

**SECTION 04 20 00
MASONRY UNITS**

PART I GENERAL

1.1 SECTION INCLUDES

- A. Concrete masonry and brick
- B. Reinforcement, anchorage, and accessories

1.2 REFERENCES

- A. ASCE 7 – American Society of Civil Engineers – Minimum Design Loads of Buildings and Other Structures
- B. ACI 530/ASCE 5/TMS 402 – Building Code Requirements for Masonry Structures
- C. ACI 530.1 /ASCE 6/TMS 602 – Specifications for Masonry Structures
- D. ASTM A82/A82M – Standard Specification for Steel Wire, Plain, for Concrete Reinforcement
- E. ASTM A123/A123M – Standard Specification for Zinc (Hot-Dipped Galvanized) Coatings on Iron and Steel Products
- F. ASTM A167- Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip
- G. ASTM A580/A580M – Standard Specification for Stainless and Heat-Resisting Steel Wire
- H. ASTM A615/A615M – Standard Specification for Deformed and Plain Carbon Steel Bars for Concrete Reinforcement
- I. ASTM A641/A641M – Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire
- J. ASTM A653/A653M – Standard Specifications for Steel Sheet, Zinc-Coated (Galvanized) or Zinc Iron Alloy Coated (Galvannealed) by the Hot-Dip Process
- K. ASTM B370 - Standard Specification for Cooper Sheet and Strip for Building Construction
- L. ASTM C34 – Standard Specification for Structural Clay Load-Bearing Wall Tile
- M. ASTM C55 – Standard Specification for Concrete Building Brick
- N. ASTM C56 – Standard Specification for Structural Clay Non-Load Bearing Tile
- O. ASTM C62 – Standard Specification for Building Brick (Solid Masonry Units Made from Clay or Shale)
- P. ASTM C73 – Standard Specification for Calcium Silicate Face Brick (Sand-Line Brick)
- Q. ASTM C90 - Standard Specification for Load-Bearing Concrete Masonry Units
- R. ASTM C126 – Standard Specification for Ceramic Glazed Structural Clay Facing Tile, Facing Brick and Solid Masonry Units
- S. ASTM C129 – Standard Specification for Non-Load Bearing Concrete Masonry Units
- T. ASTM C212 – Standard Specification for Structural Clay Facing Tile
- U. ASTM C216 – Standard Specification for Facing Brick (Solid Masonry Units Made from Clay or Shale)
- V. ASTM C315 – Standard Specification for Clay Flue Linings and Chimney Pots
- W. ASTM C530 – Standard Specification for Structural Clay Non-Load Bearing Screen Tile
- X. ASTM C652 – Standard Specification for Hollow Brick (Hollow Masonry Units Made from Clay or Shale)
- Y. ASTM C744 – Standard Specification for Prefaced Concrete and Calcium Silicate Masonry Units
- Z. IMIAC – International Masonry Industry All-Weather Council: Recommended Practices and Guide Specification for Cold Weather Masonry Units
- AA. IMIAC – International Masonry Industry All-Weather Council: Recommended Practices and Guide Specification for Hot Weather Masonry Construction

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BB. UL – Fire Resistance Directory

CC. FBC - Florida Building Code

1.3 SUBMITTALS

- A. Submit under provisions of Section 01 33 00.
- B. Product Data: Provide data for masonry units and fabricated wire reinforcement.
- C. Samples: Submit four samples of decorative block, face brick, pre-faced, units to illustrate color, texture and extremes of color range.
- D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

1.4 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.

1.5 REGULATORY REQUIREMENTS

- A. Design and construction shall comply with ASEC 7 Wind Loads, FBC, ACI 530/ASCE 5/TMS 402, and ACI 530.1/ASCE 6/TMS 602
- B. Conform to applicable code for UL Assembly requirements for fire-rated masonry construction.
- C. Provide lateral support for block walls, both vertical and horizontal.
 - 1. The vertical heights of masonry between horizontal supports shall be in accordance with the wall lateral support requirements, FBC table 2107.1.

1.6 MOCK-UP

- A. Provide mock-up of composite masonry under provisions of Section 01 40 00.
- B. Construct a masonry wall into a panel sized 5' long by 4' high, which includes a corner, mortar, and accessories, structural backup, wall openings, flashings, wall insulation, air barrier, vapor barrier and parging.
- C. Locate where directed.
- D. Mock-up to remain intact and protected until the Punch List is completed or until Owner agrees in writing to removal.
- E. Mock-up may remain as part of the work with the Owner's approval.

