SECTION 04200 - UNIT MASONRY

PART 1 - GENERAL

RELATED DOCUMENTS:

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

DESCRIPTION OF WORK:

Section includes all masonry system components, as shown on drawings for both new and renovated buildings, and as specified herein, including:

- Face Brick
- Concrete Unit Masonry
- Mortar
- Reinforcement
- Flashing
- Masonry ties and accessories
- Protection
- Temporary Heat
- Core Fill Insulation

RELATED WORK:

Section 03310. Concrete.
Section 07900. Joint Sealers.
Section 09900. Painting.

QUALITY ASSURANCE:

1. Fire Performance Characteristics: Comply with ASTM E 119.

2. Single Source Responsibility for Masonry Units and Mortar: Provide all masonry product, with the possible exception of brick, from a single supplier. Provide uniform texture and color for all masonry units, and a consistent, uniform blend of mortar from one manufacturer for each product.

3. Installation Contractor requirements: Installer shall have a minimum of five successful years of installing brick, block and decorative block installations similar to this project. At the request of the Architect, prior to start of work or acceptance of bid, Contractor shall submit a list of ten similar projects with name of client, location and masonry contract amount.

4. Autoclave units: Provide only autoclave concrete masonry units for Burnished Block Units and Concrete Unit Masonry.

5. Fire Rating: Provide concrete masonry units which have been tested and are UL listed for the following fire ratings: 1 hour, 2 hour, 3 hour, and 4 hour, as shown on the drawings.

SUBMITTALS:

1. Product Data: Manufacturer's product data for all masonry products, including but not limited to reinforcing, masonry anchors, flashing, mortar and masonry products.

2. Tests Reports: Provide tests for products specified, from a certified testing laboratory, in accordance with UBC chapter 24.

3. Tests: Provide prism, efflorescence and corefill testing as required by Architect/Engineer, initially performed and paid for by the Owner. Materials must meet or exceed standards. These tests shall initially include:

Prism test: 7 day and 28 day, (brick).
Flexural bond strength test, ASTM C 518, (brick and block).
Efflorescence Test: ASTM C 67: no efflorescence acceptable.
Freeze Thaw requirements: ASTM C 216

Brick stain manufacturer shall submit freeze/thaw cycle tests on representative brick samples which indicate durability of stain material and % stain strength.

4. Shop Drawings: Provide reinforcement and detail shop drawings as necessary.

5. Samples: Provide the following to the Architect's office:

1) Full range of color mortar samples.

2) Pallet of brick faces showing range of color and texture (minimum of 12 brick).

6. Field mock-up/sample: Provide the following at the site:

1) Sample of brick wall with selected mortar (48" high by 60" wide), also showing specified mortar installation.

7. Warranty: Provide a written twenty year warranty signed by the manufacturer and the installer, or contractor, which warrants the materials used and the workmanship for brick staining against discoloration, lift-off, and fading. Warranty shall obligate to installer manufacturer and installer to replace brick staining if material fails in the judgement of the Architect and the Owner.

DELIVERY, STORAGE, AND HANDLING:

Deliver masonry materials to project in undamaged condition.

Store and handle masonry units to prevent their deterioration or damage due to moisture, temperature changes, contaminants, corrosion or other causes.

Store cementitious materials off the ground, under cover and in dry location.

Store aggregates where grading and other required characteristics can be maintained.

Store masonry accessories including metal items to prevent deterioration by corrosion and accumulation of dirt.

PROJECT CONDITIONS:

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.

Staining: Prevent grout or mortar or soil from staining the face of masonry to be left exposed or painted. Remove immediately grout or mortar in contact with such masonry.

Protect base of walls, sills and projections from rain-splashed mud and mortar splatter.

Cold Weather Protection:

Do not lay masonry units which are wet or frozen.

Remove any ice or snow formed on masonry bed by carefully applying heat until top surface is dry to the touch.

Remove masonry damaged by freezing conditions.

Perform the following construction procedures while the 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°F (6°C).

