

SECTION 04810

MASONRY ASSEMBLIES

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Provide inspected masonry work, complete, as shown or specified.
 - 2. This Section includes unit masonry assemblies consisting of the following:
 - a. Concrete masonry units.
 - b. Mortar and grout.
 - c. Reinforcing steel.
 - d. Masonry joint reinforcement.
 - e. Ties and anchors.
 - f. Miscellaneous masonry accessories.
- B. Related Work Specified in Other Sections:
 - 1. Sheet metal flashing and trim for exposed sheet metal flashing – Division 7.
 - 2. Calking and sealing – Division 7.
 - 3. Firestopping at tops of masonry walls and openings on masonry walls – Division 7.
 - 4. Concrete for precast concrete lintels – Division 8.
- C. Products Installed But Not Furnished Under This Section
 - 1. Miscellaneous metal fabrication items built into masonry - Division 5.
 - 2. Hollow metal frames built into masonry - Division 8.

1.2 DEFINITIONS

- A. Reinforced Masonry: Masonry containing reinforcing steel in grouted cells.

1.3 PERFORMANCE REQUIREMENTS

- A. Provide unit masonry that develops the following net-area compressive strengths (f'_m) at 28 days. Determine compressive strength of masonry from net-area compressive strengths of masonry units and mortar types according to Tables 1 and 2 in ACI 530.1/ASCE 6/TMS 602.
 - 1. For Concrete Unit Masonry: $f'_m = 1500$ psi.
- B. Unit strength test method shall be used to determine the compressive strength for each wythe.

1.4 QUALITY ASSURANCE

A. Reference Standards

1. Use materials and methods per the current applicable rules, regulations or standards of the following associations unless specifically noted otherwise:
 - a. National Concrete Masonry Association (NCMA).
 - b. New York State Building Code, latest edition.
 - c. Portland Cement Association (PCA).
 - d. Building Code – International Building Code 2006.
 - e. American Concrete Institute (ACI) (ACI 530-99) Building Code Requirements for Masonry Structures.

B. Sample Panel

1. Prior to laying of masonry, construct a sample wall panel of each type of exposed masonry work, complete including bond pattern and joint tooling, not less than 4 feet high by 6 feet wide, in a location on the site that will not interfere with construction operations. Use specified materials and methods in construction of sample panel. Remove and rebuild sample panel as often as required to obtain the acceptance of the Owner's Representative, changing methods as directed. When sample panel is accepted, match masonry work to the appropriate sample panel. Leave sample panel in place until masonry work has been completed and accepted. After acceptance, remove and dispose of sample panel, off site.

C. Pre-construction Testing

1. A testing laboratory provided by the Owner shall test masonry materials and inspect masonry construction to insure that the requirements of the Building Code and ACI 530.1-99 are fulfilled.
 - a. Clay Masonry Unit Test: For each clay masonry unit indicated, per ASTM C 67.
 - b. Concrete Masonry Unit Test: For each concrete masonry unit indicated, per ASTM C 140.
 - c. Mortar Test: For mortar properties per ASTM C 270.
 - d. Grout Test: For compressive strength per ASTM C 1019.
 - e. Fire Resistance Ratings: Where indicated, provide materials and construction identical to those of assemblies with fire resistance ratings determined per ASTM E 119 by a testing and inspecting agency, by equivalent concrete masonry thickness, or by other means, as acceptable to authorities having jurisdiction.
 - 1) The Contractor shall provide the required quantity of materials for testing in size and shape required to the testing agency.

D. Grouted/Reinforced Masonry Walls

1. Sample panel for reinforced masonry: Prior to laying of reinforced masonry, construct a wall panel of each type of reinforced masonry work including bond pattern and tooling not less than 4 feet high by 6 feet wide in a location that will not interfere with construction operations. Use specified methods and materials including specified grout, reinforcing bars, bar positioners and other accessories. Remove and rebuild sample panel as often as required to obtain the acceptance of the Owner's Representative, changing methods as directed. When sample panel is accepted, match masonry work to the appropriate sample

- panel. Leave sample panel in place until masonry work has been completed and accepted. After acceptance, remove and dispose of sample panel, off site.
2. The masonry foreman responsible for placement of grouted reinforced masonry is required to hold certification from the International Masonry Institute (IMI) training program for reinforced unit masonry assemblies.

