

SECTION 04 43 00
NATURAL STONE VENEER

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Drawings and general provisions of the contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this section.
- B. Section includes:
 - 1. Dimensioned stone, stone caps, Monumental signs and stone seats.
 - 2. Dimensioned stone wall accessories

1.2 RELATED WORK

- A. Cast-in-place concrete columbarium/memorial wall systems: Section 03 30 53, (SHORT FORM) CAST-IN-PLACE CONCRETE.
- B. Precast Concrete Columbarium Niches: 03 48 24, PRECAST CONCRETE COLUMBARIUM UNITS.
- C. Precast Memorial Wall Units: Section 03 48 26, PRECAST CONCRETE MEMORIAL WALL UNITS.
- D. Mortars: Section 04 05 13, MASONRY MORTARS
- E. Masonry Grouting: Section 04 05 16, MASONRY GROUTING
- F. Flashing: Section 07 60 00, FLASHING AND SHEET METAL
- G. Joint Sealants and sealant installation: Section 07 92 00, JOINT SEALANTS
- H. Finishes: Section 09 06 00, SCHEDULE OF FINISHES
- I. Paint: Section 09 91 00, PAINTING
- J. Mockup Requirements: SECTION 01 43 39, MOCKUP REQUIREMENTS
- K. Sustainable Design: SECTION 01 81 11, SUSTAINABLE DESIGN REQUIREMENTS

1.3 SUBMITTALS

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES.
- B. Samples:
 - 1. Stone: shop drawing samples showing full color range and texture of stone, bond, and proposed mortar joints samples.
 - a. Columbaria wall, memorial wall, ossuary, retaining wall veneer stone, and monumental stone sign shop drawing samples (groups of four per stone type) minimum 1" thick, 200mm x 400mm (8" x 16") showing full color range and texture of stone.

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- b. Stone seats and stone caps, samples minimum 1" thick, 200mm x 400mm (8" x 16") showing full color range and texture of stone.
 - c. Anchors, and ties, one each and joint reinforcing 1200 mm (48 inches) long.
 2. Color sample panels, for approval, to be constructed prior to mock-up 4'-0" x 4'-0".
 3. Mock-up to be erected after approval of submitted samples, shop drawings and color sample panels. Color and texture of stone to receive final approval at mock-up - after which the stone material may be ordered.
- C. Certificates:
1. Certificates signed by manufacturer/stone source, including name and address of contractor, project location, and the quantity, and date or dates of shipment of delivery to which the certificate applies; indicate that the stone veneer meets specification requirements.
 2. Certificates shall indicate that the following items meet specification requirements:
 - a. Stone veneer - 4 inch
 - b. Stone caps
 - c. Stone seats
 - d. Monumental Stone signs - 8 inch
- D. Manufacturer's Literature and Data to include:
1. ASTM stone classifications, stone type, color, texture, grade and finish
 2. Anchors, ties, and reinforcement
 3. Reinforcing bars
 4. Recommended cleaning products and techniques
- E. Submit stone supplier's installation instructions and field erection drawings.
1. Submit manufacturer's instructions for use of mortar color and admixtures.
- F. Test reports: Prior to erection of mock-up and ordering of stone, submit information copies of test reports by approved independent testing laboratory as specified herein to VA in triplicate - for review and approval. Test reports of stone to be installed to indicate stone ASTM classification, stone type, color, texture, grade and finish.
- G. Cutting and setting drawings and indicating unit location number.
1. Indicate pertinent dimensioning, layout, anchorages, construction details, method of installation, adjacent construction, and jointing.

2. Indicate large scale details of inscriptions.

H. Sustainable Requirements: See Section 01 81 13.

1.4 MOCK-UP

A. Job mock-up: Prior to installation of stonework, erect mock-up showing proposed range of color and texture, using materials, erection methods, jointing, and workmanship required for final work.—All MOCK-UPS SHALL NOT BE A PART OF THE FINAL PROJECT BUT SHALL BE CONSTRUCTED SEPARATELY AT A NEAR-BY LOCATION DETERMINED BY RESIDENT ENGINEER.

