SECTION 04100

MORTAR AND MASONRY ACCESSORIES

PART 1 GENERAL

1.1 SUMMARY

A. Section includes:
1. Specifications for field mixed mortar, and for grout materials, anchors, ties, joint reinforcement, composite flashing and other accessories for masonry work.
2. Mortar mix; grout mix in filled masonry and bond beams.

B. Products supplied but not installed under this Section:
1. Section 04200 - Unit Masonry: Mortar and masonry accessories.
2. Section 05120 - Structural Steel: Flexible anchors attached to structural steel frame for lateral support of masonry.

C. Related Sections:
1. Section 04400 –Stone: Mortar and masonry accessories for stone units
2. Section 04700 – Cast Stone: Mortar and masonry accessories for cast stone units.
3. Section 07600 - Flashing and Sheet Metal: Metal in-wall flashing furnished for installation in Section 04200.
4. Section 07840 - Firestopping: Firestopping sealants.
5. Section 07900 - Joint Sealants: Sealant in control joints, in perimeters of openings in masonry, in soft joints under ledge angles, and for acoustical control.

1.2 REFERENCES

A. References herein to, or repetition of, any portions of Referenced Standards shall not nullify any un-referenced or un-repeated portions thereof, unless otherwise indicated herein.

B. Masonry work and grouting:
1. "(ACI 530/ASCE 5/TMS 402) Building Code Requirements for Masonry Structures and Commentary on Building Code Requirements for Masonry Structures".
2. "(ACI 530.1/ASCE 6/TMS 602) Specifications for Masonry Structures and Commentary on Building Code Requirements for Masonry Structures".

C. Grouting: PCA "Cementitious Grouts and Grouting".

1.3 SYSTEM DESCRIPTION

A. Use Type S ASTM C270 mortar throughout.

1.4 SUBMITTALS

A. Submit items indicated below to Construction Manager for review by Architect:
1. Comply with submittal requirements of referenced standards and requirements specified below.
2. Submit manufacturer's literature for products specified herein.
3. Submit manufacturer's verification that admixtures meet requirements specified herein for admixtures.
4. Submit manufacturer's certificate of compliance for reinforcing steel.
5. Submit samples of mortar colors from manufacturer's full range of standard colors.

1.5 QUALITY ASSURANCE

A. Mock-up: Provide work specified herein for mock up specified in Section 04200.

1.6 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Protect materials in a dry place, off ground and under cover.

B. Protect reinforcement from elements; immediately before placing, ensure that reinforcement is free from loose rust or from ice or other materials that will destroy or reduce bond.

PART 2 PRODUCTS

2.1 MORTAR MATERIALS

A. Portland cement: ASTM C150, Type I, non-staining cement; type III cement may be used as protection requirement for laying masonry in cold weather as specified in Section 04200.
   1. Provide natural color or white cement as required to produce mortar color selected by Architect.

B. Lime: Hydrated lime: Type S, ASTM C270.

C. Sand: ASTM Specification C144.

D. Mixing water: Potable and free of chemicals harmful to mortar.

E. Admixtures: Admixtures shall be acceptable only under the following conditions as approved by Architect:
   1. Material does not reduce either mortar strength or bond.
   2. There shall be no additional cost to Owner.
   3. Material for cold weather masonry work shall meet ASTM C494 Type C or E.
   4. Material is manufactured by a reputable manufacturer, and does not contain calcium chloride or other material corrosive to metal within wall.
   5. Material is frequently used by masonry contractor.
   6. Material is used consistently throughout masonry work, except that material used for cold weather masonry construction shall be used only in temperatures recommended by manufacturer.
   7. Material is not used for air entrainment.
   8. Material will not affect color of mortar.

F. Contractor's option for masonry cement in lieu of conventional cement-sand-lime mortar mix:
   1. Acceptable manufacturers and products:
      a. Essroc Materials, Inc. "Brixment".
      b. Flamingo Riverton Corp.
      c. Kosmos Cement Co. "Kosmortar".
      d. Southdown, Inc. "Richmortar".
      e. Lehigh Portland Cement Co. "Masonry Cement".
      f. Holnam, Inc. "Mortamix".
      g. Glen-Gery Corp. "Mortar Blend".
   2. Description: Masonry cement, mixed with sand, and meeting strength requirements of ASTM C91 and ASTM C270 for type of mortar specified herein, with maximum 18 percent air entrainment for Type M and S, 20 percent for Type N. At Contractor's option, provide type with hydrated lime if available from manufacturer. Do not add water reducing component if masonry

mortar has integral water reducing component.

G. Colored mortar:
1. Provide lime and alkali-proof mineral oxides of colors selected, mixed in accordance with manufacturer's directions. Limitations of pigments: Comply with referenced standards.
2. Colored mortar occurs at exterior brick veneer.

H. Mortar for fire brick and clay flue liner on fireplace: ASTM C105.

2.2 MASONRY ACCESSORIES

A. Joint reinforcement:
1. Acceptable manufacturers:
a. AA Wire Products Company.
b. Dur-O-Wal, Inc.
c. Heckmann Building Products, Inc.
d. Hohmann & Barnard, Inc.
e. Masonry Reinforcing Corp. of America "Wirebond".
2. Reinforcement: Fabricated, cold drawn, medium temper steel wire conforming to ASTM A82 and A641. Finish: ASTM A641, 0.10 oz. per sq. ft. zinc coating for interior walls and partitions; ASTM A153, Class B-2, hot-dipped, centrifugal galvanized for exterior walls. Indicate amount of galvanizing on one end of package.
3. Width: As required for masonry thickness and meeting requirements of referenced standards in Section 04200 for mortar coverage for weather protection.
4. Type:
a. In single or multi-wythe masonry walls and partitions: Truss type; 9 gage (0.1483 inch) side and cross rods.
b. In exterior cavity walls with brick veneer and concrete masonry inner wythe: Truss type reinforcing in inner wythe of 9 gage (0.1483 inch) side and cross rods, with loops for double pintle ties in outer wythe. Loops shall be welded to reinforcing and shall be of sufficient length to extend to outside face of inner wythe, or to face of insulation where insulation occurs, and allow reinforcing to be entirely within inner wythe; loops shall be spaced for maximum 2.67 sq. ft of wall surface per loop.

B. Anchors and ties: Zinc-coated steel, hot dipped, centrifugal galvanized after fabrication, meeting requirements of ASTM A153 Class B2, 1.50 oz. per sq.ft. Indicate amount of galvanizing on one end of package.
1. Acceptable manufacturers unless otherwise specified:
a. AA Wire Products Company.
b. Dur-O-Wal, Inc.
c. Heckmann Building Products, Inc.
d. Hohmann & Barnard, Inc.
e. Masonry Reinforcing Corp. of America "Wirebond".
2. Wire-mesh ties: Minimum 16 gage steel, 1/2 inch mesh, in strips 1-inch narrower than width of partition or wall.
3. Corrugated or crimped ties: Minimum 7/8 inch wide, 16 gage sheet steel, not less than 6 inches long.
4. Dovetail-type masonry inserts: Triangular type with 3/16 inch diameter wire with 12 gage dovetail clip; length as required to extend minimum 1-1/2 inches into brick veneer to maximum with 5/8 inch mortar coverage at end of anchor. Coordinate with Section 03300.
5. Rigid steel anchors: Minimum 1-1/2 inch by 1/4 inch by 24 inches long steel with each end turned up not less than 2 inches.
6. Flexible anchors where masonry is anchored to steel structure: 2-piece anchors permitting

horizontal and vertical movement but providing lateral restraint.

