CONSTRUCTOIN STANDARD SPECIFICATION

SECTION 04220

CONCRETE MASONRY UNITS

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PART 1 - GENERAL

1.01 SUMMARY:

A. Work Includes: This Section includes the furnishing and installation of concrete masonry units, reinforcing steel, miscellaneous masonry accessories and masonry cleaners.

B. Related Sections:

1. Section 04050, “Masonry Mortar and Grout”
2. Section 05500, “Metal Fabrications”
3. Section 06100, “Rough Carpentry”
4. Section 07200, “Building Insulation”
5. Section 07600, “Flashing and Sheet Metal”
6. Section 07900, “Joint Sealants”
7. Section 08110, “Steel Doors and Frames”
8. Section 09900, “Painting”

1.02 REFERENCES:

A. American Concrete Institute (ACI)

315-92	Details and Detailing of Concrete Reinforcement
530/ASCE 5	Building Code Requirements for Masonry Structures
530.1/ASCE 6	Specifications for Masonry Structures

B. American Society for Testing and Materials (ASTM)

A36	Specification for Structural Steel
A82-95A	Specification for Steel Wire, Plain, for Concrete Reinforcement
A123	Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
A153	Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
A185-94	Specification for Steel Welded Wire Fabric, Plain, for Concrete Reinforcement
A307-94	Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength
A366	Specification for Steel, Carbon, Cold-Rolled Sheet, Commercial Quality
A496-95a	Specification for Steel Wire, Deformed, for Concrete Reinforcement
A497-95	Specification for Welded Wire Fabric, Deformed, for Concrete Reinforcement
A525	Specification for General Requirements for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process
A615	Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
C90-97	Specification for Load-Bearing Concrete Masonry Units
C140-96b	Method of Sampling and Testing Concrete Masonry Units
C150-97	Specification for Portland Cement
C207	Specification for Hydrated Lime for Masonry Purposes
C780-96	Method for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry
C979	Specification for Pigments for Integrally Colored Concrete
C1019-89a	Test Method of Sampling and Testing Grout
D226	Specification for Asphalt Saturated Organic Felt Used in Roofing and Waterproofing
D1056-97a	Specification for Flexible Cellular Materials - Sponge or Expanded Rubber

D2000-96 Classification System for Rubber Products in Automotive Applications

D2287-96 Specification for Nonrigid Vinyl Chloride Polymer and Copolymer Molding and Extrusion Compounds

E119 Method for Fire Tests of Building Construction and Materials

E447 Methods for Compressive Strength of Masonry Prisms

C. Masonry Codes and Specifications

D. National Concrete Masonry Association (NCMA)

E. International Building Code (IBC): Chapter 21 Masonry

1.03 DEFINITIONS

A. Parging: The process of applying a coat of cement mortar to the back of the facing material, the face of the backing material, the face of rough masonry, and the earth side of foundation and basement walls (sometimes referred to as pargeting).

1.04 SUBMITTALS

A. Submit the following in accordance with conditions of Contract and Section 01330, "Submittal Procedures".

1. Product Data: Submit product data for each different concrete masonry unit, accessory, and other manufactured product indicated.

2. Shop drawings for fabrication, bending, and placement of concrete masonry reinforcing bars. Comply with ACI 315 showing bar schedules, stirrup spacing, diagrams of bent bars, and arrangement of masonry reinforcement.

3. Asbestos-free and lead-free certification for all masonry materials and accessories.

4. Concrete masonry unit samples, for initial selection purposes, in small-scale form showing full extent of colors and textures available for each different exposed masonry unit required.

5. Material certificates for the following, signed by manufacturer and Contractor certifying that each material complies with requirements.

a. Each different cement product required for mortar and grout, including name of manufacturer, brand, type, and weight slips at time of delivery.

b. Each material and grade indicated for reinforcing bars.

c. Each type and size of joint reinforcement.

d. Each type and size of anchors, ties, and metal accessories.

1.05 QUALITY ASSURANCE

A. Fire Performance Characteristics: Where indicated on the drawings, provide materials and construction identical to those of assemblies whose fire resistance has been determined per ASTM E119 by Underwriter's Laboratories.

B. Single-Source Responsibility for Masonry Units: Obtain concrete masonry units of uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from one manufacturer for each different product required for each surface or visually related surfaces.

