, galvanized.

2.7 STEEL WIRE REINFORCEMENT

A. ASTM A82, cold drawn.

2.8 REINFORCING STEEL

A. ASTM A615, deformed, Grade 60.

2.9 MISCELLANEOUS STAINLESS STEEL ITEMS

A. Bolts, nuts, washers, anchors, inserts, and the like for handling, erection, or use by other trades.

2.10 BACK-UP MATERIAL

A. Closed cell neoprene, butyl, polyurethane, vinyl or polyethylene foam rod, diameter approximately 1- 1/3 times the Joint width.

2.11 BOND BREAKERS

A. Type and material recommended by sealant manufacturer.

2.12 SEALING COMPOUND

A. Fed. Spec. TT-S-00230 C, Type 11, Class A, or ASTM C 920-87, Type S, Grade NS, Class 25.

SPEC WRITER NOTES:

1. Modify the following if other than the NCA standard Stainless Steel Rosettes are to be used. Confirm the type to be used with the project manager.

2.13 ROSETTES

A. To be produced from sheet goods like or similar to #316 stainless steel as manufactured by Aeon Manufacturing Co. Inc., Harbor City, CA. Thickness to be 2.5 mm (0.100 inch). Die stamp, producing an eight-petal flower pattern. Luster finish. 25 mm (1") in diameter with slight convex; center hole of 5.5 mm (0.218"), concentric to outer edge, with shoulder recess of 10 mm (0.400") in diameter and 1 mm (0.035") in depth. Rosettes shall match existing in place at the site in color, finish and design.

SPEC WRITER NOTES:

1. Select from the following paragraphs on cap material, based upon the type selected, following direction from the PM. Delete the ones not being used.

//2.14 CAST STONE MASONRY

- A. Cast stone shall meet the requirements of Section 04 72 00 CAST STONE MASONRY.//

//2.14 NATURAL STONE CAPS

- A. Natural Stone Caps shall meet the requirements of Section 04 43 00 NATURAL STONE VENEER for the type of stone identified in the drawings.

2.15 DECORATIVE GRAVEL

- A. See Section 32 90 00, PLANTING

2.16 CONCRETE FOOTINGS

- A. See Section 03 30 00, CAST-IN-PLACE-CONCRETE

SPEC WRITER NOTES:

- 1. Select the paragraph below based upon the method of construction for the memorial wall concrete core. Delete the paragraph that is not used.

//2.17 PRECAST FABRICATION

- A. Memorial wall units shall be of size and form as indicated on the plans.
- B. Concrete for precast memorial wall units shall have minimum compressive strength of 35 MPa (5,000 psi) at 28 days.
- C. Provide additional steel reinforcing as required for casting, handling and erection loads.
- D. Back-up Mix: Porosity, strength, weight and gradation of coarse aggregate shall be as required to produce specified characteristics.
- E. Precast memorial wall 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, reglets, inserts and similar items required for the work of other trades shall be accurately positioned in forms before casting elements.
 - b. All fastener location holes, including those for anchoring of units and attachment of memorial wall markers, shall be field drilled for anchor bolts.

SPEC WRITER NOTES:

1. Modify or delete the following two paragraphs as needed, and renumber accordingly, if the design for the memorial wall has the concrete core fully covered with markers and filler strips.
- F. 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.
- G. Architectural Finish: Exposed faces shall have smooth finish, rubbed with a fine abrasive or stone hone to create a cast stone like finish, uniformly smooth. Use ample water during rubbing to prevent working up a lather of mortar or changing texture of concrete. There shall be no air bubble marks or other such imperfections visible on the surface.
- H. 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.

//2.17 CAST-IN-PLACE CONSTRUCTION

- A. Cast-in-place concrete shall be constructed within the tolerances indicated on the drawings and in accordance with Section 03 30 53, (Short Form) CAST-IN-PLACE CONCRETE.
- B. The concrete shall be constructed with high strength concrete mix using aggregate no larger than 75mm (3/4") to facilitate the field drilling for the marker anchorage devices. The mix design shall be a minimum of 35 MPa (5000 psi).//
- C. Submit details for the mix design and finish for the concrete core of the memorial wall, onto which the anchor system for the memorial wall markers and filler strips are to be attached. Sufficient materials shall be submitted to fully demonstrate the product to be delivered, and the finish and construction tolerances to be maintained.
- D. Provide a mockup of the portions of the memorial wall to be above finished grade, and demonstrate the materials and methods for attachment of the memorial wall markers. An approved mockup is required prior to the actual field installation of the cast in place memorial wall elements.

PART 3 - EXECUTION**3.1 CONCRETE FOOTINGS**

- A. Place concrete footings per lines and grades indicated on the drawings and in accordance with Section 03 30 53, (Short Form) CAST-IN-PLACE CONCRETE.

SPEC WRITER NOTES:

1. Delete the following paragraph and renumber when the concrete core for the memorial wall is Cast-in-place.

//3.2 HANDLING AND INSTALLATION

- A. Before beginning installation, inspect work of other trades insofar as it affects the work of this Section. Commencing installation of precast concrete memorial wall units will be construed as acceptance, as suitable, of such work of other trades. Precast Memorial wall 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 memorial wall units against staining and other damage. Reinstall, realign and otherwise correct improperly installed units.
1. Accurately place and securely anchor precast concrete memorial wall units to adjoining construction in accordance with approved shop and installation drawings.//

3.3 SETTING

- A. Concrete footings (pads) for memorial wall(s) shall be constructed to meet all structural requirements to meet local soil and climate conditions and the weight and dimensions of the memorial wall(s) being supported by the respective footing.
- B. Joints shall be filled with sealant. Surfaces and other joints for precast concrete memorial wall units shall be cleaned of all dust, dirt and other foreign matter. Each precast element shall be set level and true to line with uniform joints. Joints required to have sealant shall be kept free of dirt and other contaminants for their full depth. Precautions shall be taken to protect precast concrete work from being damaged and soiled during and after installation. Wedges, spacers or other appliances that are likely to cause staining shall be removed from joints. Where two units are butted together, alignment shall be precise so that a smooth continuous line is produced.
- C. //Cast stone//Precast Architectural//Natural Stone// caps shall be installed on top of the memorial wall(s). A urethane caulking adhesive

shall be in place prior to setting the capping. Two (2) anchor pins shall be placed between the concrete core for the wall and the caps to secure the caps on top of the wall. The cap lengths shall be such that the joints between the caps align with the memorial wall markers as indicated on the drawings. The cap installation shall follow the details on the drawings.

- D. Place decorative gravel to the line and grade as indicated on the drawings. See Section 32 90 00, PLANTING.

3.4 SEALING OF JOINTS

- A. Where shown and where required for either the precast or cast-in-place installation, to make the work watertight furnish and install backer rod and sealant in the joints where indicated on the drawings. Joints shall be cleaned and primed with manufacturer recommended primer, and the joints shall have backer rod installed as recommended by the manufacturer, with the recommended width to depth ratio according to the 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.
- B. Workmanship shall be in accordance with Section 07 92 00, JOINT SEALANTS.

3.5 CLEANING

- A. After installation is complete, clean precast memorial wall units using materials, equipment and methods recommended by manufacturer.

3.6 REPLACEMENT AND REPAIR

- A. //Precast//Cast-in place// concrete memorial wall units that are damaged, cracked, stained, improperly fabricated or otherwise defective shall be removed and be replaced. //Precast//Cast-in-place// units having minor defects, not affecting serviceability or appearance may be repaired when approved by the Resident Engineer. Repaired work shall be sound, permanent, and 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 Government.

- - -END- - -