SECTION 04400
MASONRY

PART 1 - GENERAL

1.01 SCOPE

A. Furnish all labor, materials, equipment and incidentals required to construct all masonry work as shown on the Drawings and specified herein.

B. The work under this Section includes, but is not necessarily limited to, the following:

1. Concrete masonry units (CMU).
2. Reinforced CMU lintels.
3. Masonry reinforcing, ties and anchors.
4. Grouting required throughout the project.
5. Cavity wall insulation.
6. Splash blocks.
7. Membrane flashing.
8. Metal drip edge.
9. Mortar net.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 03600 – Grout

B. Section 04255 – Masonry Veneer Systems

C. Section 05500 – Miscellaneous Metal.

D. Section 07280 – Air/Vapor Barrier Membrane

E. Section 07900 - Caulking and Sealants.

1.03 SUBMITTALS

A. Submittals shall be made in accordance with the requirements of the General Conditions of the Contract Documents. In addition, the following specific information shall be provided:

1. 2 samples each of concrete masonry units.
2. Before commencing with the layout of any architectural masonry, construct sample masonry panel(s) for brick and/or concrete masonry exposed in finished work. Build panel(s) 4 ft. long x 2 ft. long x 6 ft. high by the required thickness as indicated on the drawings, with facing brick on one side, and concrete masonry units on other side and incorporating joint reinforcement, vertical control joint, specialty shapes, insulation, air vapor/barrier membrane, accessories, weepholes and flashings, face units and backup units as indicated.

a. Construct sample panel at project site location designated by the Engineer to allow acceptance by the Engineer prior to start of masonry work. Sample panel(s) shall not be built in, or as part of the structure, but shall be located where directed.

b. Construct sample panel(s) using specified materials and methods of construction, conforming to indicated shape, surface finish, color and texture range, mortar color, bond pattern, and joint finish.

c. Upon acceptance by the Engineer, sample panel(s) shall become the standard of workmanship and acceptance for represented masonry work. Do not start masonry work for which sample panel(s) are required until sample panel(s) have been accepted.

3. Manufacturer's specifications and instructions for each manufactured product including, but not limited to, pigments, etc. Indicate that copy of each applicable instruction has been distributed to the Masonry Installer if other than the Contractor.

1.04 QUALITY ASSURANCE

A. Reference Standards: Comply with the applicable provisions and recommendations of the latest edition following, except as otherwise shown or specified.

1. NCMA National Concrete Masonry Association.
2. ASTM C67 - Standard Test Methods for Sampling and Testing Brick and Structural Clay Tile; 2009.
3. ASTM C126 - Standard Specification for Ceramic Glazed Structural Clay Facing Tile, Facing Brick, and Solid Masonry Units; 2010.
4. ASTM-C-90, C-140, Concrete Masonry Units.
5. ASTM-C-426, Linear Drying Shrinkage.
6. UL618, Standard for Concrete Masonry Units.
7. ASTM A-82, Cold Drawn Steel Wire Reinforcement.
8. ASTM C-150, Requirements for Portland Cement.
9. ASTM C-207, Hydrated Lime.
10. ASTM C-144, C-33, Sand.
11. ASTM C-270, Mortar.
12. ASTM C-476-71, Grout.
13. ASTM C-615, Reinforcing Bar.

1.05 PRODUCT DELIVERY. STORAGE AND HANDLING

A. All perishable materials for the work of this Section shall be delivered, stored and handled so as to preclude damage of any nature. Manufactured materials, such as cement and lime, shall be delivered and stored in their original containers, plainly marked with identification of material and maker. Materials in broken containers, or in packages showing water marks or other evidence of damage, shall not be used and shall be removed from the site.

B. All masonry shall be shipped stacked with hay or straw protection or other suitable protective device, and shall be similarly stacked off the ground on the site in a dry location. In addition, all

masonry stored on the site shall be protected from the weather and staining with the use of tarpaulins or other covering approved by the Engineer. If units become wet, do not install until they are dry.

C. Mason's sand shall be protected during shipping, storage and while on job site to prevent contamination.

1.06 COLD WEATHER CONSTRUCTION

A. Masonry construction in cold weather shall conform to the applicable requirements of "Cold Weather Concrete Masonry Construction" of the National Concrete Masonry Association (NCMA).

1.07 WARRANTY

A. Provide a warranty against defective equipment and workmanship in accordance with the requirements of the General Conditions of the Contract Documents.