C. Single-Source Responsibility for Mortar Materials: Obtain mortar ingredients of uniform quality, including color for masonry, from one manufacturer for each cementitious component and from one source and producer for each aggregate.

D. All masonry units shall be sound, free of cracks or other defects that may interfere with the proper placing of the unit or impair the strength of construction.

E. Where units are to be used in exposed wall construction, the exposed masonry faces shall not show chips or cracks, or imperfections when viewed from a distance of not less than 20 feet (6.1 m) under diffused lighting.

F. Use of damaged items is prohibited except by specific authorization of the Sandia Delegated Representative (SDR).

G. Testing: Sandia National Laboratories (SNL) may obtain a qualified independent testing laboratory to perform the following testing indicated for source and field quality control.

1. Testing Frequency: Tests and evaluations listed in this article may be performed during construction for each 5000 sq. ft (465 m^2) of wall area, or as otherwise directed by the SDR.

2. Concrete Masonry Unit Tests: For each different concrete masonry unit indicated, units will be tested for strength, absorption, and moisture content per ASTM C140.

3. Prism Test Method: For each type of wall construction indicated, masonry prisms will be tested per ASTM E447, Method B. Prepare one set of prisms for testing at 7 days and one set for testing at 28 days.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver masonry materials to project in undamaged condition.

B. Store and handle masonry units off the ground, under cover, and in a dry location to prevent their deterioration or damage due to moisture, temperature changes, contaminants, corrosion, and other causes. If units become wet, do not place until units are in an air-dried condition.

C. Store cementitious materials off the ground, under cover, and in dry location.

D. Store aggregates where grading and other required characteristics can be maintained and contamination avoided. Store different aggregates separately.

E. Store masonry accessories including metal items to prevent corrosion and accumulation of dirt and oil.

F. Protect reinforcement, ties, and metal accessories form permanent distortion and store them off the ground.

1.07 PROJECT CONDITIONS

A. Protection of Masonry: During erection, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress. Extend cover a minimum of 24 inches (610 mm) down both sides and hold cover securely in place.

B. 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.

C. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Remove immediately any grout, mortar, and soil that come in contact with such masonry.

1. Protect base of walls from rain-splashed mud and mortar splatter by means of coverings spread on ground and over wall surface.

2. Protect sills, ledges, and projections from mortar droppings.

3. Protect surfaces of windows and door frames, as well as similar products with painted and integral finishes from mortar droppings.

D. Cold-Weather Construction: Comply with the following when ambient temperature falls below 40° F (4.4° C).

1. General: Remove masonry damaged by freezing conditions. Do not lay masonry units having temperature below 20° F (-6.7° C). Remove visible ice on masonry units before the unit is laid.

2. Specific requirements for various temperature ranges are as follows:

   a. Aggregates and mixing water shall be heated to produce mortar and grout temperatures between 40° F (4.4° C) and 120° F(48.9° C) at the time of mixing.

   b. Maintain mortar temperature on mortar boards above freezing until used on masonry.

   c. When ambient temperature is between 20° F (-6.7° C) and 25° F (-3.9° C), provide heat sources on both sides of walls under construction and install wind breaks when wind velocity exceeds 15 miles per hour (24 km per hour).

   d. When ambient temperature is below 20° F (-6.7° C), provide enclosures and heat sources to maintain the temperatures above 32° F (0° C) within the enclosure.

3. Protection

   a. When mean daily temperature is between 40° F (4.4° C) and 32° F (0° C), protect completed masonry from rain or snow by covering with weather-resistive membrane for 24 hours after construction.

   b. When mean daily temperature is between 32° F (0° C) and 25° F (-3.9° C), completely cover completed masonry with weather-resistive membrane for 24 hours after construction.

   c. When mean daily temperature is between 25° F (-3.9° C) and 20° F (-6.7° C), completely cover completed masonry with insulating blankets or equal protection for 24 hours after construction.

   d. When mean daily temperature is below 20° F (-6.7° C), maintain masonry temperature above 32° F (0° C) for 24 hours after construction by enclosure with supplementary heat, by electric heating blankets, by infrared heat lamps, or by other acceptable methods.

E. Hot-Weather Construction: Protect masonry construction from direct exposure to wind and sun when erected in ambient temperature of 90° F (32° C) or greater in the shade, with a relative humidity less than 50%.

1. Do not spread mortar beds more than 4 feet (1.2 m) ahead of masonry. Set masonry units within one minute of spreading mortar. Dampen, but do not saturate masonry units immediately before installation.