40°F (4°C) to 32°F (0°C):

Mortar: Heat mixing water to produce mortar temperature between 40°F (4°C) and 120°F (49°C).

Grout: Follow normal masonry procedures.

32°F (0°C) to 25°F (-4°C):

Mortar: Heat mixing water and sand to produce mortar temperatures between 40°F (4°C) and 120°F (49°C); maintain temperature of mortar on boards above freezing.

Grout: Heat grout materials to 90°F (32°C) to produce inplace grout temperature of 70°F (21°C) at end of work day.

25°F (-4°C) to 20°F (-7°C):

Mortar: Heat mixing water and sand to produce mortar temperatures between 40°F (4°C) and 120°F (49°C); maintain temperature of mortar on boards above freezing.

Grout: Heat grout materials to 90°F (32°C) to produce inplace grout temperature of 70°F (21°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 in excess of 15 mph.

20°F (-7°C) and below:

Mortar: Heat mixing water and sand to produce mortar temperatures between 40°F (4°C) and 120°F (49°C).

Grout: Heat grout materials to 90°F (32°C) to produce inplace grout temperature of 70°F (21°C) at end of work day.

Masonry Units: Heat masonry units so that they are above 20°F (-7°C) at time of laying.

Provide enclosure and auxiliary heat to maintain an air temperature of at least 40°F (4°C) for 24 hours after laying units.

Do not heat water for mortar and grout to above 160°F (71°C).

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.

40°F (4°C) to 32°F (0°C):

Protect masonry from rain or snow for at least 24 hours by covering with weather-resistive membrane.

32°F (0°C) to 25°F (-4°C):

Completely cover masonry with weather-resistive membrane for at least 24 hours.

25°F (-4°C) to 20°F (-7°C):

Completely cover masonry with weather-resistive insulating blankets or similar protection for at least 24 hours, 48 hours for grouted masonry.

20°F (-7°C) and below:

Except as otherwise indicated, maintain masonry temperature above 32°F (0°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°F (4°C) for 48 hours.

PART 2 - PRODUCTS

MATERIALS:

Standard Concrete Block: Provide type N-1, ASTM C 90 autoclave units in shapes and sizes as required including corners, bond beams, lintels, etc. Units shall be nominal 16" long by 8" high in thicknesses as shown including 4", 6", 8' and 12" width.

Manufacturer shall be Shiely Masonry Products Co., Anchor Block Co., or approved equal.

Install all regular masonry units in "stack bond" and "running bond" lay-up as shown on the drawings.

Architect reserves the right to reject any or all units that exhibit excessive chips or fractures. Units shall be delivered to the job site with a shop sealer having been applied at the factory.

Face Brick: Provide solid, uncored units at sills, caps, and other areas as required. Brick shall be ASTM C 216, in grade SW, type FBS face brick with uniform texture and dimensional qualities, including all special shapes as shown on the drawings. Provide from the following manufacturers:

Modular brick, nominally 2 1/4" high x 4" wide x 8" long for use in running bond. Brick shall be ASTM C 216, in grade SW, type FBS face brick with uniform texture and dimensional qualities, including all special shapes as shown on the drawings. Sawcut brick as required. Provide from the following manufacturers:

"Burgundy Run" #137, as manufactured by Acme Brick, Denton,TX

"4-441D" sand face, as manufactured by Bickerstaff Clay Products Co.

"Burgundy Grain", as manufactured by Lakewood Brick and Tile Co.

"Harvard #65 Modular"; as manufactured by Ochs Brick and Tile Co.

For bidding purposes, match manufacturer's and brick supplier's sample panels contained in the offices of the Architect. For construction, match color, texture and range approved by the Architect and the Owner on jobsite mock-ups specified in this section and in Section 01010.

MORTAR AND GROUT MATERIALS:

Portland Cement: ASTM C 150, Type I.

Hydrated Lime: ASTM C 207, Type S.

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

Provide factory blended colored mortar materials in colors as selected by the Architect.

