UNIT MASONRY ASSEMBLIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and General Provisions of Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this section.

1.2 DESCRIPTION OF WORK

A. Extent of each type of masonry work is indicated on drawings and schedule.

B. Types of masonry work required include:

1. Brick Masonry.
2. Concrete Unit Masonry.
3. Prefaced Concrete Masonry Units.
4. Reinforced masonry

C. Products installed but not furnished under this Section include the following:

1. Division 5 Section “Metal Fabrication” for steel lintels in unit masonry.
2. Division 6 Section "Rough Carpentry" for wood nailers and blocking built into unit masonry.
3. Division 7 Section “Sheet Metal Flashing and Trim” for reglets in masonry joints for metal flashing.
4. Division 8 Section “Standard Steel Doors and Frames” for hollow metal frames in unit masonry openings.

1.3 QUALITY ASSURANCE

A. Single source responsibility for Masonry Units: Obtain exposed 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 continuous surface or visually related surfaces.

B. Single source responsibility for Mortar Materials: Obtain mortar ingredients of uniform quality, including color for exposed masonry, from one manufacturer for each cementitious component and from one source and producer for each aggregate.

C. Field Constructed Mock-Ups: Prior to installation of masonry work, erect sample wall panels to further verify selections made for color and textural characteristics, under sample submittals of masonry units and mortar, and to represent completed masonry work for qualities of appearance, materials and construction; build mock-ups to comply with the following requirements:

1. Locate mock-ups on site in locations indicated or, if not indicated, as directed by Architect.

2. Build mock-ups for the following types of masonry in sizes of approximately 8’-0” long by 4' high by full thickness, including face and back-up wythes as well as accessories.

   a. Typical exterior face brick walls including any accent courses.
   b. Typical exterior concrete block walls including each type of exposed face.
   c. Typical interior and exterior prefaced concrete masonry units, including each type and color of material in pattern indicated.
   d. Include stone trim in mock-ups.

3. Protect mock-ups from the elements with weather resistant membrane.

4. Retain mock-ups during construction as standard for judging completed masonry work. When directed, demolish mock-ups and remove from site.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: For the following:

1. Masonry Units: Show sizes, profiles, coursing, and locations of special shapes.
2. Stone Trim Units: Show sizes, profiles, and locations of each stone trim unit required.
3. Reinforcing Steel: Detail bending and placement of unit masonry reinforcing bars. Comply with ACI 315, "Details and Detailing of Concrete Reinforcement”.
4. Fabricated Flashing: Detail corner units, end-dam units, and other special applications.

C. Samples for Initial Selection:

1. Pre-faced CMUs.
2. Face brick , in the form of straps of five or more bricks.

D. Samples for Verification: For each type and color of the following:

1. Pre-faced CMUs.
2. Face brick, in the form of straps of five or more bricks.
3. Special brick shapes.
4. Pigmented and colored-aggregate mortar. Make Samples using same sand and mortar ingredients to be used on Project.
5. Accessories embedded in masonry.

1.5 INFORMATIONAL SUBMITTALS

A. List of Materials Used in Constructing Mockups: List generic product names together with manufacturers, manufacturers' product names, model numbers, lot numbers, batch numbers, source of supply, and other information as required to identify materials used. Include mix proportions for mortar and grout and source of aggregates.

1. Submittal is for information only. Neither receipt of list nor approval of mockup constitutes approval of deviations from the Contract Documents unless such deviations are specifically brought to the attention of Architect and approved in writing.

B. Qualification Data: For testing agency.

C. Material Certificates: For each type and size of the following:

1. Masonry units.

a. Include data on material properties material test reports substantiating compliance with requirements.
b. For brick, include size-variation data verifying that actual range of sizes falls within specified tolerances.
c. For exposed brick, include test report for efflorescence according to ASTM C 67.
d. For masonry units used in structural masonry, include data and calculations establishing average net-area compressive strength of units.