1.7 PRE-INSTALLATION CONFERENCE

- A. Meet one week prior to commencing work of this section, under provisions of Section 01 31 00.

1.8 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store, protect, and handle products to site under provisions of Section 01 60 00.

1.9 ENVIRONMENTAL REQUIREMENTS

- A. Cold Weather Requirements: IMIAC – Recommended Practices and Guide Specifications for Cold Weather Masonry Construction
- B. Hot Weather Requirements: IMIAC – Recommended Practices and Guide Specifications for Hot Weather Masonry Construction

1.10 COORDINATION

- A. Coordinate work under provisions of Section 01 31 00.
- B. Coordinate the masonry work with installation of window anchors.

PART 2 PRODUCTS

2.1 CONCRETE MASONRY UNITS

- A. Load-Bearing Concrete Masonry Units (CMU): ASTM C90, Type II – Non-Moisture Controlled
- B. Hollow Non-Load Bearing Block Units (CMU): ASTM C129, Type II – Non-Moisture Controlled

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- C. Concrete Brick Units: ASTM C55, Grade N, Type II – Non-Moisture Controlled of same Type and Weight as block units
- D. Provide special units for 90° corners, bond beams, lintels, coved bases, bull nosed corners and angle corners.
- E. All block installed if fire-rated walls and partitions shall be classified units or certified for the intended use in accordance with FBC.

2.2 BRICK UNITS

- A. Face Brick: ASTM C216, Type FBS, Grade MW; color as selected
- B. Building Brick: ASTM C62, Grade NW; solid units
- C. Hollow Facing and Building Brick: ASTM C652, Grade SW, Type HBS; color as selected
- D. Sand-Lime Face Brick: ASTM C73, Grade SW
- E. Size and Shape: Provide special units for 90° corners, lintels, bull nosed corners and angle corners.
- F. Special Brick Shape: Shaped to profile indicated; surface texture on exposed sides and ends.
- G. Giant Face Brick: ASTM C216, Type FBS, Grade MW; color as selected
- H. Giant Hollow Facing and Building Brick: ASTM C652, Grade SW, Type HBS; color as selected
- I. Provide special units for 90° corners, lintels, bull nosed corners and angle corners.
- J. Special Giant Brick Shape: Shaped to profile indicated; surface texture on sides and ends.

2.3 REINFORCEMENT AND ANCHORAGE

- A. Single Wythe Joint Reinforcement: Truss type; steel wire, hot dip galvanized to ASTM A641/A641M Class 3 after fabrication, 3/16" side rods with 9-gauge crossties
- B. Multiple Wythe Joint Reinforcement: Ladder type; with moisture drip; adjustable type, steel wire, hot dip galvanized ASTM A641/A641M Class 3 fabrication, 3/16" side rods with 9-gauge crossties.
- C. Reinforcing Steel: ASTM A615/A615M Grade 40 and 60, deformed carbon bars, unfinished
 - 1. Strap Anchors: Bent steel shape, hot dip galvanized to ASTM A123/A123M, B2 finish.
- D. Wall Ties: Corrugated formed sheet metal, gauge thick, adjustable, hot dip galvanized to ASTM A123/A123M B2 steel finish.
- E. Wall Ties: Formed steel wire, gage thick, adjustable, eye and pintle type, hot dip galvanized to ASTM A123/A123M B2 steel finish.
- F. Dovetail Anchors: Bent steel strap, galvanized to ASTM A123/ASTM 123M B2 finish.

2.4 MORTAR AND GROUT

- A. Mortar and Grout: As specified in Section 01 05 13.

2.5 FLASHINGS

- A. Copper: ASTM B370/B370M, cold-rolled; 20 oz/sq ft, 0.027" thick; natural finish
- B. Galvanized Steel: ASTM A653/A653M, G90 finish, 24-guage core steel
- C. Stainless Steel: ASTM A167, Type 304, soft temper; 24-gauge thick; smooth finish
- D. Provide dovetail, saw tooth, or other design to develop all direction bonding
- E. Lap Sealant: Butyl type as specified in Section 07 92 00

2.6 ACCESSORIES

- A. Performed Control Joints: Neoprene material with corner and tee accessories, cement fused joints
- B. Joint Filler: Closed cell polyvinyl chloride; oversized 50% to joint width; self-expanding.
- C. Cavity Wall Drainage System: High-density polyethylene to support mortar droppings and debris within the cavity.
- D. Building Paper: No. 30 asphalt saturated felt.