1. COLUMBARIA MOCK-UP: Build full scale mock-up at site where directed, of full thickness columbarium wall. Mock-up will include pier and one open ended precast concrete columbaria niche unit and one closed ended precast concrete columbaria niche unit (see drawings), including stone veneer columns, retaining wall and stone caps.
2. MEMORIAL MARKER WALL MOCK-UP: Build full scale mock-up at site where directed - Mock-up consisting of the all wall components including stone caps.
3. Obtain VA's written acceptance of visual qualities of mock-up before ordering stone and stone materials.

1.5 QUALITY ASSURANCE

- A. Comply with requirements of listed standards and manufacturer's unless otherwise indicated. Where there is conflict between construction documents and manufacturer's requirements the most stringent shall apply.
- B. Obtain stone from a single quarry with consistent, quality, grade, color range and texture throughout work.
- C. Subcontract the fabrication of stone to a firm which has successfully fabricated stone similar to quality specified for period of not less than 5 years and is equipped to provide quantity and sizes shown. Provide written documentation of the above, for VA approval, prior to ordering stone.

1.6 SHIPPING

- A. Do not ship stone with spacer material that will stain or mar the stone finish.

1.7 COLOR SAMPLE PANEL

- A. Before starting masonry work and before mock-up, lay up a separate (from construction) Color sample panel for the Columbaria/Memorial Stone Veneer.
 1. Use stone units from random pallets of units delivered on site.
 2. Provide a 1.2m x 1.8m (4 feet x 5 feet) panel

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- B. Use Color Sample Panel approved by VA for project stone/quality, color and texture to set standard of project installation.
- C. Use the Color Sample Panel to test cleaning methods before starting Stone installation.

1.8 ENVIRONMENTAL REQUIREMENTS

- A. During freezing or near freezing weather, provide equipment and cover to maintain minimum of 40 degrees F and to protect stone work completed or in progress.
- B. At end of each working day, and also during precipitation events, cover stone work exposed to weather with waterproof coverings, securely anchored extending at least 2 feet down both sides of walls.
- C. Stone Cap joints and Wall joints: Continue to cover stone work (including stone caps) until all cap and wall joints are properly sealed and cured and are able to protect the wall/columbaria/memorial marker wall from all weather and from cleaning.
- D. Maintain materials and surrounding air to minimum 40 degrees F prior to, during, and 48 hours after completion of work.
- E. Do not use frozen materials or materials mixed or coated with ice or frost. Do not use salt to thaw ice in anchor holes or slots. Do not lower freezing point of mortar by use of admixtures or antifreeze agents.
- F. Do not build on frozen work; remove and replace stonework damaged by frost or freezing.
- G. Do not use calcium chloride in mortar or grout.

1.8 PRODUCT DELIVERY

- A. Cover and protect stone during storage and construction against moisture, soiling staining, and physical damage.
- B. Handle stone to prevent chipping, breakage, soiling, or other damage. Do not use pinch or wrecking bars without protecting edges of stone with wood or other rigid materials.
- C. Store stone on wood skids or pallets. Place and stack skids and stones to distribute weight evenly and to prevent breakage or cracking of stones. Protect stored stone from weather with waterproof, non-staining covers or enclosures, allow air to circulate around stones. Protect stone from ground splatter and contamination with earth.
- D. Protect mortar materials and stonework accessories from weather, moisture, and contamination with earth and other foreign materials.

1.9 WARRANTY

Warrant exterior masonry walls against moisture leaks and subject to terms of "Warranty of Construction", FAR clause 52.246-21, except that warranty period shall be five years.

1.10 APPLICABLE PUBLICATIONS

- A. Publications listed below form a part of this specification.
Publications are referenced in the text by the basic designation only.
- B. Munsell Neutral Value Scale, Matte (31 - step scale)
617 Little Britain Road, New Windsor, NY 12553 -6148
- C. American Society for Testing and Materials (ASTM):
 - A82/A82M-07.....Standard Specification for Steel Wire, for
Concrete Reinforcement
 - A167.....Standard Specification for Stainless and Heat-
Resisting Chromium-Nickel Steel Plate, Sheet,
and Strip; 1996.
 - A240/A240M.....Standard Specification for Heat-Resisting
Chromium and Chromium-Nickel Stainless Steel
Plate, Sheet, and Strip for Pressure Vessels;
1998b.
 - A276.....Standard Specification for Stainless Steel Bars
and Shapes; 1998b.
 - A479/A479M.....Standard Specification for Stainless and Heat-
Resisting Steel Bars and Shapes for Use in
Boilers and Other Pressure Vessels; 1997a.
 - A580/A580M.....Standard Specification for Stainless Steel
 - A153/A153M-09.....Zinc Coating (Hot-Dip) on Iron and Steel
Hardware
 - A951/A951M-11.....Steel Wire for Masonry Joint Reinforcement
 - C97/C97M-09.....Absorption and Bulk Gravity of Dimension Stone
 - C99/C99M-09.....Modulus of Rupture of Dimension Stone
 - C119-11.....Standard Terminology Relating to Dimension Stone
 - C170/C170M-09.....Compressive Strength of Dimension Stone
 - C568/C568M-10.....Limestone Dimension Stone
 - C880/C880M-09.....Flexural Strength of Dimension Stone
 - C1242-12ae1.....Selection, Design, and Installation of Dimension
Stone Attachment Systems
 - C1515-11.....Cleaning of Exterior Dimension Stone, Vertical
and Horizontal Surfaces, New or Existing
 - C1528-12b.....Selection of Dimension Stone