2. Cementitious materials. Include brand, type, and name of manufacturer.
3. Preblended, dry mortar mixes. Include description of type and proportions of ingredients.
4. Grout mixes. Include description of type and proportions of ingredients.
5. Reinforcing bars.
6. Joint reinforcement.
7. Anchors, ties, and metal accessories.

D. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.

1. Include test reports for mortar mixes required to comply with property specification. Test according to ASTM C 109/C 109M for compressive strength, ASTM C 1506 for water retention, and ASTM C 91 for air content.
2. Include test reports, according to ASTM C 1019, for grout mixes required to comply with compressive strength requirement.

E. Cold-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with requirements.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver masonry materials to project in undamaged condition.

B. Store and handle masonry units to prevent their deterioration or damage due to moisture, temperature changes, contaminants, corrosion or other causes.

1. Limit moisture absorption of concrete masonry units during delivery and until time of installation to the maximum percentage specified for Type I units for the average annual relative humidity as reported by the U.S. Weather Bureau Station nearest project site.

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.

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

1.7 PROJECT CONDITIONS

A. Protection of work: During erection, cover top of walls with waterproof sheeting at end of each day's work. Cover partially completed structures when work is not in progress.

B. Extend cover a minimum of 24 inches down both sides and hold cover securely in place.

C. Do not apply uniform floor or roof loading for at least 3 days after building masonry walls or columns.

D. Staining: Prevent grout or mortar or soil from staining the face of masonry to be left exposed or painted. Remove immediately grout or mortar in contact with such masonry.

E. Protect base of walls from rain-splashed mud and mortar splatter by means of covering spread on ground and over wall surfaces.

F. Protect sills, ledges and projections from droppings of mortar.

1.8 COLD WEATHER PROTECTION

A. Do not lay masonry units which are wet or frozen.

B. Remove any ice or snow formed on masonry bed by carefully applying heat until top surface is dry to the touch.

C. Remove masonry damaged by freezing conditions.

D. For clay masonry units with initial rates of absorption (suction) which require them to be wetted before laying, comply with the following requirements.

1. For units with surface temperatures above 32°F (0°C), wet with water heated to above 70°F (21°C).

2. For units with surface temperatures below 32°F (0°C), wet with water heated to above 130°F (54°C).

E. Perform the following construction procedures while masonry work is progressing. Temperature ranges indicated below apply to air temperatures existing at time of installation except for grout.

F. For grout, temperature ranges apply to anticipated minimum night temperatures. In heating mortar and grout materials, maintain mixing temperature selected with 10°F (6°C).

1. 40°F (4°C) to 32°F (0°C):

a. Mortar: Heat mixing water to produce mortar temperature between 40°F (4°C) and 120°F (49°C).
b. Grout: Follow normal masonry procedures.

2. 32°F (0°C) to 25°F (-4°C):

a. Mortar: Heat mixing water and sand to produce mortar temperatures between 40°F (4°C) and 120°F (49°C); maintain temperature of mortar on boards above freezing.
b. Grout: Heat grout materials to 90°F (32°C) to produce in-place grout temperature of 70°F (21°C) at end of work day.

3. 25°F (-4°C) to 20°F (-7°C):

a. Mortar: Heat mixing water and sand to produce mortar temperatures between 40°F (4°C) and 120°F (49°C); maintain temperature of mortar on boards above freezing.
b. Grout: Heat grout materials to 90°F (32°C) to produce in-place grout temperature of 70°F (21°C) at end of work day.
c. Heat both sides of walls under construction using salamanders or other heat sources.

d. Use windbreaks or enclosures when wind is in excess of 15 mph.

4. 20°F (-7°C) and below:

a. Mortar: Heat mixing water and sand to produce mortar temperatures between 40°F (4°C) and 120°F (49°C).
b. Grout: Heat grout materials to 90°F (32°C) to produce in-place grout temperature of 70°F (21°C) at end of work day.
c. Masonry Units: Heat masonry units so that they are above 20°F (-7°C) at time of laying.
d. Provide enclosure and auxiliary heat to maintain an air temperature of at least 40°F (4°C) for 24 hours after laying units.