PART 2 - PRODUCTS

2.01 MATERIALS - MASONRY

A. Concrete Masonry Units

1. Concrete masonry units (CMU) shall conform to ASTM-C-90, normal weight, Grade N, Type II, in color; "natural gray", hollow, load bearing units of 8-in x 16-in nominal face size and bed dimension as shown on the Drawings. All exposed vertical corners shall be bull nosed.
2. CMU shall be free from substances that will cause staining or pop-outs, and shall be fine, even textured wet steam cured for at least 18 hours and then air cured in covered storage for not less than 28 days before delivery. Units shall have a maximum linear drying shrinkage of 0.25 percent (ASTM C-426) and have a moisture content at time of delivery not exceeding 30 percent of total absorption.
3. Units shall be obtained from one manufacturer to insure even color and texture.
4. Provide special units required by the Drawings, including solid, corner, lintels, and jamb units.

2.02 REINFORCING, TIES, AND MISCELLANEOUS

A. Joint Reinforcement Manufacturers:

1. Dur-O-Wal, Inc.
2. Hohmann & Barnard, Inc.
3. Or equal.

B. General:

1. Prefabricated, formed of ASTM A82 cold-drawn steel.
2. Hot-dip galvanized, ASTM A153, Class B-2.

3. Provide reinforcement fabricated of 9 gage deformed side and 9 gage smooth cross wires flush welded together on 16-in. centers.
4. Provide prefabricated special pieces for corners and intersections of walls and partitions.
5. Provide joint reinforcing width according to width and type of wall indicated on drawings.

C. Exterior Cavity Walls:

1. Provide continuous truss type reinforcement with adjustable eye-wire tie system at inside wythe and one longitudinal wire at exterior veneer.
2. Provide 3/16-in. hot-dipped rectangular pintles and 9 gage clip to engage pintle and longitudinal wire in exterior veneer.

D. Single Wythe Walls:

1. Provide truss type reinforcement with two longitudinal wires.

E. Flexible Ties Manufacturer:

1. Manufacturers:
   a. Vee Wall Tie No. VWT and No. 359 Weld-on rod by Hohmann & Barnard, Inc.
   b. Triangle Wire Tie No. 316 and No. 315 weld-on rod by Heckmann Building Products, Inc.
   c. Flex-O-Lok with Type A Weld-on rod by AA Wire Products Co.
   d. Or acceptable equivalent product.
2. Provide flexible ties to tie masonry to steel framing members.
3. Wire Ties: 3/16 in. diameter galvanized, ASTM A153, Class B-2 wire, length to suit job conditions.
4. Weld-On Rods:
   a. 1/4 in. diameter steel wire.
   b. 9 in. overall with a 3/8 in. offset and 4 in. adjustment.

2.03 MORTAR & GROUT MATERIALS

A. Portland cement shall conform to ASTM C150 Type I or II.

B. Lime for masonry mortar shall be hydrated, conforming to ASTM C207, Type S.

C. Sand shall be clean, durable particles, free from injurious amounts of organic matter. The sand shall conform to the limits of ASTM C144. Sand for grout shall conform to ASTM C144 or C33 as required. All Mason's sand to be shipped from one supplier all at once.

D. Water shall be free from injurious amounts of oils, acids, alkalis or organic matter, and shall be clean and fresh.

E. Mortar shall conform to ASTM C270, Type S, consisting of 1 part portland cement, 1/2 part lime, 4-1/2 parts sand, or as otherwise approved by the Engineer. Ingredients shall be accurately measured by volume in boxes especially constructed for the purpose by the Contractor. Measurement by shovel will not be allowed.

F. Colored mortar not required for interior CMU's. .

G. Grout for setting bearing plates, machinery, or any other equipment shall be mixed as recommended by the manufacturer to give the necessary consistency for placing and to give a minimum compressive strength of 3,000 lbs. per square inch in three (3) days.

H. All other grout shall be 1 part Portland cement and 1 part sand.

I. Non-shrink grout shall utilize Embeco Aggregate as manufactured by the Masters Builders Company, Ferrolith by Sonneborn, or equal and shall be proportioned with sand in strict accordance with the manufacturer's instructions for the use intended.

