

**SECTION 03 48 24**  
**PRE-CAST CONCRETE COLUMBARIUM UNITS**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. This section covers the manufacturer and installation of precast concrete columbarium units, as shown on the drawings and specified herein, including but not limited to: the 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 as per Articles 1.3.F and further, the Contractor, shall comply with the functional tests as per Article 1.3.G of this Specification for all designs including the design indicated is the "basis of design"..
  - 2. Unless indicated otherwise, all provisions of this Specification shall apply to the Contractor proposed design.
- C. The Government 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.

**1.2 RELATED DOCUMENTS**

- A. Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES
- B. Section 01 43 39, MOCKUP REQUIREMENTS
- C. Section 01 81 11, Sustainable Design Requirements
- D. Section 03 30 53, CAST-IN-PLACE CONCRETE
- E. Section 04 20 00, UNIT MASONRY
- F. Section 04 43 00 NATURAL STONE VENEER
- G. Section 04 73 00 COLUMBARIA NICHE COVERS - MARBLE
- H. Section 07 60 00 FLASHING AND SHEET METAL
- I. Section 07 92 00, JOINT SEALANTS, Materials and Workmanship for sealant application.

J. Section 13 05 41 SEISMIC RESTRAINT REQUIREMENTS FOR NON-STRUCTURAL COMPONENTS

K. Section 31 20 00, EARTH MOVING

### **1.3 QUALITY ASSURANCE**

- A. Manufacturer's and Installer's Qualifications: Prior to commencement of work, Contractor shall submit documentation regarding the experience of his precast concrete supplier and his precast concrete installer in the design, manufacture and installation of Precast Concrete structures and custom units. Design, fabrication, delivery, and erection shall conform to ACI 318-02. Perform all welding in accordance with AWS D1.1.
- B. Precast concrete manufacturer's qualified Registered Professional Structural Engineer to certify that precast reinforced concrete conforms to specified requirements and seismic loads.
- C. Codes and regulations of the Federal, State and County authorities shall apply.
- D. Fabricate to dimensions shown and/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 in mock-up. Commence production of Columbarium Units only after written approval has been obtained from the VA.
- F. Design Criteria:
  - 1. The Columbarium Units shall be of the following type, style, and size:
    - a. Type: Precast concrete, rebar reinforcement.
    - b. Size: Interior and exterior dimensions as indicated on plans.
  - 2. Columbarium top shall be capable of structurally supporting imposed service live load of no less than 240 Kgs./Square Meter (50 lb./ft<sup>2</sup>), and dead loads based on the entire weight of the cap stone, and its thickness, height, bearing weight (based on point load at shimmed four corners and other locations as determined by the precast columbaria manufacturer), stone veneer wall thickness and heights, including material composition and element section properties, mortar and grout, and dead loads based on Stone Cap top element sectional properties.

3. The Contractor shall submit to the VA for review and approval 5 sets of design documentation showing structural design of the complete Columbaria. This documentation shall include manufacturer's design: dimensions, methods of construction, and calculations indicating and including loading of top precast columbaria units with the designed Stone Cap, connection of caps to columbaria, connection of columbaria to stem wall as per all loading conditions including Seismic loads and calculations indicating the location and loading of the stem wall embedment plates studs, columbaria precast unit to columbaria precast cast unit weld plates, columbaria back plates (to be welded to the stem wall embedment plate) and stem wall/columbaria anchor bolts. All design calculations (including seismic loading) and drawings shall be signed and sealed by manufacturers qualified Professional Structural Engineer.

G. Functional Load Tests: A functional load test will be made at the manufacturer's expense to insure that the columbarium proposed by the manufacturer, as furnished, will be capable of supporting loads stated in Article 1.3.F. The functional test will consist of two loading conditions:

1. Unconfined Loading: The columbarium will be placed on a flat surface with no support against the sides. The entire top of the columbarium will be subjected to a simulated uniform load of live load of 240 Kgs./Square Meter (50 lb./ft<sup>2</sup>) and required dead load simulating the designed stone cap, stone veneer, mortar, and grout as they will be installed. The live and dead loads will be maintained for no less than 72 hours. At end of the loading period, the maximum deflection of the Columbarium top elements shall be no more than 3 mm (1/8"). Upon removal of the load from the unit the residual deflection shall be no more than 1.5 mm (1/16") and concrete elements shall be free of all structural distress.

#### **1.4 MANUFACTURER / INSTALLER QUALIFICATIONS**

- A. Precast concrete columbarium units shall be product of manufacturer who has a minimum of 3 years experience in fabrication of the precast concrete columbarium units similar in material design and extent to that indicated on the drawings and specified herein.
- B. Precast concrete columbarium units installers 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 a product manufacturer and installer, both whom have had a minimum of 3 years experience in installation of similar design as indicated on the drawing.
- D. The precast manufacturer plant(s) used shall be National Precast Concrete Association (NPCA) certified.