5. Do not heat water for mortar and grout to above 160°F (71°C).

G. Protect completed masonry and masonry not being worked on in the following manner. Temperature ranges indicated apply to mean daily air temperatures except for grouted masonry. For grouted masonry, temperature ranges apply to anticipated minimum night temperatures.

1. 40°F (4°C) to 32°F (0°C):

a. Protect masonry from rain or snow for at least 24 hours by covering with weather-resistive membrane.

2. 32°F (0°C) to 25°F (-4°C):

a. Completely cover masonry with weather-resistive membrane for at least 24 hours.

3. 25°F (-4°C) to 20°F (-7°C):

a. Completely cover masonry with weather-resistive insulating blankets or similar protection for at least 24 hours, 48 hours for grouted masonry.

4. 20°F (-7°C) and below:

a. Except as otherwise indicated, maintain masonry temperature above 32°F (0°C) for 24 hours using enclosures and supplementary heat, electric heating blankets, infrared lamps or other methods proven to be satisfactory. For grouted masonry maintain heated enclosure to 40°F (4°C) for 48 hours.

PART 2 - PRODUCTS

2.1 BRICK MADE FROM CLAY OR SHALE

A. General: Comply with referenced standards and other requirements indicated below applicable to each form of brick required.

2.2 BRICK TYPES

A. General: Comply with referenced standards and other requirements listed below:

1. Face Brick shall be as follows:

a. Type A (Field Brick): See Material Schedule.

2. Size: Modular.

3. ASTM C216, Grade SW, Type FBX as applicable.

B. For sills, caps and similar applications resulting in exposure of brick surfaces which otherwise would be concealed from view, provide uncored or unfrogged units with all exposed surfaces finished.

C. Provide special shapes and profiles as indicated.

2.3 CONCRETE MASONRY UNITS

A. General: Comply with referenced standards and other requirements indicated below applicable to each form of concrete masonry unit required.

1. Provide special shapes where required for lintels, corners, jambs, sash, control joints, headers, bonding and other special conditions.

a. Provide bullnose units for outside corners unless otherwise indicated.
b. Provide CMU Bond Beam units where indicated.

2. Water-Repellent Admixture: All concrete masonry exposed to the exterior shall be manufactured with a liquid water-repellent block admixture intended for use with concrete masonry.

a. Products: Dry-Block Block Admixture as manufactured by Grace Construction Products, a unit of W. R. Grace & Co. or approved equal.

B. Concrete block: Provide units complying with characteristics indicated below for Grade, Type, face size, exposed face and, under each form of block included, for weight classification.

1. Exposed Faces: Manufacturer's standard color and texture, unless otherwise indicated.

a. Regular (Standard) Concrete Masonry Units using standard aggregate:

1) Manufacturers: Subject to compliance with requirements provide products from one of the following:

a) Best Block Company
b) Fendt Builder’s Supply, Inc.
c) National Block Company
d) Or approved equal

2) No substitutions will be considered.

b. Decorative (Special) Concrete Masonry Units:

1) Split-face, standard aggregate, shall be as follows:

a) Manufacturer and color: See Material Schedule.

2. Grade N.

a. Grade N except Grade S may be used above grade in exterior walls with weather protective coatings and in walls not exposed to weather.

3. Size: Manufacturer's standard units with nominal face dimensions of 16" long x 8" high (15-5/8" x 7-5/8" actual) x thicknesses indicated.

   a. Provide special shape concrete blocks as indicated on drawings.

4. Hollow Load bearing or Non-load bearing Block: ASTM C 90 and as follows:

   a. Weight Classification: Lightweight or Medium weight.

5. Solid Load bearing or Non-load bearing Block: ASTM C 145 and as follows:

   a. Weight Classification: Lightweight or Medium weight.