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- C1353-09.....Standard Test Method for Abrasion Resistance of Dimension Stone Subjected to Foot Traffic Using a Rotary Platform, Double-Head Abraser
- C1496.....Standard Guide for Assessment and Maintenance of Exterior Dimension Stone Masonry Walls and Facades
- C1722-11.....Standard Guide for Repair and restoration of Dimension Stone
- D1056-07.....Standard Specification for Flexible Cellular Materials - Sponge Expanded Rubber
- D7089-06.....Standard Practice for Determination of the Effectiveness of Anti-Graffiti Coating for Use on Concrete, Masonry, and Natural Stone Surfaces by Pressure Washing
- D. Industry Standards - Industry Standards and corresponding reference materials used are not to be treated as material proprietary.
1. Masonry Industry Council All Weather Masonry Construction Manual, 2002, TEK 3-1C.
 2. Indiana Limestone Institute (ILI) Publications and drawings
 - a. Contractor's Handbook - 7th Edition
 - b. How To Avoid Small Area Stains and Blemishes - 2nd Edition
 - c. Indiana Limestone Handbook - 22nd Edition
 3. Marble Institute of America - Dimension Stone Design Manual - 7.2 Edition
- E. Federal Specifications (FS):
- FF-S-107C-00.....Screws, Tapping and Drive
- F. International Masonry Industry All Weather Council (IMIAC): Recommended Practices and Guide Specification for Cold Weather Masonry Construction
- G. U.S. General Services Administration (GSA) Documents
1. Limestone: Characteristics, Uses and Problems 0446001S
 2. Sandstone: Characteristics, Uses and Problems 0447001S
- H. Specification: Masonry Structures (ACI 530.1/ASCE 6/TMS 602), Brick Industry Associations "Technical Notes on Brick Construction" and National Concrete Masonry Association "TEK Manual for Concrete Masonry Design and Construction".
- I. ASCE/SEI 7-10, Minimum Design Loads for Buildings and Other Structures, (ASCE, 2010) - Seismic Design

1.11 PRE-INSTALLATION CONFERENCE

- A. Convene a meeting on site, after submittals/mockup, and sample panels are received and approved but before any work, to review drawings and specifications, submittals, schedule, manufacturer instructions, site logistics and pertinent matters of coordination, temporary protection, governing regulations, tests and inspections; participants to include VA and all parties whose work is effected or related to the work of this section.

PART 2 - PRODUCTS

2.1 ACCEPTABLE STONE PRODUCTS

- A. Limestone Ossuary Veneer Wall Memorial Marker Wall, Stone Caps, Monumental Stone Signs and Stone Seats:
1. ASTM C568 Classification: II Medium-Density with the following properties:
 - a. Absorption by Weight, 4.1 %
 - b. Density, 153.6 lbs/FT³
 - c. Compressive Strength, 10,590 PSI
 - d. Abrasion Resistance, Hardness = 15.8
 - e. Flexural Strength, 1030 PSI
 2. Stone Cap sizes: As indicated on drawings
 3. Veneer sizes: As indicated on drawings
 4. Grade (ILI Range): Select, Monochromatic in color
 - a. Select - fine grained stone having a controlled minimum of the following blemishes:
 1. Streaks, spots, fossil formations, pit holes, reedy formations, texture streaks, honeycomb, travertine-like formations and grain formations changes
 5. Match color of existing precast columbaria caps - Reference the following: Glacier Buff, Fleuri Cut (VSC - VetterStone)
 6. Finish: Honed (VSC) - Provide honed finish on all exposed surfaces
- B. Extent of limestone work as indicated on Drawings and schedules.
- C. General: Provide Fleuri cut stone veneer in accordance with the contract documents. The work shall include the following:
1. Saw cut stone for field shall be as thick as indicated
 2. Dimension Stone
 - a. Cut stone from one block or from contiguous matched blocks in which natural markings are consistent with approved range samples and mockup

