SECTION 04810

CONCRETE MASONRY UNIT ASSEMBLIES

PART 1 - GENERAL

1.01 SUMMARY

A. This Section specifies the construction of unit masonry assemblies including concrete masonry units (CMUs), mortar, grout, reinforcement, ties, anchors, lintels, control joints, flashing and sheet metal materials, insulation, mixing requirements, installation, testing, and finishing.

B. Contractor shall provide all labor, materials, equipment, and services necessary to design, furnish, deliver and install all concrete masonry unit work, as indicated on the Drawings, in accordance with local codes and standards, or as specified herein. This work shall include but not be limited to laying masonry units, grout, mortar, reinforcing, accessories and insulation.

C. All work shall be coordinated with other sections. Coordinate delivery with other work to avoid delays.

D. Related sections:

1. Section 05500, "Metal Fabrications"
2. Section 07620, "Sheet Metal Flashing and Trim"
3. Section 07210, "Building Insulation"
4. Section 07920, "Joint Sealants"

1.02 SUBMITTALS

A. Submittals shall be provided in accordance with Section 01330.

B. Product Data: For each type of product indicated.

C. Shop Drawings:

1. For reinforcing steel.
2. Detail bending and placement of unit masonry reinforcing bars.
3. Comply with ACI 315, "Details and Detailing of Concrete Reinforcement." Show elevations of reinforced walls on drawings.

D. Samples for review in accordance with Sections 01330 for each type and color of masonry unit, colored mortars, and grouts.

1. Samples are to be representative of the anticipated color variations in the masonry units.
2. Submit mortar and grout mix designs furnished by either the supplier or an independent testing laboratory.
3. Mortar mix design shall designate material quantities as applicable for field mixing.

E. Material certificates for each type of product indicated. Include statements of material properties indicating compliance with requirements, standards, and type designations within standards.

F. Include material test reports for masonry units, substantiating compliance with requirements. Provide mix designs for each type of mortar and grout. Include description of type and

proportions of ingredients.

G. Building Square Footage Certification Plan from surveyor shall be submitted by General Contractor prior to erection of walls above floor slab elevation.

H. Substitutions shall be requested in accordance with Sections 01630.

1.03 QUALITY ASSURANCE

A. Installer Qualifications: It is the intent of this Specification to provide concrete masonry unit work of Standard quality as defined by the NCMA. Experience in performing work of this section, specializing in installation of work similar to that required for this project, employing workers who are skilled in this area of work, and whose projects have a record of successful in-service performance.

B. Manufacturers shall meet the industry standards and codes for the materials identified on the Drawings and in the Specifications herein. Concrete masonry units shall be from a single manufacturer, with uniform texture and color.

C. Certification: Product certificates signed by manufacturer, certifying that materials comply with specified performance characteristics, criteria, and physical requirements.

D. Manufacturer's instructions for installation shall be delivered and stored with the materials.

E. Testing: Test mortar and grout in the field as follows:

1. Laboratory shall make, cure, break and evaluate test specimens.
2. Specimens for grout shall be made as outlined by governing authorities. Handle specimens for mortar in accordance with procedures outlined by governing authorities.
3. Number of tests will be determined by Architect based on total time for construction of masonry with no less than 2 tests per week and no less than 2 tests for each level of masonry construction (foundation to roof or floor)
   a. Testing shall be in accordance with the requirements of the local jurisdiction.
4. See Division 1 for payment provisions for testing.

F. Tolerances shall conform to ACI 530.1, except as otherwise noted.

G. Warranty:

1. Manufacturer's Warranty: Submit, for Owner's acceptance, manufacturer's standard warranty document executed by authorized company official. Manufacturer's warranty is in addition to, and not a limitation of, other rights Owner may have under Contract Documents.
2. Warranty Period: two (2) years commencing on Date of Certificate of Occupancy.
3. Additional requirements for product warranties are included in Section 01788.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Transport and handle all masonry units in such a manner as to prevent chipping and breakage.