C. Prefaced Concrete Masonry Units: Lightweight concrete units indicated below with manufacturer's standard smooth resinous tile facing, complying with ASTM C 744:

1. For concrete masonry units to which prefaced surfaces are applied, comply with the following:

   a. Concrete Masonry Units: ASTM C 90, Type I, moisture-controlled, hollow units.
   b. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 1500 psi (10.3 Mpa).

2. Size: Manufactured to dimensions indicated for unfaced units, but with prefaced surfaces having 1/16-inch (1.5-mm) wide returns of facing to create ¼-inch (6.5mm) wide mortar joints with modular coursing.

3. Color and Pattern: Firestone Red.

4. Products: Subject to compliance with requirements, provide the following:

   a. Trenwyth Industries, Inc., Astra-Glaze SW.

2.4 EXTERIOR NON-LOAD BEARING REINFORCED MASONRY WALL SCHEDULE

A. The following table shall apply to all exterior non-load bearing concrete block masonry unit walls as a minimum requirement unless exceeded by drawing requirements.

B. All exterior load bearing concrete masonry walls will contain steel reinforcing. See structural drawings or contact the architect for additional information.

*WALL HEIGHT	CMU WALL WIDTH	VERTICAL REINFORCEMENT (FULL WALL HEIGHT)	As = IN^2/L.FT	MAXIMUM HORIZONTAL LOAD	REMARKS
9'-6"	8"	NO REINFORCEMENT	-	15 PSF	
12'-0"	8"	#4 @ 48" O.C.	0.05	20 PSF	
13'-4"	8"	#4 @ 48" O.C.	0.06	24 PSF	
16'-0"	8"	#5 @ 48" O.C.	0.0775	25 PSF	
18'-0"	8"	#5 @ 24" O.C.	0.155	30 PSF	
16'-0"	12"	#5 @ 48" O.C.	0.0775	25 PSF	

18'-0"	12"	#4 @ 32" O.C. OR #5 @ 48" O.C.	0.075 0.0775	32 PSF 32 PSF	
20'-0"	12"	#5 @ 40" O.C.	0.093	30 PSF	
24'-0"	12"	#5 @ 24" O.C.	0.155	32 PSF	
28'-0"	12"	#6 @ 24" O.C.	0.22	28 PSF	
30'-0"	12"	#6 @ 16" O.C.	0.33	27 PSF	
32'-0"	12"	#7 @ 16" O.C. OR 2 #6 @ 32" O.C.**	0.45 0.33	26 PSF 25 PSF	**EACH FACE
34'-0"	12"	#7 @ 8" O.C. OR 2 #7 @ 32" O.C.**	0.90 0.45	29 PSF 29 PSF	**EACH FACE

NOTE:
1. Assume Design Value f'm = 1,500 psi, Fs = 24,000 psi, M or S Mortar, Medium Weight CMU
2. *CMU Wall supported height start from foundation (dowels with scheduled reinforcement) and brace at each floor and/or roof level.
3. Grout cells solid at vertical reinforcements full height.
4. Vertical reinforcement to be placed in center of CMU wall U.N.O.
5. Increase wall reinforcement at the corner of all wall up to 10'-0" horizontally by 50% of scheduled reinforcement.
6. Place two (2) vertical bars of scheduled reinforcement at each side of each masonry opening (i.e. door, window, etc.).

2.5 INTERIOR NON-LOAD BEARING REINFORCED MASONRY WALL SCHEDULE

A. The following table shall apply to all internal non-load bearing concrete block masonry unit walls as a minimum requirement unless exceeded by drawing requirements.

B. All interior load bearing concrete masonry walls will contain steel reinforcing. See structural drawings or contact the architect for additional information.