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- E. Nailing Strips: Softwood, preservative treated for moisture resistance, dovetail shape, sized to masonry joints.
- F. Weep: Preformed plastic tubes, hollow
- G. Cavity Vents: Molded polyvinyl chloride grilles, insect resistant.
- H. Cleaning Solutions: Non-acidic, not harmful to masonry work or adjacent materials

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive work.
- B. Verify items provided by other sections of work are properly sized and located.
- C. Verify that built-in items are in proper location, and ready for roughing into masonry work.

3.2 PREPARATION

- A. Direct and coordinate placement of metal anchors supplied to other sections.
- B. Provide temporary bracing during installation of masonry work. Maintain in place until building structure provides permanent bracing.

3.3 COURSING

- A. Establish lines, levels, and coursing indicated.
 - 1. Protect from displacement.
- B. Maintain masonry courses to uniform dimension.
 - 1. Provide vertical and horizontal joints of uniform thickness.
- C. Concrete Masonry Units:
 - 1. Coursing: One unit and one mortar joint to equal 8"
 - 2. Mortar Joints: Concave
- D. Brick Units:
 - 1. Coursing: Three units and three mortar joints to equal 8"
 - 2. Mortar Joints: Concave

3.4 PLACING AND BONDING

- A. Lay solid masonry units in full bed of mortar, with full head joints, uniformly jointed with other work.
- B. Lay hollow masonry units with face shell bedding on head and bed joints.
- C. Do not butter corners of joints or excessively furrow mortar joints.
- D. Remove excess mortar as work progresses.
- E. Interlock intersections and external corners.
- F. Do not shift or tap masonry units after mortar has achieved initial set.
 - 1. To make an adjustment, remove mortar and replace.
- G. To prevent broken masonry unit corners or edges perform jobsite cutting of masonry units with proper tools to provide straight, clean, un-chipped edges.
- H. Cut mortar joints flush where wall tile is scheduled, cement parging is required, resilient base is scheduled, cavity insulation vapor barrier adhesive or bitumen damp proofing is applied.
- I. Isolate masonry partitions from vertical structural framing members with a control joint.
- J. Isolate top joint of masonry partitions from horizontal structural framing members and slabs or decks with compressible joint filler.

3.5 WEEPS

- A. Install weeps in veneer at intervals recommended by the Brick Institute of America.

3.6 CAVITY WALL

- A. Do not permit mortar to drop or accumulate into cavity air space or to plug weeps. Provide a system of high-density polyethylene strands woven to a mesh to collect mortar dropping and permanently suspend them above the weeps.
- B. Build inner wythe ahead of outer wythe to receive cavity insulation air/vapor barrier adhesive.

3.7 REINFORCEMENT AND ANCHORAGES – SINGLE WYTHE MASONRY

- A. Install horizontal joint reinforcement 16" o.c.
- B. Place masonry joint reinforcement in 1st and 2nd joints above and below openings. Extend minimum 16" each side of opening.
- C. Place joint reinforcement continuous in first and second joint below top of walls.
- D. Lap joint reinforcement ends minimum 6".
- E. Reinforce stack-bonded unit, joint corners, and intersections with strap anchors 16" o.c.
- F. All masonry below grade is to be grouted solid.
 - 1. Provide footing/wall dowels.
 - 2. Measure the splice length from the finish floor.

3.8 REINFORCEMENT AND ANCHORAGES – VENEER MASONRY

- A. Install horizontal joint reinforcement 16" o.c.
- B. Place masonry joint reinforcement in 1st and 2nd horizontal joints above and below openings.
 - 1. Extend minimum 16" each side of opening.
- C. Place joint reinforcement ends minimum 6".
- D. Lap joint reinforcement ends minimum 6".
- E. Embed wall ties in masonry back up for bonding veneer at maximum 16" o.c. vertically and 36" o.c. horizontally.
 - 1. Place maximum 3" o.c. each way around perimeter of openings, within 12" of openings.
- F. Secure wall ties, rods, strap, anchors to back-up and embed into masonry veneer at maximum 16" o.c. vertically, and 36" o.c. horizontally.
- G. Place at maximum 3" o.c. each way around perimeter of openings, within 12" of openings.
- H. Provide length to extend a minimum of 1½" into the exterior wythe.