J. Do not use calcium chloride or surfactants in mortar or grout.

2.04 SPLASH BLOCKS

A. Cast-in-place or precast using concrete having a minimum 28 day compressive strength of 3000 psi as specified under Section 03300 except that maximum size aggregate is 5/8 in. and slump is between 1-1/2 in. and 3 in. Provide splash blocks 18 in. x 24 in. by 4 in. thick with sloping, displayed drainage recess cast in top surface, and reinforced with 4 in. by 4 in. 10/10 welded wire mesh.

2.05 LINTELS

A. General:

1. Provide lintels to extend at least eight inches beyond each jamb of the masonry opening.
2. Provide lintels with all surfaces free of cracks, chips, and broken edges.
3. Provide lintels sized for wall thickness and masonry opening and with 3/8-in. allowance in height, width, and length for mortar joints.

B. Block Lintels:

1. Provide block lintels fabricated from standard lintel-type concrete masonry units of same material and texture as units in adjoining work, reinforced as indicated, and filled with grout having a minimum 28 day compressive strength of 2,500 psi as specified.

C. Steel Lintels:

1. Install galvanized steel lintels as specified under Section 05500.

2.06 VERTICAL REINFORCEMENT

A. Contractor shall furnish vertical reinforcement and dowels as specified under Section 03200.

2.07 CAVITY WALL INSULATION

A. Extruded, closed cell, polystyrene.

B. ASTM C578, Type IV. Factory Mutual approved for a Class I, fire rating.

C. R-Value: 6.7 in accordance with ASTM C518.

D. Compressive Strength: 25 lb./in.2 minimum in accordance with ASTM D1621.

E. Provide in thickness as indicated.

2.08 MEMBRANE FLASHING

A. Provide 40 mil thick thru-wall flashing consisting of a 36 mil self-adhering rubberized asphalt membrane laminated to an 4 mil high density polyethylene film with silicone treated release sheet.

B. Products:

1. CCW-705-TWF Thru-Wall Flashing by Carlisle Coatings & Waterproofing Inc.
2. Perm-A-Barrier Wall Flashing by Grace Construction Products.
3. Blueskin SA Air/Vapor Barrier Membrane by Monsey Bakor.
4. Or equal.

2.09 METAL DRIP EDGES

A. Fabricate metal drip edges from 0.0156-in. thick stainless steel.

B. Extend drip edge at least 3-in. into wall and ½-in. out from wall, with a hemmed outer edge bend down 30 degrees.

2.10 MORTAR NET

A. Mortar net shall be high density polyethylene, 90% open plastic mesh with dove tail shape.

2.11 COMPRESSIBLE JOINT FILLER

A. Closed cell neoprene conforming to ASTM D1056, Class RE41.

B. Manufacturers:

1. D/A 2010 Rapid Soft Joint by Duro-O-Wal, Inc.
2. #NS-Closed Cell Neoprene Sponge by Hohmann & Barnard, Inc.
3. 3330 Horizontal Expansion Joint by Masonry Reinforcing Corp. of America.
4. 030 Soft Joint by National Wire Products Industries.
5. Or equal.

2.12 WATER REPELLENCY

A. All split face or smooth face units shall be manufactured using an integral liquid polymeric water-repellent admixture. This admixture shall be introduced into the concrete mix in doses proven to render the units permanently water-repellent.

B. On all exterior walls the use of a matching integral liquid polymeric water-repellent admixture for the mortar shall be used.

PART 3 - EXECUTION

3.01 MORTAR

A. Mortar shall be machine mixed in an approved type of mixer in which the quantity of water can be accurately and uniformly controlled. The mixing time shall not be less than 5 minutes, approximately 2 minutes of which shall be for mixing the dry materials and not less than 3 minutes for continuing the mixing after the water has been added.

B. Where the dry-mix method is employed, the materials for each batch shall be well turned over together until the even color of the mixed, dry materials indicates that the cementitious material has been thoroughly distributed throughout the mass, after which the water shall be gradually added until a thoroughly mixed mortar of the required plasticity is obtained.

C. Mortar boxes shall be cleaned out at the end of each day's work, and all tools shall be kept clean. Mortar that has begun to set shall not be used.

3.02 MASONRY - INSTALLATION

A. No material, which is frozen or covered with frost or snow shall be used in the construction, and no anti freeze salts or ingredients shall be mixed with the mortar. Masonry shall not be laid at temperatures below 40 degrees F, without the approval of the Engineer, and all work shall be done in such a manner as to insure the proper and normal hardening of all mortar. All masonry work shall be so protected and heated that the temperature at the surface will not fall below 50 deg F for a period of 72 hours after placing. Any completed work found to be affected by freezing shall be taken down and rebuilt by the Contractor at his expense.