1) Face Brick; Cement-lime mortar shall be factory mixed type with a consistent coloration throughout, equal to Prism Pigments.

2) Concrete Unit Masonry (Running Bond); Natural Mortar Color. Use Northwestern Cement.

Aggregate for Grout: ASTM C 404.

Water: Clean,and potable.

JOINT REINFORCEMENT, TIES AND ANCHORING DEVICES:

Hot-Dip Galvanized Steel Wire: ASTM A 82 for uncoated wire and with ASTM A 153, Class B-2 (1.5 oz. per sq. ft. of wire surface) for zinc coating applied after prefabrication into units.

Zinc-Coated (Galvanized) Steel Sheet: Carbon steel with zinc coating complying with ASTM A 525, Coating Designation G90.

Joint Reinforcement: Provide welded-wire ladder type units prefabricated with deformed continuous (0.1483" d.) side rods and plain cross rods (0.1483" d.) into straight lengths of not less than 10', with prefabricated corner and tee units. Space perpendiculars not to be more than 16" o.c.

Provide ladder type unit systems with integral eyes for the insertion of flexible anchors, tying concrete block units to brick masonry. Provide preformed wire anchors that allow flexibility horizontally and vertically. Wire size shall be 0.1483". Anchors shall be sized so that they extend to within 1" of brick face. Provide one anchor every 16" in either direction.

Brick Veneer anchor systems: Provide two piece assemblies allowing vertical and horizontal movement while resisting lateral forces against the backer plate of the wall tie. Comply with ASTM C 954 for fasteners, using #10 screws x length required along with hex washer head and neoprene washer, cadmium plated.

Provide "DW-10-X" system by Hohmann & Barnard, Inc. or approved equal.

Anchor Bolts: Provide steel bolts with hex nuts and flat washers complying with ASTM A 307, Grade A, hot-dip galvanized to comply with ASTM C 153, Class C, in sizes and configurations indicated.

Approved Reinforcement Manufacturers:

AA Wire Products Co.
Dur-O-Wall, Inc.
Heckmann Building Products, Inc.
Hohmann & Barnard, Inc.
Masonry Reinforcing Corp. of America.
National Wire Products Corp.

CONCEALED FLASHING MATERIALS:

Flexible Flashing: Flexible flashing of EPDM sheet or uncured neoprene to remain flexible and waterproof.

Approved Flashing Manufacturers:

"BFG"; B.F. Goodrich Co.
"Nervastral"; Rubber and Plastics Compound Co.
"Nuflex"; Sandell Manufacturing.
"Wascoseal"; York Manufacturing.

Adhesives for flashing: As recommended by the manufacturer.

MISCELLANEOUS MASONRY ACCESSORIES:

Reinforcing Bars: Deformed steel, ASTM A 615, Grade 60 for bars No. 3 to No. 18.

Non-Metallic Expansion Joint Strips: Premolded, flexible cellular neoprene rubber filler strips complying with ASTM D 1056, Grade RE41E1, capable of compression up to 35%, of width and thickness indicated.

Premolded Control Joint Strips: Material as indicated below, designed to fit standard sash block and to maintain

lateral stability in masonry wall; size and configuration as indicated.

Styrene-butadiene rubber compound complying with ASTM D 2000, Designation 2AA-805.

Bond Breaker Strips: Asphalt-saturated organic roofing felt complying with ASTM D 226, Type I (No. 15 asphalt felt).

Weep holes: Cotton cords, initially extended 1" beyond face brick, and 18" up cavity wall. Use tape or other means to secure cord during construction. Cut off cord at wall face after completion of the work.

INSULATION:

Loose granular perlite insulation: ASTM C 549, type II or type IV, expanded perlite with r-value of 3.0 (+/-0.1) for 4.1 to 7.4 lb. density.

MASONRY CLEANERS:

Job-Mixed Detergent Solution: Use weakest formulation of solution of trisodium phosphate, laundry detergent and water to successfully do the job. Prefaced and burnished block manufacturer shall approve of solution and methods used. Provide products from ProSoCo, SureClean or other approved manufacturer.