3.9 REINFORCEMENT AND ANCHORAGES – CAVITY WALL MASONRY

- A. Install horizontal joint reinforcement 16" o.c.
- B. Place masonry joint reinforcement in 1st and 2nd horizontal joints above and below openings.
 - 1. Extend minimum 16" each side of opening.
- C. Place joint reinforcement continuous in first and second joint below top of walls.
- D. Lap joint reinforcement ends minimum 6".
- E. Embed anchors in concrete or attached to structural steel members.
 - 1. Embed anchorages in every second block or sixth brick joint.
 - 2. Provide length to extend a minimum 1½" into the exterior wythe.
- F. Reinforce stack bonded unit joint corners and intersection with strap anchors 16" o.c.

3.10 REINFORCEMENT AND ANCHORAGES – MULTIPLE WYTHE UNIT MASONRY

- A. Install horizontal joint reinforcement 16" o.c.
- B. Place masonry joint reinforcement in 1st and 2nd horizontal joints above and below openings.
 - 1. Extend minimum 16" each side of opening.
- C. Place joint reinforcement continuous in first and second joint below top of walls.
- D. Lap joint reinforcement ends minimum 6".
- E. Support and secure reinforcing bars from displacement.
 - 1. Maintain position within ½" of dimensioned position.

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- F. Embed anchors embedded in concrete or attach to structural steel members.
 - 1. Embed anchorages in every second block or sixth brick joint.
- G. Provide length to extend a minimum 1½" into the exterior wythe.
- H. Reinforce stack bonded unit joint corners and intersection with strap anchors 16" o.c.

3.11 MASONRY FLASHINGS

- A. Provide through wall flashing under parapet copings, for counter-flashing in masonry walls, where roofs abut, at lintels of exterior wall openings, ledge or shelf angles, under windowsills and band courses, at spandrel beams, foundation walls and where shown on drawings.
- B. Turn flashing up minimum 8" and bed into mortar joint of masonry, seal to concrete, and seal to sheathing over framed back up.
- C. Lap end joints minimum 6" and seal watertight.
- D. Turn flashing, fold and seal at corners, bends and interruptions to form dams.

3.12 SILLS

- A. See specification section 08 51 13 – 3.1 B Sill & Buck for windowsill requirements.

3.13 LINTELS

- A. Install lintels over openings.
- B. Install reinforced unit masonry lintels over openings where steel or pre-cast concrete lintels area not scheduled.
- C. Openings up to 42" Wide: Place two, No. 4 reinforcing bars 1" from bottom web
- D. Openings from 42": Up to 78" wide:
 - 1. Place two, No. 5 reinforcing bars 1" from bottom web.
- E. Opening over 78": Reinforce openings as detailed.
- F. Do not splice reinforcing bars.
- G. Support and secure reinforcing bars from displacement.
 - 2. Maintain position within ½" of dimensioned position.
- H. Place and consolidate grout fill without displacing reinforcing.
- I. Allow masonry lintels to attain specified strength before removing temporary supports.
- J. Maintain bearing on each side of opening. Minimum bearing of 4" on concrete, 3" on steel and 8" on masonry

3.14 ENGINEERED MASONRY

- A. Lay masonry units with core cells vertically aligned and cavities between wythes clear of mortar and unobstructed.
- B. Place mortar in masonry unit bed-joints back ¼" from edge of unit grout spaces, bevel back and upward.
 - 1. Permit mortar to cure seven days before placing grout.
- C. Reinforce masonry unit cores and cavities with reinforcement bars and grout as indicated.
- D. Retain vertical reinforcement in position at top and bottom of cells and at intervals not exceeding 192 bar diameters.
- E. Grout space dimension is the clear dimension between any masonry protrusions and increases by diameters of the horizontal bars within the cross-section of the grout space.
- F. Wet masonry unit surfaces in contact with grout just prior to grout placement.
- G. The minimum grouted spaces in both horizontal dimensions shall be as follows:
 - 1. Low-Lift Grouted Construction
 - a. Fine aggregate: Grout spaces may be less than 2".
 - b. Fine or coarse aggregate: Grout spaces shall be 2" or more.

