# SECTION 04 20 00

# UNIT MASONRY

## PART 1 - GENERAL

### 1.1 DESCRIPTION

A. This section specifies requirements for construction of masonry unit walls.

### 1.2 RELATED WORK

A. Mortars and grouts: Section 04 05 13, MASONRY MORTARING; Section 04 05 16, MASONRY GROUTING.

B. Sealants and sealant installation: Section 07 92 00, JOINT SEALANTS.

### 1.3 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES.

B. Samples:

1. Concrete masonry units, when exposed in finish work.
2. Anchors, and ties, one each and joint reinforcing 48 inches long.

C. Shop Drawings:

1. Drawings, showing reinforcement, applicable dimensions and methods of hanging soffit or lintel masonry and reinforcing masonry for embedment of anchors for hung fixtures.

D. Certificates:

1. Certificates signed by manufacturer, including name and address of contractor, project location, and the quantity, and date or dates of shipment of delivery to which certificate applies.

2. Testing laboratories facilities and qualifications of its principals and key personnel to perform tests specified.

E. Manufacturer's Literature and Data:

1. Anchors, ties, and reinforcement.
2. Shear keys.
3. Reinforcing bars.

**1.4 SAMPLE PANEL**

A. Before starting masonry, lay up a sample panel in accordance with Masonry Standards Joint Committee (MSJC) and Brick Industry Association (BIA).

1. Use masonry units from random cubes of units delivered on site.
2. Include reinforcing, ties, and anchors.

B. Use sample panels approved by Resident Engineer for standard of workmanship of new masonry work.

C. Use sample panel to test cleaning methods.

**1.5 WARRANTY**

A. Warrant exterior masonry walls against moisture leaks and subject to terms of "Warranty of Construction", FAR clause 52.246-21, except that warranty period shall be five years.

**1.6 APPLICABLE PUBLICATIONS**

A. Publications listed below form a part of this specification to the extent referenced. Publications are referenced in the text by the basic designation only.

B. American Society for Testing and Materials (ASTM):

A951-06.....Steel Wire for Masonry Joint Reinforcement.
A615/A615M-07.....Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
A675/A675M-03.....Standard Specification for Steel Bars, Carbon, Hot-Wrought, Special Quality, Mechanical PropertiesC34-03 Structural Clay Load-Bearing Wall Tile
C90-06.....Load-Bearing Concrete Masonry Units
C476-02.....Standard Specification for Grout for Masonry

F1667-05.....Fasteners: Nails, Spikes and Staples

C. Masonry Industry Council:

All Weather Masonry Construction Manual, 2000.

D. American Welding Society (AWS):

D1.4-05 Structural Welding Code – Reinforcing Steel.

E. Federal Specifications (FS):

FF-S-107C-00.....Screws, Tapping and Drive

F. Masonry Standards Joint Committee; Specifications for Masonry Structures (ACI 530.1-05/ASCE 6-05/TMS 602-99) (MSJC).

**PART 2 - PRODUCTS**

**2.1 CONCRETE MASONRY UNITS**

A. Hollow and Solid Load-Bearing Concrete Masonry Units: ASTM C90.

1. Unit Weight: Normal weight.
2. Fire rated units for fire rated partitions.
3. Sizes: Modular.
4. For molded faces used as a finished surface, use concrete masonry units with uniform fine to medium surface texture unless specified otherwise.
5. Customized units:

a. Split-face Units:

1) Split-Rib Units: Rib shapes as shown.
2) Ground Face Units:

**2.2 SHEAR KEYS**

A. ASTM D2000, solid extruded cross-shaped section of rubber, neoprene, or polyvinyl chloride, with a durometer hardness of approximately 80 when tested in accordance with ASTM D2240, and a minimum shear strength of 500 psi.

B. Shear key dimensions: Approximately 2-3/4 inches by 5/16 inch for long flange, and 1-1/2 inches by 5/8 inch for short flange.

**2.3 REINFORCEMENT:**

A. Steel Reinforcing Bars: ASTM A615, deformed bars, Grade 60.

B. Shop-fabricate reinforcement bars which are shown to be bent or hooked.

C. Joint Reinforcement:

1. Form from wire complying with ASTM A951.
2. Galvanized after fabrication.
3. Width of joint reinforcement 1-5/8 inches less than nominal width of masonry wall or partition.
4. Cross wires welded to longitudinal wires.
5. Joint reinforcing at least 10 feet in length.
6. Joint reinforcing in rolls is not acceptable.
7. Joint reinforcing that is crimped to form drip is not acceptable.
8. Maximum spacing of cross wires 16 inches to longitudinal wires.
9. Ladder Design:

   a. Longitudinal wires deformed 0.16 inch diameter wire.
   b. Cross wires 0.10 inch diameter.