B. Locate storage piles, stacks, or bins to avoid or protect material from heavy and unnecessary traffic.

C. Furnish temporary protection for all exposed masonry corners subject to injury.

D. Deliver all insulating materials in original packages, bearing the name of the manufacturer and brand.

E. Ordering: Comply with manufacturer's ordering instructions and lead time requirements to avoid construction delays.

F. Store and protect materials from exposure to harmful weather conditions, and at temperature and humidity conditions recommended by manufacturer. Some materials may need to be stored in protected enclosures, and handled by methods which avoid exposure to moisture. Store mortar, grout, and other moisture-sensitive materials off the ground, under cover, and in a dry location. Additional requirements for product delivery, storage and handling are in Section 01600.

1.05 PROJECT CONDITIONS

A. Cold Weather Requirements:

1. Fully protect all masonry units against freezing by a weathertight covering, which will also prevent accumulation of ice.
   a. Warm units to at least 50° F. before laying.
   b. When necessary to remove frost or excessive moisture, heat units to a temperature not over 150° F.
2. Do not lay masonry when the temperature of the surrounding atmosphere is below 40° F. in the 24-hour period after laying, unless adequate protection is provided.
   a. Do not use frozen materials or materials containing ice or frost.
   b. Do not build on frozen substrates.
3. Remove and replace masonry units damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in ACI 530.1.
4. Protect all finished work against freezing for a period of not less than 48 hours by means of enclosures, artificial heat or other such protective methods as may be required.
5. Carefully cover tops of walls left incomplete at the conclusion of the day's work with tarpaulins or approved roofers felt, securely held in place.

B. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in ACI 530.1.

PART 2 - PRODUCTS

2.01 CONCRETE MASONRY UNITS (CMUS)

A. Materials: Concrete masonry units shall be manufactured to meet ASTM C-90, Grade N requirements for hollow load bearing concrete masonry units, using medium weight aggregate conforming to ASTM C-331, for either conventional or integral colored units.

1. Unit moisture content shall not exceed 30% of total absorption.
2. Units shall be machine made pre-cast concrete units manufactured in accordance with NCMA Standards.
3. Units shall have a maximum linear shrinkage not to exceed 0.045 of 1% for a saturated to oven dry condition.
4. Units to have a value of Ultimate Compressive Strength equal to 1900 PSI on net area. Compressive strength of the assembly (f'm) to be 1,500 psi at 28 days
5. Sizes of units to be as indicated on the Drawings.
6. Provide special shapes (such as bull nose, sill units, pilasters, etc.) where required, and as indicated on the Drawings. Special shapes may be required for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.
7. All masonry units shall be a minimum of 45 days old prior to delivery to the job site.
8. Pattern and Texture for Decorative Units:
   a. Standard pattern, ground finish.
   b. Standard pattern, split-face finish.
9. Pre-faced Concrete Masonry Units: Medium weight concrete units, with complying with

ASTM C 744.

a. Size: Manufactured with pre-faced surfaces having 1/16-inch- wide returns of facing to create 1/4-inch- wide mortar joints.

B. Pre-molded control joint filler for 8" and wider walls shall be one of the following:

1. Quali-Seal Rubber Control Joint; Hohman and Barnard
2. Rapid Control Joint; Dur-O-Wal
3. Block-Tile Control Joint; AA Wire Products Co.

C. Provide water repellant approved by Architect on all exposed masonry surfaces that do not receive paint, stucco, or any other overlay.

1. Application of the water repellant shall not alter the natural texture of the materials.

2.02 REINFORCEMENT

A. Reinforcing Bars shall be provided as follows:

1. Uncoated Steel Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.
2. ASTM A 615, Grade 40 as noted on the drawings only.
3. ASTM A706 weldable rebar.
4. Rebar positioners for reinforcing steel shall be AA-239 for vertical steel bars, and AA-238 for horizontal steel bars.

