SECTION 04200

BRICK, CONCRETE MASONRY UNITS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and Specification Sections, apply to this Section.

1.02 SUMMARY

A. This Section includes the following:
   1. Brick unit masonry, modular sized water-struck brick.
   2. Concrete masonry units- standard.

1.03 RELATED SECTIONS: The following sections contain requirements that relate to this Section:

A. Products installed but not furnished under this Section include the following:
   1. Steel lintels in unit masonry are detailed on structural drawings.
   2. Wood nailers and blocking built into unit masonry are specified in Division 6 Section "Rough Carpentry."
   3. Hollow metal frames in unit masonry openings are specified in Division 8 Section "Steel Doors and Frames."
   4. Aluminum Storefront in Division 8 08411
   5. Glazed Aluminum Curtain Wall 08911

1.04 SYSTEM PERFORMANCE REQUIREMENTS

A. Provide unit masonry that develops the following installed compressive strengths (f'm):
   1. For brick masonry: As follows:
      f'm = 2000 psi minimum.
   2. For concrete masonry unit: As follows
      fm = 1500 psi minimum.

1.05 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.

B. Product data for each different masonry unit, accessory, and other manufactured product indicated.

C. Shop drawings for reinforcing detailing fabrication, bending, and placement of unit masonry reinforcing bars. Comply with ACI 315 "Details and Detailing of Concrete Reinforcing" showing bar schedules, stirrup spacing, diagrams of bent bars, and arrangement of masonry reinforcement.

D. Samples for verification purposes of the following:
   1. Full-size units for each different exposed masonry unit required showing full range of exposed color, texture, and dimensions to be expected in completed construction.

E. Accessories embedded in the masonry.
F. Cold-weather construction procedures evidencing compliance with requirements specified in referenced unit masonry standard.

1.06 QUALITY ASSURANCE

A. Preconstruction Tests by Unit Test Methods: Test the following materials by methods indicated:
   1. Brick Masonry Units: Test each type, class and grade of brick masonry units per ASTM C - 216 for grade SW Type FBS modular extruded brick.
   2. Mortar Tests: Test each mortar type per ASTM C 780.

1.07 SUBMITTALS

A. General: Submit manufacturer's product data for each type of masonry unit, accessory, and other manufactured products, including certifications.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Store masonry off ground to prevent contamination by mud, dust, slats, or materials likely to cause staining or other defects.

B. Cover materials as necessary to protect from the elements.

C. Protect anchors, ties, and reinforcement from elements.

1.09 PROJECT CONDITIONS

A. Protection of Work: During erection, cover top of walls with heavy waterproof sheeting at end of each day's work. Cover partially completed structures when work is not in progress.
   Extend cover a minimum of 24 inches down both sides and hold cover securely in place.
   Do not apply uniform floor or roof loading for at least 12 hours after building masonry walls or columns.

B. Staining: Prevent grout or mortar or soil from staining the face of masonry to be left exposed. Remove immediately grout or mortar in contact with such masonry. Protect base of walls from rain-splashed mud and mortar splatter by means of coverings spread on ground and over wall surface.
   Protect sills, ledges and projections from droppings of mortar.

C. Cold Weather Protection:
   1. Do not lay masonry units which are wet or frozen.
   2. Remove any ice or snow formed on masonry bed by carefully applying heat until top surface is dry to the touch.
   3. Remove all masonry determined to be damaged by freezing conditions.
   4. Perform the following construction procedures while masonry work is progressing. Temperature ranges indicated below apply to air temperatures existing at time of installation except for grout. For grout, temperature ranges apply to anticipated minimum night temperatures. In heating mortar and grout materials, maintain mixing temperature selected within 10 deg F (6 deg C).
      a. 40 deg F (4 deg C) to 32 deg F (0 deg C):
         Mortar: Heat mixing water to produce mortar temperature between 40 deg F (4 deg C) and 120 deg F (49 deg C).