10. Trussed Design:

    a. Longitudinal and cross wires not less than 0.16 inch nominal diameter.
    b. Longitudinal wires deformed.

11. Multiple Wythes ties:

    a. Longitudinal wires 0.10 inch, two in each wythe with ladder truss wires 0.10 inch overlay, welded to each longitudinal wire.
    b. Longitudinal wires 0.16 inch with U shape 0.10 inch rectangular ties extending into other wythe not less than 3 inches spaced 16 inches o.c. Adjustable type with U shape tie designed to receive 0.16 inch pintle projecting into other wythe 3 inches minimum.

**2.4 ANCHORS, TIES, AND REINFORCEMENT**

A. Steel Reinforcing Bars: ASTM A615M, deformed bars, grade as shown.

B. Joint Reinforcement:

1. Form from wire complying with ASTM A951.
2. Galvanized after fabrication.
3. Width of joint reinforcement 0.16 inches less than nominal width of masonry wall or partition.
4. Cross wires welded to longitudinal wires.
5. Joint reinforcement at least 10 feet in length.
6. Joint reinforcement in rolls is not acceptable.
7. Joint reinforcement that is crimped to form drip is not acceptable.
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C. Adjustable Veneer Anchor for Frame Walls:

1. Two piece, adjustable anchor and tie.
2. Anchor and tie may be either type; use only one type throughout.
3. Loop Type:

    a. Anchor: Screw-on galvanized steel anchor strap 0.11 inch by 3/4 inch wide 9 inches long, with 0.35 inch offset and 4 inch adjustment. Provide 0.20 inch hole at each end for fasteners.

b. Ties: Triangular tie, fabricated of 0.20 inch diameter galvanized cold drawn steel wire. Ties long enough to engage the anchor and be embedded not less than 2 inches into the bed joint of the masonry veneer.

4. Angle Type:

a. Anchor: Minimum 16 gage thick galvanized steel angle shaped anchor strap. Provide hole in vertical leg for fastener. Provide hole near end of outstanding leg to suit upstanding portion of tie.
b. Tie: Fabricate from 0.20 inch diameter galvanized cold drawn steel wire. Form "L" shape to be embedded not less than 2 inches into the bed joint of the masonry veneer and provide upstanding leg to fit through hole in anchor and be long enough to allow 2 inches of vertical adjustment.

D. Dovetail Anchors:

1. Corrugated steel dovetail anchors formed of 0.0598 inch thick by 1 inch wide galvanized steel, 3-1/2 inches long where used to anchor 4 inch nominal thick masonry units, 5-1/2 inches long for masonry units more than 4 inches thick.
2. Triangular wire dovetail anchor 4 inch wide formed of 9 gage steel wire with galvanized steel dovetail insert. Anchor length to extend at least 3 inches into masonry, 1 inch into 1-1/2 inch thick units.
3. Form dovetail anchor slots from 0.0239 inch thick galvanized steel (with felt or fiber filler).

E. Individual ties:

1. Rectangular ties: Form from 3/16 inch diameter galvanized steel rod to a rectangular shape not less than 2 inches wide by sufficient length for ends of ties to extend within 1 inch of each face of wall. Ties that are crimped to form drip are not permitted.

F. Wall Ties, (Mesh or Wire):

1. Mesh wall ties formed of ASTM A82, W0.5, 16-gage galvanized steel wire 1/2 inch by 1/2 inch mesh, 3 inches wide by 8 inches long.
2. Rectangular wire wall ties formed of W1.4, 9-gage galvanized steel wire 2 inches wide by 8 inches long.

G. Corrugated Wall Tie:

1. Form from 0.0598 inch thick corrugated, galvanized steel 1-1/4 inches wide by lengths so as to extend at least 4 inches into joints of new masonry plus 1-1/2 inches turn-up.
2. Provide 3/16 inch hole in turn-up for fastener attachment.