7. Anchors for brick veneer to steel studs:
   a. Dur-O-Wal, Inc. #D/A213 2-screw type, with manufacturer's own polymer-coated screws and neoprene washers; manufacturer's standard double pintle ties of sufficient length to extend across air space and minimum 2 inches into brick veneer to maximum with 5/8 inch mortar coverage at end of anchor.
   b. Hohmann & Barnard, Inc. #DW-10X 12 ga. by 1-1/4 inch wide by maximum 6 inch high slip-type anchors; provide horizontal leg depth equal to thickness of sheathing. Provide 3/16" V-type veneer ties of sufficient length to extend across air space and minimum 2 inches into brick veneer. Screws shall be self-tapping, polymer-coated with neoprene washers. Provide largest size recommended by anchor manufacturer for size of holes in anchors, thickness of sheathing and sufficient engagement into studs.
   c. Types by other manufacturers only as approved by Architect.
8. Sealer tape on studs for screw penetration at anchors for brick veneer to steel studs: Hohmann & Barnard, Inc. "Textroseal", 2-1/2 inch wide continuous 0.040 inch thick multi-ply polyethylene tape coated with polymer modified asphalt. Similar product by other manufacturers specified above acceptable only upon approval by Architect.
9. Ties for exterior cavity walls with brick veneer and concrete masonry inner wythe: 3/16 hot-dipped galvanized wire double pintle type of sufficient length to extend across air space and minimum 2 inches into brick veneer to maximum with 5/8 inch mortar coverage at end of anchor.

C. Bond breaker strips: #15 asphalt or coal tar roofing felt per ASTM D226 or D227 respectively.

D. Slip plane for steel lintels at expansion joints in face brick: #30 asphalt or coal tar roofing felt per ASTM D226 or D227 respectively.

E. Slip plane for concrete masonry and precast concrete lintels at control joints: 10 ga. steel plate 1/2 inch narrower and 1 inch shorter than bearing surface of lintel. Steel: Hot-dipped galvanized per ASTM A525, 1.3 oz. per sq.ft.

F. Pre-molded control joint fillers in concrete masonry: Solid rubber or neoprene meeting ASTM D2000, minimum durometer hardness of 70, or polyvinyl chloride meeting ASTM D2287, minimum durometer hardness of 85, designed to fit standard sash block.

G. Joint filler at soft joint at tops of non-bearing, non-fire-rated partitions under structure shall be compressible material of size recommended by manufacturer for joint width, of any of the following types:
   1. Pre-formed type by any manufacturer meeting ASTM D1056 Class RE41 with minimum 50 percent compressibility.
   2. Fiberglass insulation.
   3. Pre-compressed expanding foam type: "Willseal Tape Type 150" Impregnated pre-compressed expanding foam sealant tape, by illbruck/USA; precompressed thickness recommended by manufacturer for joint width.

H. Joint filler in expansion joints in face brick and soft joint under ledge angles in face brick: Pre-formed material of size recommended by manufacturer for joint width by any manufacturer meeting ASTM D1056 Class RE41 with minimum 50 percent compressibility.

I. In-wall composite flashing:
   1. Composite flashing consisting of fabric encapsulated minimum 3 oz. per sq. ft. copper or nearest equivalent thickness stainless steel by Advanced Building Products, Afco Products Inc., Dur-O-Wal, Inc., or York Manufacturing, Inc.

2. Contractor's option for composite flashing: Firestone Building Products "FlashGard", 0.040 inch thick ethylene propylene diene terpolymer (EPDM) based synthetic rubber. Provide manufacturer's standard primer, sealant tape and other accessories for various conditions as recommended by flashing manufacturer.
3. Furnish composite or Contractor's option flashing at locations not specified in Section 04200 to be metal.

J. Sealant material for penetrations in composite flashing: Type recommended by flashing manufacturer.

K. Masonry cleaner:
1. Approved manufacturers:
   a. Euclid Chemical Co., and ProSoCo., Inc.
   b. Other manufacturers approved by brick manufacturer and acceptable to Architect.
2. Cleaning material: Type acceptable by Architect and recommended for type of brick by manufacturers of cleaning material and brick, and which will not remove cement paste and weatherability from mortar as certified by manufacturer of cleaning material.

L. Weeps and vents in brick veneer: Dur-O-Wal, Inc. "Cell Vent D/A #1006", or Hohmann & Barnard, Inc. "Quadro-Vent"; color as selected by Architect from manufacturer's full range of colors.

M. Weeps at calcium silicate masonry walls: Cotton rope wick, 1/4 to 3/8 inch diameter, in length required to produce 2 inch exposure on exterior and 18 inches in cavity.

N. Mortar traps: Polyethylene or nylon mesh designed to trap mortar droppings. Acceptable products:
1. “Mortar Net”, Hohman and Bernard or Mortar Net.
2. “Mortar Break”, Advanced Building Products.

O. Reinforcing steel bars entirely within masonry: Deformed; 40,000 psi yield - stirrups, ties and bars indicated on Drawings to be field bent or welded; 60,000 psi yield - other bars. Provide reinforcing steel positioners.

2.3 GROUT MATERIALS

A. Grout materials per ASTM C476 and PCA "Cementitious Grouts and Grouting":
1. Fine grout with fine aggregate for spaces up to 2 inches.
2. Coarse grout with fine and coarse aggregate for bond beams and spaces 2 inches and larger.

2.4 MIXES

A. Mortar:
1. Comply with proportion and mixing specifications of ASTM C270 and referenced standards, except that lime/cement ratio (by volume) for Type N mortar shall be limited to 1 part lime per part of Portland Cement.
2. Type of mechanical mixing equipment shall be at the option of the Contractor, but shall be capable of producing mortar as specified herein.
3. Mortar proprtions must be accurately measured prior to mixing. Add cement to mix in full bag quantities. Measure sand in box with volume of one cubic foot as often as necessary to maintain consistent proportions and at least once daily and every 4 hours of mixing.
4. Mix colored mortar to produce uniform color throughout. Mix trial batches, dry, and establish color by sample panels specified in Section 04200.

B. Grout: Comply with ASTM C476 proportion specifications and with PCA "Cementitious Grouts and Grouting"; strength, f'c 4000 psi. Type of mechanical mixing equipment shall be at the option of the

Contractor, but shall be capable of producing grout as specified herein. Slump; 8 to 11 inches

2.5 TIME OF USE AND RETEMPERING OF MORTAR

A. Use mortar within time specified in referenced standards. When retempering, thoroughly mix water into mortar mix; do not splash water onto surface of mortar mix.

PART 3 EXECUTION

3.1 INSTALLATION

Not Applicable

END OF SECTION

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SECTION 04200

UNIT MASONRY

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
1. Masonry walls, veneer and partitions.
2. Grouting of concrete masonry walls.
3. Masonry cleaning.
4. Masonry fireplace.
5. Calcium silicate masonry veneer.

B Products Installed But Not Supplied Under This Section:
1. Section 04100 - Mortar and Masonry Accessories.
2. Section 05120 - Structural Steel: Structural metal framing embedded in masonry.
3. Section 05200 - Metal Joists: Metal joist anchorages embedded in masonry.
4. Section 05300 - Metal Decking: Metal deck anchorages embedded in masonry.
5. Section 05500 - Metal Fabrications: Work specified therein that is embedded in masonry including but not limited to loose laid steel angle lintels.
6. Section 06110 - Miscellaneous Rough Carpentry: Anchorages specified therein embedded in masonry.
7. Section 07200 - Insulation: Cavity wall insulation.
8. Section 07520 – Built-up Bituminous Roofing: Anchorages specified therein embedded in masonry.
9. Section 07600 - Flashing and Sheet Metal: Metal flashing and flashing receivers embedded in masonry walls.
10. Section 14240 - Hydraulic Elevators: Hoist beam and guide rail bracket inserts.

C. Related Sections:
1. Section 07150 - Dampproofing: Dampproofing on exterior surfaces of concrete masonry backup for masonry veneer and concrete frame members faced with exterior masonry veneer.
2. Section 07480 - Firestopping: Firestopping of rated openings.
3. Section 07900 - Sealants: Sealant at control joints, ledge angles, for acoustical control, and wherelse indicated.
4. Section 08100 - Metal Doors and Frames: Frames in masonry walls.

D. Alternates:
1. Alternate to provide stone work as specified in Section 04400 in lieu of calcium silicate masonry units, Type1 - “University of Toledo Ashlar”, as specified herein.
2. Alternate to replace masonry with metal wall panels as shown on Elevations at Generator Room and along Arcade – Unit B.

1.2 REFERENCES

A. References herein to, or repetition of, any portions of Referenced Standards shall not nullify any un-referenced or un-repeated portions thereof, unless otherwise indicated herein.