Note: Use extreme care in cleaning walls to develop a solution that does not stain mortar or cause streaking.

MORTAR AND GROUT MIXES:

General: Do not add admixtures including coloring pigments, air- entraining agents, accelerators, retarders, water repellent agents, anti-freeze compounds or any other admixtures, unless approved by the Architect in writing. Do not use calcium chloride in mortar or grout.

In general, mortar mix shall inherently contain between 5% and 8% air.

Mixing: Combine and thoroughly mix cementitious, water and aggregates in a mechanical batch mixer; comply with referenced ASTM standards for mixing time and water content. Use mixing boxes or another precise method of mixing ingredients.

Mortar for Unit Masonry: Comply with ASTM C 270, Proportion Specification, for types of mortar required, unless otherwise indicated. Provide the strength and type of mortar appropriate for the conditions. Provide the weakest type of mortar without effecting bond strength or necessary compressive strength of the masonry walls. The strength of the mortar shall in no cases exceed 80% of the compressive strength of the masonry units.

Limit cementitious materials in mortar to portland cement and lime. Masonry cement products or mixtures shall not be used on this project.

Typically, use Type S mortar for the project except where indicated. Provide Type M mortar below grade.

Grout for Unit Masonry: Comply with ASTM C 476.

Latex Additive: Provide latex additive, at strength recommended by the additive supplier, for all exposed walls where burnished block or prefaced block units are to be installed including Corridors, Restrooms, Public Toilets, Lobbies, etc.

PART 3 - EXECUTION

INSTALLATION, GENERAL:

Do not prewet or use wet concrete masonry units. If using power saws to cut units, allow sufficient time to dry out.

Cleaning Reinforcing: Before placing, remove loose rust, ice and other coatings from reinforcing.

Thickness: Build cavity and composite walls, floors and other masonry construction to the full thickness shown.

Build chases and recesses as shown or required. Do not exceed four courses without providing required mortar and vertical reinforcement.

Install masonry anchors and reinforcing/ladder systems per the manufacturer's instructions. Two piece masonry veneer anchors shall be installed over building paper or waterproofing, at 16" o.c. vertically and horizontally, making sure that there is allowable movement in all directions. At soldier coursing, install flexible anchors at 12" o.c. vertically and horizontally. At rock face masonry, install flexible anchors at 12" o.c. vertically, and 16" o.c. horizontally.

Coordinate the installation of masonry work with all other trades to ensure that conduits, pipes and other built-in items are included, and the work proceeds smoothly.

Cut masonry units using motor-driven saws to provide clean, sharp, unchipped edges. If water saws are used, wait until masonry units have sufficiently dried out prior to erection.

Install flexible flashing at areas shown on the drawings and at all areas as required including lintels, sills, copings, terminations and similar conditions. At terminations, corners, splices or overlaps, adhere flashing to one another and provide an 8" minimum overlap to prevent water from migrating into the cavity.

At the end of each work day, and during inclement securely ather, cover all cavities to prohibit rain water from entering the masonry construction: this is at all interior and exterior walls.

CONSTRUCTION TOLERANCES:

Variation from Plumb: For vertical lines and surfaces of columns, walls and arrises do not exceed 1/8" in 10', or 3/16" in a story height not to exceed 20', nor 1/4" in 40' or more. For external corners, expansion joints, control joints and other conspicuous lines, do not exceed 1/8" in any story or 20' maximum, nor 1/4" in 40' or more. For vertical alignment of head joints do not exceed plus or minus in 10', 1/4" maximum.

Variation from Level: For bed joints and lines of exposed lintels, sills, parapets, horizontal grooves, and other conspicuous lines, do not exceed 1/8" in any bay or 20 maximum, nor 1/4" in 40' or more. For top surface of bearing walls do not exceed 1/8" between adjacent floor elements in 10' or 1/16" within width of a single unit.

Variation of Linear Building Line: For position shown in plan and related portion of columns, walls and partitions, do not exceed 1/4" in any bay or 20' maximum, nor 1/2" in 40' or more.

