

SECTION 04810
REINFORCED UNIT MASONRY

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 7-98 - American Society of Civil Engineers – Wind Loads (Chapter 6 only)
- D. ASTM A82 - Cold-Drawn Steel Wire for Concrete Reinforcement
- E. ASTM A123 - Zinc (Hot Dipped Galvanized) Coatings on Iron and Steel Products
- F. ASTM A167 - Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip
- G. ASTM A525 - Steel Sheet, Zinc Coated, (Galvanized) by the Hot-Dip Process.
- H. ASTM A580 - Stainless and Heat-Resisting Steel Wire
- I. ASTM A615 - Deformed and Plain Billet Steel Bars For Concrete Reinforcement
- J. ASTM B370 - Cooper Sheet and Strip For Building Construction
- K. ASTM C55 - Concrete Building Brick
- L. ASTM C90- Load-Bearing Concrete Masonry Units
- M. ASTM C126 - Facing Brick (Solid Masonry Units Made From Clay or Shale).
- N. Florida Building Code.
- O. TMS 402-92
- P. TMS 602-92
- Q. ASTM C652 - Hollow Brick (Hollow Masonry Units Made From Clay or Shale).
- R. IMIAC - International Masonry Industry All-Weather Council: Recommended Practices and Guide Specification for Cold Weather Masonry Construction.
- S. IMIAC - International Masonry Industry All-Weather Council: Recommended Practices and Guide Specification for Hot Weather Masonry Construction.
- T. UL - Fire Resistance Directory

1.3 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Shop Drawings: Indicate bars sizes, spacing, locations, reinforcement quantities, bending and cutting schedules, supporting and spacing devices for reinforcement and accessories.
- 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. Test in accordance with ASTM C67, with the following additional requirements:
- C. For engineered brick masonry, if the coefficient of variation of the compression samples tested exceeds 12%, obtain compressive strength by multiplying average compressive strength of specimens by: $1 - 1.5 (v/100 - .12)$ where v is the coefficient of variation of sample tested.
- D. In case of a dispute, cost of tests of units after delivery shall be borne by the purchaser, unless tests indicate that units do not conform to the requirements of the specifications, in which case cost shall be borne by the seller.
- E. For field construction, use materials and mix by proportions in accordance with BIA Technical Notes, measuring materials by volume.
- F. Laboratory mortar testing may be required to establish mortar properties before or during construction or to maintain a degree of quality control during mortar production in the field. This testing is to conform to ASTM C780.
- G. 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.
- B. Installer: Masonry Company with a minimum of 5 years experience in commercial brick masonry.

1.6 REGULATORY REQUIREMENTS

- A. Design and construction shall comply with ASCE 7-98 – 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.

1.7 MOCK-UP

- A. Provide mock-up of composite masonry under provisions of Section 01400.
- 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 remain as part of the work.

1.8 PRE-INSTALLATION CONFERENCE

- A. A preconstruction conference, when directed by the Architect/Engineer, will be held after the award of the General Contract, but prior to beginning of masonry work to discuss:
 - 1. Method and sequence of masonry construction
 - 2. Special masonry details
 - 3. Standard of workmanship
 - 4. Quality control requirements
 - 5. Job organization
- B. Attendance is mandatory for:

1. General contractor job superintendent
 2. Masonry subcontractor job superintendent
 3. Masonry subcontractor foreman
 4. At least two masons
 5. Authorized representative of the brick supplier
 6. Mortar material suppliers
- C. Meet two weeks prior to commencing work of this section.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Store, protect and deliver products to site.
- B. Deliver products of this section on pallets, with individual faces protected; keep dry.
- C. Store glazed units in protected area or under cover on level ground; keep dry. Do not double-stack pallets.
- D. Store brick off ground and cover with plastic to prevent contamination by mud, dust or materials likely to cause staining or other defects.
- E. Store mortar bags off the ground and covered.
- F. Place sand on plastic and tarps, and cover with plastic at end of day.
- G. Protect reinforcement from elements.

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 01040.
- B. Coordinate the masonry work with installation of window anchors.

2.0 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 C90-90, Type II – Non-Moisture Controlled.
- C. Decorative Block Units (CMU): ASTM C90-90, Type II – Non-Moisture Controlled.
- 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 2001.

2.2 BRICK UNITS

- A. Face Brick: Type 1/2/3 Hanson 761, Campus Standard.
- B. Other brick shapes/colors to require Florida Tech approval.

2.3 REINFORCEMENT AND ANCHORAGE

- A. Single Wythe Joint Reinforcement: Ladder type; steel wire, hot dip galvanized to ASTM A641 Class 3 after fabrication, 3/16" side rods with 9-ga cross ties.
- B. Reinforcing Steel: A615, Grade 40 or Grade 60; specified in Section 03300, unfinished.
- C. Strap Anchors: Bent steel shape, hot dip galvanized to ASTM A123 B2 finish.

2.4 MORTAR AND GROUT

- A. Mortar and Grout: As specified in Section 04100.

2.5 FLASHINGS

- A. Copper: ASTM B370, cold rolled; 20 oz/sq ft, 0.027 inch thick; natural finish.
- B. Galvanized Steel: ASTM A525, 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.

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; self-expanding.
- C. Building Paper: No. 30 asphalt saturated felt.
- D. Nailing Strips: Softwood, preservative treatment for moisture resistance, dovetail shape, sized to masonry joints.
- E. Weep: Preformed plastic tubes, hollow.
- F. Cavity Vents: Molded polyvinyl chloride grilles insect resistant.
- G. Cleaning Solutions: Non-acidic, not harmful to masonry work or adjacent materials.