*WALL HEIGHT	CMU WALL WIDTH	VERTICAL REINFORCEMENT (FULL WALL HEIGHT)	As = IN^2/L.FT	REMARKS
10'-0"	6"	NO REINFORCEMENT	-	
10'-0" TO 18'-0"	6"	* #3 @ 32" O.C.	0.0412	* REINFORCEMENT CAN BE ELIMINATED IF WALL SUPPORTED 10'-0" HORIZONTALLY
16'-0"	8"	NO REINFORCEMENT	-	
20'-0"	8"	#3 @ 48" O.C.	0.0275	
24'-0"	8'"	#3 @ 48" O.C.	0.0275	
20'-0"	10"	NO REINFORCEMENT	-	
24'-0"	10"	#3 @ 48" O.C.	0.0275	
28'-0"	10"	#4 @ 56" O.C.	0.0433	
30'-0"	10"	#4 @ 48" O.C.	0.05	
22'-8"	12"	NO REINFORCEMENT	-	
32'-0"	12"	#4 @ 72" O.C.	0.0333	
36'-0"	12'	#4 @ 64" O.C.	0.0375	

NOTE:
1. Assume Design Value f'm = 1,500 psi, Fs = 24,000 psi, N Mortar, Light Weight CMU.

2. All masonry wall design for lateral load = 5 PSF (Wind Load).
3. *CMU wall supported height start from foundation (dowels with scheduled reinforcement) and brace at floor or roof level with minimum 1" space.
4. Grout cells solid at vertical reinforcements full height.
5. Vertical reinforcement to be placed in center of CMU wall U.N.O.
6. Place one (1) vertical bar of scheduled reinforcement at each side of each masonry opening (i.e. door, window, etc.)

2.6 MORTAR; PRE-BLENDED MORTAR MIXES, AND COLORED MORTAR MIXES

A. Provide Spec Mix/Quikrete factory pre-blended mortar mix, colored mortar mix, and integral water repellent mortar mix as manufactured instead of field prepared mortars NO SUBSTITUTION Pre-blended mortar shall include manufacturer's standard silo system for mixing and delivery of mortar mixes.

1. Pre-blended mortar and grout mixes shall be mixed with potable water in strict compliance with manufactures standard silo system for mixing and delivery system of mortar mixes or 80lb bags of pre- blended as governed.

B. FACTORY PRE-BLENDED BULK and BAG MORTAR and GROUT MIXES

1. Material: Pre-blended factory mix of masonry cements, mortar cement and portland cement lime sand aggregate mixtures, no substitutions.
2. Mortar Type: Property mixture Type S exterior and interior at load-bearing masonry walls and Type N for exterior and interior masonry veneer construction.
3. Material: Pre-blended factory mix of masonry, mortar cements and portland cement lime sand aggregate and color pigments no substitution.
4. Mortar Type: Property mixtures Type S exterior and interior at load-bearing masonry walls and Type N for exterior and interior masonry veneer construction.
5. Material: Pre-blended factory mix of grout type shall be specified as fine or Coarse.
6. Pre-blended Mortar and Grout Certificates: Provide full submittal package, with test data, for pre-blended mortars and grouts for approval prior to construction.

C. Manufacture and Use

1. Materials and aggregate shall be measured by weight.
2. Mix at one location produce uniform batches.
3. Deliver without segregation.
4. Follow building code requirements for hot and cold weather masonry.
5. Store at job site as to prevent hardening, deterioration, contamination and segregation.

D. Property Requirements

1. Mortar shall comply with ASTM C 270 Property Requirements.

E. Sampling

1. Sample from original container prior to adding water.
2. Grout: Test at least three specimens at each age specified in accordance with ASTM C 1019.
3. Mortar: Standard test method for preconstruction and construction evaluation of mortars. ASTM C780

F. Testing

1. Testing lab shall be evaluated in accordance with ASTM C 1093

2. Mix mortar with a flow of 110 plus or minus 5%
3. Compressive strength ASTM C 109
4. Air content ASTM C270
5. Water retention ASTM C270
6. Report complete sampling and test report.
7. The field technician sampling, making, and curing specimens for acceptance testing should be certified field testing technician- Grade 1, through the NCMA.

