SECTION 042200

CONCRETE UNIT MASONRY

PART 1 GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE

A. Mortar and Grout: Section 040513.

B. Brick Masonry: Section 042113.

C. Masonry Restoration: Section 040121.

D. Built-In Flashings: Section 076000.

1.02 SUBMITTALS

A. Shop Drawings:

1. Submit placing drawings for bar reinforcement.

B. Product Data: Catalog sheets, specifications, and installation instructions for the following:
1. Masonry wall reinforcement.
2. Bar reinforcement.
3. Adjustable wall ties.
4. Flexible anchors.
5. Dovetail anchor slot concrete inserts.
6. Tiebars.
7. Buck anchors.
8. Thru-wall masonry flashing.
9. Cap flashing with thru-wall cap flashing receiver.
10. Control joint filler.
11. Asphalt felt.

C. Samples:
1. Hollow Load-bearing Units (Normal Weight): 6 of each size.
2. Concrete Building Brick: 2 of each size.
3. Accessories: Each item specified, full size or 24 inch long sections as applicable, except bar reinforcement (if any).

D. Quality Control Submittals:
1. Test Reports: Certified test reports for concrete masonry units showing that materials for delivery to the Project meet the requirements of these Specifications.
2. Certificates: Affidavit required under Quality Assurance Article.

1.03 QUALITY ASSURANCE

A. Certifications: Affidavit by the bar reinforcement manufacturer certifying that bar material meets the contract requirements.
   1. Submit evidence of steel material compliance with this Specification. Evidence shall consist of certification of source of material, copies of purchase orders and manufacturer's certifications. For stock material, submit copies of latest mill or purchase orders for material replacement.
      a. Documentation to confirm compliance with General Conditions Article 25.4 Domestic Steel.
   2. Certificates: Bar reinforcement manufacturer's certification that bar material conforms with ASTM A 615 and specified grade.

B. The Contractor agrees, that if the value of this contract exceeds $100,000 all structural steel, reinforcing steel and other major steel items to be incorporated in the Work of this Contract shall be produced and made in whole or substantial part in the United States, its territories or possessions.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Store masonry units off the ground on platforms that allow air circulation under stacked units.

B. Cover and protect masonry units against wetting prior to use.

C. Handle masonry units on pallets or flat bed barrows.

1.05 PROJECT CONDITIONS

A. Environmental Requirements; Cold Weather Conditions:
   1. At temperatures below 40 degrees F, maintain mortar temperature between 40 degrees F and 120 degrees F. If necessary, heat mixing water and sand to produce the required results.
   2. At temperatures between 40 degrees F and 32 degrees F, protect masonry from rain and snow for 24 hours after laying.
   3. At temperatures between 32 degrees F and 20 degrees F, provide wind breaks and cover the masonry to prevent wetting and freezing. Maintain masonry above freezing for not less than 24 hours using auxiliary heat or insulating blankets.
   4. At temperatures below 20 degrees F, provide heated enclosures for laying the masonry. At the end of the workday, maintain the enclosures and keep the Work from freezing for not less than 24 hours.
   5. Do not lower freezing point of mortar by use of antifreeze, calcium chloride or other additives.
   6. Do not use frozen materials or materials coated with ice or frost.

PART 2 PRODUCTS

2.01 CONCRETE MASONRY UNITS

A. Hollow Load-Bearing Units: ASTM C 90, Type I.

B. Concrete Building Brick: ASTM C 55, Type I, Grade N.

C. Aggregate:
1. Lightweight Units: ASTM C 331; dry net weight not more than 105 lb per cu ft.
2. Normal Weight Units: ASTM C 33; dry net weight not less than 125 lb per cu ft.

D. Special Shapes: Units of shape and size required for lintels, corners, jambs, sash, control joints, headers, bonding, and other special conditions indicated.
1. Outside Corners: Square edge units, unless otherwise shown.

3. Units for Walls and Partitions to be Vertically Reinforced, Grouted, or Filled with Loose Insulation: Two cell (core) units.

E. Manufacturer: Obtain masonry units from one manufacturer, of uniform texture and color for each kind required. All concrete masonry units must be certified to contain a minimum of 30 percent pre-consumer (post-industrial) recycled content.