1.5 SUBMITTALS

- A. Furnish submittals for items that are identified in this Section by a different typeface and a bracketed code (e.g., *Item [L]*). Refer to Division 1 General Requirements for definition of codes for types of submittals and the administrative requirements governing submittal procedure. General submittal requirements pertaining to this Section are specified herein under this Article.
- B. *Substitute Masonry Units [S]*: Samples shall be submitted of only substitute masonry units and colors not specified.
- C. *Control Joints [D]*: Submit shop drawings of control joints to show design and components.
- D. *Fabricated Flashings [D]*: Submit shop drawings of fabricated flashings at shelf angles, end dam units, corner units, and metal drip edges.
- E. *Pre-Construction Masonry Conference [R]*: Representatives of the Contractor, Owner, and Testing Agency shall meet at the office of the Owner's Representative. Submit proposed materials, details, and sequence of construction for review at least 2 weeks prior to the meeting. Provide minutes of meeting to all parties, including list of attendees and decisions.
- F. *Steel Bar Reinforcement [D]*: Submit shop drawings showing size and location of reinforcing bars. Include wall elevations showing placement of reinforcing at bond beams, lintels, wall openings, parapets, load-bearing walls and vertical reinforcement.
- G. *Material Certificates [C]*: Material Certificates: Signed by manufacturers certifying that each of the following items complies with requirements:
 1. Each type of masonry unit required.
 - a. Include size-variation data for brick, verifying that actual range of sizes falls within specified tolerances.
 - b. Include test data, measurements, and calculations establishing net-area compressive strength of masonry units.
 2. Each cement product required for mortar and grout, including name of manufacturer, brand, type, and weight slips at time of delivery.
 3. Each combination of masonry unit type and mortar type. Include statement of net-area compressive strength of masonry units, mortar type, and net-area compressive strength of masonry determined according to Tables 1 and 2 in ACI 530.1/ASCE 6/TMS 602.
 4. Each material and grade indicated for reinforcing bars.
 5. Each type and size of joint reinforcement.
 6. Each type and size of anchor, tie, and metal accessory.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Handle units in manner to prevent damage to same. Do not place units directly on the ground or dump them in piles.
 - 1. Deliver masonry units to the site on pallets.
 - 2. Cover all masonry units with waterproof covering to prevent water absorption from either rain or condensation.
- B. Deliver mortar materials to the site in their original, unopened containers bearing label identifying manufacturer's name and brand, and store under cover in a dry place, so as to prevent absorption of water and intrusion of foreign matter.
- C. Protect reinforcing, ties and anchors from contact with soil. Store metal items to prevent corrosion and accumulation of dirt and oil. Remove rust and other coatings which will interfere with bond.
- D. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.
- E. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.

1.7 PROJECT CONDITIONS

- A. Protection
 - 1. Protect masonry against damage from water, snow, frost, freezing and other weather conditions. Cover the tops of walls exposed to the weather with a non-staining, waterproof cover at completion of each day's work. Similarly protect at all times partially completed walls not being worked on. Cover walls exposed to the weather if rain occurs prior to hardening of mortar.
 - 2. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least 3 days after building masonry walls or columns.
 - 3. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.
 - a. Protect base of walls from rain-splashed mud and from mortar splatter by coverings spread on ground and over wall surface.
 - b. Protect sills, ledges, and projections from mortar droppings.
 - c. Protect surfaces of window and door frames, as well as, similar products with painted and integral finishes, from mortar droppings.
 - d. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.

4. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.
 - a. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F and above and will remain so until masonry has dried, but not less than 7 days after completing cleaning.
5. Hot-Weather Requirement: Protect unit masonry work when temperature and humidity conditions produce excessive evaporation of water from mortar and grout. Provide artificial shade and wind breaks and use cooled materials as required.
 - a. When ambient temperature exceeds 100 deg F, or 90 deg F with a wind velocity greater than 8 mph, do not spread mortar beds more than 48 inches ahead of masonry. Set masonry units within 1 minute of spreading mortar.
6. Brace and protect walls during erection as required to protect persons, property and the work from damage due to winds or other causes. Protect finish masonry walls from damage due to subsequent construction operations. Remove and replace damaged face units.

1.8 SEQUENCING AND SCHEDULING

- A. Coordinate the work of this Section with the work of other trades, under this Contract or other contracts, doing adjacent or concurrent work so as to insure proper, timely, and adequate interface.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Concrete Masonry Units
 1. Hollow Concrete Masonry Units: Per ASTM C 90.
 2. Solid Concrete Masonry Units: Per ASTM C 90.
 3. Use masonry units of medium weight made of concrete weighing between 105 and 125 lbs. per cubic foot, with normal weight aggregate per ASTM C 33 or lightweight aggregate per ASTM C 331 or a combination of the 2 weights.
 4. Provide structurally sound units that are free from defects that interfere with setting or that impair the strength or performance of the construction. Provide block free from broken corners or edges, chips, pops, stain, slick spots and other surface blemishes, and that are uniform in color and texture.
 5. Provide modular sized units, 8 inch x 16 inch nominal face size, of thickness indicated. Provide bullnose units, lintel units, bond-beam units, end units, sash units, and other special shape units as required to complete the work, matching the stretcher units in size, color and texture. Provide special size units where so indicated.
- B. Precast Concrete Lintels
 1. Precast Concrete Lintels: Provide precast concrete lintels of size and with reinforcing bars as shown. Concrete shall have a 3000 psi 28-day strength and shall have attained full

strength prior to installation. Fabricate units at least 16 inches longer than width of masonry opening; where exposed in the finished wall, make units to length for jointing with stretcher units in the bond pattern used in the wall.

C. Mortar

1. Mortar: Per ASTM C 270. Use the “Proportion Specifications” method.
2. Portland Cement: ASTM C 150, Type I or II, except Type III may be used for cold-weather construction.
3. Hydrated Lime: ASTM C 207, Type S.
4. Sand: ASTM C 144.
5. Portland Cement-Lime Mix: Packaged blend of portland cement complying with ASTM C 150, Type I or Type III, and hydrated lime complying with ASTM C 207.
6. Mortar Cement: ASTM C 1329.
7. Masonry Cement: ASTM C 91.
8. Use the following mortar types for the conditions defined:
 - a. Type S
 - 1) Load-bearing walls
 - b. Type N
 - 1) Interior walls.
 - 2) Firewalls.
9. *Mortar Tests [T]*: Perform evaluation tests of mortar per ASTM C 780, to show compliance with ASTM C 270 as follows:
 - a. Compressive strength: as defined for “type” specified
 - b. Water retention (flow after suction)
 - c. Air content

D. Grout

1. *Portland Cement Grout [T]*: Per ASTM C 476, with 2000 psi 28-day strength, when sampled and tested, per ASTM C 1019 and 8 inch to 11 inch slump per ASTM C 143, modified as follows:
 - a. Use only portland cement per ASTM C 150, Type I, II or III.
 - b. Use only hydrated lime per ASTM C 207, Type S.
 - c. Use only aggregate per ASTM C 404.
 - d. For spaces less than 2 inches wide, use fine-aggregate grout.
 - e. Admixtures shall contain no more than 0.5% calcium chloride by weight of admixture.
2. *Epoxy Grout [P]*: Per ANSI A118.3, non-staining type, standard white color. Use for glazed block walls where scheduled.
 - a. Laticrete International Inc. “Latapoxy SP-100 Stainless Epoxy Grout”.