2.7 JOINT REINFORCEMENT, TIES AND ANCHORING DEVICES

A. Materials: Comply with requirements indicated below for basic materials and with requirements indicated under each form of joint reinforcement, tie and anchor for size and other characteristics:

1. Hot-Dip Galvanized Steel Wire: ASTM A 82 for uncoated wire and with ASTM A 153, Class B-2 (1.5 oz. per sq. ft. of wire surface) for zinc coating applied after prefabrication into units.

B. Joint Reinforcement: Provide welded-wire units prefabricated with deformed continuous side rods and plain cross rods into straight lengths of not less than 10', with prefabricated corner and tee units, and complying with requirements indicated below:

1. Width: Fabricate joint reinforcement in units with widths of approximately 2" less than nominal width of walls and partitions as required to provide mortar coverage of not less than 5/8" on joint faces exposed to exterior and 1/2" elsewhere.

2. Wire Size for Side Rods: 0.1483" diameter.

3. Wire Size for Cross Rods: 0.1483" diameter.

4. For single-wythe masonry provide type as follows with single pair of side rods:

a. Ladder design with perpendicular cross rods spaced not more than 16" o.c.

5. For multi-wythe masonry provide type as follows:

a. Ladder design with perpendicular cross spaced not more than 16" o.c. and number of side rods as follows: One side rod for each face shell of concrete masonry back-up and one rod for brick wythe.
b. Number of side rods for Composite Construction: One side rod for each face shell of concrete masonry back-up and one rod for brick wythe.

C. Flexible Anchors: Where flexible anchors are indicated for connecting masonry to structural framework, provide 2-piece anchors as described below which permit vertical or horizontal differential movement between wall and framework parallel to, but resist tension and compression forces perpendicular to, plane of wall.

1. For anchorage to steel framework provide manufacturer's standard anchors which fasten thru exterior sheathing and extent thru rigid insulation.

a. Wire Size: 0.1875" diameter.
b. Products: Subject to compliance with requirements, provide the following:

1) “HCL-911”, Wire-Bond as distributed by Masonpro. Phone No. 800-659-4731

2) RAP-TIE, Fero Corporation as distributed by Masonpro Phone No. 800-659-4731

D. Adjustable Anchors for Connecting to Structure: Provide anchors that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.

1. Anchor Section for Welding to Steel Frame: Crimped 1/4-inch- (6.4-mm-) diameter, hot-dip galvanized steel.
2. Tie Section for Steel Frame : Triangular-shaped wire tie, sized to extend within 1 inch (25 mm) of masonry face, made from 0.188-inch- (4.8-mm-) diameter, hot-dip galvanized steel.

2.8 CONCEALED FLASHING MATERIALS

A. Sheet Metal Flashing: Fabricate from the following metal complying with requirements specified in Division 7 Section "Sheet Metal Flashing and Trim" and below:

1. Stainless Steel: 0.015" thick.

B. Solder and Sealants for Sheet Metal Flashings: As specified in Division 7 Section "Sheet Metal Flashing and Trim."

C. Bituthene Sheet Flashing (Rubberized Asphalt): Flexible sheet flashing especially formulated from modified bituthene flexible and waterproof in concealed masonry applications, black in color and of thickness indicated below:

1. Thickness: 40 mils.

2. Manufacturer: W.R. Grace & Co.

3. Provide stainless steel drip under flexible sheet flashing at lintels and where indicated.

4. Form end dams at lintel ends.

2.9 MISCELLANEOUS MASONRY ACCESSORIES

A. Reinforcing Bars: Deformed steel, ASTM A 615, Grade 60 for bars No. 3 to No. 18.

B. Control Joint Strips: Premolded, flexible cellular neoprene rubber filler strips complying with ASTM D 1056, Grade RE41E1, capable of compression up to 35%, of width and thickness indicated.

C. Bond Breaker Strips: Asphalt-saturated organic roofing felt complying with ASTM D 226, Type I (No. 15 asphalt felt).

D. Steel Column Isolation Material: 1/2 inch thickness asphalt impregnated fiberboard.

E. Weep/Vent Products: Use the following unless otherwise indicated:

1. Mesh Weep/Vent: Free-draining mesh; made from polyethylene strands, full height and width of head joint and depth 1/8 inch (3 mm) less than depth of outer wythe; in color selected from manufacturer's standard.

a. Products: Subject to compliance with requirements, provide the following:

1) Mortar Net USA, Ltd.; Mortar Net Weep Vents.