B. Masonry reinforcement fabrication tolerances shall be as follows:

1. Sheared length: Plus 1", Minus 1".
2. All other bends: Plus 1", Minus 1".

2.03 TIES AND ANCHORS

A. Materials:

1. Hot-Dip Galvanized, Carbon-Steel Wire: ASTM A 82; with ASTM A 153/A 153M, Class B-2 coating.
2. Steel Sheet, Galvanized after Fabrication: ASTM A 1008/A 1008M, Commercial Steel, hot-dip galvanized after fabrication to comply with ASTM A 153/A 153M.
3. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

B. Wire Ties, General: Unless otherwise indicated, size wire ties to extend at least halfway through veneer but with at least 5/8-inch cover on outside face. Outer ends of wires are bent 90 degrees and extend 2 inches parallel to face of veneer.

C. Individual Wire Ties: Rectangular units with closed ends and not less than 4 inches wide.

1. Wire: Fabricate from 1/4-inch- diameter, hot-dip galvanized steel wire.

D. Adjustable Anchors for Connecting to Structure: Provide anchors that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.

1. Anchor Section for Welding to Steel Frame: Crimped 1/4-inch- diameter, hot-dip galvanized steel wire.
2. Tie Section: Triangular-shaped wire tie, sized to extend within 1 inch of masonry face, made from 0.188-inchdiameter, hot-dip galvanized steel wire.
3. Connector Section for Concrete: Dovetail tabs for inserting into dovetail slots in concrete and attached to tie section; formed from 0.053-inch- thick, steel sheet, galvanized after fabrication.

E. Partition Top anchors: 0.097-inch- thick metal plate with 3/8-inch- diameter metal rod 6 inches long welded to plate and with closed-end plastic tube fitted over rod that allows rod to move in and out of tube. Fabricate from steel, hot-dip galvanized after fabrication.

F. Rigid Anchors: Fabricate from steel bars 1-1/2 inches wide by 1/4 inch thick by 24 inches long, with ends turned up 2 inches or with cross pins.

1. Corrosion Protection: Epoxy coating 0.020 inch thick.

2.04 MORTAR AND GROUT MATERIALS

A. All mortar shall conform to ASTM C270, Type S.

1. Aggregate for mortar shall conform to ASTM C144, except that no less than 3% or more than 10% shall pass a No. 100 sieve.
2. Admixture for mortar shall be a water reducing plasticizing admixture, strearate type water repellent admixture, introduced at the mixer in a dry powder form.
   a. The material shall give the mortar improved workability, reduce mixing water approximately 20%, a reduction in drying shrinkage, increased bond, reduced permeability, and shall have minimum bleeding.
   b. The material shall be used at the rate of one pint per 100 lbs of portland cement.
   c. The manufacturer, upon request 72 hours in advance, shall make available at no cost, the services of a qualified full-time filed representative to assure proper use of the admixture.
   d. All mortar on the Project shall incorporate the admixture.
3. Mortar for concrete unit masonry shall be freshly prepared and uniformly mixed in ratio one part portland cement, ½ part lime, 3-4 parts sand, and shall conform to ASTM C 270, Type S.
4. Mortar mixing: Add sand, cement and mix, then add lime. Mix mortar after all ingredients are added to mixer for at least 5 minutes, or until a thoroughly uniform mix is obtained, whichever period is longer. Adjust consistency of mortar to the satisfaction of the mason, adding as much water as is compatible with the convenience in using the mortar. If the mortar begins to stiffen from evaporation of a part of the mixing water, retemper mortar by adding water within basin formed by mortar, and remixing.

B. All grout shall conform to ASTM C 476, and produce a minimum compressive strength of 2000 PSI at 28 days and determined by the provisions of ASTM C1019.