E. Joint Reinforcement

1. Joint Reinforcement: Cold drawn steel wire per ASTM A 82 and hot dipped galvanized (after fabrication) per ASTM A 153, Class B-2, 1.5 oz. per square foot zinc coating; No. 9 gage deformed longitudinal and plain cross wires, and out-to-out spacing of longitudinal wires approximately 2 inches less than nominal wall thickness.
 - a. For structural facing tile, use No. 11 gage wire.

2. For single wythe masonry walls, No. 9 gage wire ladder type at vertically-reinforced walls so crossrods occur at webs (16" intervals):
 - a. Dur-O-Wal, Inc., "Ladur".
 - b. Hohmann & Barnard, Inc., "220 Ladder Mesh".
 - c. Masonry Reinforcing Corp. of America, "Series 200, 2 Wire System".
 - d. National Wire Products Industries, "Tie-Wal" Ladder Type.
3. Grout Retainer:
 - a. Wire Bond "Grout Stop"
 - b. Heckman "Metal Lath 268"
 - c. Dur-O-Wal, Inc. "Dur-O-Stop"
 - d. Hohmann & Barnard, Inc., MGS, "Mortar/Grout Screen"

F. Wall Reinforcement

1. Wall Reinforcement: For vertical reinforcement, and horizontal reinforcement in bond beams and lintels; deformed billet steel bars per ASTM A 615, Grade 60.

G. Metal Ties And Anchors

1. Provide all masonry ties and anchors with hot-dipped galvanized finish (after fabrication) per ASTM A 153, Class B-2, 1.5 oz. per square foot zinc coating.
2. Masonry to Steel Framing Anchors: 2-piece galvanized steel, ¼ inch diameter wire anchors with triangular ties. Weld 1 piece to framing and imbed other piece in masonry. Provide type that allows horizontal and vertical movement.
 - a. Dur-O-Wall Inc. "D/A 701-708 Triangle Ties" and "D/A 709 Anchor".
 - b. Heckmann Building Products Inc. "316 Ties" and "315 Anchor".
 - c. Hohmann & Barnard Inc. "VWT Vee Wall Ties" and 359 Anchor".
 - d. Masonry Reinforcing Corp. of America "1100 Ties" and "Type-I-1000 Anchor".
 - e. National Wire Products Industries "200 Series Ties" and "100 Anchor".
3. Joint Stabilizing Anchors: Provide at expansion and control joints where indicated, to allow expansion, contraction or isolation at joints. Construct of 2 galvanized metal sleeves connected together with 2 galvanized steel wires designed to slide in the sleeve ends.
 - a. Dur-O-Wal "DA 2200 Joint Stabilizing Anchor".
 - b. Hohmann & Barnard "Slip Set" Stabilizer.
 - c. Masonry Reinforcing Corp. Of America "1700 Control Joint Anchor".
4. Reinforcing Bar Positioners:
 - a. Wire Bond Series 3400 or 3401, vertical and horizontal.
 - b. Dur-O-Wall, D/A 811 Series, vertical; D/A 812 horizontal.

H. Masonry Flashing

1. Embeddable Flashing Device: High density polyethylene composition molded .0624 inch thick flashing pan with .3125 inch perimeter flanges and concaved weep spout.
 - a. Masonry Specialty Products. Inc., "Block-Flash" (877-352-7448).