## 2.5 PREFORMED COMPRESSIBLE JOINT FILLER

A. Thickness and depth to fill the joint as specified.

B. Closed Cell Neoprene: ASTM D1056, Type 2, Class A, Grade 1, B2F1.

C. Non-Combustible Type: ASTM C612, Class 5, 1800 degrees F.

## 2.6 ACCESSORIES

A. Weep Hole Wicks: Glass fiber ropes, 3/8 inch minimum diameter, 12 inches long.

B. Box Board:

1. Mineral Fiber Board: ASTM C612, Class 1.
2. 1-inch thickness.
3. Other spacing material having similar characteristics may be used subject to the Resident Engineer's approval.

C. Masonry Cleaner:

1. Detergent type cleaner selected for each type of masonry used.
2. Acid cleaners are not acceptable.
3. Use soapless type specially prepared for cleaning brick or concrete masonry as appropriate.

D. Fasteners:

1. Concrete Nails: ASTM F1667, Type I, Style 11, 3/4 inch minimum length.
2. Masonry Nails: ASTM F1667, Type I, Style 17, 3/4 inch minimum length.
3. Screws: FS-FF-S-107, Type A, AB, SF thread forming or cutting.

## PART 3 - EXECUTION

### 3.1 JOB CONDITIONS

A. Protection:

1. Cover tops of walls with nonstaining waterproof covering, when work is not in progress. Secure to prevent wind blow off.

B. Cold Weather Protection:

1. Masonry may be laid in freezing weather when methods of protection are utilized.
2. Comply with MSJC and “Hot and Cold Weather Masonry Construction Manual”.

### 3.2 CONSTRUCTION TOLERANCES

A. Lay masonry units plumb, level and true to line within the tolerances as per MSJC requirements and as follows:

B. Maximum variation from plumb:

1. In 10 feet - 1/4 inch.
2. In 20 feet - 3/8 inch.
3. In 40 feet or more - 1/2 inch.

C. Maximum variation from level:

1. In any bay or up to 20 feet - 1/4 inch.
2. In 40 feet or more - 1/2 inch.

D. Maximum variation from linear building lines:

1. In any bay or up to 20 feet - 1/2 inch.
2. In 40 feet or more - 3/4 inch.

E. Maximum variation in cross-sectional dimensions of columns and thickness of walls from dimensions shown:

1. Minus 1/4 inch.
2. Plus 1/2 inch.

F. Maximum variation in prepared opening dimensions:

1. Accurate to minus 0 inch.
2. Plus 1/4 inch.

**3.3 INSTALLATION GENERAL**

A. Keep finish work free from mortar smears or spatters, and leave neat and clean.

B. Anchor masonry as specified in Paragraph, ANCHORAGE.

C. Wall Openings:

1. Fill hollow metal frames built into masonry walls and partitions solid with mortar as laying of masonry progresses.
2. If items are not available when walls are built, prepare openings for subsequent installation.

D. Tooling Joints:

1. Do not tool until mortar has stiffened enough to retain thumb print when thumb is pressed against mortar.
2. Tool while mortar is soft enough to be compressed into joints and not raked out.
3. Finish joints in exterior face masonry work with a jointing tool, and provide smooth, water-tight concave joint unless specified otherwise.
4. Tool Exposed interior joints in finish work concave unless specified otherwise.

E. Partition Height:

1. Extend partitions at least four inches above suspended ceiling or to overhead construction where no ceiling occurs.
2. Extend following partitions to overhead construction.

   a. Where noted smoke partitions, FHP (full height partition), and FP (fire partition) and smoke partitions (SP) on drawings.
   b. Both walls at expansion joints.
   c. Corridor walls.
   d. Walls at stairway and stair halls and elevators.
   e. Reinforced masonry partitions

3. Extend finish masonry partitions at least four-inches above suspended ceiling and continue with concrete masonry units or structural clay tile to overhead construction:

F. Lintels:

1. Lintels are not required for openings less than 3 feet 4 inches wide that have hollow metal frames.
2. Openings 3 feet 5 inches wide to 5 feet 4 inches wide with no structural steel lintel or frames, require a lintel formed of concrete masonry lintel or bond beam units filled with grout per ASTM C476 and reinforced with (1) #5 rod top and bottom for each 4 inches of nominal thickness unless shown otherwise.
3. Precast lintels of 3000 psi concrete, of same thickness as partition, and with one Number 5 deformed bar top and bottom for each 4 inches of nominal thickness, may be used in lieu of reinforced CMU masonry lintels.
4. Use steel lintels, for openings over 5 feet 4 inches wide, brick masonry, and elevator openings unless shown otherwise.
5. Doors having overhead concealed door closers require a steel lintel, and a pocket for closer box.
6. Length for minimum bearing of 4 inches at ends.
7. Build masonry openings or arches over wood or metal centering and supports when steel lintels are not used.