#### **1.5 SUSTAINABILITY REQUIREMENTS**

- A. Materials in this section may contribute towards contract compliance with sustainability requirements. See Section 01 81 11, SUSTAINABLE DESIGN REQUIREMENTS, for project local/regional materials and recycled content 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- SUSTAINABILITY REQUIREMENTS**

- 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/conserve/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 13, LEED FOR NEW CONSTRUCTION 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 ALLOWABLE TOLERANCES**

- A. In addition to tolerances of individual elements required by American Concrete Institute Publication 533.3R, erection tolerances shall be as follows:
1. Variation of anchors and fasteners from dimensions specified.....3 mm.(1/8")
  2. Variation in overall dimensions of precast element (height and width)3 mm.(1/8")
  3. Maximum differential between adjacent units in erected position..... 3 mm.(1/8")
  4. Variation in thickness of precast panels and elements..... 3 mm.(1/8")
  5. Maximum vertical differential between adjacent columbarium units in installed position.....3mm.(1/8-inch)
  6. Variation in overall dimensions of back to back precast elements..... 3 mm.(1/8")

#### **1.8 SUBMITTALS**

- A. In accordance with Division 1 Section 01 33 23 SHOP DRAWINGS, PRODUCT DATA, and SAMPLES, furnish the following:
1. Samples: Submit sample 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. Washers
  - i. Stainless steel columbaria back weld plate and/or angle
  - j. Stainless steel stem wall embedment plate and stud (to weld to columbaria back weld plate).
2. Samples of two complete Precast Concrete Columbarium Units, to demonstrate quality of construction, delivered to the site to be approved prior to production - See Mock-Up.
- 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 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).
    - 2) 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.
  - 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. The pre-cast columbaria contractor shall inspect the concrete support

(foundation) work for compliance to criteria set forth by the pre-cast columbaria manufacturer for installation.

6. Production Drawings:

- a. Elevation view of each structural element.
- b. Plan 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 VA, or adjustments made to the foundations that are acceptable to the VA.
- 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. Written instructions of how the exposed concrete of the precast niche units is to be cleaned.

9. Certificates:

- a. Manufacturers qualifications specifying precast concrete columbarium units meet the requirements of ACI 533.3R and as specified.
- b. 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.
- c. 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.

10. Provide State registered structural engineer columbaria certification and load calculations. Design shall be specifically prepared for this project.

11. Mock-ups: Provide full scale mock-ups - SEE ALSO 01 43 39 MOCKUP REQUIREMENTS:



- a. Provide mock-ups for two of the Five High precast columbaria (open-closed unit and closed - closed unit) units within their respective setting, including the foundation stem wall/stone ledge, embedment plates, welds, full scale stone caps, connecting pins/bolts, stone veneer, and pier, retaining walls, waterproofing and flower strips.
- b. Mock-up shall be constructed separate from the final project. Maintain mock-up until end of project as indicated by VA, and dismantle and removed from site. Restore site to finished project condition.

#### **1.9 DELIVERY, STORAGE**

- A. Ship precast concrete columbarium units to 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.

#### **1.10 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 SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES for details regarding the coordination of work.

#### **1.11 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 "Guarantee" article in Division 1 Specification Sections except that guarantee period is one year.

#### **1.12 APPLICABLE PUBLICATIONS**

- A. The publications listed below from a part of this specification to the extent referenced. The publications are referenced in the text by the

basic designation only. Comply with applicable provisions and recommendations of the following:

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-08.....Structural Steel

ASTM A276-13.....Stainless Steel Bars and Shapes

A615/A615M-12.....Deformed and Plain Billet-Steel Bars for  
Concrete Reinforcement.

A1064/A1064M-13.....Standard Specifications for Carbon-Steel Wire  
and Welded Wire Reinforcement, Plain and  
Deformed, for Concrete.

C33/C33M-12.....Concrete Aggregates

C150/C150M-12.....Portland Cement

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/DESIGN**

A. To establish an acceptable basis of design as indicated herein is the columbarium unit design provided by Koppenburg Enterprises, Inc., 17501 147 Street SW, Monroe, WA 98272, Tele: (800) 574-2481 as an acceptable design quality conforming to these Specifications and Drawings as a 'Basis of Design' for the same or an approved equal.

1. Manufacturers design of pre-cast columbaria to be based on contract document and manufacturers' final design of the product, with design

of all structural anchors and supports to withstand all live and dead loads including wind loads and seismic loads.