I. Joint Materials

1. Flexible Joint Filler Strips: For use with sash block or built-in between block and concrete as indicated, pre-fabricated rubber or polyvinylchloride, of width to be placed under compression and of shape shown.
 - a. Dur-O-Wal Inc. "Rapid Control Joint" or "Rapid Poly-Joint"
 - b. Hohmann & Barnard Inc. "VS Series PVC".
 - c. Masonry Reinforcing Corp. of America "Control Joint"
 - d. National Wire Products Industries "PVC 001/002" or "RUB 021/022".
2. Bond Breaker Strip: For concrete masonry unit wall control joints, use one of the following:
 - a. Asphalt roofing felt, per ASTM D 226, 15-pound weight.
3. Isolation Gaskets: For use between masonry and steel building frame, use asphalt-impregnated cellular paper, 1/4 inch single thickness or 1/2 inch double thickness to suit conditions:
 - a. Williams Products Co, "Everlastic Column Boxboard 5004-3 (1/4") or 5008-3 (1/2")".
4. Expansion Filler: Use in joints between masonry and other construction materials as specified for the 2 conditions.
 - a. To maintain fire-rated walls, at abutting terminations with other building materials, at top of masonry walls up to underside of beams or deck, and at other voids where fire-rated construction is required. Use U.L. listed ceramic fiber insulation.
 - 1) The Carborundum Co. "Fiberfrax Durablanket Insulation:
 - 2) Thermal Ceramics "Kaowool FireMaster Blanket".
 - 3) Tremco "Cerablanket FS".
 - b. To fill voids between abutting masonry and other construction materials where fire-rating is not affected. Closed cell neoprene or PVC foam, board stock of thickness to be under compression when in the joint; except use tubular gaskets where shown.
 - 1) Hohman & Barnard #NS Closed Cell Neoprene Sponge.
 - 2) Williams Products, Inc.

J. Masonry Cleaners

1. Job-Mixed Detergent Solution: Solution of 1/2 cup dry measure tetrasodium polyphosphate and 1/2 cup dry measure laundry detergent dissolved in 1 gal. of water.
2. Acidic Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry without discoloring or damaging masonry surfaces. Use product expressly approved for intended use by cleaner manufacturer and manufacturer of masonry units being cleaned.

PART 3 EXECUTION

3.1 LAYING UP MASONRY

A. Examination

1. Examine conditions for compliance with requirements for installation tolerances and other conditions affecting performance.
 - a. Verify that foundations are within tolerances specified.
 - b. Verify that reinforcing dowels are properly placed.
 - c. Verify that the structural steel frame and miscellaneous metal work is complete, plumb, secured and properly located to allow masonry work to be installed as detailed and with adequate clearances.
2. Foundation and steel frame discrepancies:
 - a. Notify the Architect Engineer and Owner's Representative in writing of discrepancies.
 - b. Foundation and/or steel frame discrepancies: Do not proceed with masonry work until conditions have been corrected.
 - c. Foundation discrepancies affecting the masonry work shall be resolved by Foundation Contractor, the Masonry Contractor and the Owner Representative without Owner's extra cost.
 - d. Steel Frame discrepancies affecting the masonry work shall be resolved by the Steel Frame contractor, the Masonry Contractor, and the Owner's Representative without Owner's extra cost."
3. Before installation, examine rough-in and built-in construction to verify actual locations of piping connections.

B. General

1. Lay out work carefully in advance to make joints, both horizontal and vertical, fit the openings with a minimum of cutting. Provide joints of uniform width. Form corners as true 90 degree angles unless otherwise shown. Exposed units shall be free from chips on faces and exposed edges, and from broken corners.
2. Construct masonry walls and partitions exposed in the finished work in straight, true and plumb planes. Surfaces of walls and partitions not exposed in the finished work may vary 1/8 inch in 8-foot, vertically from plumb plane, horizontally from a straight true plane.
3. Start the partitions on concrete floor slabs and extend to roof or floor construction above; except that where partitions are shown to terminate at suspended ceilings, extend partitions a minimum of 4 inches above such suspended ceilings, unless shown otherwise.
4. Provide expansion joints in masonry work. Between top of masonry walls or partitions and underside of steel or concrete beams, metal deck, or concrete slabs; at ends of masonry walls or partitions abutting other construction, or other masonry walls or partitions except at tooth-bonded intersections; and elsewhere as shown; by packing the space with Expansion Filler. Provide the last course in such walls or partitions of solid units terminating to provide 3/8 inch space minimum.
5. Step back unfinished masonry where possible, and tooth only where necessary.
6. Lay masonry units dry. After laying masonry units, remove units that are moved or disturbed, and thoroughly clean and relay with fresh mortar.