G. Wall and Partition Units:

1. Lay out field units to provide for running bond of walls and partitions, with vertical joints in second course centering on first course units unless specified otherwise.
2. Align head joints of alternate vertical courses.
3. At sides of openings, balance head joints in each course on vertical center lines of openings.
4. Use no piece shorter than 4 inches long.
5. On interior partitions provide a 1/4 inch open joint for caulking between exterior walls, concrete work and abutting masonry partitions.

H. Before connecting new masonry with previously laid, remove loosened masonry or mortar, and clean and wet work in place as specified under wetting.

I. Temporary Formwork: Provide formwork and shores as required for temporary support of reinforced masonry elements.

J. Construct formwork to conform to shape, line and dimensions shown. Make sufficiently tight to prevent leakage of mortar, grout, or concrete (if any). Brace, tie and support as required to maintain position and shape during construction and curing of reinforced masonry.

K. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and all other reasonable temporary loads that may be placed on them during construction.

L. Allow not less than the following minimum time to elapse after completion of members before removing shores or forms, provided suitable curing conditions have been obtained during the curing period.

1. 10 days for girders and beams.
2. 7 days for slabs.
3. 7 days for reinforced masonry soffits.

**3.4 ANCHORAGE**

A. Veneer to Frame Walls:

1. Use adjustable veneer anchors.
2. Fasten anchor to stud through sheathing with self drilling and tapping screw, one at each end of loop type anchor.
3. Space anchors not more than 16 inches on center vertically at each stud.

B. Veneer to Concrete Walls:

1. Install dovetail slots in concrete vertically at 2 feet on centers.
2. Locate dovetail anchors at 16 inch maximum vertical intervals.
3. Anchor new masonry facing to existing concrete with corrugated wall ties spaced at 16 inch maximum vertical interval, and at 2 feet maximum horizontal intervals. Fasten ties to concrete with power actuated fasteners or concrete nails.

C. Anchorage of Abutting Masonry:

1. Anchor interior 4 inch thick masonry partitions to exterior masonry walls with wall ties. Space ties at 2 foot maximum vertical intervals. Extend ties 4 inches minimum into masonry.
2. Anchor interior masonry bearing walls or interior masonry partitions over 4 inches thick to masonry walls with rigid wall anchors spaced at 16 inch maximum vertical intervals.
3. Anchor abutting masonry walls and partitions to concrete with dovetail anchors. Install dovetail slots vertically in concrete at centerline of abutting wall or partition. Locate dovetail anchors at 16 inch maximum vertical intervals. Secure anchors to existing wall with two 3/8 inch by 3 inch expansion bolts or two power-driven fasteners.
4. Anchor abutting interior masonry partitions to existing concrete and existing masonry construction, with corrugated wall ties. Extend ties at least 4 inches into joints of new masonry. Fasten to existing concrete and masonry construction, with powder actuated drive pins, nail or other means that provides rigid anchorage. Install anchors at 16 inch maximum vertical intervals.

## 3.5 REINFORCEMENT

A. Joint Reinforcement:

1. Use as joint reinforcement in single wythe concrete masonry unit walls or partitions.
2. Locate joint reinforcement in mortar joints at 16 inches maximum vertical intervals.
3. Additional joint reinforcement is required in mortar joints at both 8 inches and 16 inches above and below windows, doors, louvers and similar openings in masonry, except where other type anchors are required for anchorage of masonry to concrete structure.
4. Joint reinforcement is required in every other course of stack bond CMU masonry.

B. Steel Reinforcing Bars:

1. Install in cells of hollow masonry units where required for vertical reinforcement and in bond beam units for lintels and bond beam

horizontal reinforcement. Install in wall cavities of reinforced masonry walls where shown.

2. Use grade 60 bars if not specified otherwise.
3. Bond Beams:

   a. Form Bond beams of load-bearing concrete masonry units filled with ASTM C476 grout and reinforced with 2 #5 reinforcing steel unless shown otherwise. Do not cut reinforcement.
   b. Brake bond beams only at expansion joints and at control joints, if shown.