Variation in Cross-Sectional Dimensions: For columns and thickness of walls, from dimensions shown, do not exceed plus or minus 1/4".

Variation in Mortar Joint Thickness: Do not exceed bed joint thickness indicated by more than plus or minus 1/8, with

a maximum thickness limited to 1/2". Do not exceed head joint thickness indicated by more than plus or minus 1/8".

LAYING MASONRY WALLS:

Layout walls in advance for accurate spacing of surface bond patterns with uniform joint widths and to accurately locate opening, movement-type joints, returns and offsets. Avoid the use of less- than-half-size units at corners, jambs and whenever possible at other locations.

Stopping and Resuming Work: Rake back 1/2-unit length in each course; do not tooth. Clean exposed surfaces of set masonry, wet units lightly (if required) and remove loose masonry units and mortar prior to laying fresh mortar.

Fill all exterior cavities of block units with pour-in insulation. Fill units at regular intervals. Do not exceed more than 8 courses of block, without filling cavities.

MORTAR BEDDING, TOOLING AND JOINTING:

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

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 in all courses of piers, columns and pilasters, and where adjacent to cells or cavities to be reinforced or filled with concrete or grout/ For starting course on footings where cells are not grouted, spread out full mortar bed including areas under cells.

TOOLING AND JOINTS:

Cut joints flush for masonry walls which are to be concealed or to be covered by other materials, and at cavity walls to receive waterproofing, unless otherwise indicated.

Tool exposed joints at all exterior and interior masonry joints use a slightly concave jointer, larger than joint thickness, unless otherwise indicated, for a slightly concave joint. "Exposed" means any joint exposed to view whether room is considered to finished or unfinished.

Collar Joints: After each course is laid, fill in vertical longitudinal joint between wythes solidly and with mortar for the following masonry work:

Mortar that is exposed to view shall be retempered only once. In all cases, mortar color shall remain consistent or shall be subject to removal and repointing at no additional cost to the Owner.

At steel angles, bent plates, provide compressible filler between top of masonry and bottom of steel relieving angle or plate. Above steel angle or bent plate, extend flexible flashing down continuous to the underside of brick, and include rope weeps at 16" o.c. to allow moisture in cavity to weep out of masonry wall. Ropes may be taped or tacked in place until the work extends beyond the ropes.

Ensure that flexible flashing is always overlapped a minimum of 6" and bonded to prohibit the migration of water and moisture. At head and corner details, take extra care to ensure that there are no gaps or penetrations between flashings. Extend flexible flashing beyond the edge of the brick at masonry lintels. Trim flexible flashing after sealant has been applied at lintels and relieving angles.

CAVITY WALLS:

Maintain a clean cavity throughout the work. Strike joints at inside walls within cavity flush. Provide weep ropes, 16" on center, installed between horizontal joints just above flexible flashings. Tape or tie weep ropes to the cavity wall, and maintain a relatively free cavity while laying brick. Extend rope 1" beyond brick face initially, and cut rope weeps, after walls have been laid.

Lay up brick in a logical sequence and as specified. Anchors shall extend from ladder reinforcing eyes into mud, and out to within 1" of the face of brick. Install anchors so that there is maximum potential for future movement. Brick shall be placed so that units are aligned, with vertical joints on center. Provide special striking and tooling of joints as specified.

CAVITY WALL INSULATION

Pour granular insulation into block cavities at areas specified or shown on the drawings. Fall limit shall not exceed 8' in height per pour. Pour to underside of roof structure above wall locations.

Install rigid insulation at locations as shown on the drawings. Rigid Insulation shall be 2" extruded insulations, Type TG as manufactured by Dow Chemical Company, or approved equal. Also refer to Section 07200.

HORIZONTAL JOINT REINFORCEMENT:

General: Provide continuous horizontal joint reinforcement as indicated and required.

Cut or interrupt joint reinforcement at control and expansion joints, unless otherwise indicated.