7. Mortar:
 - a. "Measurement of materials for mortar shall be by volumetric measure and be controlled and accurately maintained. Measurement by "Shovel full" shall not be permitted."
 - b. Mortar shall be retempered as required to maintain consistency. Dispose off site of mortar which has begun to stiffen, set or which is over 2-1/2 hours old.
 - c. Follow color manufacturer's recommendations for re-temper colored mortar to avoid color mis-match."
8. Stopping and Resuming Work: In each course, rack back 1/2-unit length for 1/2 running bond do not tooth. Clean exposed surfaces of set masonry, wet masonry units lightly if required, and remove loose masonry units and mortar before laying fresh masonry.
9. Built-in Work: As construction progresses, build in items specified under this and other Sections of the Specifications. Fill in solidly with masonry around built-in items.
10. Where built-in terms are to be embedded in cores of hollow masonry units, place a grout retainer in the in joint below and rod mortar or grout into core.
11. Fill cores in hollow concrete masonry units with grout 24 inches under bearing plates, beams, lintels, posts, and similar items, unless otherwise indicated.
12. Provide mortar beds on top of walls where walls support steel framing or precast concrete members. Build up mortar beds to provide elevations required to receive such members. Trowel surface of mortar beds true and level.
13. Provide or leave openings, holes, chases or other modifications in the masonry work as shown and as required for the passage of pipes, ducts, conduits, and other work. After items have been installed, close up the remaining portions of the openings, holes and chases with masonry to match adjacent surfaces. Rake out joints indicated to be sealed or calked, 1/2 inch deep. Rake out all joints to receive flashing, 1-1/2 inch deep.
14. Set and build-in to the masonry work, items so furnished. Locate and place the items carefully and secure the parts in place rigidly, per instructions of furnishing party. Set anchorages in solid mortar.
15. Fill the spaces between metal frames and masonry with grout.
16. Use cores filled with mortar, or provide solid units for anchorage in locations where handrails, plumbing fixtures, utility cabinets and similar items are attached.
 - a. Provide solid units for anchoring of frames and track of sliding fire doors, per requirements of the Owner's Underwriters.
17. Construct masonry walls and partitions of proper thickness to receive pipe, ducts, conduit and similar core-run items, whether or not so dimensioned. If room sizes or critical space requirements are affected by the need for larger units, obtain approval from the Owner's Representative before proceeding.

C. Concrete Masonry Units

1. Lay up concrete masonry units in common or running bond. Align vertical joints in a straight plumb line. Keep horizontal joints level. Work joints so as to bond properly with facing and backing materials. Provide joints of uniform width and thickness, and not exceeding 1/2 inch. Tool exposed joints in the finished work slightly concave. Strike off other joints flush.

2. Lay up units with cells in vertical and in such a manner that the main bearing webs come into proper relation for the bearing on units below. Lay units with full mortar coverage on horizontal and vertical face shells.
 - a. Bed webs in mortar in starting course on footings and in all courses of piers, columns, and pilasters, and where adjacent to cells or cavities to be filled with grout.
 - b. For starting course on footings where cells are not grouted, spread out full mortar bed, including areas under cells.
3. Form external vertical (and horizontal) corners, with bullnose concrete masonry units. Form internal corners square. Form exposed ends of walls and partitions with flush end units. Tie intersecting walls with metal ties, joint stabilizing anchor or with wall reinforcing at 16 inches on center vertically and provide a control joint. Provide a course of solid units at top of all walls and partitions. Provide 2 courses of solid units, or fill cores and voids with grout, directly under framing that bears on walls. All masonry below grade shall be grouted solid.
 - a. Use bonding units where brick header courses align with horizontal joint line in the work.
4. Cut masonry units with motor driven saws to provide clean, sharp, unchipped edges.
5. Install reinforced masonry lintels above openings in masonry walls except where steel or precast concrete lintels are shown.
6. Where lateral support of walls is not provided by piers, cross-walls, floors or roofs within the criteria specified below, provide lateral support clips to structural framing at not over 4 feet on center or with metal ties or anchors as specified, or with piers:
 - a. Bearing walls: 18 times the nominal wall thickness.
 - b. Non-bearing walls: 36 times the nominal wall thickness.