4. Stack Bond:

   a. Locate additional joint reinforcement in vertical and horizontal joints as shown.
   b. Anchor vertical reinforcement into the foundation or wall or bond beam below and hold in place.
   c. Provide temporary bracing for walls over 8 ft. tall until permanent horizontal bracing is completed.

5. Grout openings:

   a. Leave cleanout holes in double wythe walls during construction by omitting units at the base of one side of the wall.
   b. Locate 3 in. x 3 in. min. clean-out holes at location of vertical reinforcement.
   c. Keep grout space clean of mortar accumulation and sand debris. Clean the grout space every day using a high pressure jet stream of water, or compressed air, or industrial vacuum, or by laying wood strips on the metal ties as the wall is built. If wood strips are used, lift strips with wires as the wall progresses and before placing each succeeding course of wall ties.

**3.6 CMU CONTROL JOINTS.**

A. Provide CMU control (CJ) joints where shown on drawings.

B. Keep joint free of mortar and other debris.

C. Where joints occur in masonry walls.

1. Install cross shaped shear keys in concrete masonry unit wythe with preformed compressible joint filler on each side of shear key unless otherwise specified.
2. Install filler, backer rod, and sealant on exposed faces.

D. Use standard notched concrete masonry units (sash blocks) made in full and half-length units where shear keys are used to create a continuous vertical joint.

E. Interrupt steel joint reinforcement at expansion and control joints unless otherwise shown.

F. Fill opening in exposed face of expansion and control joints with sealant as specified in Section 07 90 20, GARAGE WATERPROFING SYSTEMS.

**3.7 BUILDING EXPANSION AND SEISMIC JOINTS**

A. Keep joint free of mortar. Remove mortar and other debris.

B. Install non-combustible, compressible type joint filler to fill space completely except where sealant is shown on joints in exposed finish work.

C. Where joints are on exposed faces, provide depth for backer rod and sealant as specified in Section 07 90 20, GARAGE WATERPROFING SYSTEMS, unless shown otherwise.

**3.8 ISOLATION SEAL**

A. Where full height walls or partitions lie parallel or perpendicular to and under structural beams or shelf angles, provide a separation between walls or partitions and bottom of beams or shelf angles not less than the masonry joint thickness unless shown otherwise.

B. Insert in the separation, a continuous full width strip of non-combustible type compressible joint filler.

C. Where exposed in finish work, cut back filler material in the joint enough to allow for the joint to be filled with sealant material specified in Section 07 90 20, GARAGE WATERPROFING SYSTEMS.

**3.9 CONCRETE MASONRY UNITS**

A. Kind and Users:

1. Provide special concrete masonry shapes as required, including lintel and bond beam units, sash units, and corner units. Use solid concrete masonry units, where full units cannot be used, or where needed for anchorage of accessories.
2. Provide solid load-bearing concrete masonry units or grout the cell of hollow units at jambs of openings in walls, where structural members impose loads directly on concrete masonry, and where shown.
3. Masonry assemblies shall meet the required fire resistance in fire rated partitions of type and construction that will provide fire rating as shown.

B. Laying:

1. Lay concrete masonry units with 3/8 inch joints, with a bond overlap of not less than 1/4 of the unit length, except where stack bond is required.
2. Do not wet concrete masonry units before laying.
3. Bond external corners of partitions by overlapping alternate courses.
4. Lay first course in a full mortar bed.
5. Set anchorage items as work progress.
6. Where ends of anchors, bolts, and other embedded items, project into voids of units, completely fill such voids with mortar or grout.
7. Provide a 1/4 inch open joint for caulking between exterior walls, concrete work and abutting masonry partitions.
8. Lay concrete masonry units with full face shell mortar beds and fill head joint beds for depth equivalent to face shell thickness.
9. Lay concrete masonry units so that cores of units, that are to be filled with grout, are vertically continuous with joints of cross webs of such cores completely filled with mortar. Unobstructed core openings not less than 2 inches by 3 inches.
10. Do not wedge the masonry against the steel reinforcing. Minimum 1/2 inch clear distance between reinforcing and masonry units.
11. Install deformed reinforcing bars of sizes shown.
12. Steel reinforcement, at time of placement, free of loose flaky rust, mud, oil, or other coatings that will destroy or reduce bond.
13. Steel reinforcement in place before grouting.