B. Masonry work and grouting:
   1. "(ACI 530/ASCE 5/TMS 402) Building Code Requirements for Masonry Structures and Commentary on Building Code Requirements for Masonry Structures".
   2. "(ACI 530.1/ASCE 6/TMS 602) Specifications for Masonry Structures and Commentary on Building Code Requirements for Masonry Structures".
   3. Keep a copy of above-referenced standards in field office.

C. Sheet metal work built into masonry work: SMACNA "Architectural Sheet Metal Manual".

D. Grouting: PCA "Cementitious Grouts and Grouting".

1.4 SUBMITTALS

A. Submit items indicated below to Construction Manager for review by Architect:
   1. Samples:
      a. Submit five individual samples showing extreme variations in color and texture of face brick.
      b. Submit two samples of each type of calcium silicate masonry.
      c. Submit color samples for integrally colored precast concrete chimney cap.
   2. Tests:
      a. Submit certified tests that face brick and all types of normal and lightweight concrete masonry units meet requirements specified herein.
      b. Submit certified data indicating that fire-rated concrete masonry units meet requirements specified herein.
   3. Shop drawings: Submit drawings showing special shapes.
   4. Submit color samples for integrally colored concrete masonry.
   5. Submit procedures for cold and hot weather construction.
   6. Submit test reports for all masonry materials and accessories. Comply with referenced standards.

1.5 QUALITY ASSURANCE

A. Masonry cleaning shall be performed by subcontractor who does only brick cleaning and has had minimum 3 years experience in brick cleaning work of type and size of this project.

B. Sample Panels: Before installing unit masonry, build sample panels, using materials indicated for the completed Work, to verify selections made under sample Submittals and to demonstrate aesthetic effects. Build sample panels for each type of exposed unit masonry assembly in sizes approximately 48 inches long by 48 inches high by full thickness.
   1. Locate mockups on-site in the location and of the size indicated or, if not indicated, as directed by Construction Manager.
   2. Demonstrate the proposed range of aesthetic effects and workmanship.
   3. Clean exposed faces of panels with masonry cleaner indicated.
   4. Protect approved sample panels from the elements with weather-resistant membrane.
   5. Maintain sample panels during construction in an undisturbed condition as a standard for judging the completed Work.
   6. Approval of sample panels is for color, texture, and blending of masonry units; relationship of mortar and sealant colors to masonry unit colors; tooling of joints; aesthetic qualities of workmanship; and other material and construction qualities specifically approved by Architect in writing.
      a. Obtain Architect's approval of mockups before start of final unit of Work.
   7. Retain and maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
      a. When directed, demolish and remove mockups from Project site.

1.6 REGULATORY REQUIREMENTS

A. Fire-rated concrete masonry units shall comply with requirements of building code referenced in this Project Manual.

1.7 PRE-INSTALLATION CONFERENCE

A. Prior to commencement of work of this section, schedule a meeting at site with Contractor, masonry subcontractor, and Architect to review specifications, scope of work, and other requirements, to ensure complete compliance with specifications and understanding of job conditions.

PART 2 PRODUCTS

2.1 MATERIALS

A. Face brick:
1. ASTM C216, Grade SW, Type FBX, utility size (3-5/8” x 3-5/8" x 11-5/8").
2. Face brick: Belden, “Burbank Clear A”
3. Special shapes:
   a. Ledge angle bricks as indicated on Drawings.
   b. Any other special shapes indicated on Drawings.
   c. Match face brick in color and texture.

B. Concrete masonry units:
1. Hollow load bearing units: ASTM C90, Type I or Type II; cured minimum 14 days if cured at atmospheric pressure.
2. Weight:
   a. Lightweight: Expanded shale, pumice or expanded clay aggregate per ASTM C331; do not use coal cinder bottom ash or similar waste product which will cause rusting, staining or popouts or will contain combustible matter.
   b. Normal weight: Aggregate per ASTM C33.
   c. Do not mix lightweight and normal weight units where both are simultaneously exposed to view.
3. Fire-rated masonry: Provide fire-rated units meeting requirements of building code referenced in this Project Manual and meeting hourly ratings indicated on Drawings.
4. Sight-exposed faces: Manufacturer's standard color and texture.
5. Size: Nominal face dimensions of 16" long x 8" high, unless otherwise shown.
6. Cores: Provide two core block where grouting is required as specified herein.
7. Special shapes: Provide where shown and required for soaps, formed-in-place masonry lintels, corners, bonding and other special conditions.
   a. Provide bullnose block for outside corners unless otherwise shown.
   b. Provide jamb sash unit for premolded control joints where no face brick occurs.
8. Masonry bond beams, pilasters and formed-in-place lintels: Units of type and size indicated with minimum ultimate compressive strength of concrete for block of f'c = 3,000 psi.
   a. Provide formed-in-place masonry lintels wherever openings over 1'-0" wide occur without structural steel or other supporting lintels, and wherelse indicated.

C. Fireplace masonry:
1. Shell: Concrete masonry specified herein.
2. Firebrick: Low duty refractory brick, ASTM C64; color and texture selected from manufacturer's full range.
3. Flue liner: Clay flue liner, ASTM C315; size and shape as indicated.
4. Chimney cap: Custom made chimney cap of integrally colored precast concrete

D. Calcium silicate masonry units:
1. Specified manufacturer: Arriscraft U.S.A. Corp.
a. Manufacturers as specified for cast stone in Section 04700 shall be acceptable.

2. Product; Type1: Arriscraft “University of Toledo Ashlar”
a. Texture: Bold, rocked face.
b. Size:
1) R22; 2-3/8 inches high by 23-5/8 inches long by 3-3/4 inch bed: 10 percent
2) R52; 5-1/4 inches high by 23-5/8 inches long by 3-1/2 inch bed: 20 percent
3) R82; 8-1/8 inches high by 23-5/8 inches long by 3-1/2 inch bed: 40 percent
4) R11; 11 inches high by 23-5/8 inches long by 3-3/4 inch bed: 30 percent
c. Color:
1) 94-0730A, white, in R23, R52, R82, R11 sizes: 60 percent
2) 94-1102A. tan, in R23, R52 sizes: 30 percent
3) 95-1214A, marigold, in R23, R11 sizes: 10 percent
3. Product; Type 2: Arriscraft "Renaissance Masonry Units”.
a. 3-5/8 inches high by 23-5/8 inches long by 3-5/8 inches deep; bold face.
b. 11-5/8 inches high by 23-5/8 inches long by 3-5/8 inches deep; smooth dressed face.
c. Color: White
4. Materials and manufacture: High density, severe weathering calcium silicate masonry unit, pressure formed and autoclaved, meeting ASTM C744.

2.2 FABRICATION OF CONCRETE MASONRY

A. Fabricate masonry units per ASTM standards specified above; provide special shapes as indicated and specified.

2.3 FABRICATION OF CALCIUM SILICATE MASONRY

A. Fabricate calcium silicate masonry per ASTM C744 standards and standards specified herein; provide special shapes and finishes as specified herein and indicated on Drawings.

B. Fabrication tolerances:
1. Unit face deviations: ..... +/- 3/8 inch.
2. Unit length: ..... +/- 1/16 inch.
3. Unit height: ..... +/- 1/16 inch.
4. Deviation from square: ..... +/- 1/16 inch, with measurement taken using the longest edge as the base.
5. Bed depth: ..... +/- 1/8 inch.

C. Physical properties:
1. Compressive dry strength: ..... 5512 - 7687 psi, ASTM C170.
2. Modulus of rupture: ..... 624 - 914 psi, ASTM C99.
3. Absorption rate: ..... 7.8 - 9.8 percent, ASTM C97.
4. Density: ..... 126 - 132 lbs. per cubic foot, ASTM C97.

2.4 FABRICATION OF PRECAST CHIMNEY CAP

A. Fabricate, finish, cure and identify per referenced "Specifications for Concrete Masonry Construction".
   1. Chimney cap reinforcing: Provide two reinforcing bars on all sides, overlapped and tied.
   2. Provide 1-ibch projection from face of wall with drip.
   3. Finishes:
      a. Exposed surfaces: As cast, free of form marks and irregularities.
      b. Surfaces to receive mortar: Rough "wood-float" finish for bonding to mortar.
      c. Other concealed surfaces: As cast.
   4. Fabricate chimney cap of integrally colored concrete; color shall match cast stone copings specified in Section 04700. .