2.02 ACCESSORIES

A. Masonry Wall Reinforcement: Joint reinforcement factory fabricated from cold-drawn steel wire, ASTM A 82, truss or ladder design, with 9 gage deformed steel wire longitudinal rods welded to 9 gage steel wire cross ties spaced 16 inches oc; width 1-1/2 to 2 inches less than total wall thickness. Furnish factory-fabricated corner and tee sections for corners and wall intersections.
1. Finish for Exterior Walls: 1.5 oz per sq ft hot dipped galvanized after fabrication, ASTM A 153, Class B-2.
2. Finish for Interior Walls: 0.8 oz per sq ft mill galvanized, ASTM A 641, Class 3, except interior walls exposed to moist environment shall have finish specified for exterior walls.
3. Cavity Wall Construction: Ladder design fabricated with drip notch in cross ties centered over the cavity.
4. For walls with concrete masonry unit back-up wythe, reinforcement shall have a third longitudinal rod located for proper embedment at internal face shell of concrete masonry units.
5. Provide units with adjustable 2 piece rectangular ties where horizontal joints of facing wythe do not align with those of back-up.

B. Bar Reinforcement: ASTM A 615, Grade 60, deformed steel bars.
1. Rebar Positioner: Fabricate from galvanized steel wire, 9 gage or 6.5 gage as required. Design to fit concrete masonry units, and number, size and location of rebars indicated. Products; Steel-Wich Telescoping Rebar Positioner or No. 376 Rebar Positioner or No. 377 Rebar

Positioner by Heckmann Building Products, Inc., 1501 N. 31st Ave., Melrose Park, IL 60160, (800) 621-4140, www.heckmannbuildingprods.com.

C. Adjustable Wall Ties: 3/16 inch dia cold-drawn steel wire, ASTM A 82; 2 piece construction consisting of pintle section with 2 legs and corresponding eye section. Maximum clearance between connecting parts shall be 1/16 inch. Wall tie shall be of size for at least 1-1/2 inch embedment into the mortar bed of solid masonry units.
   1. Finish for Exterior Walls: 1.5 oz per sq ft hot dipped galvanized after fabrication, ASTM A 153, Class B-2.
   2. Finish for Interior Walls: 0.8 oz per sq ft mill galvanized, ASTM A 641, Class 3, except interior walls exposed to moist environment shall have finish specified for exterior walls.
   3. For solid masonry wythes, provide z-shaped ties.
   4. For composite wythes (face brick with concrete unit masonry backing), provide rectangular shaped ties.

D. Flexible Anchors: 1.5 oz per sq ft hot dipped galvanized steel anchors which will permit horizontal and vertical movement of masonry but will maintain lateral restraint, and as follows:
   1. For Anchorage To Concrete Framework: 2 piece anchors with 12 gage sheet steel dovetail section and rectangular or vee-shaped 3/16 inch dia wire tie section sized to extend to within one inch of face of masonry.
   2. For Anchorage To Steel Framework: 2 piece anchors with crimped 1/4 inch dia bar for welding to steel and rectangular or vee-shaped 3/16 inch dia wire tie section sized to extend to within one inch of face of masonry.

E. Dovetail Anchor Slot Concrete Inserts: 24 gage galvanized steel, with filler strip; slot sized to fit dovetail anchor.

F. Tiebars: 1-1/4 x 1/4 x 28 inch long steel bars with 3-inch long right angle bent ends, 1.5 oz per sq ft hot dipped galvanized after fabrication. Adjust length of bars as required when obstructions are encountered.

G. Buck Anchors (For Anchoring New Masonry To Existing Construction): 1-1/4 x 1/8 x 8 inch long Z type steel buck anchor with 2 inch long right angle bent ends, bolt hole in one bent end, 1.5 oz per sq ft hot dipped galvanized after fabrication. Furnish 3/8-inch diameter galvanized machine bolt and non-ferrous metal expansion shield.

H. Thru-Wall Masonry Flashing: Copper fabric consisting of a single sheet of 7 oz. copper sheet with asphalt impregnated glass fabric bonded to both sides of copper.
   1. Joint Sealant: Trowel grade asphalt roofing cement.

I. Cap flashing With Thru-Wall Cap Flashing Receiver: Three-way mortar bond type receiver with snap fit cap flashing. Acceptable product; ":Two-Piece Cap Flashing" by Keystone Flashing Co., 5119 N. Second St., Philadelphia, PA 19120, (800) 526-8348, www.keystoneflashing.com.
   1. Lead Coated Copper: 16 oz.