- b. Cut stone accurately to shape and dimensions with jointing as shown on approved shop drawings. Cut exposed faces true with joints and beds dressed straight and square within Fabrication Tolerances specified herein and as indicated on drawings. Grade and mark stone for overall uniform appearance when assembled in place. Natural minor variations in appearance are acceptable when stone units match approved range samples and mock-up for color and other characteristics when approved by the Resident Engineer.
3. Cut Stone Fabrication Tolerances
 - a. Maximum Variation from Thickness: +/- 1/8 inch for non finished ends, +/- 1/16 inch for finished end corner pieces
 - b. Maximum Variation From Face Size: +/- 1/16 inch
 - c. Maximum Variation from Flat: +/- 1/16 inch
 - d. Maximum Variation from Square: +/- 1/16 inch
4. External edges shall be scored
5. Split Tail Stainless steel stone anchors: Engineered/specified by stone fabricator.

2.2 MARBLE (OSSUARY CAP)

A. Classification:

1. Abrasion Resistance, Hardness:
 - a. Marble shall have an abrasive hardness value (Ha) of 10.0 minimum, as tested as specified in ASTM C241.
2. Absorption:
 - a. Marble absorption shall be 0.15 of moisture by weight tested for a 48 hour period as specified in ASTM C97.
3. Compressive strength:
 - a. Marble shall have a minimum compressive strength of 5.27 kg/mm² (7,500 psi), tested as specified in ASTM C170.
4. Modulus of rupture:
 - a. Marble shall have a minimum modulus of rupture of 0.70kg/mm² (1000 psi) tested as specified in ASTM C99.

B. Source of supply:

1. All stone shall be obtained from a quarry within the United States of America, having adequate capacity and facilities to meet the specified requirements. Cutting and finishing shall be done by a manufacturer equipped to process the material promptly, in order and in strict accordance with these specifications. Evidence to this effect shall be provided by the contractor to the VA.

C. Marble Material:

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1. Marble shall be white American monumental marble which shall be sound and compact, free from cracks, spalls, chips, holes, calcite lines more than two inches in length, open seams, pits, or other defects that would impair its strength, durability or appearance.

D. Marble Color:

1. The overall whiteness of the marble exclusive of allowable colorization shall be no less than standard number N8 of the Munsell Neutral Value Scale, 31 Step Scale. Variations in coloration shall blend gradually with the white background. Blotches of color, or clouding and veining which is in sharp contrast with the background whiteness, which would inhibit ease of legibility of the inscription, or which presents an objectionable appearance shall be caused for rejection.

E. Manufacturer:

1. Dimension Tolerance:

- a. Covers shall conform to the dimensions shown on the drawings:

1. Width -- plus or minus 1/16 inch
2. Height -- plus or minus 1/16 inch
3. Thickness -- plus or minus 1/16 inch
4. Surface Deviation from a True Plane -- plus or minus 1/16 inch

b. Finish

1. The exposed surfaces shall be machine 80 grit minimum honed with a finishing stone to produce a smooth satin finish, free of scratches, saw marks, rust spots and skips.

2.3 QUARTZ BASED SANDSTONE

- A. Quartz Based Sandstone Dimensioned Stone at stone walls, columbaria and memorial marker walls and piers:

1. ASTM C 616 Classification: I Sandstone with 60% minimum free silica content.
2. Face Size: As indicated on drawings
3. Finish and color: To match color, texture of stone work at the existing Main Cemetery wall/gate, existing columbaria piers and Administration Building wainscot.

- B. Extent of quartz based sandstone work as indicated on Drawings and schedules

1. Installation of stonework:

Stonework to withstand maximum design loads from wind, gravity, seismic, movement of structure, volume change of masonry back-up, and thermally induced movement, as well as to resist deterioration under

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conditions of normal use including exposure to weather, without failure.