2. Mortar can be retempered with cool water only once to maintain consistency.

3. Protection: When the mean daily temperature exceeds 100° F (38° C) or exceeds 90° F (32° C) with a wind velocity greater than 8 mph, fog spray all newly constructed masonry until damp, at least three times a day until the masonry is three days old.

PART 2 - PRODUCTS

2.01 CONCRETE MASONRY UNITS

A. Load-Bearing Concrete Masonry Units: ASTM C90, and as follows:

1. Unit Compressive Strength: Provide units with minimum average net area compressive strength of 1900 psi (13100 kPa).

2. Size: Provide manufacturer's standard units with nominal face dimensions of 8" wide x 8" high x 16" long (203 mm wide x 203 mm high x 406 mm long), actual dimensions 7-5/8" x 7-5/8" x 15-5/8" (194 mm x 194 mm x 397 mm), unless otherwise indicated.

3. Provide Type I, moisture-controlled units.

4. Weight Classification: Normal weight.

B. Provide special shapes where indicated and as follows:

1. For lintels, corners, jambs, sash, control joints, headers, bonding, and other special conditions.

2. Bullnose units for outside corners where indicated.

3. Square-edge units for outside corners, except where indicated as bullnose.

C. Exposed Faces: Where special finishes are indicated, provide units with the following:

1. Standard aggregate, split face or split face-fluted finish.

2. Standard aggregate, slump finish.

3. Scoria aggregate, smooth face, split face or split face-fluted finish.

2.02 REINFORCEMENT

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

B. Deformed Reinforcing Wire: ASTM A496.

C. Plain Welded Wire Fabric: ASTM A185.

D. Deformed Welded Wire Fabric: ASTM A497.

E. Joint Reinforcement: 9 gage deformed side rods and diagonal rods, in accordance with ASTM A951.

1. Galvanized in accordance with ASTM A641 for internal applications and ASTM A153 for external applications.

2. Description: Prefabricated truss type welded-wire units with deformed continuous side rods and diagonal rods, spaced no more than 16" O.C. into straight lengths of not less than 10 feet (3 m), with prefabricated corner and tee units.

3. Available Manufacturers: Subject to compliance with requirements, manufacturers offering joint reinforcement that may be incorporated in the work include, but are not limited to, the following:

   AA Wire Products Co.
   Duro-O-Wal, Inc.
   Heckman Building Products, Inc.
   Hohmann & Barnard, Inc.
   Masonry Reinforcing Corp. of America
   Southern Construction Products, Inc.

2.03 TIES AND ANCHORS

A. Galvanized Carbon Steel Wire: ASTM A82, hot-dip galvanized after fabrication to comply with ASTM A153, Class B2. Wire diameter 0.1875 inch (4.76 mm), unless otherwise indicated.

B. Galvanized Steel Sheet: ASTM A366 (commercial quality) cold-rolled carbon steel sheet hot-dip galvanized after fabrication to comply with ASTM A525, for sheet metal ties and anchors. Minimum thickness 0.0598 inch (16 gage) (1.52 mm), unless otherwise indicated.

C. Steel Plates and Bars: ASTM A36, hot-dip galvanized to comply with ASTM A123 or ASTM A153, Class B3, as applicable to size and form indicated.

D. Bent Wire Ties: Individual units prefabricated from bent wire to comply with requirements indicated below:

   1. Tie Shape for Hollow Masonry Units Laid with Cells Vertical: Rectangular with closed ends and not less than 4 inches (102 mm) wide.

   2. Tie Shape for Solid Masonry Unit Construction: Z-shaped ties with ends bent 90 degrees to provide hooks not less than 2 inches (51 mm) long.

E. Adjustable Anchors for Connecting Masonry to Structural Framework: Provide two-piece assemblies as described below allowing vertical or horizontal differential movement between wall and framework parallel to plane of wall, but resisting tension and compression forces perpendicular to it.

   1. For anchorage to concrete framework, provide manufacturer's standard with dovetail anchor section formed from sheet metal and triangular-shaped wire tie section sized to extend within 1 inch (25 mm) of masonry face. Wire diameter 0.1875 inch (4.76 mm).

   2. For anchorage to steel framework provide manufacturer's standard anchors with crimped 1/4-inch (6.35 mm) diameter wire anchor section for welding to steel and triangular-shaped wire tie section sized to extend within 1 inch (25 mm) of masonry face. Wire diameter 0.1875 inch (4.76 mm).