14. Minimum clear distance between parallel bars: One bar diameter.
15. Hold vertical steel reinforcement in place by centering clips, caging devices, tie wire, or other approved methods, vertically at spacings noted.
16. Support vertical bars near each end and at intermediate intervals not exceeding 192 bar diameters.
17. Reinforcement shall be fully encased by grout or concrete.
18. Splice reinforcement or attach reinforcement to dowels by placing in contact and secured or by placing the reinforcement within 1/5 of the required bar splice length.
19. Stagger splices in adjacent horizontal reinforcing bars. Lap reinforcing bars at splices a minimum of 40 bar diameters.
20. Grout cells of concrete masonry units, containing the reinforcing bars, solid as specified under grouting.
21. Cavity and joint horizontal reinforcement may be placed as the masonry work progresses.

C. Waterproofing Parging:

1. Parge earth side of concrete masonry unit basement walls with mortar applied in two coats, each coat 1/4 inch thick.
2. Clean wall surfaces to receive parging of dirt, oil, or grease, and moisten before application of first coat.
3. Roughen first coat when partially set, permit to hardened for 24 hours, and moisten before application of second coat.
4. Keep second coat damp for at least 48 hours.
5. Thicken parging and round to form a cove at the junction of outside wall face and footing.

**3.10 POINTING**

A. Fill joints with pointing mortar using rubber float trowel to rub mortar solidly into raked joints.

B. Wipe off excess mortar from joints of glazed masonry units with dry cloth.

C. Finish exposed joints in finish work with a jointing tool to provide a smooth concave joint unless specified otherwise.

**3.11 GROUTING**

A. Preparation:

1. Clean grout space of mortar droppings before placing grout.
2. Close cleanouts.
3. Install vertical solid masonry dams across grout space for full height of wall at intervals of not more than 30 feet. Do not bond dam units into wythes as masonry headers.
4. Verify reinforcing bars are in cells of units or between wythes as shown.

B. Placing:

1. Place grout by hand bucket, concrete hopper, or grout pump.
2. Consolidate each lift of grout after free water has disappeared but before plasticity is lost.
3. Do not slush with mortar or use mortar with grout.
4. Interruptions:

   a. When grouting must be stopped for more than an hour, top off grout 1-1/2 inch below top of last masonry course.
   b. Grout from dam to dam on high lift method.
   c. A longitudinal run of masonry may be stopped off only by raking back one-half a masonry unit length in each course and stopping grout 4 inches back of rake on low lift method.

C. Puddling Method:

1. Double wythe masonry constructed grouted in lifts not to exceed 12 inches or less than 2 inches wide.
2. Consolidate by puddling with a grout stick during and immediately after placing.
3. Grout the cores of concrete masonry units containing the reinforcing bars solid as the masonry work progresses.

D. Low Lift Method:

1. Construct masonry to a height of 5 ft maximum before grouting.

2. Grout in one continuous operation and consolidate grout by mechanical vibration and reconsolidate after initial water loss and settlement has occurred.

E. High Lift Method:

1. Do not pour grout until masonry wall has properly cured a minimum of 4 hours.
2. Place grout in lifts not exceeding 5 ft.
3. Exception: Where the following conditions are met, place grout in lifts not exceeding 12.67 ft.

   a. The masonry has cured for at least 4 hours.
   b. The grout slump is maintained between 10 and 11 in.
   c. No intermediate reinforced bond beams are placed between the top and the bottom of the pour height.

4. When vibrating succeeding lifts, extend vibrator 12 to 18 inches into the preceding lift to close any shrinkage cracks or separation from the masonry units.

**3.12 PLACING REINFORCEMENT**

A. General: Clean reinforcement of loose rust, mill scale, earth, ice or other materials which will reduce bond to mortar or grout. Do not use reinforcement bars with kinks or bends not shown on the Contract Drawings or final shop drawings, or bars with reduced cross-section due to excessive rusting or other causes.

B. Position reinforcement accurately at the spacing indicated. Support and secure vertical bars against displacement. Horizontal reinforcement may be placed as the masonry work progresses. Where vertical bars are shown in close proximity, provide a clear distance between bars of not less than the nominal bar diameter or 1 inch, whichever is greater.

C. Splice reinforcement bars where shown; do not splice at other places unless accepted by the Resident Engineer. Provide lapped splices, unless otherwise indicated. In splicing vertical bars or attaching to dowels, lap ends, place in contact and wire tie.