B. All CMU shall be laid in a full bed of mortar, applied to shells only. Butter the vertical joint of unit already set in the wall and all contact faces of the unit to be set. Each unit shall be placed and shoved against the unit previously laid so as to produce a well compacted vertical mortar joint for the full shell thickness. Units shall set with all cells in a vertical position. The moisture content of the units when laid shall not exceed 35 percent of the total absorption as determined by laboratory test.

C. All masonry units shall be laid in stretcher (running) bond unless otherwise shown. Tool dense and neat.

D. Sizes shall be as specified and called for on the Drawings, and where "Soaps" and "Splits" are used, the space between these members and the backup material shall be slushed full of mortar.

E. Joints of all masonry shall be tooled in accordance with the following:

1. Wait until unit mortar is thumb-print hard before tooling joint.
2. The required personnel of the Contractor shall be kept on the job after hours, if necessary, to properly tool joints.
3. Both vertical and horizontal joints shall be maintained uniform in spacing.

4. Joints for CMU shall be 3/8-in.

5. Concurved.

F. Install all frames required to be set in masonry, set masonry tightly against frames, build in all frame anchors.

G. Surfaces shall be brushed as work progresses and maintained as clean as it is practicable. Unfinished work shall be raked back where possible, and toothed only where absolutely necessary. Before leaving fresh or unfinished work, walls shall be fully covered and protected against rain and wind and before continuing work previously laid shall be swept clean. The tops of walls or other unfinished work shall be protected against all damaged by frost or the elements by means of waterproof paper, tarpaulins, boards or other means approved by the Engineer.

The Contractor shall build in all miscellaneous items to be set in masonry for which placement is not specifically provided under separate Divisions, including, lintels, ties, electrical panel boxes, sleeves, vents, grilles, anchors, grounds, and exterior electric conduits and fixtures, and shall cooperate with other trades whose work is to be coordinated with the work under this Section.

H. All anchorage, attachment, and bonding devices shall be set so as to prevent slippage and shall be completely covered with mortar or grout.

I. All ties and reinforcing for masonry shall be furnished and installed by the Contractor.

3.03 VERTICAL REINFORCEMENT

A. Place steel reinforcement bars vertically in all masonry walls as indicated.

B. Locate vertical reinforcement and dowels in first cells of CMU at jambs of all masonry openings and then space horizontally as indicated.

C. Embed dowels 1-ft.-6-in. into reinforced concrete at top and bottom of CMU walls and partitions. Overlap reinforcing 2-ft.-0-in. using 6-ft.-0-in. maximum length bars.

D. Grout cells as specified.

3.04 CUTTING AND JOBBING

A. Leave slots and opening for inserts, wires, conduits, and similar items of construction, open or cut.

B. Provide recesses or openings at junction boxes, or other locations as indicated.

C. Provide openings in exterior walls and interior partitions at duct, conduit, exhaust and other wall penetrations. Bridge above openings using concrete masonry units. Reinforced masonry lintels shall be provided at openings greater than 1-ft.-4-in. Install membrane wall flashing at exterior wall openings.

D. Masonry units to be dried to 35 percent moisture content from prior cutting or grinding before installation of mechanical and electrical services.

3.05 PARTITIONS

A. Partitions shall be continuous from floor to underside of roof deck as indicated. An isolation joint shall be placed in the intersection between partitions and structural members. Continuous sealants shall be provided at all isolation joints as specified in Section 07900.

3.06 BOND BEAMS

A. Bond beams shall be filled with grout and reinforced as indicated.

3.07 COMPRESSIBLE JOINT FILLERS

A. Compressible joint fillers shall be provided as indicated and where directed by the Engineer.

3.08 CAVITY WALL INSULATION

A. Install insulation to cavity wall air/vapor barrier membrane with mastic as recommended by the manufacturer of the insulation at 1 ft. both horizontally and vertically on the inside face. Mastic to be compatible with air/vapor barrier membrane. Fit the courses of insulation between wall ties or horizontal joint reinforcement and other confining obstructions in the cavity. Tightly butt edges of insulation in both directions. Press insulation units firmly into place against the inside wythe

of masonry or against other construction including structural members to form a continuous thermal barrier.