2. Fabricate as indicated on Drawings.

J. Control Joint Filler: For vertical control joints, close cell neoprene, 1/2 inch thick by 3 inch wide, conforming to ASTM D 1056, RE41 or ASTM D 2056, RE41; NS - Closed Cell Neoprene Sponge by Hohman & Barnard Inc., 30 Rasons Ct., Hauppauge, NY 11788, (800) 645-0616, www.h-b.com; or DA2015 closed cell neoprene by Dur-O-Wal Inc., 7777 Washington Village Dr., Ste. 130, Dayton, OH 45459, (888) 977.9600, www.dur-o-wal.com.

2.03 SOURCE QUALITY CONTROL

A. Tests: Sample and test concrete masonry units in accordance with ASTM C 140 and ASTM C 426. Have tests performed by a qualified independent testing laboratory.

PART 3 EXECUTION

3.01 PREPARATION

A. Allow other trades sufficient opportunity to install built-in Work before proceeding with the walls and partitions. Do not cover pipes, conduit, or ductwork in masonry until directed by the Director's Representative.

B. Clean off supporting surface under first course of masonry just prior to laying the masonry units.

C. Protection:
1. Protect face materials against staining.
2. Remove misplaced mortar immediately.
3. Protect sills, ledges, off-sets, and similar items from mortar drippings and other damage during construction.
4. Protect newly laid masonry from exposure to precipitation, excessive drying, freezing, soiling, backfill, and other harmful elements.
5. Cover top of walls with non-staining waterproof covering when Work is not in progress. Place with minimum 2-foot overhang of protective covering on each side of wall and securely anchor.

3.02 INSTALLATION

A. Install concrete masonry units plumb and true to line in level courses accurately spaced.

B. Lay masonry units in running bond, with vertical joints located at center of units in course below, unless otherwise indicated on the Drawings.

C. Lay masonry units in existing concrete unit masonry bond pattern, and match existing coursing and joints.

D. Lay only dry masonry units.

E. Adjust units to final position while mortar is soft and plastic. Remove units disturbed after mortar has stiffened; clean joints and units of mortar and re-lay in fresh mortar.

F. Lay out Work to avoid use of less than half-size units. Where cutting of masonry units is necessary, cut with a power saw.

G. Where fresh masonry joins partially or totally set masonry, clean bond surfaces of set masonry, removing loose mortar and foreign material prior to laying fresh masonry.

H. If it is necessary to stop off a horizontal run of masonry, rack back one-half unit length in each course. Toothing will not be permitted unless approved in writing by the Director's Representative.

I. Cavity Wall Construction: Keep cavities clean of mortar droppings.

3.03 INSTALLATION TOLERANCES

A. Variation from the Plumb:
   1. In the lines and surfaces of columns, walls, and arises:
      a. In 10 feet: 1/4 inch.
      b. In any story or 20 feet maximum: 3/8 inch.
      c. In 40 feet or more: 1/2 inch.
   2. For external corners, control joints, and other conspicuous lines:
      a. In any story or 20 feet maximum: 1/4 inch.
      b. In 40 feet or more: 1/2 inch.

B. Variation from the Level or Grades indicated on the Drawings:
   1. For exposed lintels, sills, parapets, horizontal grooves, and other conspicuous lines:
      a. In any bay or 20 feet maximum: 1/4 inch.
      b. In 40 feet or more: 1/2 inch.

C. Variation of the Linear Building Lines from Established Position in Plan and Related Portion of Columns, Walls, and Partitions:
   1. In any bay or 20 feet maximum: 1/2 inch.
   2. In 40 feet or more: 3/4 inch.

D. Variation in Cross-sectional Dimensions of Columns and in the Thickness of Walls: Minus 1/4 inch; plus 1/2 inch.

E. Surface Plane Tolerance for Concrete Unit Masonry to Receive High-build Glazed Coating or Thin-set Tile: 1/8 inch in 10 feet in all directions.

3.04 MORTAR BEDS

A. Hollow Units:
   1. Lay with full mortar coverage on horizontal and vertical face shells.
   2. Bed webs in mortar also at the following locations:
      a. All courses of piers, columns and pilasters.

b. Starting course on footings and solid foundation walls.
c. Adjacent to cells or cavities to be reinforced or filled.
d. Within 1'-6" of each side of openings.

B. Solid Units: Lay with full mortar coverage on horizontal and vertical joint surfaces.

3.05 JOINTS

A. Horizontal and Vertical Face Joints:
1. Nominal Thickness: 3/8 inch, unless otherwise indicated.
2. Construct uniform joints.
3. Strike joints flush in surfaces to be plastered, stuccoed, or covered with other masonry or other surface applied finish other than paint and high-build glazed coating.
4. Cut joints flush and tool slightly concave on both sides of other walls and partitions, including inner wythe of exterior cavity walls.
5. Point joints tight in unparged masonry below ground.