2. Maximum variation from face/flat of portion of wall stone abutting stone cap, columbaria niche unit, memorial marker wall and expansion joint:
 - a. Provide a flat/straight/plumb edge for proper surface for joint sealant - remainder of stone surface to be the cropped finished as per existing stone. See drawings.

2.4 REINFORCEMENT AND ANCHORAGES

- A. Anchors, Dowels, Ties, Cramps, and Supports: Type 304 stainless steel of sizes and configurations required for support of stone and applicable superimposed loads, including seismic loads. All reinforcement, anchors and wall components to follow manufacturer requirements and instructions.
- B. Fasteners: Bolts, washers and nuts, Type 304 stainless steel.
- C. Avoid the use of Lifting Hooks except where approved and utilized: Removable type for panels in excess of 75 lbs.
 1. Basis of Design for Acceptable Product: Heckman Building Products, Inc.; No. 262.
- D. Hot-Dip Galvanized, Carbon-Steel Wire: ASTM A82; with ASTM A153/153M, Class B-2 coating.
- E. Wire Ties, General: Unless otherwise indicated, size wire ties to extend at least halfway through veneer but at least 16mm (5/8 inch) cover on outside face. Outer ends of wires are bent 90 degrees and extend 50 mm (2 inches) parallel to face of veneer.
- F. Individual Wire Ties: Rectangular units with closed ends and not less than 100 mm (4 inches).
 1. Where withes do not align or are of different materials, use adjustable ties with pintle-and-eye connections having a maximum adjustment of 32 mm (1-1/4 inches).
 2. Wire: Fabricate from 4.8 mm (3/16 inch) diameter, hot-dip galvanized steel wire. Horizontal Seismic Wire system
- G. Adjustable Masonry-Veneer Anchors
 1. General: Provide anchors that allow vertical adjustment but resist tension and compression forces perpendicular to plane of wall, for attachment over sheathing to wood or metal studs, and as follows:
 - a. Structural Performance Characteristics: Capable of withstanding a 445 N (100 lbf) load in both tension and compression without deforming or developing play in excess of 1.3 mm (0.05 inch).

2. Split Tail Stone Anchor

- a. Stainless Steel - Type 304
- b. 1/8" Thick x 1 1/2" Wide, with 1" splits - to span 2" drainage cavity within Ossuary Wall - Limestone Veneer

2.5 ACCESSORIES

- A. Joint Sealant: Refer to Section 07 92 00.
- B. Weep Holes: Weep cell vent location as indicated: typical- 24" O.C.(At base and head of wall and columbaria units). Cell vent to fill entire joint - joint size may vary.
- C. Cavity Drainage Material: Free-draining mesh, made from polymer strands that will not degrade within the wall cavity.
 1. Strips, full-depth of cavity and height prevent mesh from being clogged with mortar droppings.
- D. Mortar: Refer to Section 04 05 13. Do not use calcium chloride in mortar
- E. Setting Buttons: Fiberglass of thickness required for joint size indicated to maintain uniform joint width.
 1. Sealant: Comply with Section 07920 - SEALANTS AND CAULKING.
- F. Cementitious Dampproofing: Cementitious formulation nonstaining to stone; compatible with joint sealants and noncorrosive to anchors and attachments. Damp proofing to be compatible with stone product as per stone manufacturer's requirements and recommendations utilize cementitious coatings such as Thoroseal.

2.6 STONE FABRICATION

- A. Fabricate as shown and as detailed on reviewed shop drawings and in compliance with recommendations of applicable stone association.
- B. Provide holes and sinkages cut or drilled for anchors, fasteners, supports and lifting devices, as indicated and required to secure stonework in place. Shape beds to fit supports.
- C. Accurately cut, dress, drill, fit and finish stone work to shapes and sizes indicated. Cut edges square to face. Make arise straight, sharp, and true.

2.7 INCISED ADDRESS MARKERS

- A. Cut numerical markers into face of stone by sandblasting where indicated on the drawings. All sandblasting work to be completed prior to setting stone - replace damaged materials with new.
- B. Addressing Paint:
 1. Basis of Design: Lithichrome Stone Paint or approved equal
 - a. Ultra-violet resistant

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- b. Apply according to manufacturers' requirements' and recommendations
- c. Apply 'overcoat' clear color, over the Lithichrome paint as per manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive work.
- B. Verify items provided by other Sections of work are properly sized and located.
- C. Verify that built-in items are in proper location, and ready for roughing into masonry work.
- D. Beginning of installation means installer accepts existing conditions.