1. Materials for grout shall be accurately measured.
   a. When partial batches are mixed, use extreme care in measuring all of the ingredients.
2. Aggregate for grout shall conform to ASTM D448, coarse aggregate, Size No. 8.
3. Sand for grout shall conform to ASTM C404, fine aggregate, Size No. 1.
   a. Admixture for grout shall comply with CRD 566-79, Specifications for Grout Fluidifiers. Application rate shall be one percent by weight of all cementitious material in the mix.
4. Fine grout shall be composed of one part portland cement, to which may be added 1/10 part hydrated lime or lime putty, and 2-1/4 to 3 parts sand.
5. Coarse grout shall be composed of one part portland cement, to which may be added 1/10 part hydrated lime or lime putty, and 2-1/4 to 3 parts sand, and not more than 2 parts aggregate (gravel). This grout may only be used in grout spaces in brick masonry 2" or more in horizontal dimension, and in grout spaces in filled cell construction 4" or more in both horizontal dimensions.
6. Mix grout after all ingredients are added to mixer.
   a. Mix for a period of at least 5 minutes or until a thoroughly uniform mix has been obtained, whichever period is longer.
   b. Grout shall have as high a water content as is consistent with placing and workability without segregation.
7. All grout shall be stirred or mixed at frequent intervals, to prevent separation of the materials.

C. Cement for mortar and grout shall be Type II, low alkali portland cement conforming to ASTM C 150, standard gray. All cement shall be from one manufacturer.

D. Hydrated Lime shall conform to ASTM C207, Type S.

E. Mortar coloring material shall consist of limeproof inorganic compounds in the proportions recommended by the manufacturer, but in no case exceeding 15% of the weight of the Portland Cement. At all exposed locations, color mortar to match the color of the masonry units.

F. Water shall be potable.

G. Epoxy Pointing Mortar: ASTM C 395, epoxy-resin-based material formulated for use as pointing mortar for structural-clay tile facing units.

H. Cold-Weather Admixture: Nonchloride, noncorrosive, accelerating admixture complying with ASTM C 494/C 494M, Type C, and recommended by manufacturer for use in masonry mortar of composition indicated.

1. Acceptable Products:
   a. Addiment Incorporated; Mortar Kick.
   b. Euclid Chemical Company (The); Accelguard 80.
   c. Grace Construction Products, a unit of W. R. Grace & Co. - Conn.; Morset.
   d. Sonneborn, Div. of ChemRex; Trimix-NCA.

2.05 FLASHING MATERIALS

A. Coordinate/Provide installation of flashing and sheet metal materials as required of this Specification and as indicated on the Drawings, including all labor, materials, equipment, and services necessary to complete the work, and as directed by the Architect.

2.06 MISCELLANEOUS MASONRY ACCESSORIES

A. Compressible Filler: Premolded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; formulated from neoprene urethane or PVC.

B. Preformed Control-Joint Gaskets designed to fit standard sash block and to maintain lateral stability in masonry wall. At fire rated walls, provide fire rated joint closures per local codes and herein. Control joints shall be made from one of the following:

1. Styrene-butadiene-rubber compound, complying with ASTM D 2000, Designation M2AA-805.
2. PVC, complying with ASTM D 2287, Type PVC-65406.

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

D. Weep/Vent Products: Use the following, unless otherwise indicated:

1. Rectangular Plastic Weep/Vent Tubing: Clear butyrate, 3/8 by 1-1/2 by 3-1/2 inches long.
2. Cellular Plastic Weep/Vent: One-piece, flexible extrusion made from UV-resistant polypropylene copolymer, full height and width of head joint and depth 1/8 inch less than depth of outer wythe, in color selected from manufacturer's standard.
   a. Products:
      i. Advanced Building Products Inc.; Mortar Maze weep vent.
      ii. Dayton Superior Corporation, Dur-O-Wal Division; Cell Vents.
      iii. Heckmann Building Products Inc.; No. 85 Cell Vent.
      iv. Hohmann & Barnard, Inc.; Quadro-Vent.
      v. Wire-Bond; Cell Vent.

2.07 MASONRY CLEANERS

A. Proprietary Acidic Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar/grout stains from new masonry without damaging masonry. Use product approved for

intended use by cleaner manufacturer and manufacturer of masonry units being cleaned.

PART 3 - INSTALLATION

3.01 GENERAL

A. Do not lay chipped, cracked or otherwise defective units in the wall where exposed to view.

B. Remove and replace any units that are chipped, cracked, broken or otherwise defective, whether before or after setting.