2. At Brick Masonry: Provide at 16 inches on center.

3. And as indicated on Drawings.

2.10 MASONRY CLEANERS

A. Job-mixed Detergent Solution: Solution of trisodium phosphate (1/2 cup dry measure) and laundry detergent (1/2 cup dry measure) dissolved in one gallon of water.

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

a. "Sure Klean" No. 600 Detergent; ProSoCo, Inc.

2.11 MORTAR AND GROUT MIXES

A. General: Do not add admixtures including coloring pigments, air-entraining agents, accelerators, retarders, water repellent agents, anti-freeze compounds or other admixtures, unless otherwise indicated.

B. Mixing: Combine and thoroughly mix cementitious, water and aggregate in a mechanical batch mixer; comply with referenced ASTM standards for mixing time and water content.

C. Mortar for Unit Masonry: Comply with ASTM C 270, Proportion Specifications, for types of mortar required, unless otherwise indicated.

1. Limit cementitious materials in mortar to Portland cement-lime.

2. Use Type M mortar for masonry below grade and in contact with earth, and where indicated.

3. Use Type S mortar for reinforced masonry and where indicated.

4. Use Type N mortar for exterior, above grade loadbearing and non-loadbearing walls; for interior loadbearing walls; and for other applications where another type is not indicated.

D. Grout for Unit Masonry: Comply with ASTM C 476 for grout for use in construction of reinforced and non-reinforced unit masonry. Use grout of consistency indicated or if not otherwise indicated, of consistency (fine or coarse) at time of placement which will completely fill all spaces intended to receive grout.

1. 2000 psi, 28-day compressive strength.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Wetting Clay Brick: Wet brick made from clay or shale which have ASTM C 67 initial rates of absorption (suction) of more than 30 grams per 30 sq. in. per minute. Use wetting methods which ensure each clay masonry unit being nearly saturated but surface dry when laid.

B. Do not wet concrete masonry units.

C. Cleaning Reinforcing: Before placing, remove loose rust, ice and other coatings from reinforcing.

D. Thickness: Build cavity and composite walls, floors and other masonry construction to the full thickness shown. Build single-wythe walls (if any) to the actual thickness of the masonry units, using units of nominal thickness indicated.

E. Build chases and recesses as shown or required for the work of other trades. Provide not less than 8" of masonry between chase or recess and jamb of openings, and between adjacent chases and recesses.

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

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

1. Use dry cutting saws to cut concrete masonry units.

H. Bond Break: Provide a continuous bond breaker strip in all mortar joints between clay masonry and concrete masonry.

3.2 CONSTRUCTION TOLERANCES

A. Variation From Plumb: For vertical lines and surfaces of columns, walls and arises do not exceed 1/4" in 10', or 3/8" in a story height not to exceed 20', nor 1/2" in 40' or more. For external corners, expansion joints, control joints and other conspicuous lines, do not exceed 1/4" in any story or 20' maximum, nor 1/2" in 40' or more. For vertical alignment of head joints do not exceed plus or minus 1/4" in 10', 1/2" maximum.

B. Variation From Level: For bed joints and lines of exposed lintels, sills, parapets, horizontal grooves and other conspicuous lines, do not exceed 1/4" in any bay or 20' maximum, nor 1/2" in 40' or more. For top surface of bearing walls do not exceed 1/8" between adjacent floor elements in 10' or 1/16" within width of a single unit.

C. Variation of Linear Building Line: For position shown in plan and related portion of columns, walls and partitions, do not exceed 1/2" in any bay or 20' maximum, nor 3/4" in 40' or more.

D. Variation in Cross-Sectional Dimensions: For columns and thickness of walls, from dimensions shown, do not exceed minus 1/4" nor plus 1/2".