- B. Manufacturer's that have previously completed at least one successful(as deemed by the VA NCA) NCA columbarium project are deemed to be acceptable for processing their units through the procedures according to these specifications and the drawings.
- C. Manufacturer's 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. ASTM C33. Limit gradation as required to produce the specified appearance and quality of concrete.

## **2.4 PORTLAND CEMENT**

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

## **2.5 STRUCTURAL STEEL**

- A. ASTM A36.

## **2.6 STEEL FABRIC REINFORCEMENT**

- A. ASTM A1064, galvanized.

## **2.7 STEEL WIRE REINFORCEMENT**

- A. ASTM A1064, cold drawn.

## **2.8 REINFORCING STEEL**

- A. ASTM A615, deformed, Grade 60.

## **2.9 MISCELLANEOUS GALVANIZED STEEL ITEMS**

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

## **2.10 MARBLE NICHE COVERS (GOVERNMENT FURNISHED / CONTRACTOR INSTALLED)**

- A. Marble niche covers shall be furnished by the Government and delivered to the site on pallets and shall be of size, type, finish and quantities required for this project. Contractor and Government representatives 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 surplus of niche covers shall be verified, once the niche covers are accepted at the site, they shall become the Contractors responsibility until installed by the contractor and the installation is accepted by the VA.

#### **2.11 NICHE COVER ATTACHMENT HARDWARE**

A. VA National Cemetery Administration, standard stainless steel rosette, mounting brackets, and bolts for complete attachment of the niche covers to the precast columbarium units are to be as shown on drawings:

1. Rosettes

- a. ASTM Type 316 stainless steel sheet goods, 2.7 mm (0.100 inch) thick.
- b. Die stamp, producing an eight-petal flower pattern as shown on drawings, 25 mm (one-inch) 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 1mm (0.035") in depth.
- c. Luster finish.

2. Interior mounting and attachment elements:

- a. ASTM Type 304 or 316 stainless steel tamper-resistant bolts, nuts, washers, anchors, mounting brackets, inserts and the like.

3. Manufacturer Basis of Design: Sinner Brothers, 3452 Hancock Street, San Diego, CA 92110 or an approved equal

#### **2.12 BACK-UP MATERIAL**

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

#### **2.13 BOND BREAKERS IF USED**

A. Type and material recommended by sealant manufacturer.

#### **2.14 SEALING COMPOUND IF USED**

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

#### **2.15 FABRICATION**

A. Precast concrete columbarium units shall NOT be: fabricated, delivered or incorporated in the work until samples and mock-ups have been approved. Precast concrete shall comply with ACI 533.3R, except as modified herein.

- 1. Concrete for precast columbarium units shall have minimum compressive strength of 34.5 MPa (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. All fastener location holes, including those for anchoring of units and attachment of niche covers, shall be cast into units. Drilling to 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.
  - c. Identification: Provide permanent markings to identify pick-up points and orientation in structure, complying with markings indicated on final shop drawings. Imprint date of casting on each precast unit on a surface, which will not be visible in finished structure.
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 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, variation in color and texture, and blemishes on the niche faces are removed before shipping to the site.
  - a. Finish for all exposed faces and edges of columbaria units shall be coated with color coat suitable for cured concrete, such as 'MASTERPROTECT HB 300 SB' manufactured by Sonneborn- BASF or and approved equivalent. Color and texture to be approved by Resident

Engineer prior to application of coating. Manufacturer's literature and color charts to be submitted as a part of the submittal process.

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.

### **PART 3 - EXECUTION**

#### **3.1 HANDLING AND INSTALLATION**

- A. All work performed under this section shall be in accordance with the Specifications, Drawings, and Manufacturer's instructions and recommendations. In the event of a conflict, the stricter requirement shall prevail.
- B. Before beginning installation, inspect work of other trades in-so-far as it effects the work of this Section. Install units by competent installation crews meeting the requirements of paragraph 1.4 B. 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 improper installed units.
  1. Accurately place and securely anchor precast concrete columbarium units to adjoining construction in accordance with approved shop, manufacturer's requirements 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 design 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 is critical. Maintaining this dimension in setting the units, especially at the top of the precast niche units, will allow that the placement will produce the correct overhang and be symmetrical.
- C. 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 where ever 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.
  - 1. Workmanship shall be in accordance with Division 1 Specification Sections and Section 07 92 00, JOINT SEALANTS.

### **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 VA. 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 Government.

**3.6 FINISHING OF EXPOSED EDGES AND FACES**

- A. Apply coating to complete, cleaned exposed concrete edges as per manufacturer's standard specifications and recommendations.

----- E N D -----