2. High-Lift Grouted Construction:
 - a. Fine or coarse aggregate: Grout space shall not be less than 2" wide.
- H. The area of vertical reinforcement shall not exceed 6% of the area of the grout space.
- I. When grouting is stopped for more than one hour, terminate grout 1½" below top of upper masonry unit to form a positive key for subsequent grout placement.
- J. Low Lift Grouting – Place first lift of grout to a height of 16" and rod for grout consolidation.
 1. Place subsequent lifts in 8" increments and rod for grout consolidation
- K. High Lift Grouting:
 1. Provide cleanout opening no less than 4" high at the bottom of each cell to be grouted by cutting one face shell of masonry unit,
 2. In double wythe walls, omit every second masonry unit in one of the wythes for clean out and cell inspection purposes.
 3. In double wythe walls, construct vertical grout barriers or dams between the masonry wythes, with masonry units every 25' maximum.
 4. Clean out masonry cells and cavities with high-pressure water spray before pouring or pumping grout.
 - a. Allow the complete water drainage and use compressed air to remove debris.
 5. Contractor shall request inspection of the cells and cavities before concealing them.
 - a. Allow three days advance notice of inspection.
 6. After cleaning and cell inspections, seal openings with masonry units.
 7. Pump grout into spaces. Maintain water content in grout to intended slump without aggregate segregation.
 8. Limit grout lift to 48" and rod for grout consolidation. Wait 30 to 60 minutes before placing next lift.

3.15 CONTROL AND EXPANSION JOINTS

- A. Provide expansion joints and control joints to prevent uncontrolled stress cracks in the structure and according to the engineering's plans and standards.
- B. Do not continue horizontal joint reinforcement through control and expansion joints.
- C. Install preformed control joint device in continuous lengths. Seal butt and corner joints in accordance with manufacturer's instructions.
- D. Size control joint in accordance with Section 07 92 00 for sealant performance.

3.16 BUILT-IN WORK

- A. As work progresses, install built-in metal door and glazed frames, fabricated metal frames, window frames, wood nailing strips, anchor bolts, plates, and other items to be built-in the work and furnished by other sections.
- B. Install built-in items plumb and level.
- C. Bed anchors of metal door and glazed frames in adjacent mortar joints.
 1. Fill frame voids solid with grout. Fill adjacent masonry cores with grout minimum 12" from framed openings.
- D. Do not build in organic materials subject to deterioration.

3.17 TOLERANCES

- A. Maximum Variation from Alignment of Columns: Pilasters: ¼"
- B. Maximum Variation from Unit to Adjacent Unit: 1/32"
- C. Maximum Variation from Plane of Wall: ¼" in 10' and ½" in 20' or more
- D. Maximum Variation from Plumb: ¼" per story non-cumulative and ½" in two stories or more
- E. Maximum Variation from Level Coursing: ⅛" in 3', ¼" in 10'; and ½" in 30'

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F. Maximum Variation of Joint Thickness: $\frac{1}{8}$ " in 3'

G. Maximum Variation from Cross-Section Thickness of Walls: $\frac{1}{4}$ "

3.18 CUTTING AND FITTING

A. Cut and fit for chases, pipes, conduit, sleeves, and grounds.

1. Coordinate with other sections of work to provide correct size, shape, and location.

B. Obtain approval prior to cutting or fitting masonry work not indicated or where appearance or strength of masonry work may be impaired.

3.19 PARGING

A. Dampen masonry walls prior to parging.

B. Scarify each parging coat to ensure full bond to subsequent coat.

C. Parge masonry walls in two uniform coats of mortar to a total thickness of $\frac{3}{4}$ " minimum.

D. Steel trowel surface smooth and flat with a maximum surface variation of $\frac{1}{8}$ " per foot.

E. Strike top edge of parging at 45°

3.20 FIELD QUALITY CONTROL

A. Architect, Owner, or Building Department may request field inspections per Section 01 40 00 1.7 Quality Control.

3.21 CLEANING

A. Clean work under provisions of 01 77 00, and comply with ASTM, BIA, and ACI 530.

B. Remove excess mortar and mortar smears as work progresses.

1. Mortar streaks and/or stains that cannot be removed by light cleaning shall be replaced.

2. Do not use abrasives for rubbing or scraping off mortar stains.

C. Replace defective mortar and match adjacent work.

D. Clean soiled surfaces with cleaning solution.

1. Use only cleaning products approved by the Architect and applied in direct conformance with the manufacturer's instructions.

2. DO NOT USE Muratic acid to clean masonry.

E. Use non-metallic tools in cleaning operations.

3.22 PROTECTION OF FINISHED WORK

A. Protect finished work under provisions of Section 01 50 00.

B. Without damaging completed work, provide protective boards at exposed external corners, only at those corners subject to damage due to construction activities.

END OF SECTION