B. Fill horizontal joint between top of masonry partitions and underside of concrete slabs and beams with mortar, unless otherwise shown on the Drawings.

C. Collar Joints: Except in cavity walls, fill vertical-longitudinal joint between wythes by slushing and rodding the joint full of mortar.

D. Remove mortar protruding into cells or cavities to be reinforced or filled.

3.06 HORIZONTAL JOINT REINFORCEMENT

A. Reinforce horizontal joints of concrete unit masonry with continuous masonry wall reinforcement at the following locations:
1. Exterior walls.
2. Interior load-bearing walls.
3. Straight runs of interior non-load-bearing partitions and walls that exceed 20 feet in length or exceed 12 feet in height, including partitions and walls having door and window openings.
4. Joint immediately above and below openings in walls and partitions for a length 4 feet longer than opening.

B. Install masonry wall reinforcement in horizontal joints as follows:
1. Space reinforcement every 16 inches vertically, except space 8 inches in parapet walls.
2. Straighten kinks or bends in the wires caused by handling, without injury to the material, before placing in masonry.
3. Place longitudinal wires over face shell mortar beds.
4. Embed entire length of longitudinal wires fully in mortar.
5. Provide minimum mortar cover of 5/8 inch on exterior side of exterior walls and 1/2 inch at other locations.
6. Lap ends of adjoining strips of reinforcement 6 inches or more.
7. Install factory fabricated corner and tee sections at corners and wall intersections respectively.

8. Cut reinforcement one inch short of each side of control and expansion joints.
9. Install additional lengths of reinforcement in first unreinforced joint above and below openings, centered on opening.

3.07 TYING ADJACENT WYTHES

A. Tie adjacent wythes of masonry walls together with continuous masonry wall reinforcement spaced vertically not more than 16 inches oc. Install reinforcement as specified under HORIZONTAL JOINT REINFORCEMENT.
   1. Where horizontal mortar joints of back-up wythe and face wythe do not align or where one wythe is required to be constructed before the other, tie adjacent wythes of masonry walls together with adjustable wall ties spaced 16 inches vertically and 24 inches horizontally, in conjunction with continuous masonry wall reinforcement.

3.08 BONDING WITH MASONRY

A. Bonding of Abutting or Intersecting Walls and Partitions:
   1. External Corners: Where partitions and walls form external corners, bond together by alternate lapping of each course of corner unit.
   2. Door Openings Near Intersections: Where door openings in abutting partitions or walls are within one foot of the intersection, lay every second course at intersection in masonry bond. Reinforce every second course of intersection with masonry wall reinforcement. Fill all cells between the intersection and the door frame with mortar to the full height of the door.

B. Bonding Pilasters, Piers, and Columns: Lay every second course in masonry bond. Reinforce every second course with masonry wall reinforcement.

3.09 TYING INTERSECTING WALLS AND PARTITIONS

A. Except where masonry bond is specified, terminate abutting walls and partitions flush against the face of the abutted walls. Tie intersections at every second course as follows:
   1. Load-Bearing Walls: Install tiebars. Embed bent ends in cells filled with mortar. Install pieces of metal lath under the cells to support the mortar fillings.
   2. Non-Load-Bearing Walls: Install ties of masonry wall reinforcement tee sections or strips of hardware cloth embedded in mortar.
      a. Center standard length masonry wall reinforcement tee sections on the walls.
      b. Width of hardware cloth strips shall be the width of the abutting wall less 1-1/2 inches; length shall be 24 inches or twice the width of the abutted wall, whichever is greater. Center the strips on the abutting wall and extend across intersection to 3/4 inch from the farthest face of the abutted wall.

B. Fill vertical joint at abutted walls and partitions solid with mortar at intersection. If a control joint is located at the intersection, rake out both sides of joint to a depth of 3/8 inch.

3.10 ANCHORING

A. Anchor walls adjoining or intersecting structural framing and dependent upon structural framing for lateral support to structural members with flexible anchors. Build wire tie section into wall and secure other piece of anchor to structural member.
   1. Space anchors 16 inches oc, unless otherwise shown on the Drawings.

B. Anchoring Partitions and Infill Abutting Existing Construction: Install buck anchors in bed joints 16 inches oc vertically. Embed one bent end in cell filled with mortar. Install piece of metal lath under the cell to support the mortar filling. Expansion bolt other bent end to existing construction.

3.11 BUILT-IN WORK

A. Avoid cutting and patching.

B. Build-in bolts, anchors, nailing blocks, inserts, frames, vents, flashings, conduit and other items as masonry Work progresses.