Grout: Follow normal masonry procedures.

b. 32 deg F (0 deg C) to 25 deg F (-4 deg C):
   Mortar: Heat mixing water and sand to produce mortar temperature between 40 deg F (4 deg C) and 120 deg F (49 deg C); maintain temperature of mortar on boards above freezing.
   Grout: Heat grout materials to 90 deg F (32 deg C) to produce in-place grout temperature of 70 deg F (21 deg C) at end of work day.
c. 25 deg F (-4 deg C) to 20 deg F (-7 deg C):
   Mortar: Heat mixing water and sand to produce mortar temperature between 40 deg F (4 deg C) and 120 deg F (49 deg C); maintain temperature of mortar on boards above freezing.
   Grout: Heat grout materials to 90 deg F (32 deg C) to produce in-place grout temperature of 70 deg F (21 deg C) at end of work day.
   Heat both sides of walls under construction using salamanders or other heat sources.
   Use windbreaks or enclosures when wind is excess of 15 mph.
d. 20 deg F (-7 deg C) and below:
   Mortar: Heat mixing water and sand to produce mortar temperature between 40 deg F (4 deg C) and 120 deg F (49 deg C).
   Grout: Heat grout materials to 90 deg F (32 deg C) to produce in-place grout temperature of 70 deg F (21 deg C) at end of work day.
e. Masonry Units: Heat masonry units so that they are above 20 deg F (-7 deg C) at time of laying:
   Provide enclosures and auxiliary heat to maintain an air temperature of at least 40 deg F (4 deg C) for 24 hours after laying units.
   Do not heat water for mortar and grout to above 160 deg F (71 deg C).

5. Protect completed masonry and masonry not being worked on in the following manner. Temperature ranges indicated apply to mean daily air temperatures except for grouted masonry. For grouted masonry, temperature ranges apply to anticipated minimum night temperatures.
   a. 40 deg F (4 deg C) to 32 deg F (0 deg C):
      Protect masonry from rain or snow for at least 24 hours by covering with weather-resistive membrane.
   b. 32 deg F (0 deg C) to 20 deg F (-7 deg C):
      Completely cover masonry with weather-resistive insulating blankets or similar protection for at least 24 hours, 48 hours for grouted masonry.
   c. 20 deg F (-7 deg C) and below:
      Except as otherwise indicated, maintain masonry temperature above 32 deg F (0 deg C) for 24 hours using enclosures and supplementary heat, electric heating blankets, infrared lamps or other methods proven to be satisfactory. For grouted masonry maintain heated enclosure to 40 deg F (4 deg C) for 48 hours.

PART 2 - PRODUCTS

2.01 MASONRY UNITS, GENERAL

Manufacturer: Obtain masonry units from one manufacturer, of uniform texture and color for each kind required, for each continuous area and visually related areas.

Masonry Unit Characteristics: Provide units complying with standards referenced and requirements indicated. Masonry units selected and herein specified have been selected for size, texture, and color. Substitutions may be made if minimum requirements listed below are met and ARCHITECT approves substitution based on visual qualities and consistency.

A. Concrete Masonry Units (CMU):
   1. General: Comply with referenced standards and other requirements indicated below applicable to each form of concrete masonry unit required.
   2. Size: A. Manufacturer's standard units with nominal face dimensions unless otherwise indicated.

   3. Special Shapes: Provide where required for lintels, corners, jambs, sash, control joints, headers, bonding and other special conditions at coping.
   4. Hollow Load-Bearing CMU: ASTM C 90; Grade N.
   5. Weight Classification: Normal weight units unless otherwise indicated. (125 lbs. per cu. ft. or more, oven dry weight of concrete).
   6. Cure units in a moisture-controlled atmosphere or in an autoclave at normal pressure and temperature to comply with ASTM C 90, Type I.
      Limit moisture absorption during delivery and until time of installation to the maximum percentage specified for Type I units for the average annual relative humidity as reported by the U.S. Weather Bureau Station nearest the project site.

B. Brick Masonry Units:
   1. General: Comply with referenced standards and other requirements indicated below applicable to the brick masonry units required.
   2. Sizes; Manufacturers standard units - 2-1/4" x 3-5/8" x 7-5/8".
      special shapes - Provide where required for lintels, corners, jambs, sills, sash, control joints, headers, bonding and all special conditions.
   3. Brick Masonry: Brick by Morin Brick Co., Colony Red Water-Struck – no substitution.
   4. Efflorescence: Provide brick tested according to ASTM C67 and is rated non-efflorescenced.

2.02 MORTAR AND GROUT MATERIALS

A. Portland Cement: ASTM C 150, Type I or Type II, unless otherwise approved by Engineer. Provide full range of color options for architect’s selection. Tinted mortar SGS 8SH Dark Chocolate

B. Masonry Cement: to be approved for this project.

C. Hydrated Lime: ASTM C 207, Type S.

D. Aggregate for Mortar: ASTM C 144, except for joints less than 1/4" use aggregate graded with 100% passing the No. 16 sieve.