PART 3 EXECUTION

3.1 PREPARATION

A. Refer to referenced standard specifications for concrete masonry construction.

B. Coordinate with Sections in "Products Installed But Not Furnished Under This Section" in Part 1 herein to receive work specified therein.

C. Coordinate with Section 07150 – Damproofing for installation of damproofing on concrete and concrete masonry surfaces prior to installation of face brick and other finished masonry or stonework.

3.2 INSTALLATION

A. Unless more stringent requirements are indicated in Contract Documents construct masonry per the Ohio Building Code, and referenced standards.

B. Tolerances: Comply with most stringent tolerances specified in referenced standards.

C. Mortar: Install masonry with type and mix of mortar specified in Section 04100.

D. Pattern bond: Running bond in compliance with referenced standards.

E. Lay face brick in full bed and head joints; lay other masonry per referenced standards.

F. Install each type of concrete masonry specified in Part 2 herein at locations indicated on Drawings.

G. Tops of masonry walls, partitions:
   1. Extend to structure above unless otherwise noted.
   2. Fill joints with mortar at bearing partitions.
   3. Provide space at top for soft joint for non-bearing partitions. Install joint filler material.
   4. At fire-rated partitions, gap at top of non-bearing partitions is filled under Section 07480.
   5. Where not required to extend to structure above, terminate partition not less than 2" above suspended ceiling.

H. Control and expansion joints:
   1. Construct control joints in concrete masonry minimum 3/8 inch wide.
   2. Construct expansion joints in face brick minimum 1/2 inch wide.
   3. Do not continue joint reinforcement across control joints.
   4. At bond beams, stop control joint at bottom of bed joint supporting bond beams; rake bed joint 3/4 inches deep for caulking in Section 07900.

5. Control joint fillers in concrete masonry:
   a. Where face brick, calcium silicate masonry, or stone work occurs: Install pre-molded joint filler in collar joint between face brick and concrete masonry backup.
   b. Where no face brick, calcium silicate masonry, or stone work occurs: Install pre-molded joint filler in jamb sash concrete masonry unit.
6. Compressible joint filler in expansion joints in face brick; joint filler in soft joint under ledge angles in face brick: Install pre-formed, non-expansive type in joint to back of joint; recess from face sufficient depth to allow backer rod and calking under Section 07900.
7. Provide slip plane at steel lintels at expansion joints in face brick and calcium silicate masonry as follows:
   a. Place specified slip-plane material directly on masonry course below lintel; hold material back 1/2" from opening, face of wall and end of lintel.
   b. Place lintel on full bed of mortar on top of slip-plane to assure uniform bearing.
   c. When mortar has hardened sufficiently, rake joint 3/4" deep at end of and under lintel for caulking by others.
   d. Lay first course of masonry above lintel in full mortar bed.
8. Provide slip plane at formed-in-place concrete masonry lintels at control joints as follows:
   a. Place metal slip-plane plate directly on masonry course below lintel; hold plate back 1/2" from opening, face of wall and end of lintel.
   b. Place bond breaker against masonry at end of lintel; hold bond breaker 1/2" from face of wall.
   c. Place lintel on full bed of mortar on top of slip-plane plate to assure uniform bearing.
   d. Fill joint at end of lintel with mortar against bond breaker.
   e. When mortar has hardened sufficiently, rake joint 3/4" deep at end of and under lintel for caulking by others.
   f. Lay first course of masonry above lintel in full mortar bed.
9. Unless otherwise indicated on Drawings, locate control joints in concrete masonry and expansion joints in brick 30'-0" apart at the following locations:
   a. Near corners.
   b. Window jambs.
   c. At building expansion joints.
   d. At piers, columns, changes in wall height of adjacent portions of walls, and at changes in wall thickness.
   e. At both sides of windows wider than 6'-0".
10. Extend control joints from footing to top of wall at exterior walls, and from bottom to top in interior walls.

I. Masonry bearing walls abutting other masonry bearing walls or exterior masonry wall shall be either of the following:
   1. Bond per referenced standard specifications for concrete masonry construction.
   2. Anchor rigidly with rigid steel anchors at 16" o.c. vertically.

J. Masonry non-bearing partitions abutting other masonry partitions or walls: Bond per referenced standard specifications for concrete masonry construction or anchor rigidly with wire mesh ties at 16" o.c. vertically.

K. Cold weather masonry construction: Protect masonry when air temperature is 40 degrees and falling.
   1. Construct in compliance with referenced standards.
   2. Use of admixtures or anti-freeze agents: Refer to Section 04100.
   3. If, at Contractor's option in addition to requirements of referenced standards, insulating blankets are used to protect masonry work from temperature extremes, use blankets manufactured for the purpose and having polypropylene insulation rather than fiberglass insulation.

L. Hot weather masonry construction: Comply with referenced standards.

M. Head and bed joints:
   1. Nominal 3/8 inch thick; variation up to 5/8" thick will be permitted to adjust coursing and to minimize cutting at openings providing such variation is gradual to minimize visual contrast in widths of adjacent joints.
   2. Configuration:
      a. Flush joints: At masonry exposed to earth below grade, and at masonry to be finished with other construction. At masonry exposed to earth below grade or exposed to the weather, tool joint with concave or "V" joint tool and fill with extra mortar to obtain flush joint when rubbed with carpet faced wood float.
      b. Tooled concave joints: Other sight-exposed joints.
   3. Colored mortar: Tool joints at wetness recommended by mortar color manufacturer. Do not tool joint when too wet.

N. Wetting of masonry units: Comply with referenced standards.

O. Horizontal joint reinforcement:
   1. General requirements for continuous reinforcement:
      a. Ensure that joint reinforcement is fully embedded in mortar.
      b. Install in first bed joint below top course of masonry.
      c. Install in first two bed joints above and below openings.
      d. Space not to exceed 16" on center vertically for entire length and height of wall or partition.

   2. Single wythe and multi-wythe interior partitions: Install continuous reinforcement extending into all wythes. Install type specified in Section 04100.
   3. Exterior walls with concrete masonry inner wythe and brick veneer: Install continuous reinforcement, of the type specified in Section 04100, in inner wythe; do not extend into brick veneer. At insulated cavity walls, install so that ties welded to reinforcing extend to outside face of insulation and allow reinforcing to be entirely within inner wythe. Refer to requirements specified later in this section for installation of veneer.
   4. Brick veneer:
      a. Do not install continuous reinforcement.
      b. Install pre-formed reinforcement at corners, offsets and intersecting walls spaced not to exceed 16" on center vertically for entire height of wall.
      c. At curved cavity walls, cut inner wythe reinforcing periodically to form curve.
   5. Do not extend reinforcement through control or expansion joints.
   6. Install with mortar coverage for weather protection per referenced standards.

P. Reinforcing rods entirely within masonry: Install per referenced standards.

Q. Bearing support at filled masonry: Unless otherwise detailed, fill hollow masonry units with grout under wall supported beams or lintels a minimum 3 courses vertically and 24" horizontally each side of bearing, and wherelse required. Grout as specified under Grouting and Reinforced Masonry herein.

R. Except as specified herein for lintels, keep open space at expansion or control joints free of mortar by using a continuous wood or metal strip temporarily set on wall.

S. Built-in work: Coordinate work with other sections so that all connecting work shall be properly located and installed.
   1. Build in panel boxes, access panels, anchors, grounds, water-proofing, flashing, flashing receivers, reglets, expansion joints and other necessary incidental work. Attach anchors to steel columns.
   2. Bed window sills, door sills, copings, steel lintels, etc., firmly and solidly in mortar.

3. Provide required bedding and grouting for metal windows and stools.
4. Grout in solid with mortar behind metal door frames in masonry.
5. Provide caulking spaces of 1/4 inch wide by 3/4 inch deep around wall openings or as indicated on Drawings.
6. Maintain fire rating with masonry at built-in work in fire-rated walls.