C. Fit masonry units closely around built-in Work. Fill voids around built-in items with mortar for anchorage. Solidly fill space between masonry and metal frames with mortar.

D. Unless otherwise shown on the Drawings, construct 1/4 inch to 3/8 inch wide open joint around outside perimeter of exterior door and window frames and other framed exterior wall openings to receive sealant. Rake joints and tool smooth to a uniform depth of 1/4 inch.

E. Installing In-Wall Flashings:
   1. Clean contact surfaces and remove projections that might puncture the flashing. Place flashing on bed of mortar and cover with mortar.
   2. Where bar reinforcement punctures the wall flashing, cut the flashing as close as possible to form a tight fit around the reinforcement.
   3. Apply trowel grade asphalt roof cement completely around the penetrations.
   4. Place flashings on bed of mortar and cover with mortar.
   5. At base of wall only, extend flashing 1/2 inch beyond the face of the wall and turn down at 45 degrees to form a drip at building foundation wall.
   6. At all other locations, after the Director's Representative has inspected and approved flashing, cut flashing 1/4 inch beyond the face of the wall and turn down at 45 degrees to form a drip. Retool joint as required.
   7. Extend thru wall flashing a minimum of 16 inches vertically up from relieving angle and concrete shelf.
   8. Installing Compression Bar: Install a continuous metal compression bar over the flashing where indicated on the Drawings and secure one foot

on center. Apply a bead of Type 1 Sealant along the top edge of the flange.

9. Form inside and outside corners using splice pieces. Splice pieces to be a minimum of 12 inches on each side of corner, install in accordance with the manufacturer's printed details, lap ends and edges a minimum of 6 inches, apply trowel grade asphalt roof cement between all flashing layers.

F. Installing Thru-Wall Cap Flashing Receivers:
   1. Set the receiver so there is mortar above and below the built-in portion.
   2. Do not mallet, bend or deform the exposed portion.
   3. Lap all end joints so they interlock at the first raised rib. Apply Type 3 sealant between the mating surfaces of the built-in portion of the receiver before interlocking end joints.

G. Installing Cap Flashing in Receivers:
   1. Insert the cap flashing into the receiver-locking slot. Apply upward pressure along the entire length of the cap flashing so that it is securely locked into position

3.12 CONTROL JOINTS

A. Install control joints at locations shown on the Drawings. If locations of control joints are not shown, provide vertical control joints spaced not to exceed 35 feet; locate joints at points of natural weakness in the masonry Work.

B. Mortar Control Joints: Fill abutting cells of masonry units with mortar after installing asphalt felt at one side of joint to break the bond. Rake out joints to a depth of 3/8 inch.

C. Premoulded Control Joint Strips: Install joint strip as the Work progresses. Compress strips as masonry units are laid.

3.13 EXPANSION JOINTS

A. Install expansion joints at locations shown on the Drawings. Keep joints free of mortar and debris.

B. Build flanges of metal expansion strips into masonry. Lap joints between metal strips 4 inches in direction of flow. Solder joints between metal strips below grade and at junctures with horizontal expansion joints.

3.14 REINFORCING WALLS AND PARTITIONS WITH BAR REINFORCEMENT AND GROUT

A. Place bar reinforcement in cells and cavities in the masonry where shown on the Drawings. Secure bars in designed locations with rebar positioners.

B. Grouting: Completely fill cells and cavities in the masonry with grout where shown on the Drawings. Puddle or slightly vibrate grout during placement.

3.15 POINTING AND CLEANING

A. Cut off mortar projections remaining from tooling joints.

B. Dry brush masonry Work after mortar has set, at end of each day's Work and after final pointing.

C. At completion of masonry Work, fill holes in joints (except weep holes) and tool.

D. Remove and replace CMU that are loose, chipped, broken, stained, or otherwise damaged, or if units do not match adjacent units. Install new units to match adjoining units in fresh mortar, point joints to eliminate any evidence of block replacement.

E. Cut out and repoint defective joints.

F. Leave Work and surrounding surfaces clean and free of mortar spots and droppings.

3.16 CONCRETE MASONRY UNIT SCHEDULE

A. Unless shown otherwise on the Drawings, use the various kinds of concrete masonry units specified at the locations indicated below:
   1. Hollow Load-Bearing Units (Normal Weight):
      a. Use for exposed exterior Work.
      b. Use for Work in which the same masonry units are exposed on both the interior and exterior

END OF SECTION