D. Reinforced Unit Masonry

1. Provide reinforced walls or piers in locations shown. Install vertical reinforcing in block cores, of sizes and at spacings shown. Use vertical bar positioners. After mortar has set, fill cores containing reinforcing with grout. If only segments of a wall are reinforced, provide setting mortar on cross-webs adjacent to segment, during laying, to contain the grout in the reinforced cores.
 - a. Construct reinforced blast-resistant masonry block walls where and as shown.
2. Temporary Formwork and Shores: Construct formwork and shores to support reinforced masonry elements during construction.
 - a. Construct formwork to conform to shape, line, and dimensions shown. Make it sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.
 - b. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and other temporary loads that may be placed on them during construction.
3. Placing Reinforcement: Comply with requirements of ACI 530.1/ASCE 6/TMS 602.
4. Grouting: Do not place grout until entire height of masonry to be grouted has attained sufficient strength to resist grout pressure.
 - a. Comply with requirements of ACI 530.1/ASCE 6/TMS 602 for cleanouts and for grout placement, including minimum grout space and maximum pour height.

E. Lintels And Bond Beams

1. Provide concrete masonry lintel units matching the stretcher units in size and texture for lintels at locations with openings greater than 24 inches. Place reinforcing bars as shown and fill void with grout. Construct lintel with a minimum of 8 inches of bearing at each end. Where lintel is exposed in final construction, match the bond pattern used in the wall. Cure field fabricated lintels before handling and installing or temporarily support built-in-place lintels until cured.
2. Provide precast lintel units in textures, color, finish and strength to match adjacent masonry units with reinforcing bars indicated. Construct precast lintels with a minimum of 8 inches bearing on each side. Provide precast lintels with the same curing process as the adjacent masonry units.
3. Provide concrete masonry bond beam units or other methods of grout confinement for bond beams. Place reinforcing bars as shown and fill void with grout. For continuous bond beams, lap reinforcing bars 12 inches minimum and provide bars around corners. Tie bond beams to structural members as shown.

F. Steel Lintels

1. Receive, set, and anchor steel lintels. Center lintels over the openings and set level. In all cases, install horizontal leg in level planes, or tilted slightly in towards the building; never tilt horizontal leg away from the building. Construct lintel with a minimum of 8 inches of bearing at each end.

G. Control Joints

1. Construct control joints in concrete masonry unit or expansion joints in brick-concrete masonry unit wall construction to provide for differential movement, at not over 20 feet on center, or 2.5 times the wall height whichever is less, unless otherwise indicated. Construct vertical control joints at natural weaknesses in the walls, such as door and window openings, and in other locations shown on the Drawings, or as indicated below:
 - a. At locations where changes in wall height or thickness occur.
 - b. At windows and doors to 6'-7" wide, provide a control joint on one side of the opening.
 - c. At doors and windows over 7'-7" wide, provide control joints at both sides of the opening.
 - d. At doors and windows with lintels, provide control joint at end of lintel above opening. At windows, provide control joint along jamb and extend down along this line to bearing.
 - e. Provide movement joints at junctions of interior masonry walls with exterior walls.
 - f. Provide horizontal joint, 3/8" min. for veneer expansion below all shelf angles.
2. Construct typical control joints and expansion joints by breaking the running bond in the wall with a continuous thru-wall vertical joint 3/8 inch wide and provide 1/2 inch deep sealant space.
 - a. In concrete masonry unit work, construct the control joint by laying up the block with the half core end at the joint; as concrete masonry units are laid up, line one side of the joint with 1 ply of Bond Breaker Strip and fill the core and web space formed at the joint with mortar, packed in place, to form a keyed joint which will withstand lateral pressure.

