

**SECTION 04 20 10
REINFORCED MASONRY UNITS**

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Concrete masonry or brick units
- B. Reinforcement, anchorage, and accessories
- C. Parged masonry surfaces

1.2 REFERENCES

- A. ACI 530/ASCE 5/TMS 402– Building Code Requirements for Masonry Structures
- B. ACI 530.1/ASCE 6/TMS 602- Specifications For Masonry Structures
- C. ASCE 7 - American Society of Civil Engineers – Minimum Design Loads of Buildings and Other Structures
- D. ASTM A82/A82M - Standard Specification for Steel Wire 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 A653/A653M - Standard Specifications for Steel Sheet, Zinc Coated, (Galvanized) or Zinc Iron Alloy (Galvannealed) by the Hot-Dip Process.
- H. ASTM A580/A580M - Standard Specification for Stainless and Heat-Resisting Steel Wire
- I. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon Steel Bars For Concrete Reinforcement
- J. ASTM A641/A641M – Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire
- 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 C652 - Standard Specification for Hollow Brick (Hollow Masonry Units Made From Clay or Shale).
- T. FBC - Florida Building Code
- U. IMIAC - International Masonry Industry All-Weather Council: Recommended Practices and Guide Specification for Cold Weather Masonry Construction
- V. IMIAC - International Masonry Industry All-Weather Council: Recommended Practices and Guide Specification for Hot Weather Masonry Construction
- W. UL - Fire Resistance Directory

1.3 SUBMITTALS

- A. Submit under provisions of Section 01 33 00.
- B. Shop Drawings: Indicate bars sizes, spacing, locations, reinforcement quantities, bending and cutting schedules, supporting and spacing devices for reinforcement and accessories.

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- C. Product Data: Provide data for brick and masonry units and fabricated wire reinforcement.
- D. Samples: Submit samples of decorative block, brick units to illustrate color, texture, and extremes of color range.
- E. Design Data: Indicate required mortar strength, masonry unit assembly strength in all planes with supportive test data.
- F. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

1.4 QUALITY ASSURANCE

- A. Perform work in accordance with ACI 530 and ACI 530.1.
- B. Maintain one copy of each document on site.

1.5 QUALIFICATIONS

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

1.6 REGULATORY REQUIREMENTS

- A. Design and construction shall comply with ASCE 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

1.7 MOCK-UP

- A. Provide mock-up of composite masonry under provisions of Section 01 40 00.
- B. Construct a masonry wall panel sized 8' long by 6' high, which includes mortar and accessories, 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. Mockup may not remain as part of the work.

1.8 PRE-INSTALLATION CONFERENCE

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

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Store, protect, and deliver products to site under provisions of Section 01 60 00.

1.10 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

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

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- D. Concrete Brick Units: ASTM C55, Grade N, Type II – Non-Moisture Controlled of same type and weight as block units
- E. All block installed in 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 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-ga cross ties.
- 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: A615/A615M, Grade 40 or Grade 60; deformed carbon bars as specified in Section 03 20 00, 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/A123M B2 finish.

2.4 MORTAR AND GROUT

- A. Mortar and Grout: As specified in Section 04 05 13.

2.5 FLASHINGS

- A. Copper: ASTM B370, cold rolled; 20 oz/sq ft, 0.027 inch thick; natural finish.
- B. Galvanized Steel: ASTM A653/A653M, G90 finish, 24-ga core steel
- C. Stainless Steel: ASTM A167, Type 304, soft temper; 24-ga 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. Preformed Control Joints: Neoprene material, provide with corner and tee accessories, cement fused joints.
- B. Joint Filler: Closed cell polyvinyl chloride; oversized 50% to joint width and 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.

- E. Nailing Strips: Softwood, preservative treatment 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.
 - 1. Maintain in place until building structure provides permanent bracing.

3.3 COURSING

- A. Establish lines, levels, and coursing indicated. Protect from displacement.
- B. Maintain masonry courses to uniform dimension, with 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. Buttering corners of joints or excessive furrowing of mortar joints is not permitted.
- 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. Where adjustments are made, remove mortar, and replace.
- G. Perform job site cutting of masonry units with proper tools to provide straight, clean, un-chipped edges.
 - 1. Prevent broken masonry unit corners or edges.
- H. Cut mortar joints flush where wall tile is scheduled, cement parging is required, resilient base is scheduled, cavity insulation vapor barrier adhesive is applied, 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 REINFORCEMENT AND ANCHORAGES

- A. Install horizontal joint reinforcement 16" oc.
- B. Place masonry joint reinforcement in first and second horizontal joints above and below openings, and 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" oc.
- F. All masonry below grade is to be grouted solid.
 - 1. Provide footing/wall dowels.
- G. Measure the splice length from the finish floor

3.7 REINFORCEMENT AND ANCHORAGES - VENEER MASONRY

- A. Install horizontal joint reinforcement 16" o.c.
- B. Place masonry joint reinforcement in first and second horizontal joints above and below openings, and 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 wall ties in masonry back-up for bonding veneer at maximum 16" o.c. vertically and 36" o.c. horizontally.
 - 1. Place at 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.
 - 1. Place at maximum 3" o.c. each way around perimeter of openings, within 12" of openings.
 - 2. Provide length to extend a minimum of 1½" into the exterior wythe.
- G. Reinforce stack bonded unit joint corners and intersections with strap anchors 16" o.c.