3 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. 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 are not permitted.
- D. Remove excess mortar as work progresses.
 - 1. Keep cavity in cavity walls clean by:
 - a. Installing a type of subsurface drainage matting in the cavity to prevent mortar droppings from clogging the cavity.
 - or
 - b. Plastering excess mortar onto back of brick.
 - or
 - c. Placing wood strips with attached wire pulls on metal ties. Before placing next row of metal ties, remove and clean wood strips.
- E. Interlock intersections and external corners.
- F. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove mortar and replace.
- G. Perform job site cutting of masonry units with proper tools to provide straight, clean, un-chipped edges. 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 REINFORCEMENT AND ANCHORAGES

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

3.6 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. 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. Place at maximum 3" o.c. each way around perimeter of openings, within 12" of openings. 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.
- H. Before placing brick, remove loose mortar, rust and other coatings from reinforcement

3.7 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. 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.
- G. Before placing brick, remove loose mortar, rust and other coatings from reinforcement

3.8 REINFORCEMENT AND ANCHORAGES - MULTIPLE WYTHE 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. Maintain position within ½" of dimensioned position.
- F. Embed anchors embedded in concrete or attached to structural steel members. Embed anchorages in every second block or sixth brick joint. 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.
- H. Before placing brick, remove loose mortar, rust and other coatings from reinforcement.

3.9 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 window sills 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, 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.

3.10 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. 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.

3.11 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. 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. Splice reinforcement in accordance with Section 03200.
- 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. Grout spaces 2" or greater in width with course grout using high or low lift grouting techniques.
- G. 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.
- H. Low Lift Grouting: Place first lift of grout to a height of 16" and rod for grout consolidation. Place subsequent lifts in 8" increments and rod for grout consolidation.
- I. 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 30' maximum.
 - 4. Clean out masonry cells and cavities with high-pressure water spray. Permit complete water drainage.
 - 5. Request inspection of the cells and cavities. 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. Wait 30 to 60 minutes before placing next lift.

3.12 CONTROL AND EXPANSION JOINTS

- A. Do not continue horizontal joint reinforcement through control and expansion joints.

- B. Install preformed control joint device in continuous lengths. Seal butt and corner joints in accordance with manufacturer's instructions.
- C. Size control joint in accordance with manufacturer's instructions for sealant performance.

3.13 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. 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.

3.14 TOLERANCES

- A. Maximum Variation From Alignment of Columns and 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, ½" in two stories or more.
- E. Maximum Variation From Level Coursing: ⅛" in 3' and ¼" in 10', ½" in 30'.
- F. Maximum Variation of Joint Thickness: ⅛" in 3'. Variation in Mortar Joint Thickness: Do not exceed bed joint thickness indicated by more than plus or minus 1/8", with a maximum thickness limited to 1/2". Do not exceed head joint thickness indicated by more than plus or minus 1/8".

3.15 CUTTING AND FITTING

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

3.16 TOOLING AND TUCK POINTING

- A. Tooling:
 - 1. Tool exposed joints slightly concave or "V" or grapevine when "thumbprint" hard with a nonrusting round jointer slightly larger than width of joint, compressing mortar tightly against both sides of the joint, head joints shall match bed joint profile.
 - 2. Trowel-point or concave tool exterior joints below grade.
 - 3. Flush cut all joints not tooled.
- B. Tuck Pointing:
 - 1. If required, rake mortar joints to a depth of not less than 1/2" nor more than 3/4".
 - 2. Saturate joints with clean water.
 - 3. Fill solidly with pointing mortar of the same proportions as mortar in main part of the wall, if known; if not, type N.
 - 4. Tool joints.

3.17 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° .

3.18 PROTECTION OF WORK – IN PROGRESS

- A. Wall covering to prevent mortar joint wash out and entry of water into the wall.
- B. During erection, cover top of wall with strong waterproof membrane at end of each day or shutdown.
- C. Cover partially completed walls when work is not in progress.
- D. Extend cover minimum of 24" down both sides.
- E. Hold cover securely in place.
- F. When the ambient air temperature exceed 100° F or 90° F with a wind velocity greater than 8 mph, mortar beds shall not be spread more than 4 ft. ahead of the masonry units. Units shall be laid within one minute of spreading mortar.
- G. For load application:
 - 1. Do not apply uniform floor or roof loading for at least 12 hr. after building masonry columns or walls.
 - 2. Do not apply concentrated loads for at least 3 days after building masonry columns or walls.
 - 3. Provide temporary bracing during masonry erection, as required, and maintain in place until building structure provides permanent bracing.

3.19 STAINING

- A. Prevent grout or mortar from staining the face of masonry.
- B. Remove immediately grout or mortar in contact with face of masonry.
- C. Protect all sills, ledges and projections from droppings of mortar, protect door jambs and corners from damage during construction.
- D. Protect the base of the wall from rain splashed mud and mortar splatter by using straw, sawdust or plastic spread along the base.
- E. Scaffold boards near the wall should be turned on edge at the end of the day.

3.20 CLEANING

- A. Clean work under provisions of 01700. Cleaning of masonry shall conform to ASTM, BIA, and ACI 530.
- B. Remove excess mortar and mortar smears as work progresses. Mortar streaks and/or stains that cannot be removed by light cleaning shall be replaced. Abrasives shall not be used for rubbing or scraping off mortar stains
- C. Replace defective mortar. Match adjacent work.
- D. Clean soiled surfaces with cleaning solution. Use only cleaning products approved by the Architect and applied in direct conformance with the manufacturer's instructions. Muratic acid shall NOT be used 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 01500.

- B. Without damaging completed work, provide protective boards at exposed external corners that may be damaged by construction activities.

END OF SECTION