Reinforce walls with continuous horizontal joint reinforcing unless specifically noted to be omitted. Overlap joint reinforcement a minimum of 7".

Provide continuity at corners and wall intersections by use of prefabricated "L" and "T" sections. Cut and bend reinforcement units as directed by manufacturer for continuity at returns, offsets, column fireproofing, pipe enclosures and other special conditions.

For parapets, space reinforcement at 8" o.c. vertically, unless otherwise indicated.

For concrete masonry, normal running bond, space reinforcement at 24" o.c. vertically, unless otherwise indicated or required.

For concrete masonry, stack bond, space reinforcement at 16" o.c. vertically, unless otherwise indicated.

For soldier coursing, space reinforcement at 12" o.c. vertically, unless otherwise indicated.

Reinforce masonry openings greater than 1'-0" wide, with horizontal joint reinforcement placed in 2 horizontal joints approximately 8" apart, immediately above the lintel and immediately below the sill. Extend reinforcement a minimum of 2'- 0" beyond jambs of the opening except at control joints.

In addition to wall reinforcement, provide additional reinforcement at openings as required to comply with the above.

Coordinate Placement of vertical placement shown on the drawings.

CONTROL AND EXPANSION JOINTS:

General: Provide vertical and horizontal expansion, control and isolation joints in masonry where shown. Build-in related items as the masonry work progresses.

Build flanges of metal expansion strips into masonry. Lap each joint 4" in direction of water flow. Seal joints below grade and at junctures with horizontal expansion joints, if any.

Build-in non-metallic joint filler where indicated.

Build in horizontal pressure relieving joints where indicated; construct joints by either leaving an air space or inserting non- metallic compressible joint filler of width required to permit installation of sealant and backer rod.

Vertical control joints shall extend a minimum of 8" below grade.

LINTELS:

Install steel lintels where indicated. In general, provide steel lintels at masonry openings including but not limited to the following locations: doors, framed openings, windows, exterior or interior louvers, transfer grilles, framed blockouts and recesses, ductwork penetrations, piping penetrations, cabinet unit heaters, fire hose cabinets, chimney breeching penetrations, bundled piping and conduit.

Provide masonry lintels where shown and wherever openings of more than 1'-0" for brick size units and 2'-0" for block size units are shown without structural steel or other supporting lintels. Provide precast or formed-in-place masonry lintels. Cure precast lintels before handling and installation. Temporarily support formed-in-place lintels.

For hollow concrete masonry unit walls, use specially formed U- shaped lintel units with 2-#5 reinforcement bars placed as shown filled with coarse grout.

Provide minimum bearing of 8" at each jamb, unless otherwise indicated.

FIELD QUALITY CONTROL:

Owner shall employ a testing laboratory experienced in performing types of masonry field quality control tests and inspection services for masonry tests indicated, and to perform additional tests as required.

Testing Company shall report test results in writing and in form specified under each test method, to Architect and Contractor.

REPAIR, POINTING, AND CLEANING:

General: As soon as masonry walls are completed remove excess mortar extending out from joints, and wipe off smears ar surfaces to minimize the extend and intensity of final cleaning. All work should be lightly cleaned with simple equipment at the end of each day,

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 and glazed to eliminate evidence of replacement.

Pointing: During the tooling of joints, enlarge any voids or holes, except weep holes, and completely fill with mortar. Point- up all joints including corners, openings and adjacent work to provide a neat, uniform appearance, prepared for application of sealants.

Final Cleaning: After mortar is set and cured, clean masonry under proper climatic conditions as follows:

Perform test samples using solutions or specified products that shall remove all excess mortar and smears without damaging the masonry, nor discoloring the mortar.

Saturate walls as required prior to cleaning. Follow procedures for cleaning brick as described in " Technical Note #20, Revised", by the BIA. Clean concrete masonry according to NCMA "Tek" bulletins.

Protect all surfaces from other trades and construction related activities until ready for use by the Owner and/or completion of all of the Work.

END OF SECTION 04200