T. Stopping and resuming work: Comply with referenced standards. Keep walls dry with waterproof covering after stopping work.

U. Joints at ledge angles: Construct as detailed.

V. Masonry which faces on or abuts concrete: Attach with dovetail anchors spaced not to exceed 16" vertically, 24" horizontally.

W. Except walls directly over load bearing walls, do not place masonry on structural floors until concrete is at least twenty-eight (28) days old and shoring has been removed.

X. Weeps at brick veneer: Provide weeps specified in Section 04100 at head joints immediately above flashing; space 24" O.C. Ensure that weeps entirely fill head joint in both thickness and height. Also ensure that weeps are open for drainage.
1. Provide vents at 4'-0" o.c. at top of separate cavity areas, and at top of walls. Line up vents vertically as closely as possible with weeps at bottom of walls. Place vents in top course at top of cavity area immediately below next layer of flashing, and at top of wall. Recess vents from face of wall as recommended by vent manufacturer. Ensure that vents entirely fill head joint in both thickness and height.

Y. Rope weeps at calcium silicate masonry: Provide weeps specified in Section 04100 at base of head joints immediately above flashing; space 16 inches on center. Turn wicking down at lip of sill to be as inconspicuous as possible. Trim flush with face of wall after mortar has set.

Z. Mortar traps: Install mortar traps specified in Section 04100 continuously behind weeps at flashing per mortar trap manufacturer's instructions.

3.3 FLASHING EMBEDDED IN MASONRY

A. Flashing:
1. Install metal and composite flashings at locations indicated on Drawings.
2. If not indicated on Drawings, or unless otherwise indicated on Drawings, locate as follows:
a. Install metal flashing where drips are required such as window heads, soffits and other locations where masonry does not occur below flashing. Also install metal flashing at other locations where drips are indicated on Drawings.
b. Install composite flashing where drips are not required and not indicated on Drawings such as at ledge angles, at bottoms of cavities and under window sills.

B. Metal flashing:
1. Install per referenced SMACNA standard.
2. Install flashing fully embedded in mortar joint.
3. Form drips by extending flashing uniformly a maximum of 1/2 inch from face of wall, and turn down at 45 degree angle and hem. If metal flashing without a drip is indicated on Drawings, terminate flashing at exterior face of wall.
4. Lap end joints 6" and seal with sealant specified in Section 07600. Seal penetrations in flashing with mastic.

5. At exterior cavity walls with brick veneer, extend flashing up and onto backup material and mechanically attach to studs, masonry or concrete at minimum 16 inches o.c.
6. Ensure that continuous flashing is continuous, sealed at penetrations and interruptions, to ensure a continuous "gutter" effect to drain water to weeps.

C. Composite flashing:
1. Install flashing fully embedded in mortar joint.
2. Extend flashing beyond wall face and cut off flush with wall when directed by Architect.
3. Lap end joints 6" and seal with flashing sealant material specified in Section 04100. Seal penetrations in flashing with mastic.
4. At exterior cavity walls with brick veneer, extend flashing up and onto backup material and mechanically attach through sheathing to studs, masonry or concrete at minimum 16 inches o.c. At sheathing on studs, coordinate with other sections to ensure that flashing is installed prior to installation of asphalt felt.
5. Ensure that continuous flashing is fully continuous, sealed at penetrations and interruptions, to ensure a continuous "gutter" effect to drain water to weeps.

D. Where reglets are indicated, extend flashing into reglets and wedge tight per referenced standards and industry practice.

E. Extend flashing at window sills to first head joint past sills and turn up 1 inch; also turn up 1 inch at inside of window.

3.4 ADDITIONAL REQUIREMENTS FOR EXTERIOR CAVITY WALLS WITH BRICK VENEER AND CONCRETE MASONRY INNER WYTHE

A. At insulated cavity walls: Install insulation to face of backup with mastic per manufacturer's recommendations, with edges buttered and butted. Wedge insulation behind loops of inner wythe reinforcing to ensure that insulation is tight to outer face of inner wythe. Maintain detailed clear space between face of insulation and outer wythe of masonry.

B. Install double pintle ties fully embedded in mortar joints in outer wythe at intervals not to exceed 1.77 sq.ft. of wall surface; attach to ties welded to reinforcement in inner wythe. Ensure that double pintle ties are of sufficient length to extend across air space and minimum 1-1/2 inches into brick veneer to maximum with 5/8 inch mortar coverage at end of anchor. Do not install continuous reinforcement in outer wythe.

C. Keep cavity free of mortar and debris during construction. Bevel bed joints downward from face to back; lay brick with rolling motion toward cavity, squeezing minimal mortar toward cavity. Do not cut off excess mortar; spread onto back of brick. If wood strip is used in cavity, raise at every other course; raise carefully to avoid loosening fresh laid masonry. Do not leave strips in cavity. Ensure that cavities are free of mortar and debris and weeps are open.

D. Install horizontal joint reinforcement at corners and offsets of veneer, at locations and spacing specified herein under "Horizontal joint reinforcement".

3.5 ADDITIONAL REQUIREMENTS FOR BRICK VENEER ON STEEL STUDS AND EDGE OF FLOOR STRUCTURE

A. At studs: Prior to installation of veneer anchors, at each stud install sealer tape uninterrupted at vertical line of veneer anchors; do not install sealer tape in individual segments at each anchor. Firmly adhere sealer tape to sheathing. Attach veneer anchors through sealer tape and gypsum sheathing to each stud; attach with specified screws through each screw hole in anchor; ensure firm contact of Hohmann & Barnard anchors with stud for each side of each leg at top and bottom of anchor. Space anchors maximum 16 inches o.c. vertically, 24 inches horizontally.

B. At floor structure: Attach anchors to floor structure as recommended by anchor manufacturer; locate at same horizontal and vertical spacing as specified above for anchors on studs. Use type of anchor specified in Section 04100 for material of floor structure.

C. Install veneer ties at each anchor, spaced 16 inches o.c. vertically, fully embedded in mortar joints in brick veneer. Keep ties horizontal into joints. Ensure that ties are of sufficient length to extend across air space and minimum 1-1/2 inches into brick veneer to maximum with 5/8 inch mortar coverage at end of anchor.

D. Keep cavity free of mortar and debris during construction. Bevel bed joints downward from face to back; lay brick with rolling motion toward cavity, squeezing minimal mortar toward cavity. Do not cut off excess mortar; spread onto back of brick. If wood strip is used in cavity, raise at every other course; raise carefully to avoid loosening fresh laid masonry. Do not leave strips in cavity. Ensure that cavities are free of mortar and debris and weeps and vents are open.

E. Install horizontal joint reinforcement at corners and offsets of veneer, at locations and spacing specified herein under "Horizontal joint reinforcement".

3.6 FORMED-IN-PLACE CONCRETE MASONRY LINTELS

A. Install lintels on mortar joints except as specified elsewhere herein for lintels at control joints; provide minimum 8 inches bearing at each jamb.

B. Construction of formed-in-place lintels unless otherwise indicated on Drawings:
1. Provide formed-in-place masonry lintels wherever openings over 1'-0" wide occur without structural steel or other supporting lintels, and wherelse indicated.
2. Reinforcement: Provide one reinforcing bar top and bottom for each 4 inches width of wall thickness of size number not less than number of feet of opening width and not less than #4 bar.
3. Construct proper shoring to provide level platform true to proper elevation and of sufficient strength to support load without visible deflection. Keep shoring in place for a minimum 7 days after lintel is poured and masonry is placed full height over opening.
4. Lay masonry units with full mortar coverage abutting edges, reinforcing steel placed accurately and supported in cavity. Pour concrete and rod carefully to ensure complete filling of cavity, proper embedding of reinforcing without displacement. Screed off excess concrete to level top surface.
5. Install lintels at control joints as specified elsewhere herein for construction of control joints.

3.7 CONCRETE MASONRY BOND BEAMS AND PILASTERS

A. Install reinforcing steel and grout as specified in Grouting and Reinforced Masonry herein.

3.8 GROUTING OF CONCRETE MASONRY CONSTRUCTION

A. Use grout mix specified in Section 04100 for grouting. Install grout per Section 4 of ACI 530.1 " Specifications For Masonry Structures" and PCA "Cementitious Grouts and Grouting" for grouting unless otherwise specified herein or indicated on Drawings.