F. Rigid Anchors: Provide straps of form and length indicated, fabricated from metal strips of following width and thickness.

1. 1-1/2 inches (38.1 mm) wide by 1/4 inch (6.35 mm) thick, unless otherwise indicated.

G. Miscellaneous Anchors

1. Unit Type Masonry Inserts in Concrete: Cast iron or malleable iron inserts of type and size indicated.

2. Dovetail Slots: Furnish dovetail slots, with filler strips, of slot size indicated, fabricated from 0.0336-inch (22-gage) (0.8534 mm) sheet metal.

3. Anchor Bolts: Steel bolts complying with A307, Grade A; with ASTM A563 hex nuts and, where indicated, flat washers; hot-dip galvanized to comply with ASTM A153, Class C; of diameter, length and type indicated on the drawings.

H. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the work include, but are not limited to, the following:

AA Wire Products Co.
Duro-O-Wal, Inc.
Heckman Building Products, Inc.
Hohmann & Barnard, Inc.
Masonry Reinforcing Corp. of America
Southern Construction Products, Inc.

2.04 MISCELLANEOUS MASONRY ACCESSORIES

A. Nonmetallic Expansion Joint Strips: Premolded neoprene filler strips complying with ASTM D1056, Type 2 (closed cell), Class A (cellular rubber and rubber-like materials with specific resistance to petroleum base oils), Grade 1 (compression-deflection range of 2-5 psi (14 - 35 kPa)), compressible up to 35 percent, of width and thickness indicated.

B. Preformed Control Joint Gaskets: styrene-butadiene rubber compound ASTM D2000, Designation 2AA-805., designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.

C. Bond Breaker Strips: Asphalt-saturated organic roofing felt complying with ASTM D226, Type I (No. 15 asphalt felt).

D. Weep Holes: Medium-density round plastic polyethylene tubing, 3/8-inch (9.53 mm) outside diameter by 4 inches (102 mm) long.

E. Waterproofing: Provide Prime-a-Pell 200 water repellent by Chemprobe Corp. on all exterior exposed CMU or paint according to requirements in Section 09900, “Painting”.

2.05 MASONRY CLEANERS

A. Job-Mixed Detergent Solution: Solution of trisodium phosphate (1/2-cup or 118 mL dry measure) and laundry detergent (1/2-cup or 118 mL dry measure) dissolved in one gallon (3.78 L) of water.

B. Job-Mixed Muriatic Solution: Solution of 1 part muriatic acid and 10 parts clean water, mixed in a nonmetallic container with acid added to water.

C. Proprietary Acidic Cleaner: Manufacturer's standard-strength, general-purpose cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry surfaces of type indicated below without discoloring or damaging masonry surfaces; expressly approved for intended use by manufacturer of masonry units being cleaned.

1. For masonry not subject to metallic oxidation stains, use formulation consisting of a concentrated blend of surface-acting acids, chelating, and wetting agents.

2. For dark colored masonry not subject to metallic oxidation stains, use formulation consisting of a liquid blend of surface-acting acids and special inhibitors.

3. For masonry subject to metallic oxidation stains, use formulation consisting of a liquid blend of organic and inorganic acids and special inhibitors.

4. Available Products: Subject to compliance with requirements, a product that may be used to clean unit masonry surfaces includes, but is not limited to, the following:

"Sure Klean No. 600 Detergent," ProSoCo, Inc.
"Sure Klean No. 101 Lime Solvent," ProSoCo, Inc.
"Sure Klean Vana Trol," ProSoCo, Inc.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine conditions for compliance with requirements for installation tolerances and other specific conditions, and other conditions affecting performance of concrete masonry unit.

B. Examine rough-in and built-in construction to verify actual locations of piping connections prior to installation.

C. Do not proceed until unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Clean all reinforcement by removing mud, oil, or other materials that will adversely affect or reduce bond at the time mortar or grout is placed. Reinforcement with rust and/or mill scale will be accepted, provided the dimensions and weights, including

heights of deformations, are not less than required by the ASTM specification covering this reinforcement in this Specification.

B. Prior to placing masonry, remove laitance, loose aggregate, and anything else that would prevent mortar from bonding to the foundation.