D. Provide not less than minimum lap as indicated on shop drawings, or if not indicated, as required by governing code.

E. Weld splices where indicated. Comply with the requirements of AWS D1.4 for welding materials and procedures.

F. Embed metal ties in mortar joints as work progresses, with a minimum mortar cover of 5/8 inch on exterior face of walls and 1/2 inch at other locations.

G. Embed prefabricated horizontal joint reinforcement as the work progresses, with a minimum cover of 5/8 inch on exterior face of walls and 1/2 inch at other locations. Lap joint reinforcement not less than 6 inches at ends. Use prefabricated “L” and “T” sections to provide continuity at corners and intersections. Cut and bend joint reinforcement as recommended by manufacturer for continuity at returns, offsets, column fireproofing, pipe enclosures and other special conditions.

H. Anchoring: Anchor reinforced masonry work to supporting structure as indicated.

I. Anchor reinforced masonry walls to non-reinforced masonry where they intersect.

**3.13 INSTALLATION OF REINFORCED CONCRETE UNIT MASONRY**

A. Do not wet concrete masonry units (CMU).

B. Lay CMU units with full-face shell mortar beds. Fill vertical head joints (end joints between units) solidly with mortar from face of unit to a distance behind face equal to not less than the thickness of longitudinal face shells. Solidly bed cross-webs of starting courses in mortar. Maintain head and bed joint widths shown, or if not shown, provide 3/8 inch joints.

C. Where solid CMU units are shown, lay with full mortar head and bed joints.

D. Walls:

1. Pattern Bond: Lay CMU wall units in 1/2-running bond with vertical joints in each course centered on units in courses above and below, unless otherwise indicated. Bond and interlock each course at corners and intersections. Use special-shaped units where shown, and as required for corners, jambs, sash, control joints, lintels, bond beams and other special conditions.
2. Maintain vertical continuity of core or cell cavities, which are to be reinforced and grouted, to provide minimum clear dimension indicated and to provide minimum clearance and grout coverage for vertical reinforcement bars. Keep cavities free of mortar. Solidly bed webs in mortar where adjacent to reinforced cores or cells.
3. Where horizontal reinforced beams (bond beams) are shown, use special units or modify regular units to allow for placement of continuous horizontal reinforcement bars. Place small mesh expanded metal lath or wire screening in mortar joints under bond beam courses over cores or cells of non-reinforced vertical cells, or provide units with solid bottoms.

E. Grouting:

1. Use “Fine Grout” per ASTM C476 for filling spaces less than 4 inches in one or both horizontal directions.
2. Use “Coarse Grout” per ASTM C476 for filling 4-inch spaces or larger in both horizontal directions.
3. Grouting Technique: At the Contractor’s option, use either low-lift or high-lift grouting techniques subject to requirements which follow.

F. Low-Lift Grouting:

1. Provide minimum clear dimension of 2 inches and clear area of 8 square inches in vertical cores to be grouted.
2. Place vertical reinforcement prior to grouting of CMU. Extend above elevation of maximum pour height as required for splicing. Support in position at vertical intervals not exceeding 192 bar diameters nor 10 feet.

3. Lay CMU to maximum pour height. Do not exceed 5 foot height, or if bond beam occurs below 15 foot height, stop pour 1-1/2 in below top of bond beam.
4. Pour grout using chute container with spout or pump hose. Rod or vibrate grout during placing. Place grout continuously; do not interrupt pouring of grout for more than one hour. Terminate grout pours 1-1/2 inches below top course of pour.
5. Bond Beams: Stop grout in vertical cells 1-1/2 inches below bond beam course. Place horizontal reinforcement in bond beams; lap at corners and intersections as shown. Place grout in bond beam course before filling vertical cores above bond beam.

**3.14 CLEANING AND REPAIR**

A. General:

1. Clean exposed masonry surfaces on completion.
2. Protect adjoining construction materials and landscaping during cleaning operations.
3. Cut out defective exposed new joints to depth of approximately 3/4 inch and repoint.
4. Remove mortar droppings and other foreign substances from wall surfaces.

B. Concrete Masonry Units:

1. Immediately following setting, brush exposed surfaces free of mortar or other foreign matter.
2. Allow mud to dry before brushing.

END OF SECTION 04 20 00