B. Seal joints between insulation units by applying adhesive, mastic or sealant, recommended by the insulation manufacturer, to edges of each unit to form a tight seal as units are shoved into place. Fill the voids in the completed installation with adhesive, mastic or sealant recommended by the insulation manufacturer.

C. Complete installation and concealment of insulation to avoid prolonged exposure of insulation to direct sunlight by covering exposed insulation.

3.09 MEMBRANE FLASHING INSTALLATION AND COORDINATION

A. Self-Adhered, Composite Flexible Membrane Flashing: Prepare masonry surfaces to receive flashings smooth and free of projections. Install flashing to dry surfaces at air and surface temperatures of 25 deg. F. and above in accordance with manufacturer's recommendations at locations indicated.

1. Precut pieces of flashing to easily handled lengths for each location.
2. Remove release paper and position flashing carefully before placing it against the surface.
3. When properly positioned, place against surface by pressing firmly into place by hand roller or a blunt object. Fully adhere flashing to substrate to prevent water from migrating under flashing.
4. Overlap adjacent pieces 2 inches and roll all seams with a steel hand roller or a blunt object.
5. Install metal drip edges beneath flashing at exterior face of wall. Stop flashing ½-in. back from outside face of wall and adhere flashing to top of metal drip edge.

6. At heads, sills and all flashing terminations, turn up ends a minimum of 2 inches and make careful folds to form an end dam, with the seams sealed.

7. Do not allow the rubberized asphalt surface of the flashing membrane to come in contact with polysulfide sealants, creosote, uncured coal tar products or EPDM.

8. Do not expose flashing membrane to sunlight for more than thirty days prior to enclosure.

B. Accessories:

1. Apply surface conditioner at rate recommended by the manufacturer, prior to flashing installation. Allow surface conditioner to dry completely before flashing application.

2. Apply a bead or trowel coat of mastic along flashing top edge, seams, cuts and penetrations.

3.10 FIELD QUALITY CONTROL

A. Repair joints that are unsound, not full of mortar, or which have hairline cracks due to shrinkage or poor adhesion, as follows:

1. Cut or rake affected mortar to a depth of 3/4 in.

2. Brush out debris.

3. Thoroughly moisten remaining mortar and adjoining masonry and paint with neat cement.

4. Point joint full of mortar.

5. Tool joint to a hard, glassy surface.

6. After first day, wet down walls having repaired joints, at least five times daily, for a minimum of three days.

B. Remove and reconstruct work injured by climatic conditions, or because of insufficient protection as directed by the Engineer and at no additional cost to the Owner.

C. Pointing consists of raking out defective joints, and stack bond pattern joints; repairing defective joints; and working joint after mortar has initially set.

1. Joints except control joints, joints in stack bond pattern and joints to be sealed: Tool concave in a manner which will compact and press the mortar against the units. Strike flush joints covered with plaster, drywall, or waterproofing membrane.

2. Control joints, expansion joints and joints to be sealed shall not contain mortar.

3. Defective joints: Rake out the full depth of the joint, patch with mortar, and tool to match adjacent joints.

D. Apply cleaning agent to sample wall area of 20 sq. ft. in location acceptable to Engineer if cleaning by water does not produce satisfactory results to the Engineer.

1. Do not proceed with cleaning until sample area is acceptable to Engineer.

2. Follow manufacturer's printed instructions.

3. Scrub with approved cleaning agent.

4. Immediately rinse with clear water.

5. Work small sections at a time.

6. Work from top to bottom.

7. Protect sash, metal lintels, and other materials which may corrode when masonry is cleaned with acid solution.

E. When left overnight, cover tops of wythes of masonry walls with a by waterproof membrane extending at least 24 inches down both sides. Protect masonry left for greater length of time in accordance with requirements specified in Section 01500. When work is resumed, clean all top surfaces of loose mortar. Wet units thoroughly, except concrete masonry units when required as specified.

3.11 FIELD TESTING

A. Test concrete masonry units in accordance with ASTM C140.

B. A minimum of two specimens of mortar shall be taken each day. A layer of mortar 1/2 to 5/8 in. thick shall be spread on the masonry units and allowed to stand one minute. The specimens shall then be prepared and tested for compressive strength in accordance with ASTM A 780.

C. Test grout compressive strength in accordance with ASTM C1019. A minimum of two specimens of grout per day shall be sampled and tested. Each specimen shall have a minimum ultimate compressive strength of 2,500 psi at 28 days.