3.2 PREPARATION

- A. Verify items provided by other Sections of work are properly sized and located.
- B. Establish lines, levels, and coursing. Protect from disturbance.
- C. Provide temporary bracing during erection of masonry work. Maintain in place until building structure provides permanent bracing.
- D. Scaffolding: Provide, erect, maintain, move, and finally remove scaffolding and staging required for masonry installation. Construct and maintain scaffolding in compliance with applicable ordinances, laws, rules and regulations. Scaffolding shall be sufficiently substantial to support workmen, and necessary materials and equipment. Provide adequate guard rails for protection of property, workmen, and passerby.
- E. Supply sufficient quantity of anchorages and direct correct placement.
- F. Verify that items built-in under other sections are properly located and sized. Advise installers of other trades of specific requirements relating to placement and location of interrelated work. Exchange and coordinate shop drawings.
- G. Clean stone prior to erection, leaving all edges and surfaces free of dirt, foreign material and stains. Do not use wire brushes or implements which mark or damage exposed surfaces. Do not wet expansion or control joints. Clean stone by thoroughly scrubbing with fiber brushes and then drenching with clear water. Use only mild cleaning compounds that contain no caustic or harsh materials or abrasives.
- H. Coat stone with Dampproofing to extend indicated below and as shown in typical detail drawings:

1. Stone at all masonry ledges near grade and/or courtyard and sidewalk elevations: Beds, joints, side, and back surfaces to at least 12 inches above finish-grade elevations and as per Industrial Limestone Institute Standards.
2. No stone to extend below grade.
3. Allow Dampproofing to cure before setting dampproofed stone. Do not damage or remove Dampproofing while handling and setting stone.

3.3 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. Erect stone in accordance with stone manufacturer's instructions, in the event that there is conflict with the construction documents, the stricter requirement shall prevail. Provide chases, reveals, reglets, openings, and other spaces as indicated or required for contiguous work.
- C. Arrange stone pattern to provide consistent joint work throughout as per drawings.
- D. Place setting buttons in full mortar setting bed to support stone over and establish joint dimension.
- E. Set stone in full mortar setting bed to support stone over full bearing surface and to establish joint dimensions.
 1. Point joints after setting by tooling to concave profile (verify profile with VA during job mock-up).
- F. Shore up units until settling bed will maintain panel in position without movement.
- G. Maintain uniform joint widths of 3/8 inch in exterior locations unless otherwise indicated.
- H. Allowable tolerances:
 1. Variation from Plumb: For lines, corners, and surfaces of walls, do not exceed 1/4 inch in 10 feet.
 2. Maximum variation from plane of unit to adjacent unit: 1/32 inch.
- I. Where stonework will contact ferrous metal surfaces concealed in back-up construction, apply heavy coat of bituminous paint on metal surfaces prior to setting of stone. Do not stain stone.
- J. Cavity Construction: Keep open space between back of stone units and back-up or framing as shown, keep cavity open; fill with mortar mesh; do not fill with mortar or grout - allow any moisture to exit at lower cell vents. See Section 07 60 00 Flashing and Sheet Metal

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3.4 COURSING

- A. Place masonry to lines and level indicated.
- B. Arrange and trim stones for adequate fit in a range in a pattern with course heights as indicated, random lengths, uniform joint widths with offset between vertical joints as indicated. and as seen in existing stone work at Eagle Point National Cemetery. Provide pattern in and for mock-up review and approval.

3.5 PLACING AND BONDING

- A. Lay masonry in full bed of mortar (horizontal, vertical, and collar joints), properly jointed with other work. Buttering corners of joints and deep or excessive furrowing of mortar joints is not permitted.
- B. Fully bond intersections, and external and internal corners.
- C. Do not shift, or tap masonry units after mortar has taken initial set. Where adjustment must be made, remove mortar and replace.
- D. Remove excess mortar on surface and in cavities.
- E. Perform job site saw cutting with proper tools to provide straight unchipped edges. Take care to prevent breaking masonry unit corners or edges.