3. Where control joints are located at the end of lintels, install Bond Breaker Strip in bed joint of lintel.

H. Isolation Joints

1. Provide isolation joints wherever masonry encloses a steel column and elsewhere as shown. Construct joints by separating the masonry from the steel with Isolation Gaskets. Do not compress the Isolation Gasket.

I. Joint Reinforcement

1. Reinforce concrete masonry unit walls and partitions with joint reinforcement except:
 - a. Where veneers are tied to concrete back-up.
 - b. Where metal ties are specified or specifically noted or shown.
2. Install horizontal joint reinforcing continuously in every second horizontal concrete masonry unit joint or at 16 inches on center vertically, calculated to provide reinforcement in the top joint of each wall or partition. Supplement the reinforcement at openings in walls or partitions with additional reinforcing in the joints immediately above and immediately below the opening, if such joints are not reinforced by the normal placement of the reinforcement. The additional reinforcing shall be the same as used in the wall or partition and of length equal to the width of the opening plus 4 feet centered on the opening. Terminate reinforcing at each side of control joints. Bend and extend reinforcing around corners and through intersections by cutting, bending and lapping. Lap reinforcing 6 inches at joints between pieces. Embed longitudinal wires completely in mortar.

J. Metal Ties And Anchors

1. Install metal ties and anchors to bond and to secure masonry work, as shown or as follows:
 - a. Tie masonry wythes together, where other types of bonding are not specified or shown, with metal ties spaced not over 32 inches on center horizontally and 16 inches on center vertically, staggered.
 - b. Tie ends of masonry walls and partitions to abutting construction with specified joint stabilizing anchors spaced at 16 inches on center vertically.
 - c. Tie masonry walls enclosing a steel-framed building to each steel column not more than 24 inches vertically, and to each spandrel beam with metal ties spaced 32 inches on center horizontally.
2. Secure metal ties rigidly in place, to masonry by fully embedding in mortar, to steel by welding. In vertically cored masonry, position ties over a vertical joint when tying wythes. In cored masonry, fill end cores of units when tying wall ends.

K. Field Inspections / Quality Assurance

1. Special masonry inspections shall not be required for empirically designed masonry that is part of non essential buildings as defined by the IBC.
 - a. Structural testing shall, however, be required for empirically designed masonry that is part of essential buildings designed for seismic resistance. Testing shall be Level 1 as defined by Table 1708.1.2 of the IBC.

L. Masonry Waste Disposal

1. Unused masonry materials are the property of the Contractor and, at the completion of his Work, must be removed from the site.
2. The contractor may request the approval to use clean masonry debris as a site fill material. Upon approval by the Owner's Representative, the Contractor may:
 - a. Dispose of clean masonry units, mortar, grout, cement and sand by crushing the masonry debris into units of 4 inches or less in all dimensions and mix the debris with 2 parts of specified material for each part of masonry debris per soil and fill materials in Division 2.
 - b. Maintain masonry fill debris below 18 inches of finish grade.
3. Remove excess masonry waste and dispose of all materials legally that are not used as fill on the site.

M. Cleaning And Pointing

1. Clean exposed surfaces of masonry thoroughly to remove mortar, dirt, paint spots, stains, efflorescence and defacements. Protect exposed adjacent materials during installation and cleaning operations. Remove mortar droppings from aluminum and other metal surfaces daily. Do not use sand blast, or other materials or methods that will stain, discolor, or damage the masonry surfaces in any way.
2. Point up joints full and even and to match tooling used on wall. Cut out and point up defective joints during or before cleaning. Clean out and provide proper-depth recesses for caulking and sealing work.
3. Brush clean concrete masonry units as the work progresses. Allow mortar droppings on such surfaces to dry and then remove by trowel, block-rubbing and brushing.
4. Protect surfaces which could be harmed by cleaning operations.
5. Remove all excess materials, debris, equipment, sample panels, etc. From site upon completion and acceptance of masonry work.

END OF SECTION

Revision History	
Date	Rev. No.
A	0
B	0
C	0
E	0
F	0
02-19-09	0

DS/djo

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