C. Do not wet concrete masonry prior to installation, unless otherwise indicated.

3.03 INSTALLATION

A. General:

1. Thickness: Build masonry construction to the full thickness shown, using units of nominal thickness indicated.

2. Leave openings for equipment to be installed before completion of masonry. After installation of equipment, complete masonry to match construction immediately adjacent to the opening.

3. Cut masonry units with motor-driven saws to provide clean, sharp, unchipped edges. Cut units as required to provide continuous pattern and to fit adjoining construction. Use full-size units without cutting where possible.

4. Matching Existing Masonry: Match coursing, bonding, color, and texture of new masonry with existing masonry.

B. Masonry erection:

1. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint widths and for accuratly locating openings, movement-type joints, returns, and offsets. Avoid the use of less-than-half-size units at corners, jambs, and where possible at other locations.

2. Erect walls to comply with specified construction tolerances, with courses accurately spaced and coordinated with other construction.

3. Lay all exposed masonry in one-half running bond with vertical joint in each course centered on units in courses above and below, do not use units with less than nominal 4-inch (102 mm) horizontal face dimensions at corners or jambs.

4. Lay all concealed masonry with all units in running bond or bonded by lapping not less than 2 inches (51 mm). Bond and interlock each course at corners. Do not use units with less than nominal 4-inch (102 mm) horizontal face dimensions at corners or jambs.

5. Stopping and Resuming Work: In each course, rack back 1/2-unit length; do not tooth. Clean exposed surfaces of set masonry, and remove loose masonry units and mortar prior to laying fresh masonry.

6. 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.

a. Fill space between hollow metal frames and masonry solidly with mortar, unless otherwise indicated.

b. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath in the joint below and rod mortar or grout into core.

c. Fill cores in hollow concrete masonry units with grout 3 courses under bearing plates, beams, lintels, posts, and similar items, or as otherwise indicated on the contract drawings.

3.04 CONSTRUCTION TOLERANCES

A. Dimension of Elements

1. In cross section or elevation.....-1/4 in, +1/2 in. (-6.35 mm, + 12.7 mm)

2. Mortar joint thickness
bed.....±1/8 in. (± 3.18 mm)
head.....-1/4 in., +3/8 in. (- 6.35 mm, + 9.53 mm)
collar .....-1/4 in., +3/8 in. (-6.35 mm, + 9.53 mm)

Initial bed joint shall not be less than 1/4 inch (604 mm) or more than 1 inch (24 mm).

3. Grout space or cavity width .....-1/4 in., +3/8 in. (-6.35 mm, + 9.53 mm)

B. Elements

1. Variation from level:
bed joints.....±1/4 in. in 10 ft.(± 6.35 mm in 3.05 m)
.....±1/2 in. maximum (± 12.7 mm)
top surface of bearing walls.....±1/4 in. in 10 ft. (± 6.35 mm in 3.05 m)
.....±1/2 in. maximum (± 12.7 mm)

2. Variation from plumb .....±1/4 in. in 10 ft.(± 6.35 mm in 3.05 m)
.....±3/8 in. in 20 ft. (± 9.53 mm in 6.1 m)
.....±1/2 in. maximum (± 12.7 mm)

3. True to a line.....+1/4 in. in 10 ft. (+ 6.35 mm in 3.05 m)
.....+3/8 in. in 20 ft. (+ 9.53 mm in 6.1 m)
.....+1/2 in. maximum (+ 12.7 mm)

4. Alignment of columns and walls (bottom versus top)
.....+1/4 in. for bearing walls (+ 6.35 mm)
.....+1/2 in. for nonbearing walls (+ 12.7 mm)

C. Location of Elements

1. Indicated in plan.....+1/2 in. in 20 ft. (+ 12.7 mm in 6.1 m)
.....+3/4 in. maximum (+ 19.1 mm)
2. Indicated in elevation.....+1/4 in. in story height (+ 6.35 mm)
.....+3/4 in. maximum (+ 19.1 mm)

3.05 PLACING MORTAR AND UNITS

A. Hollow concrete units:

1. Face shells of bed joints fully mortared.

2. Webs are fully mortared in all courses of piers, columns, and pilasters, in the starting course on foundations, when necessary to confine grout or loose-fill insulation, and when otherwise required.

3. For starting course on footings where cells are not grouted, spread out full mortar bed including areas under cells.

B. Cut joints flush for masonry walls to be concealed or to be covered by other materials, unless otherwise indicated.

3.06 REINFORCEMENT INSTALLATION

A. Place reinforcement in accordance with the sizes, types, and locations indicated on the contract drawings. Horizontal reinforcement may be placed as the masonry work progresses.