E. Aggregate for Grout: ASTM C 404.

F. Water: Clean and potable.

2.03 WATER REPELLENT ADMIXTURE

A. Concrete masonry units to contain water repellent admixture at time of manufacture.

B. Mortar and grout to contain water repellent admixture.

C. Available Products: Subject to compliance with requirements, products that may be incorporated in

the work include, but are not limited to, the following:
1. Dryblock System, W.R. Grace or Adaiment Block Plus W-10.

2.04 MASONRY ACCESSORIES

A. Drainage System: York Manufacturing flash vent 3 oz. NP System. Using great seal LT-100 liquid tape.

B. Horizontal Joint Reinforcing and Ties for Masonry:
   1. Provide welded wire units prefabricated in straight lengths of not less than 10', with matching corner ("L") and intersecting ("T") units. Fabricate from cold-drawn steel wire complying with ASTM A 82, with deformed continuous side rods and plain cross rods, into units with widths of approximately 2" less than nominal width of walls and partitions as required to position side rods for full embedment in mortar with mortar coverage of not less than 5/8" on joint faces exposed to exterior and not less than 1/2" elsewhere. Provide the following type of joint reinforcing unless otherwise indicated:
      a. Ladder type with perpendicular cross rods spaced not more than 16" o.c., at all walls having vertical reinforcing grouted-in-place.
      b. Truss type with diagonal cross rods spaced not more than 16" o.c. at all other walls.
      c. Number of Side Rods: Single pair for single wythe masonry and as indicated for multi-wythe masonry, or if not otherwise indicated, one side rod for each brick wythe and one side rod for each face shell of each concrete masonry wythe.
   2. For multi-wythe walls where indicated provide tab type consisting of single pair of side rods and continuous diagonal truss-type ties. Space side rods for embedment within each face shell of back-up wythe and extend ties to within 1" of exterior face of facing wythe.
      a. At exterior cavity wall construction provide units with adjustable 2-piece triangular ties spaced at 16" o.c.
   3. Wire Sizes: Fabricate with 9-gage side and cross rods, unless otherwise indicated.
   4. Wire Finish: Provide manufacturer's standard mill galvanized finish except as otherwise indicated below.
      a. For exterior walls hot-dip galvanize joint reinforcing after fabrication to comply with ASTM A 153, Class B-2 coating (1.5 oz. per sq. ft.).

C. Individual Wire Ties for Masonry:
   1. Fabricate from 3/16" cold-drawn steel wire, ASTM A 82, unless otherwise indicated, of the length required for proper embedment in wythes of masonry.
   2. For use with hollow masonry units cells laid vertical, provide rectangular shaped ties.
   3. For use with solid masonry units, provide ties with ends bent to 90 deg angles to form hooks not less than 2" long, 2-piece type.
      a. Where spacing and back-up joints do not align, provide either offset or adjustable 2-piece ties.
   4. For exterior walls, fabricate from steel wire with 1.5 oz. hot-dip zinc coating, ASTM A 153 Class B-2, or fabricate from steel wire with not less than 7-mil copper coating, ASTM B 227, Grade 30 HS.

D. Anchors and Ties:
   1. Provide straps, bars, bolts and rods fabricated from not less than 16 ga. sheet metal or 3/8" diameter rod stock, unless otherwise indicated.
   2. Flexible Anchors: Where masonry is indicated to be anchored to structural framework with

flexible anchors, provide 2-piece anchors which will permit horizontal and vertical movement of masonry but will provide lateral restraint.

3. Metal Fasteners for steel studs: Steel drill screws, #10 diameter x length required to penetrate studs
4. For devices which extend into exterior wythe, fabricate from steel with hot-dip galvanized coating, ASTM A 153, Class B-2.

E. Concrete Inserts for Masonry:
1. Unit Type: Furnish cast iron or malleable iron inserts of the type and size shown, hot-dip galvanized after fabrication with 1.5 oz. zinc coating, ASTM A 153, Class B-2.
2. For installation of concrete inserts, see Concrete Sections of these Specifications. Advise Concrete Installer of specific requirements regarding his placement of inserts which are to be used by the Masonry Installer for anchoring of Masonry Work.
3. Flashings for Masonry: (built-in and concealed).
4. Copper-Fabric Laminate: Copper sheet weighing 3 oz. per square foot, bonded with asphalt between 2 layers of cotton fabric cloth.
5. Adhesive for Flashing: Of type recommended by manufacturer of flashing material for use indicated.