3.6 TOLERANCES

- A. Alignment of Columns: Maximum of 6 mm (1/4 inch) from true line.
- B. Variation from Unit to Adjacent Unit: 0.8 mm (1/32 inch) maximum.
- C. Variation from Plane of Wall: 6 mm (1/4 inch) in 3 m (10 feet) and 12 mm (1/2 inch) in 6 m (20 feet) or more.
- D. Variation from Plumb: 6 mm (1/4 inch) per story non-cumulative, 12 mm (1/2 inch) in two stories or more.
- E. Variation from Level Coursing: 3 mm (1/8 inch) in 1 m (3 feet); 6 mm (1/4 inch) in 3 m (10 feet); 6 mm (1/4 inch) maximum.
- F. Variation of Joint Thickness: 3 mm (1/8 inch) in 1 m (3 feet).
- G. Maximum variation from Cross Sectional Thickness of Walls: Plus or minus 6 mm (1/4 inch).

3.7 REINFORCEMENT AND ANCHORAGES

- A. Attach wall ties to wall CMU for veneer construction at maximum 400 mm (16 inches) on-center vertically and 400 mm (16 inches) on-center horizontally. Place at maximum 200 mm (8 inches) on-center (or every third course) each way around perimeter of openings, within 300 mm (12 inches) of openings.
- B. Anchor stone veneer to unit masonry with metal veneer anchors as follows:

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1. Secure wire anchors by inserting pintles into eyes of masonry wall reinforcement projecting from horizontal mortar joints.
2. Embed SS Split Tail anchors in veneer mortar joints to within 25 mm (1 inch) of face.

3.8 MASONRY FLASHINGS

- A. Extend through wall flashings to within 1/2" of exterior face of veneer. Turn up interior end to termination bar and seal onto face of vertical surface - See Drawings.
- B. Lap end joints minimum 150 mm (6 inches) and seal watertight per manufacturer's recommendation.
- C. Use flashing manufacturer's recommended adhesive and termination sealant.
- D. Create end dams at end cavity runs, and other vertical elements to channel water to nearest weep hole away in portion of wall and items which might allow water to travel vertically.

3.9 WEEPS AND VENTS

- A. Install weep vents in veneer at 600 mm (24 inches) on center, above through-wall flashing, above shelf angles, and at top and bottom of walls.
- B. Install weep vents below stone cap joints.

3.10 CONTROL/EXPANSION JOINTS

- A. Size control joints in accordance with Section 07 92 00 for sealant performance, but in no case larger than adjacent mortar joints in exposed face brick.
- B. Provide expansion joints as indicated.

3.11 CUTTING AND FITTING

- A. Obtain approval prior to cutting or fitting any area not indicated or where appearance or strength of masonry work may be impaired.

3.12 CLEANING

- A. All joint work is to be completed prior to beginning the cleaning and washing process of the wall and stone. All joint sealants and backer rod at walls, caps, columbaria niche units, memorial marker walls etc., to be in place and cured properly prior to cleaning and washing of wall and stone.
- B. Pressure wash: should pressure wash be used, deliver water by a wide-angle nozzle from a distance no closer than that required by the stone manufacturer, provide pressure (psi) as per manufacturers' requirements. Review stone manufacturer's requires prior to cleaning. Do not clean walls until all cap and wall joints are properly sealed and cured and

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are able to protect the wall/columbaria/memorial marker wall from all weather and from cleaning

- C. Remove excess mortar and smears.
- D. Replace defective mortar. Match adjacent work.
- E. Clean soiled surfaces with non-acidic solution which will not harm stone or adjacent materials. Consult stone manufacturer for acceptable cleaners. Leave surfaces thoroughly clean and free of all mortar and other soiling.
- F. Use non-metallic tools in cleaning operations.
- G. Comply with ASTM C1515 and D7089.
- H. Clean mortar with non-acidic cleaners/wash that will not harm stone - consult manufacturer prior to beginning any cleaning processes. Take care not to harm stone with cleaners and wash.

3.13 PROTECTION

- A. Maintain protective boards at exposed external corners which may be damaged by construction activities.
- B. Provide protection without damaging completed work.
- C. Keep joint voids clear of mortar.
- D. At end of each working day, and during rainy weather, cover stone work exposed to weather with waterproof coverings, securely anchored extending at least 2 feet down both sides of walls. Cover stone work (including caps) until all cap and wall joints are properly sealed and cured to be able to protect the wall/columbaria/memorial marker wall from weather and cleaning.

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