C. Provide proper masonry units for all windows, doors, bond seams, lintels, pilasters, caps, etc., with a minimum of unit cutting. Where masonry unit cutting is necessary, all cuts shall be neat and regular. Do all necessary cutting with a power driven carborundum or diamond disc blade saw.

D. Use full-size units without cutting if possible. If cutting is required, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

E. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures.

F. Wetting of Brick: Concrete masonry units shall be laid dry. Wet brick before laying if initial rate of absorption exceeds 30 g/30 sq. in. per minute when tested per ASTM C 67. Allow units to absorb water so they are damp but not wet at time of laying.

G. Comply with tolerances in ACI 530.1/ASCE 6/TMS 602 and with the following:

1. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.
2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.

H. Provide all openings in masonry walls where required or as indicated on the Drawings.

I. Build in all items as indicated on the Drawings, identified elsewhere in these Specifications, or as required for a complete job, including but not limited to reinforcing steel, bolts, anchors, nailing block, door and window frames, pipes, conduits and vents.

J. Provide temporary bracing for all masonry walls and leave in place until masonry is cured and the roof diaphragm is secured in place.

K. High lift grout shall be installed in accordance with applicable codes and standards, and as specified below.

3.02 LAYING MASONRY WALLS

A. Foundation Preparation

1. The foundation on which a reinforced grouted masonry wall will be built must have a clean, smooth surface with aggregate exposed.
2. Sand blasting may be necessary if the surface has laitance or other foreign material lodged in the pores of the foundation surface.

B. Laying Hollow Cell Masonry Walls

1. Provisions as specified under the respective masonry units shall apply to the work specified herein.

C. Masonry units shall be clean and free from dirt when laid in the wall.

D. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.

E. Lay all masonry units in uniform and true courses, level and plumb.

1. Use full mortar bedding for the first course on the foundation and wherever maximum strength is required.
2. Use face shell bedding except where full mortar bedding is required.
3. Butter vertical head joints well for a thickness equal to the face shell of the unit and push these joints tight, so that the mortar bonds well to both units.
4. Solidly fill joints from the face of the unit to the depth of the face shell.
5. Lay masonry units in the wall to the desired height with joints of uniform thickness.
6. Lay masonry units in such a way that cracks are not formed at the time the unit is placed in the wall.
7. Level, plumb, and straighten before mortar stiffens.
   a. Adjust masonry units to their final position in the wall while the mortar is still soft and plastic enough to ensure a good bond.
   b. If the position of the unit is shifted after the mortar has stiffened, or bond is broken or cracks are formed, relay unit in new mortar.
8. Bond shall be plumb throughout.

F. Provide 3 courses of solid masonry or grouted hollow masonry units below all steel bearing plates, beams bearing on masonry walls, or as otherwise required to carry loads onto masonry walls.

G. Provide solid grout or mortar between webs of masonry face shells for full length of all steel lintels. Lay face units, soaps, romans, etc., with full head and bed joints.

H. Protect masonry against too rapid drying by hosing down thoroughly twice each day for 5 days, including Saturday and Sunday, following laying of units. Hosing once each day is sufficient where the high temperature for the day does not exceed 80° F., or where masonry is shaded from direct sunlight.

I. Where masonry is scheduled to receive damp proofing, provide parge coat of mortar over all masonry surfaces. At all inside corners, parge to form cove.

J. Solid grout all metal door frames in masonry walls as each 2 feet of masonry is laid.

K. Where masonry is to enclose conduit or piping, bring it to proper level indicated, and as approved by the Architect. Do not cover any pipe, conduit chases, or enclosures until advised that work has been inspected and tested. Build in items specified in this and other Sections of this Specification.

L. Cold weather requirements: When air temperature is below 40° F., provide adequate equipment for heating the mortar and grout materials. Temperatures of separate materials, including water, shall not exceed 140° F., when placed in the mixer. Maintain mortar and grout between 50° F., and 90° F. while being used.

M. Hot weather requirements: Wet mortar board before loading and cover mortar to retard drying

when not being used.