F. Miscellaneous Masonry Accessories:
1. Reinforcing Bars: Deformed steel, ASTM A 615, Grade 60 for bars No. 3 to No. 18.
2. Non-Metallic Expansion Joint Strips: Provide premolded, compressible, elastic fillers of foam rubber, neoprene, or extruded plastic.
3. Bond Breaker Strips: 15-lb. asphalt roofing felt complying with ASTM D 226, or 15-lb., coal-tar roofing felt complying with ASTM D 227.
4. Plastic Weepholes: Unless otherwise indicated, provide one piece flexible extrusion medium density polyethylene plastic full depth to form weepholes at top and base of walls.
5. Asphalt Sealer: Asphalt based sealer intended for use in sealing metal from moisture penetration and corrosive.
6. Insulation: SPECIFIED IN DIVISION 7.
7. Washed Pea Stone: Provide 1/4" - 3/8" diameter, smooth, washed clean pea gravel for placement at base of masonry wall cavities and over continuous flexible fabric flashings wherever occurring in cavities, typical. Washed pea stone shall be of sufficient depth to cover weep joints.

2.05 MORTAR AND GROUT MIXES

A. Do not lower the freezing point of mortar by use of admixtures or anti-freeze agents.
1. In no case shall calcium chloride be used in mortar or grout.

B. Mortar for Unit Masonry: Comply with ASTM C 270, Proportion Specification, for types of mortar required, unless otherwise indicated.
1. Limit cementitious materials in mortar to Portland cement-lime.
2. Use Type M mortar for masonry below grade and in contact with earth, and where indicated.
3. Use Type S mortar for concrete masonry units and where indicated.
4. Mortar Color: To be selected. Tinted mortar SGS 8SH Dark Chocolate.

C. Grout for Unit Masonry: Comply with ASTM C 476 for grout for use in construction of reinforced and nonreinforced unit masonry. Use grout of consistency (fine or coarse) at time of placement which will completely fill all spaces intended to receive grout.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other specific conditions, and other conditions affecting performance of unit masonry.
   1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of unit masonry.

B. Examine rough-in and built-in construction to verify actual locations of piping connections prior to installation.

C. Do not proceed until unsatisfactory conditions have been corrected.

3.02 INSTALLATION, GENERAL

A. Comply with referenced unit masonry standard and other requirements indicated applicable to each type of installation included in Project.

B. Thickness: Build cavity and composite walls and other masonry construction to the full thickness shown. Build single-wythe walls to the actual thickness of the masonry units, using units of nominal thickness indicated.

3.03 LAYING MASONRY WALLS

A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint widths and for accurate locating of openings, movement-type joints, returns, and offsets. Avoid the use of less-than-half-size units at corners, jambs, and where possible at other locations.

B. Lay up walls to comply with specified construction tolerances, with courses accurately spaced and coordinated with other construction.

C. Bond Pattern for Exposed Masonry: Lay exposed masonry as shown; do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.

D. Lay concealed masonry with all units in a wythe in running bond or bonded by lapping not less than 2 inches. Bond and interlock each course of each wythe at corners. Do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.

3.04 MORTAR BEDDING AND JOINTING

A. Lay brick and solid concrete masonry units with completely filled bed, head and collar joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not slush head joints.

B. Lay hollow concrete masonry units with full mortar coverage on horizontal and vertical face shells. Bed webs in mortar in starting course on footings and foundation walls and in all courses of piers, columns and pilasters, and where adjacent to cells or cavities to be reinforced or to be filled with concrete or grout. For starting courses on footings where cells are not grouted, spread out full mortar bed including areas under cells.

C. Joints: Maintain joint widths shown, except for minor variations required to maintain bond

alignment. If not otherwise indicated, lay walls with 3/8" joints. Cut joints flush at first course of interior exposed joints to be covered with base. Tool exposed joints slightly concave using a jointer larger than joint thickness. Rake out mortar in preparation for application of caulking or sealants where shown. Vertical joints containing weephole shall remain clear of mortar except at top of wall where weep tubes shall penetrate full depth of tooled, mortar filled joint and where weep joints occur at soldered masonry units.