B. Reinforcement shall be secured against displacement prior to grouting by wire positioners or other suitable devices such as wire tying, at intervals not exceeding 200 bar diameters.

C. Tolerances: Placement of reinforcement in walls and flexural elements shall be:

1. + 1/2 inch (13 mm) when the distance from the centerline of steel to the opposite face of masonry, *d*, is equal to 8 inches (203 mm) or less

2. $\pm$ 1 inch (25 mm) for *d* equal to 24 inches (600 mm) or less but greater than 8 inches (203 mm)

3. $\pm$ 1-1/4 inch (32 mm) for *d* greater than 24 inches (600 mm).

4. $\pm$ 2 inches for longitudinal location of reinforcement.

D. Clearance between reinforcing steel and the surface of the masonry shall be not less 1/4 inch (6.4 mm) for fine grout and 1/2 inch (12.7 mm) for coarse grout.

E. Do not bend reinforcement after it is embedded in grout or mortar, unless directed by the SDR.

F. Horizontal Joint Reinforcement: Provide continuous horizontal joint reinforcement as indicated. Install longitudinal side rods in mortar for their entire length with a minimum cover of 5/8 inch (15.9 mm) on exterior side of walls, 1/2 inch (12.7 mm) elsewhere. Lap reinforcing a minimum of 6 inches (152 mm).

1. Cut or interrupt joint reinforcement at control and expansion joints, unless otherwise indicated for structural considerations.

2. Provide continuity at corners and wall intersections by use of prefabricated "L" and "T" sections. Cut and bend reinforcement units as directed by manufacturer for continuity at returns, offsets, column fireproofing, pipe enclosures, and other special conditions.

3.07 ANCHORING MASONRY TO STRUCTURAL MEMBERS

A. Anchor masonry to structural members where masonry abuts or faces structural members to comply with the following:

1. Provide an open space not less than 1 inch (25 mm) in width between masonry and structural member, unless otherwise indicated. Keep open space free of mortar or other rigid materials.

2. Anchor masonry to structural members with flexible anchors embedded in masonry joints and attached to structure.

3. Space anchors as indicated, but not more than 24 inches (610 mm) o.c. vertically and 36 inches (914 mm) o.c. horizontally, unless otherwise indicated on the contract drawings.

3.08 ANCHORING SINGLE-WYTHE MASONRY VENEER

A. Anchor single-wythe masonry veneer to metal studs with masonry veneer anchors to comply with the following requirements:

1. Fasten each anchor section through sheathing to metal studs with 2 metal fasteners of type indicated.

2. Embed tie section in masonry joints. Provide not less than 2-inch (51-mm) air space between back of masonry veneer wythe and face of sheathing.

3. Locate anchor section relative to course in which tie section is embedded to allow maximum vertical differential movement of tie up and down.

4. Space anchors as indicated on the contract drawings, but not more than 18 inches (457 mm) o.c. vertically and 24 inches (610 mm) o.c. horizontally with not less than one anchor for each 2 sq. ft (0.19 sq. m) of wall area. Install additional anchors within 1'-0" (305 mm) of openings and at intervals around perimeter not exceeding 8 inches (203 mm).

B. Install vents at the top of each continuous air space in masonry veneer walls.

3.09 MOVEMENT (CONTROL AND EXPANSION) JOINTS

A. Install control and expansion joints in masonry units where indicated. Build in related items as the masonry progresses. Do not form a continuous span through movement joints unless provisions are made to prevent in-plane restraint of wall or partition movement.

B. If location of control joints is not indicated on the contract drawings, place vertical joints spaced not more than 30 feet (9.1 m) o.c. Locate control joints at points of natural weakness in masonry work.

C. Form control joints in concrete masonry as follows:

1. Fit bond breaker strips into hollow contour in ends of block units on one side of control joint. Fill the resultant core with grout and rake joints in exposed faces.

2. Install preformed control joint gaskets designed to fit standard sash block.

3. Install special shapes designed for control joints. Install bond breaker strips at joint. Keep head joints free and clear of mortar or rake joint.

D. Build in horizontal pressure-relieving joints where indicated; construct joints by either leaving an air space or inserting nonmetallic 50 percent compressible joint filler of width required to permit installation of sealant and backer rod specified in Section 07900 "Joint Sealants."