1. Use all mortar and grout within one hour of initial mixing and use no mortar or grout after it has begun to set up or after it has become harsh or non-plastic.

N. Fill cores in hollow concrete masonry units with grout 24 inches under bearing plates, beams, lintels, posts, and similar items, unless otherwise indicated.

3.03 BONDING

A. Bond Pattern shall be as indicated on the Drawings. Where no bond pattern is indicated, lay up wall in a straight uniform course with regular running bond. Do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs. Open ends shall not be exposed.

B. Intersecting block bearing walls shall not be tied together in a masonry bond, except at corners.

1. One wall shall terminate at the face of the other wall with a control joint at that point.
2. Tie these walls together with a metal tie bar ¼" x 1¼" x 28" long, with a 2" right angle bend at each end of the bar, and spaced vertically 24" on center.
3. The bends at the ends of the bars to be embedded in cores filled with mortar or concrete.
4. At exposed locations, rake out these joints ¾" deep after the mortar has become quite stiff.
5. Caulking of these joints is specified elsewhere in these specifications.

C. Intersecting non-bearing block walls shall be tied with strips of metal lath or ¼" mesh galvanized hardware cloth placed across the joint between the two walls.

1. Place in alternate horizontal block courses.
2. Rake out and prepare for caulking as specified above.

3.04 MORTAR BEDDING AND JOINTING

A. Mortar joints shall be straight, clean, and uniform in thickness.

B. Where masonry units are to receive stucco, plaster, wallboard, or other covering, strike joints flush.

C. At exposed areas, joints shall be concave tooled as indicated on the Drawings.

D. Unless otherwise indicated or specified, horizontal and vertical mortar joints shall be a nominal 1/3" thick, and course vertically to 4" or 8", horizontally to 16".

3.05 GROUT (REFER TO SPECIAL INSPECTIONS)

A. Grout shall be installed in accordance with applicable codes and standards, as indicated on the Drawings, and as specified herein. Grout all cells.

B. Comply with requirements of ACI 530.1 for cleanouts and for grout placement.

C. Do not place grout until entire height of masonry to be grouted has attained sufficient strength to resist grout pressure.

D. Grout locations and maximum pour heights are as indicated on the Drawings and specified herein.

E. Pour no grout unless the masonry wall has been allowed to cure a minimum of 3 days in hot weather and 5 days in cold damp weather.

1. Grout may be placed by hand bucket, concrete hopper or through a grout pump.
2. Grout space shall not be wet down prior to placing of grout.
3. Align cells to be grouted to form unobstructed, continuous vertical spaces within the wall.
4. Mortar the webs around the cores of all cells to be grouted.
5. Keep excess mortar from extruding and falling into the grout space. Remove mortar that projects more than 3/8" into the grout space.
6. At the foundation, mortar bedding under the first course to be grouted shall be such as to permit grout to come into direct contact with the foundation or bearing surface.

F. A grout pour may consist of one or more grout lifts.

1. Place grout in lifts not exceeding 5 feet in height.
2. Use a 3/4" flexible cable vibrator for consolidation of each grout lift immediately after placing.
   a. Reconsolidate each grout lift after initial water loss and settlement has occurred.
   b. Consolidation of second grout lift, and reconsolidation of first grout lift may be done in the same operation as specified above.
3. Between grout pours, a horizontal construction joint shall be formed by stopping all wythes at the same elevation and with the grout stopping a minimum of 1½ inches below a mortar joint, except at the top of the wall.
4. Where bond beams occur, the grout pour shall be stopped a minimum of ½ inch below the top of the masonry.
5. Cleanouts, minimum of 3"X4", shall be provided at the bottom of all grout pours over 5 feet in height.
   a. Where required, cleanouts shall be provided in the bottom course at every vertical bar, but shall not be spaced more than 32 inches on center for solidly grouted masonry. Cleanouts shall be sealed after inspection and before grouting

G. Use extreme care to prevent any grout or mortar from staining the face of the masonry to be left exposed or painted.

   a. Grout or mortar which is visible on the face of such masonry shall be immediately removed.
   b. Protect all sills, ledges, offsets, and other projections, from droppings of mortar or grout, and protect door jambs and corners from damage during construction.