D. Efflorescence Test: Brick which will be exposed to weathering shall be tested for efflorescence. Tests shall be scheduled far enough in advance of starting masonry work to permit retesting if necessary. Sampling and testing shall conform to the applicable provisions of ASTM C 67. Units meeting the definition of "effloresced" will be subjected to rejection.

E. Prism Tests: At least one prism test sample shall be made for each 465 square meters of wall but not less than three such samples shall be made for any building. Three prisms shall be used in each sample. Prisms shall be tested in accordance with ASTM E447.

3.12 CONSTRUCTION TOLERANCES

A. Variation from Plumb: Do not exceed the following construction tolerances in vertical elements, including surfaces of walls, columns, and pilasters:

1. 1/4 inch in 10 feet.

2. 3/8 inch in one story height, or 20 feet, whichever is less, except 1/4 inch for external corners, expansion joints, and other highly conspicuous vertical elements.

3. 1/2 inch in 40 feet or more.

4. Plus or minus 1/4 inch in 10 feet, 1/2 inch maximum, for vertical alignment of head joints.

B. Variation from Level: Do not exceed the following construction tolerances for bed joints and lines of exposed lintels, sills, parapets, horizontal grooves, and other conspicuous horizontal elements:

1. 1/4 inch in one bay or in 10 feet maximum.
2. 1/2 inch in 20 feet or more.

C. Variation from Plan Lines: Do not exceed the following horizontal construction tolerances for related portions of columns, walls, and partitions:

1. 1/2 inch in any bay or in 20 feet maximum.
2. 3/4 inch in 40 feet or more.

D. Variation in Cross Section: Do not exceed the following construction tolerances for thickness of walls and other masonry elements:

1. Minus 1/4 inch.
2. Plus 1/2 inch.

E. Variation in Mortar Joint Thickness: Do not exceed the following construction tolerances for thickness of mortar joints:

1. Bed joints: Plus or minus 1/8 inch.
2. Head joints: Minus 1/4 inch, plus 3/8 inch.

3.13 CLEANING

A. All holes in exposed masonry shall be pointed, and defective joints shall be cut out and repointed with mortar of same color as that of the original and adjoining work.

B. Exposed masonry shall be protected against staining by wall coverings, and excess mortar shall be wiped off the surface as the work progresses.

C. All masonry shall be cleaned with approved detergent solution in accordance with manufacturer's printed directions. No acid or metal scrapers shall be used on masonry.

END OF SECTION 04400

SECTION 04812
GLASS UNIT MASONRY

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Glass masonry units.

B. Mortar bed and pointing mortar.

C. Perimeter treatment.

1.02 RELATED REQUIREMENTS

A. Section 04065 - Mortar and Masonry Grout: Mortar for glass unit masonry.

1.03 REFERENCE STANDARDS

A. ACI 530/530.1/ERTA - Building Code Requirements and Specification for Masonry Structures; American Concrete Institute International.

B. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

C. ASTM C270 - Standard Specification for Mortar for Unit Masonry.

D. ASTM C780 - Standard Test Method for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry.

1.04 SUBMITTALS

A. See General Conditions for submittal procedures and requirements.

B. Product Data: Provide data for glass units and accessories.

C. Samples: Submit two glass units and two curved units illustrating color, design, and face pattern.

D. Manufacturer's Installation Instructions: Indicate special procedures, positioning of reinforcement, perimeter conditions requiring special attention.

E. Maintenance Materials: Furnish the following for the Owner's use in maintenance of project.

F. Extra Glass Units: Ten of each type, size, and pattern combination.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of documented experience.

B. Installer Qualifications: Company specializing in performing the work of this section with minimum 5 years of documented experience.

1.06 MOCK-UP

A. Construct one mock-up, 4 feet long by 4 feet high; include glass units with head, jamb, and sill conditions, and perimeter chase and construction.

B. Locate where directed.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Accept glass units on site on pallets; inspect for damage.

1.08 FIELD CONDITIONS

A. Cold and Hot Weather Requirements: Comply with requirements of ACI 530/530.1/ERTA or applicable building code, whichever is more stringent.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Glass Units:

1. Pittsburgh Corning Corporation; Product Decora: www.pittsburghcorning.com, or equal. Pittsburg Corning Corporation Product Decora is the basis of design and is approved for use.
2. Nippon Electric Glass Co. Ltd: www.neg.co.jp/arch.
3. Weck Glass Blocks: www.glashaus.com.