3.9 ADDITIONAL REQUIREMENTS FOR FIREPLACE

A. Construct fireplace in strict accordance with the Ohio Building Code, referenced standards, and as detailed.

B. Install firebrick with specified fire resistant mortar.

C. Install clay flue liner with specified fire resistant mortar. Fully bed flue liner sections in mortar with joints cut flush and smoothed on interior; parge exterior joint area. Set liners one section ahead of surrounding masonry. Liner shall stand free of surrounding masonry except for sufficient masonry to hold liner in position.

D. Install metal lintel, damper and other related accessories furnished in Section 05500.

E. Install chimney cap in full bed of mortar, flashed as specified herein.

3.10 ADDITIONAL REQUIREMENTS FOR INSTALLATION OF CALCIUM SILICATE MASONRY

A. Install calcium silicate masonry and anchors in accordance with supplier's recommendations and shop drawings, and referenced standards for stone construction.

B. Cutting of calcium silicate masonry units:
1. Cut units with wet-saw.
2. Pre-soak units using clean pottable water prior to cutting.
3. Clean units with stiff fiber brush and clean water.
4. Allow units to surface dry prior to placement.

C. Arrange calcium silicate masonry to provide consistent joint work throughout; maintain uniform joint width of 1/2 inch.

D. Pattern Bond:
1. Type 1 – University of Toledo Ashlar: Provide four block ashlar blend; percentage of color and size as specified in Part 2 herein.
2. Type 2 – 12 inches by 24 inches smooth face: Running bond.
3. Contractor shall site cut approximately 5 percent of the R82 units on one head end at an angle of 80 degrees to the horizontal plane to reproduce the slope end cut effect visible on the older buildings on campus.

E. Install flashing as detailed and specified herein under Flashing.

F. Maximum variation from plane of adjacent units: 1/32 inch.

G. Lay units in full bead of mortar, properly jointed with other work. Buttering corners of joints, deep or excessive furrowing of mortar joints are not permitted.

H. Clean calcium silicate masonry as work progresses as recommended by manufacturer. Allow mortar droppings to partially dry then remove by means of brushing with a stiff fiber brush.

3.11 ADJUSTMENT AND CLEANING OF BRICK AND CONCRETE MASONRY

A. Comply with referenced standards in addition to other requirements specified herein.

B. Clean exterior masonry:
   1. Cleaning procedure for masonry surfaces: Apply specified masonry cleaning solution and rinse with water pressures in accordance with recommendations of manufacturers of cleaning solution and brick.
   2. Prevent run-down of cleaning materials onto adjacent glass and other surfaces.
   3. Should cleaning solution run onto adjacent glass or other surfaces, do not allow solution to stand or dry. Remove immediately.

C. Clean interior masonry: Remove protruding mortar and point uneven and defective joints in surfaces which will be exposed, painted or finished with other materials. Clean surfaces free from mortar, dirt, dust, grease, oil and efflorescence. Clean surfaces to be painted to paintable condition.

D. Replace any finished materials and surfaces damaged, streaked or discolored by cleaning operations.

E. Calcium silicate masonry:
   1. Remove and replace calcium silicate masonry units which are broken, chipped, stained or otherwise damaged. Provide new matching units; install as specified.
   2. Clean calcium silicate masonry as recommended by manufacturer.

END OF SECTION

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SECTION 04400

STONE

PART 1 GENERAL

1.1 SUMMARY

A. Section includes:
1. Cut stone veneer at walls.
2. Metal anchors, mortar, and joint pointing.

B. Products installed but not supplied under this Section:
1. Section 05500 - Metal Fabrications: Supports for cast stone work.
2. Section 07600 - Flashing and Sheet Metal: Metal flashing and flashing receivers embedded in stone walls.

C. Related Sections:
1. Section 04200 - Unit Masonry: Masonry work adjacent to stone work.
2. Section 05500 - Metal Fabrications: Supports for stone work.
3. Section 07900 - Joint Sealants: Sealant.

D. Alternates:
a. Alternate to provide stone work as specified herein in lieu of calcium silicate masonry units, Type1 - “University of Toledo Ashlar”, as specified in Section 04200.

1.2 REFERENCES

A. ASTM Standards applicable to stone work:
1. A36 Structural steel.
2. A123 Zinc (Hot Dipped) Coatings on Products Fabricated from Rolled, Pressed and Forged Steel Shapes.
3. C120 Methods of Flexure Testing of Slate (Modulus of Rupture, Modulus of Elasticity).
4. C568 Specification for Limestone Building Stone.
7. D2203 Test Method for Staining of Caulking Compounds and Sealants.
8. E488 Test Methods for Strength of Anchors in Concrete and Masonry Elements.
9 C1242 Anchorage for Stone.

B. Building Stone Institute (BSI)

C. Limestone:
1. Indiana Limestone Institute.
2. Marble Institute of America, (MIA).

1.3 SYSTEM DESCRIPTION

A. Design requirements:
1. Design, reinforce and size stone, stone anchors and stone-supporting steel members to withstand dead loads and live loads caused by pressure and suction of wind acting normal to plane of wall as calculated in accordance with the Ohio Building Code unless more stringent requirements are specified herein.

2. Design areas exposed to the wind for a wind speed of 90 mph with Exposure B, wind importance factor 1.15 in accordance with Ohio Building Code and ASCE-7 where required.
3. Design for the following industry-recognized safety factors:
   a. Dolomitic limestone: 8.

B. Performance requirements: Stone work, stone anchors and stone-supporting steel members shall accommodate, without damage to stone or anchors: Movement within stone work; movement between stone work and perimeter materials; dynamic loading and release of loads; and deflection of structural support framing. Assume L/360 maximum live load deflection for horizontal building framing, occurring independently on individual levels.

1.4 SUBMITTALS

A. Submit items indicated below to Construction Manager for review by Architect:
1. Manufacturer's literature for products specified herein.
2. Shop drawings, indicating layout, dimensions, stone anchors and stone-supporting steel members, and jointing.
3. Manufacturers' storage, handling and installation instructions and field erection or setting drawings.
4. Two (2) samples 12 inches by 12 inches in size illustrating minimum and maximum color range and texture, markings and surface finish or each type of stone.
5. Samples of mortar colors from manufacturer's full range of standard colors.
6. Certificates of Compliance indicating the stone materials supplied for the Work are in compliance with requirements of this Section 04400.
7. For work specified herein, for record only, submit design calculations by an experienced Professional Engineer registered in State of Ohio.

1.5 QUALITY ASSURANCE

A. Installer: Company specializing in installing cut stone with five (5) years experience in work of similar size and scope.

B. Sample Panels: Before installing stone, build sample panels, using materials indicated for the completed Work, to verify selections made under sample Submittals and to demonstrate aesthetic effects. Build sample panels for each type of exposed unit masonry assembly in sizes approximately 48 inches long by 48 inches high by full thickness.
1. Locate mockups on-site in the location and of the size indicated or, if not indicated, as directed by Construction Manager.
2. Demonstrate the proposed range of aesthetic effects and workmanship.
3. Clean exposed faces of panels with stone cleaner indicated.
4. Protect approved sample panels from the elements with weather-resistant membrane.
5. Maintain sample panels during construction in an undisturbed condition as a standard for judging the completed Work.
6. Approval of sample panels is for color, texture, and blending of stone; relationship of mortar and sealant colors to stone colors; tooling of joints; aesthetic qualities of workmanship; and other material and construction qualities specifically approved by Architect in writing.
   a. Obtain Architect's approval of mockups before start of final unit of Work.
7. Retain and maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
   a. When directed, demolish and remove mockups from Project site.

1.6 DELIVERY, STORAGE AND HANDLING

A. Deliver and store products to site as recommended by manufacturer.

1.7 ENVIRONMENTAL REQUIREMENTS

A. Maintain materials and surrounding air to a minimum 40 degrees F (5 degrees C) prior to, during, and 48 hours after completion of work.

B. During temporary storage on site, at end of working day, or during rainy weather, cover stone work exposed to weather with non-staining waterproof coverings, securely anchored.