3.06 MASONRY JOINT REINFORCEMENT

A. Place horizontal reinforcing per structural drawings.

1. Continuously reinforce first bed joint immediately above and below openings.
2. In second bed joint, it shall extend 2 feet beyond each side of opening.
3. Lap reinforcement a minimum of 6" at splices, and cut and bend at corners.

B. Place vertical reinforcing and bond beam reinforcing as indicated.

1. Lap splices in reinforcing not less than 40 bar diameters.
2. Use re-bar positioners to position reinforcing steel in cells and at all laps in steel bars.
3. Reinforce all walls vertically as indicated on the Drawings.
4. Provide vertical reinforcement at all wall ends, corners, intersections and at jambs of openings.
5. Provide all reinforced bond beams indicated.
6. Grout barrier below bond beams shall be continuous wire lath.

C. Space vertical reinforcing in center of grout or as indicated on structural drawings at center of wall, continuous full height of wall with one #5 at all corners, intersections, wall ends, jambs, at each side of control joints, and at intervals not to exceed 48" on center unless otherwise noted.

1. Dowel all vertical reinforcing to foundation with dowels to match vertical wall or column reinforcing.

D. Reinforcing steel shall be in place and inspected prior to grouting.

1. Vertical cells to be filled shall have vertical alignment to maintain a continuous cell area.
2. Fill cells solidly with grout in lifts not to exceed 4 feet and stop pours 1-1/2" below the top of a course to form a key at pour points.
3. Rod grout in vertical spaces immediately after pouring, and again about 5 minutes later.
4. Grout beams over openings and bond beams in a continuous operation.
5. Solidly grout in place all bolts, anchors, etc. See this section for high-lift grout requirements.

E. Install in mortar with a minimum cover of 5/8 inch on exterior side of walls, 1/2 inch elsewhere

F. Interrupt joint reinforcement at control and expansion joints, unless otherwise indicated.

G. Provide continuity at wall intersections by using prefabricated T-shaped units.

H. Provide continuity at corners by using prefabricated L-shaped units.

3.07 CONTROL JOINTS

A. Provide control joints, as indicated on the Drawings and as required by the applicable codes, at all vertical masonry walls.

1. In long length of walls, provide joints at a maximum of 20 feet o.c. or as indicated.
2. Do not locate less than 24" from a bearing plate or from a jamb of an opening wider than 48".
3. Control joints shall be continuous full height of walls.
4. At bond beams, control joint shall separate both block and grout. However, steel reinforcing shall be continuous.
5. Hold control joint fill materials back from finished surfaces.
6. At fire rated walls, provide fire rated joint closures in accordance with local codes and Section 07920.

3.08 ANCHORING MASONRY TO STRUCTURAL MEMBERS

A. Anchor masonry to structural members where masonry abuts or faces structural members to comply with the following:

1. Provide an open space not less than 1 inch in width between masonry and structural member, unless otherwise indicated.
2. Anchor masonry to structural members with anchors embedded in masonry joints and attached to structure.
3. Space anchors as indicated, but not more than 24 inches o.c. vertically and 36 inches o.c. horizontally.

3.09 FLASHING, WEEP HOLES, CAVITY DRAINAGE, AND VENTS

A. General: Install embedded flashing and weep holes in masonry at shelf angles, lintels, ledges, other obstructions to downward flow of water in wall, and where indicated.

B. Install flashing as follows, unless otherwise indicated:

1. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Where flashing is within mortar joint, place through-wall flashing on sloping bed of mortar and cover with mortar. Before covering with mortar, seal penetrations in flashing as recommended by flashing manufacturer.
2. At lintels and shelf angles, extend flashing a minimum of 6 inches into masonry at each end. At heads and sills, extend flashing 6 inches at ends and turn up not less than 2 inches to form end dams.