2.02 GLASS UNITS

A. Hollow Glass Units: Unit core filled with white thermal insulation. Permanently seal hollow unit by heat fusing joint; with joint key to assist mortar bond.

1. Provide specially shaped units where indicated, including corners, curved units, and end units.
2. Nominal Size: 4 inch by 8 inch by 8 inch.
3. Color: Clear glass.
4. Pattern and Design: similar to Decora.
5. Insulation Value: U value of.51 BTU/sq ft/h/degree F.
6. Shading Coefficient:.65.
7. Acoustic Sound Loss: 50 decibels.

2.03 ACCESSORIES

A. Panel Reinforcement: Steel, galvanized after fabrication in accordance with requirements of ASTM A123/A123M:

1. Side Rods: Two 9 gage rods spaced 2 inches apart.
2. Cross Rods: 14 gage rods welded 8 inches on center.

B. Expansion Strips: Dense glass fiber matting, 7/16 inches by 4 inches nominal size.

C. Panel Anchors: Steel strips, 20 gage thick x 1 3/4 inch wide; punched with three rows of elongated holes, pattern staggered, hot dip galvanized after fabrication in accordance with requirements of ASTM A123/A123M.

D. Perimeter Channel: Extruded aluminum channel profile, 4-3/4 inch by 1-1/4 inch by 1/8 inch size, one piece per length installed, uncoated finish.

E. Asphalt Emulsion: Water based.

2.04 MORTAR AND POINTING MATERIAL

A. Mortar: ASTM C270, Type M using the Proportion specification as specified in Section 04065.

B. Pointing Mortar: ASTM C270, Type M using the Proportion specification with maximum 2 percent ammonium stearate or calcium stearate per cement weight, with beach sand aggregate.

2.05 MORTAR MIXING

A. Mix mortar ingredients in accordance with Section 04065.

B. Thoroughly mix mortar ingredients in accordance with ASTM C270 in quantities needed for immediate use.

C. Do not use anti-freeze compounds to lower the freezing point of mortar.

D. If water is lost by evaporation, re-temper only within two hours of mixing.

E. Use mortar within two hours after mixing at temperatures of 90 degrees F, or two-and-one-half hours at temperatures under 40 degrees F.

2.06 MIX TESTS

A. Testing of Mortar Mix: In accordance with ASTM C780 for compressive strength, consistency, mortar aggregate ratio, water content, air content, and splitting tensile strength.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify that openings are ready to receive work.

3.02 PREPARATION

A. Clean glass units of substances that may impair bond with mortar or sealant.

B. Establish and protect lines, levels, and coursing.

C. Protect elements surrounding the work of this section from damage and disfigurement.

3.03 INSTALLATION

A. Erect glass units and accessories in accordance with manufacturer's instructions.

B. Locate and secure perimeter metal channel.

C. Coat sill under units with asphalt emulsion as a bond breaker, and allow to dry.

D. Set panel anchors in mortar bed directly over coating.

E. Provide full mortar joints. Furrowing is not permitted. Remove excess mortar.

F. Maintain uniform joint width of 1/4 inch.

G. Place panel reinforcement at every second horizontal joint in full mortar bed and at first course above and below openings within the glass unit panel.

H. Lap reinforcement joints 6 inches. Discontinue reinforcement at expansion joints.

I. Isolate panel from adjacent construction on sides and top with expansion strips concealed within perimeter trim. Keep expansion joint voids clear of mortar.

J. Shore assembly until setting bed will maintain panel in position without movement.

K. To accommodate pointing mortar, rake out joints 5/8 to 3/4 inch.

L. Fill joints with pointing mortar. Pack into voids. Neatly tool surface to a concave profile.

M. Remove excess mortar.

3.04 TOLERANCES

A. Variation From Joint Width: Plus 1/8 inch and minus 0 inches.

B. Maximum Variation from Plane of Unit to Adjacent Unit: 1/32 inch.

C. Maximum Variation of Panel from Plane: 1/8 inch.

3.05 CLEANING

A. Clean and polish faces of glass unit masonry, using materials and technique that will not scratch or deface units.

3.06 PROTECTION

A. Maintain protective boards at exposed external corners. Provide protection without damaging completed work.

END OF SECTION 04812