E. Locate horizontal pressure-relieving joints beneath shelf angles supporting masonry veneer and attached to structure behind masonry veneer.

3.10 LINTELS

A. Install steel lintels where indicated.

B. Provide masonry lintels where shown and wherever openings of more than 2'-0" (610 mm) for block size units are shown without structural steel or other supporting lintels. Provide precast or formed-in-place masonry lintels. Cure precast lintels before handling and installation. Temporarily support formed-in-place lintels.

C. For hollow concrete masonry unit walls, use specially formed bond beam units with reinforcement bars placed as indicated and filled with coarse grout.

D. Provide minimum bearing of 8 inches (203 mm) at each jamb, unless otherwise indicated.

3.11 WEEP HOLES

A. Install weep holes in the head joints of the first course of masonry immediately above embedded flashings and as follows:

1. Form weep holes with product specified in Part 2 of this Section.

2. Space weep holes 24 inches (610 mm) o.c., unless otherwise indicated.

3.12 INSTALLATION AND GROUTING OF REINFORCED MASONRY UNIT

A. Temporary Formwork: Construct formwork and shores to support reinforced masonry elements during construction.

B. Construct formwork to conform to shape, line, and dimensions shown. Make 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.

C. Do not place grout until entire height of masonry to be grouted has attained sufficient strength to resist displacement of masonry units and breaking of mortar bond.

D. All cells and spaces containing reinforcement shall be filled with grout.

E. Prior to grouting, grout space shall be cleaned so that all spaces to be filled with grout do not contain mortar drippings, debris, loose aggregates, and any material deleterious to masonry grout.

F. Place reinforcement and ties in grout spaces prior to grouting. Bolts shall be accurately set and held in place to prevent dislocation during grouting.

G. Grouting of any section of wall shall be completed in one day with no interruption greater than one hour.

H. Cleanouts: Provide cleanouts in the bottom course of masonry for each grout pour, when the grout pour height exceeds 5 feet (1.5 m).

1. Provide cleanouts adjacent to each vertical bar.

2. In solid grouted masonry, space cleanouts horizontally a maximum of 32 inches (813 mm) o.c.

3. Construct cleanouts with an opening of sufficient size to permit removal of debris. Minimum opening dimension shall be 3 inches (76 mm).

4. Cleanouts shall be sealed after inspection and before grouting.

I. Place grout within 1 1/2 hour from introducing water in the mixture and prior to initial set.

J. Grout Lift Height: Place grout in lifts not exceeding 5 feet (1.5 m).

K. Consolidation: Consolidate grout at the time of placement.

1. Consolidate grout pours 12 inches (305 mm) or less in height by mechanical vibration or by puddling.

2. Consolidate pours exceeding 12 inches (305 mm) in height by mechanical vibration and reconsolidate by mechanical vibration after initial water loss and settlement has occurred.

3.13 PARGING

A. Parge predampened masonry walls where indicated with Type S or N mortar applied in two uniform coats to a total thickness of 3/4 inch (19.05 mm). Scarify first parging coat to ensure full bond to subsequent coat.

B. Use a steel-trowel finish to produce a smooth, flat, dense surface with a maximum surface variation of 1/8 inch per foot (3.175 mm per m). Form a wash at top of parging and a cove at bottom.

C. Damp cure parging for at least 24 hours and protect until cured.

3.14 REPAIRING, POINTING, AND CLEANING

A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or if units do not match adjoining units. Install new units to match adjoining units and in fresh mortar or grout, pointed to eliminate evidence of replacement.

B. Pointing: During the tooling of joints, enlarge any voids or holes, except weep holes, and completely fill with mortar. Point-up all joints including corners, openings, and adjacent construction to provide a neat, uniform appearance, prepared for application of sealants.

C. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:

1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.

2. Protect adjacent stone and nonmasonry surfaces from contact with cleaner by covering them with liquid strippable masking agent, polyethylene film, or waterproof masking tape.

3. Wet wall surfaces with water prior to application of cleaners; remove cleaners promptly by rinsing thoroughly with clear water.

4. Leave the work area and surrounding surfaces clean and free of mortar, spots, droppings and broken masonry. Remove defective or broken work and install new work.

D. Waterproofing: After completion of final cleaning, apply waterproofing according to the manufacturer's installation instructions ensuring that all exposed masonry surfaces receive full coverage.

END OF SECTION