C. Do not set stone with a film of water or frost on surface.

PART 2 PRODUCTS

2.1 STONE

A. Random ashlar stone shall be dolomitic limestone “Lannon Stone” Regal Blend as produced by Wislanco Stone Company, Inc. or approved equal and shall match existing University Buildings.

B. Stone shall be cut to a depth of approximately 4-inches. Stone shall contain proportionate amounts of bed face, split face, and seam face as required to match existing structures.

C. Size:
1. Random length ranging from 8-inches to 48-inches with an average of 26-inches.
2. Heights vary as follows:
   a. 2-1/4 inches: 10 percent
   b. 5 inches: 25 percent
   c. 7-3/4 inches: 25 percent
   d. 10-1/2 inches: 15 percent
   e. 13-1/4 inches: 15 percent
   f. 16 inches: 10 percent
3. Corners shall be full 4-inches trimmed square and true, or as shown on Drawings.
4. At least 80 percent of all corners shall be in the 7-3/4 inches and 13-1/4 inches height range.

2.2 MORTAR

A. Setting and pointing mortar materials:
1. Portland Cement: ASTM C150, Type II, low alkali. Only one brand shall be used throughout work.
2. Sand: (Fine aggregates) ASTM C144, clean and sharp.
3. Lime: Hydrated lime per ASTM C207, Type S, containing 85 percent calcium by weight.

B. Mortar pigment for pointing mortar: Provide lime and alkali-proof Mineral oxides of colors selected, mixed in accordance with manufacturer's directions. Limitations by weight of cement: 3 percent for carbon black, 15 percent for other pigments.

C. Water: Clean and potable.

2.3 ACCESSORIES

A. Anchors, dowels, ties, cramps: ASTM C1242; stainless steel, Type 304; of sizes and configurations required for support of stone and applicable superimposed loads.

B. Setting shims and spacers: Grove Structural Shims polypropylene 8000 psi; thicknesses as needed for joint widths. Other manufacturers will be acceptable only upon approval of their product by addendum prior to taking of bids.

C. Sealant at anchor kerfs: Type specified for exterior wall sealants specified in Section 07900, or other type recommended by Granite manufacturer and approved by Architect.

D. Mortar for grout - Type N ASTM C270, comprised of the following:
1. Portland Cement: ASTM C150, Type II, low alkali. Only one brand shall be used throughout work.
2. Sand: (Fine aggregates) ASTM C144, clean and sharp.
3. Lime: Hydrated lime per ASTM C207, Type S, containing 85 percent calcium by weight.

E. Cleaning solution: Type which will not harm stone, joint materials, or adjacent surfaces. Consult stone supplier for recommended type.

2.4 MORTAR MIX

A. Setting mortar: One part Portland cement, one part lime, six parts sand by volume.

B. Pointing mortar: One part Portland cement, one part lime, three parts sand.

C. Thoroughly mix mortar ingredients in quantities needed for immediate use.

D. Additional requirements:
1. Add mortar color in accordance with manufacturer's instructions. Ensure uniformity of mix and coloration.
2. Do not use anti-freeze compounds in mortar.
3. Use mortar within two hours after mixing.
4. If necessary, retemper mortar within two hours of mixing to replace water lost by evaporation.

2.5 STONE FABRICATION

A. Form to shapes and sizes as detailed, in largest practicable sizes.

B. Form external corners to square joint profile.

C. Slope exposed top surfaces of stone for natural wash, or as detailed.

D. Rout grooves for ramp lights as detailed.

E. Coat cavity surface of stone with manufacturer's recommended back coating to surfaces not in contact with mortar. Allow coating to cure.

PART 3 EXECUTION

3.1 INSPECTION

A. Verify that support work and site conditions are ready to receive work of this Section.

B. Establish lines and levels. Protect from disturbance.

C. Beginning of installation means acceptance of existing conditions and support work.

3.2 PREPARATION

A. Clean stone prior to erection. Do not use wire brushes or implements which will mark or damage exposed surfaces.

B. Wet stone sufficiently to take up surface absorption, prior to setting.

3.3 INSTALLATION

A. Install limestone and anchors in accordance with supplier's recommendations and shop drawings, and referenced standards for limestone construction.

B. Arrange stone pattern to provide a consistent joint width of 1/4 inch throughout, or as detailed.

C. Install insulation to face of backup with mastic per manufacturer's recommendations, with edges buttered and butted. Wedge insulation behind loops of inner wythe reinforcing to ensure that insulation is tight to outer face of inner wythe. Maintain detailed clear space between face of insulation and outer wythe of stone.

D. Install anchors per manufacturer's approved shop drawings.

E. Anchor stone to concrete walls with anchors.

F. Install flashing as detailed and specified in Section 04200 – Unit Masonry.

G. Use shims and spacers specified herein to ensure alignment. Except at cavity spaces on walls, set stone in full mortar setting bed to support stone over full bearing surface and to establish joint dimensions.

H. Shore up units until setting bed will maintain panel in position without movement for seven (7) days after setting.

I. Fill dowel and lifting holes with mortar.

J. To accommodate pointing mortar or sealant and backer rod, rake out joints 5/8 to 3/4 inch. Brush mortar joints clean.
   1. To establish sealant joint sizes, refer to Section 07900 for proper joint width/depth ratio.

K. Wet stone sufficiently to take up surface absorption.

L. Except at calked joints, fill joints with pointing mortar. Pack and work into voids. Neatly tool surface to slightly concave joint.

M. Tolerances:
   1. Positioning of elements: Maximum 1/4 inch from true position.
   2. Maximum variation from plane of wall: 1/4 inch in 10 feet; 1/2 inch in 50 feet.
   3. Maximum variation between face plane of adjacent panels: 1/16 inch.
   4. Maximum variation from plumb: 1/4 inch.
   5. Maximum variation from level coursing: 1/8 inch in 3 feet; 1/4 inch in 10 feet; 1/2 inch maximum. (Top of top course of abutting panels shall be level with each other, but achieving levelness shall not necessitate deviation from other maximum tolerances specified herein.)
   6. Maximum variation of joint width: 1/8 inch in 3 feet.
   7. Maximum variation of width of adjacent joints: 1/32 inch.

3.4 CUTTING AND FITTING

A. Obtain approval prior to cutting or fitting any item not so indicated on Drawings.

B. Do not impair appearance or strength of stone work by cutting.

3.5 CLEANING

A. Remove excess mortar upon completion of work.

B. Remove and replace limestone units which are broken, chipped, stained or otherwise damaged. Provide new matching units; install as specified.

C. Clean limestone as recommended by manufacturer and referenced standards for limestone.

END OF SECTION

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SECTION 04700

CAST STONE

PART 1 GENERAL

1.1 SUMMARY

A. Section includes:
1. Cast stone copings, sills, and panels.
2. Metal anchors, mortar, and joint pointing.

B. Products installed but not supplied under this Section:
1. Section 05500 - Metal Fabrications: Supports for cast stone work.
2. Section 07600 - Flashing and Sheet Metal: Metal flashing and flashing receivers embedded in cast stone.

1.2 SUBMITTALS

A. Submit items indicated below to Construction Manager for review by Architect:
1. Manufacturer's literature for products specified herein.
2. Shop drawings indicating layout, dimensions, anchorages and jointing.
3. Submit two (2) samples 6 inches by 6 inches in size illustrating minimum and maximum color range and texture, markings, and surface finish.
4. Submit samples of grout colors from manufacturer's full range of standard colors.

1.3 QUALITY ASSURANCE

A. Installer: Company specializing in installing cast stone with five (5) years experience in work of similar size and scope.

B. Coordinate with Section 05500 for provisions for supports.

1.4 DELIVERY, STORAGE AND HANDLING

A. Deliver and store products to site as recommended by manufacturer.

1.5 ENVIRONMENTAL REQUIREMENTS

A. Maintain materials and surrounding air to a minimum 40 degrees F (5 degrees C) prior to, during, and 48 hours after completion of work.

B. During temporary storage on site, at end of working day, or during rainy weather, cover stone work exposed to weather with non-staining waterproof coverings, securely anchored.