3.05 STRUCTURAL BONDING OF MULTI-WYTHE MASONRY

A. Use continuous horizontal joint reinforcing embedded in horizontal joints for bond tie between wythes. Install at not more than 16" o.c. vertically as specified. Provide continuity at corners and intersections using prefabricated "L" and "T" units.

3.06 HORIZONTAL JOINT REINFORCING

A. Provide continuous horizontal joint reinforcing as shown and specified. Fully embed longitudinal side rods in mortar for their entire length with a minimum cover of 5/8" on exterior side of walls and 1/2" at other locations. Lap reinforcement a minimum of 6". Do not bridge control and expansion joints with reinforcing, unless otherwise indicated. Provide continuity at corners and wall intersections by use of prefabricated "L" and "T" sections. Cut and bend units as directed by manufacturer for continuity at returns, offsets, column fireproofing, pipe enclosures and other special conditions.

B. Space continuous horizontal reinforcing as follows:
   1. For multi-wythe walls (solid or cavity) where continuous horizontal reinforcing acts as structural bond or tie between wythes, space reinforcing as required by code but not less than 16" o.c. vertically.
   2. For single-wythe walls, space reinforcing at 16" o.c. vertically, unless otherwise indicated.

C. Reinforce masonry openings greater than 1'-0" wide, with horizontal joint reinforcing placed in 2 horizontal joints approximately 8" apart, both immediately above lintels and below sills. Extend reinforcing a minimum of 2'-0" beyond jambs of the opening, bridging control joints where provided.

3.07 ANCHORING MASONRY WORK

A. Provide anchoring devices of the type indicated. If not indicated, provide standard type for facing and back-up involved.

B. Anchor masonry to structural members where masonry abuts or faces such members to comply with the following:
   1. Provide an open space not less than 1" in width between masonry and structural member, unless otherwise shown. Keep open space free of mortar or other rigid materials.
   2. Anchor masonry to structural members with metal ties embedded in masonry joints and attached to structure. Provide anchors with flexible tie sections, unless otherwise indicated.
   3. Space anchors as shown, but not more than 24" o.c. vertically and 36" o.c. horizontally.

C. Lintels:
   1. Install loose steel lintels or precast units where shown and where required for support of construction above with a minimum bearing of 8" at each jamb, unless otherwise indicated.

D. Control and Expansion Joints:
   1. Provide vertical expansion, control and isolation joints in masonry where shown on Drawings. Build in related masonry accessory items as the masonry work progresses.

3.08 FLASHING OF MASONRY WORK

A. Provide concealed flashings in masonry work at, or above, all shelf angles, lintels, ledges and other obstructions to the downward flow of water in the wall so as to divert such water to the exterior.

B. Prepare masonry surfaces to be smooth and free from projections which could puncture flashing. Place through-wall flashing on bed of mortar and cover with mortar. Seal penetrations in flashing with mastic before covering with mortar.

C. Extend flashings the full length of lintels and shelf angles and minimum of 4" into masonry each end. Extend flashing from a line 1/2" in from exterior face of outer wythe of masonry, through the outer wythe, turned up a minimum of 4", and through the inner wythe to within 1/2" of the interior face of the wall in exposed work. Where interior surface of inner wythe is concealed by furring, carry flashing completely through the inner wythe and turn up approximately 2". At heads and sills turn up ends not less than 2" to form a pan.
   1. Provide weepholes in the head joints of the same course of masonry bedded in the flashing mortar.
   2. Install flashings in accordance with manufacturer's instructions.
   3. Install reglets and nailers for flashing and other related work where shown to be built into masonry work.

3.09 REPAIR, POINTING AND CLEANING

A. Remove and replace masonry units which are loose, chipped, broken, stained or otherwise damaged, or if units do not match adjoining units as intended. Provide new units to match adjoining units and install in fresh mortar or grout, pointed to eliminate evidence of replacement.

B. Pointing: During the tooling of joints, enlarge any voids or holes, except weepholes, and completely fill with mortar. Point-up all joints at corners, openings and adjacent work to provide a neat, uniform appearance, properly prepared for application of caulking or sealant compounds.

C. Clean exposed masonry surfaces by the bucket and brush hand cleaning method or by high pressure water method. Comply with requirements of BIA Technical Notes.
   1. Use commercial cleaning agents (detergents) in accordance with manufacturer's instructions.

D. Clean exposed CMU masonry by dry brushing at the end of each day's work and after final pointing to remove mortar spots and droppings. Comply with recommendations in NCMA TEK Bulletin No. 28.

END OF SECTION