3. Install metal drip edges beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch back from outside face of wall and adhere flexible flashing to top of metal drip edge.
4. Install metal flashing termination beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch back from outside face of wall and adhere flexible flashing to top of metal flashing termination.

C. Install weep holes in head joints in exterior wythes of first course of masonry immediately above embedded flashing and as follows:

1. Use specified weep/vent products or open head joints to form weep holes.
2. Space weep holes 24 inches o.c., unless otherwise indicated.
3. Cover cavity side of weep holes with plastic insect screening at cavities insulated with loose-fill insulation.

D. Install vents in head joints in exterior wythes at spacing indicated. Use open head joints to form vents.

1. Close cavities off vertically and horizontally with blocking in manner indicated. Install through-wall flashing and weep holes above horizontal blocking.

3.10 REINFORCED UNIT MASONRY INSTALLATION

A. Temporary Formwork and Shores: Construct formwork and shores as needed to support reinforced masonry elements during construction.

1. Construct formwork to provide shape, line, and dimensions of completed masonry as indicated. Make forms sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.
2. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and other temporary loads that may be placed on them during construction.

B. Placing Reinforcement: Comply with requirements in ACI 530.1.

C. Grouting: Do not place grout until entire height of masonry to be grouted has attained enough strength to resist grout pressure.

1. Comply with requirements in ACI 530.1 for cleanouts and for grout placement, including minimum grout space and maximum pour height.
2. Limit height of vertical grout pours to not more than 60 inches.

3.11 FIELD QUALITY CONTROL

A. Inspectors: Owner will engage qualified independent inspectors to perform inspections and prepare reports. Allow inspectors access to scaffolding and work areas, as needed to perform inspections.

1. Place grout only after inspectors have verified compliance of grout spaces and grades, sizes, and locations of reinforcement.

B. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections indicated below and prepare test reports:

C. Testing Frequency: One set of tests for each 5000 sq. ft. of wall area or portion thereof.

D. Clay Masonry Unit Test: For each type of unit provided, per ASTM C 67.

E. Concrete Masonry Unit Test: For each type of unit provided, per ASTM C 140.

F. Mortar Test (Property Specification): For each mix provided, per ASTM C 780. Test mortar for mortar air content and compressive strength.

G. Grout Test (Compressive Strength): For each mix provided, per ASTM C 1019 .

3.12 POINTING AND CLEANING

A. Point and fill holes and cracks in exposed mortar joints.

1. Cut out defective mortar joints, refill solidly with mortar, and tool as indicated on the Drawings and in the Specification herein.
   a. Pre-hydrate mortar for pointing by mixing dry ingredients with only sufficient water to produce a damp mass of such consistency that it will retain its form when pressed into a ball with the hands, but will not flow under the trowel.
   b. Allow mortar to stand for a period of not less than one hour, and not more than 2 hours, after which, remix with the addition of sufficient water to produce satisfactory workability.

B. Pointing mortars shall be identical to adjacent mortar in similar joints, and finish results shall match and be indistinguishable from original mortar used.

C. Upon completion of the masonry work, clean all exposed masonry in an approved manner acceptable to the Architect.

D. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.

E. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:

1. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes.
2. Protect adjacent surfaces from contact with cleaner.
3. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
4. Clean brick by bucket-and-brush hand-cleaning method described in BIA Technical Notes 20.
5. Clean masonry with a proprietary acidic cleaner applied according to manufacturer's written instructions.
6. Clean concrete masonry by cleaning method indicated in NCMA TEK 8-2A applicable to type of stain on exposed surfaces.

3.13 MASONRY WASTE DISPOSAL

A. Waste Disposal as Fill Material: Dispose of clean masonry waste, including excess or soil-contaminated sand, waste mortar, and broken masonry units, by crushing and mixing with fill material as fill is placed.

1. Do not dispose of masonry waste as fill within 18 inches of finished grade.
2. Remove excess clean masonry waste that cannot be used as fill, as described above, and other masonry waste, and legally dispose of off Owner's property.

END OF SECTION 04810