C. Do not set stone with a film of water or frost on surface.

PART 2 PRODUCTS

2.1 CAST STONE

A. Acceptable manufacturers:
1 Custom Cast Stone.
2. Architectural Concrete Co., Inc., “Tannerstone”.
3. Edwards Precast and Cast Stone Co.
4. Continental Cast Stone Inc.
5. W.N. Russel and Co.

B. Color: As selected from manufacturer’s full range.

C. Surface Finish: Exposed surface shall exhibit a fine grained texture similar to that of natural stone. No bugholes or air voids will be permitted.

D. Thickness and profile: As indicated on Drawings.

E. Materials:
1. General: Comply with ASTM C 1364 and the following:
2. Portland cement: Type I of III, white or natural grey, ASTM C 150, containing not more than 0.60 percent total alkali when tested according to ASTM C114.
3. Coarse aggregates: Granite, quartz or limestone; ASTM C33 except for gradation as required to achieve desired finish and texture..
4. Fine Aggregates (sand): Carefully graded and washed natural sands, or manufactured granite, quartz or limestone sands; ASTM C33 except for gradation.
5. Colors - Inorganic, natural or synthetic, iron oxide pigments; ASTM C 979.
6. Admixtures: ASTM C 494.
7. Water: Clean and potable.
8. Air entrainment: Wet cast mixtures shall maintain 5 to 7 percent air entrainment where surfaces are exposed to freeze-thaw; ASTM C 260, certified by manufacturer to be compatible with other admixtures used.
9. Reinforcement (when necessary for handling, setting and structural stresses: New billet steel reinforcing bars; ASTM A615, Grade 40 or 60.
10. Embedded anchors and other inserts: Fabricated from stainless steel, Type 304.

2.2 MORTAR

A. Mortar for grout - Type N ASTM C270, comprised of the following:
1. Portland Cement: ASTM C150, Type II, low alkali. Only one brand shall be used throughout work.
2. Sand: (Fine aggregates) ASTM C144, clean and sharp.
3. Lime: Hydrated lime per ASTM C207, Type S, containing 85 percent calcium by weight.
4. Water: Clean and potable.

B. Mortar pigment for pointing mortar: Provide lime and alkali-proof Mineral oxides of colors selected, mixed in accordance with manufacturer's directions. Limitations by weight of cement: 3 percent for carbon black, 15 percent for other pigments. mixed in accordance with manufacturer's directions. Limitations by weight of cement: 3 percent for carbon black, 15 percent for other pigments.

C. Water: Clean and potable.

2.3 ACCESSORIES

A. Anchors, dowels, ties, cramps: ASTM C1242, bronze or stainless steel; non-corrosive; of sizes and configurations required for support of cast stone.

B. Setting shims and spacers: Grove Structural Shims polypropylene 8000 psi; thicknesses as needed for joint widths. Other manufacturers will be acceptable only upon approval of their product by addendum prior to taking of bids.

C. Cleaning solution: Type which will not harm cast stone, joint materials, or adjacent surfaces. Consult cast stone manufacturer for recommended type.

2.4 FABRICATION

A. Cast stone:
1. Fabricate cast stone per ASTM C744 standards and standards specified herein; provide shapes and finishes as specified herein and indicated on Drawings.
2. Form to shapes and sizes as detailed, in largest practicable sizes.
   a. Provide cast-in drips in sills and copings where face of lintel is exposed to rain.
   b. Fabricate sills in one piece; form sills to slope away from window and provide configuration required; provide 1" projection from face of wall with drip.
   c. Fabricate copings to slope toward roof side of wall and parapet; provide 1" projection from face of wall with drip.
5. Fabrication tolerances: The numerically greater of plus or minus 1/8 inch or length/360.
6. Reinforcement where require as specified herein:
   a. Reinforcement shall be galvanized or epoxy coated when covered with less than 2 inches of material.
   b. Material covering reinforcement shall be minimum twice the thickness of diameter or bars.
   c. Area of reinforcement shall be not less than 1/4 of one percent of the cross section area and otherwise as required by ACI 318 Building Code Requirements for Reinforced Concrete.
7. Cure and finish:
   a. Cure units under direst fired stream generator at a minimum temperature of 105 degrees F for a minimum of 6 hours within 12 hours of product fabrication.
   b. Remove cement film from exposed surfaces prior to packaging for shipment.
8. Physical properties:
   a. Compressive dry strength:..... 6000 psi minimum at 28 days, per ASTM 1194
   b. Absorption: ..... 6 percent maximum at 28 days per ASTM C 1195 or ASTM C642

B. Mortar mix:
1. Setting mortar: One part Portland cement, one part lime, six parts sand by volume.
2. Pointing mortar: One part Portland cement, one part lime, three parts sand.
3. Thoroughly mix mortar ingredients in quantities needed for immediate use.
4. Add mortar color in accordance with manufacturer's instructions. Ensure uniformity of mix and coloration.
5. Do not use anti-freeze compounds in mortar.
6. Use mortar within two hours after mixing.
7. If necessary, retemper mortar within two hours of mixing to replace water lost by evaporation.

PART 3 EXECUTION

3.1 INSPECTION

A. Verify that support work and site conditions are ready to receive work of this Section.

B. Establish lines and levels. Protect from disturbance.

C. Beginning of installation means acceptance of existing conditions and support work.

3.2 PREPARATION

A. Clean cast stone prior to erection. Do not use wire brushes or implements which will mark or damage exposed surfaces.

B. If recommended by manufacturer, wet stone sufficiently to take up surface absorption, prior to setting.

3.3 INSTALLATION

A. Erect stone in accordance with stone supplier's instructions and erection drawings.

B. Arrange stone pattern to provide a consistent joint width of 1/4 inch throughout, or as detailed.

C. Install anchors furnished in Section 05500 per manufacturer's approved shop drawings.

D. Use shims and spacers specified herein to ensure alignment. Set stone in full mortar setting bed to support stone over full bearing surface and to establish joint dimensions.

E. To accommodate pointing mortar or sealant and backer rod, rake out joints 5/8 to 3/4 inch. Brush mortar joints clean. To establish sealant joint sizes, refer to Section 07900 for proper joint width/depth ratio.

F. Except at calked joints, fill joints with pointing mortar. Pack and work into voids. Neatly tool surface to slightly concave joint.

G. Tolerances:
1. Positioning of elements: Maximum 1/8 inch from true position.
2. Maximum variation from plane of wall: 1/4 inch in 10 feet; 1/2 inch in 50 feet.
3. Maximum variation between face plane of adjacent panels: 1/16 inch.
4. Maximum variation from plumb: 1/8 inch.
5. Maximum variation of joint width: 1/8 inch in 3 feet.
6. Maximum variation of width of adjacent joints: 1/32 inch.

3.4 CUTTING AND FITTING

A. Obtain approval prior to cutting or fitting any item not so indicated on Drawings.

B. Do not impair appearance or strength of stone work by cutting.

C. When cutting units with a wet saw, always pre-wet unit with clean water. Use a continuous source of fresh water to saw. Immediately after saw cutting, wash cut units with stiff fiber brush and thoroughly rinse with clean water. Failure to follow this procedure may result in units stained by cutting slurry.

3.6 ADJUSTMENT AND CLEANING

A. Brush walls after tooling to remove excess mortar from unit faces as work progresses. If mortar has been allowed to set, remove same with clean wooden paddle.

B. If post-construction cleaning is required, clean a small, hidden (as approved by Architect) test area. Have the same person(s) who will clean the wall clean the test area. Before proceeding further, obtain Architect's approval.

C. Wash down and brush walls to remove mortar and stains. Use only non-acid detergents and clean water with fiber brushes. Start at top of the wall and work down. Clean walls in small areas at a time; finish that area before the cleaning solution dries. Rinse cleaned area thoroughly before moving on to another area.

D. Should specified cleaning methods be insufficient, proceed with other methods only with the advice from cast stone manufacturer and as approved by Architect.

E. Do not use wire brushes for cleaning.

F. When using high pressurized washing systems, Exercise extreme care (especially with smooth face material) not to damage unit. Limit pressure to no more than 300 psi. In any case, use only a fan-shaped nozzle no closer than 12 inches to unit.

END OF SECTION

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