3.8 REINFORCEMENT AND ANCHORAGES - CAVITY WALL MASONRY

- A. Install horizontal joint reinforcement 16" o.c.
- B. Place masonry joint reinforcement in first and second horizontal joints above and below openings, and 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 in every second block or sixth brick joint.
 - 1. Provide length to extend a minimum 1½" into the exterior wythe.
- F. Reinforce stack bonded unit joint corners and intersections with strap anchors 16" o.c.

3.9 REINFORCEMENT AND ANCHORAGES - MULTIPLE WYTHER UNIT MASONRY

- A. Install horizontal joint reinforcement 16" o.c.
- B. Place masonry joint reinforcement in first and second horizontal joints above and below openings, and 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.
- F. Embed anchors embedded 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.

G. Reinforce stack bonded unit joint corners and intersections with strap anchors 16" o.c.

3.10 MASONRY FLASHINGS

A. Provide thru-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.

3.11 SILLS

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

3.12 LINTELS

A. Install pre-cast concrete lintels over openings.

B. Install reinforced unit masonry lintels over openings where steel or precast concrete lintels are not scheduled.

C. Openings Up to 42" wide: Place two, No. 4 reinforcing bars 1" from bottom

D. Openings From 42" Up to 78" wide: Place two, No. 5 reinforcing bars 1" from bottom.

E. Opening Over 78": Reinforce openings as detailed.

F. Do not splice reinforcing bars.

G. Support and secure reinforcing bars from displacement.

1. 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.

1. Minimum bearing of 4" on concrete, 3" on steel and 8" on masonry

3.13 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.

D. Retain vertical reinforcement in position at top and bottom of cells and at intervals not exceeding 192 bar diameters.

1. Splice reinforcement in accordance with Section 03 20 00.

E. Wet masonry unit surfaces in contact with grout just prior to grout placement.

F. Grout spaces less than 2" in width with fine grout using low lift grouting techniques.

G. Grout spaces 2" or greater in width, use a course grout.

H. When grouting is suspended for more than one hour, terminate grout 1½" below top of upper masonry unit to form a positive key for subsequent grout placement.

I. Low Lift Grouting:

1. Place first lift of grout to a height of 16" and rod for grout consolidation.

2. Place subsequent lifts in 8" increments and rod for grout consolidation.

J. High Lift Grouting:

1. Provide cleanout opening no less than 4" high at the bottom of each grouted cell 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 30' maximum.
4. Clean out masonry cells and cavities with high-pressure water spray. Permit complete water drainage.
5. Contractor shall request inspection of the cells and cavities.
 - a. Allow three days advance notice of inspection.
6. After cleaning and cell inspection, 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 60" and rod for grout consolidation.
 - a. Wait 30 to 60 minutes before placing next lift.

3.14 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.
 1. 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.

3.15 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.
 2. Fill adjacent masonry cores with grout minimum 12" from framed openings.
- D. Do not build in organic materials subject to deterioration.

3.16 TOLERANCES

- A. Maximum Variation From Alignment of Columns and Pilasters: $\frac{1}{4}$ "
- B. Maximum Variation From Unit to Adjacent Unit: $\frac{1}{32}$ "
- C. Maximum Variation From Plane of Wall: $\frac{1}{4}$ " in 10' and $\frac{1}{2}$ " in 20' or more
- D. Maximum Variation From Plumb: $\frac{1}{4}$ " per story non-cumulative, $\frac{1}{2}$ " in two stories or more
- E. Maximum Variation From Level Coursing: $\frac{1}{8}$ " in 3' and $\frac{1}{4}$ " in 10', $\frac{1}{2}$ " in 30'
- F. Maximum Variation of Joint Thickness: $\frac{1}{8}$ " in 3'
- G. Maximum Variation from Cross-Section Thickness of Walls: $\frac{1}{4}$ "

3.17 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.

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3.18 PARING

- A. Dampen masonry walls prior to paring.
- B. Scarify each paring 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 paring at 45°

3.19 FIELD QUALITY CONTROL

- A. Architect, Owner, or Building Department may request field inspections per Section 01 40 00 1.7 Inspection Services.

3.20 CLEANING

- A. Clean work under provisions of 01 77 00 and conform to ASTM, BIA, and ACI 530.
- B. Remove excess mortar and mortar smears as work progresses.
 - 1. Replace material when mortar streaks and/or stains are not removable by light cleaning.
 - 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.

3.21 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 that may be damaged by construction activities.

END OF SECTION