E. Variation in Mortar Joint Thickness: Do not exceed bed joint thickness indicated by more than plus or minus 1/8", with a maximum thickness limited to 1/2". Do not exceed head joint thickness indicated by more than plus or minus 1/8".

3.3 LAYING MASONRY WALLS:

A. Layout walls in advance for accurate spacing of surface bond patterns with uniform joint widths and to accurately locate openings, movement-type joints, returns and offsets. Avoid the use of less-than-half-size units at corners, jambs and wherever possible at other locations.

B. Lay-up walls to comply with specified construction tolerances, with courses accurately spaced and coordinated with other work.

C. Pattern Bond: Lay exposed masonry in the bond pattern shown or, if not shown, lay in running bond with vertical joint in each course centered on units in courses above and below. Lay concealed masonry with all units in a wythe in running bond or bonded by lapping not less than

2". Bond and interlock each course of each wythe at corners. Do not use units with less than nominal 4" horizontal face dimensions at corners or jambs.

1. Grind miter internal corner to match intersection of bullnose.

D. Stopping and Resuming Work: Rack back 1/2-unit length in each course; do not tooth. Clean exposed surfaces of set masonry, wet units lightly (if required) and remove loose masonry units and mortar prior to laying fresh masonry.

E. Built-in Work: As the work progresses, build-in items specified under this and other sections of these specifications. Fill in solidly with masonry around built-in items.

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

2. 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.

3. Fill cores in hollow concrete masonry units with grout 3 courses (24") under bearing plates, beams, lintels, posts and similar items, unless otherwise indicated.

3.4 MORTAR BEDDING AND JOINTING

A. Lay solid brick size masonry units with completely filled bed and head joint; butter ends with sufficient mortar to fill head joints and shove into place. Do not slush head joints.

B. Lay hollow concrete masonry units with full mortar coverage on horizontal and vertical face shells. 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 reinforced or filled with concrete or grout. For starting course on footings where cells are not grouted, spread out full mortar bed including areas under cells.

C. Maintain joint widths shown, except for minor variations required to maintain bond alignment. If not shown, lay walls with 3/8" joints.

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

E. Tool exposed joints slightly concave for brick and slightly concave for block, unless otherwise indicated.

F. Remove masonry units disturbed after laying; clean and reset in fresh mortar. Do not pound corners or jambs to shift adjacent stretcher units which have been set in position. If adjustments are required, remove units, clean off mortar and reset in fresh mortar.

3.5 STRUCTURAL BONDING OF MULTI-WYTHE MASONRY

A. Use continuous horizontal joint reinforcement installed in horizontal mortar joints for bond tie between wythes. Install at not more than 16" o.c. vertically.

1. For horizontally reinforced masonry, provide continuity at corners with prefabricated "L" units, in addition to masonry bonding.

B. Intersecting and Abutting Walls: Unless vertical expansion or control joints are shown at juncture, provide same type of bonding specified for structural bonding between wythes and space as follows:

1. Provide individual metal ties at not more than 24" o.c. vertically.

2. Provide continuity with horizontal joint reinforcement using prefabricated "T" units.

3.6 ANCHORING MASONRY WORK:

A. General: Provide anchor devices of type specified.

1. Anchor masonry to structural members where masonry abuts or faces structural members.

3.7 REINFORCED UNIT MASONRY INSTALLATION

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

1. Construct formwork to provide shape, line, and dimensions of completed masonry as indicated. Make forms 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.
2. 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.

B. Placing Reinforcement: Comply with requirements in Section 2104.5 in the Uniform Building Code.

C. Grouting: Do not place grout until entire height of masonry to be grouted has attained enough strength to resist grout pressure.

1. Comply with requirements in Section 2104.6 in the Uniform Building Code for cleanouts and for grout placement, including minimum grout space and maximum pour height.
2. Limit height of vertical grout pours to not more than 60 inches (1520 mm).

3.8 CONTROL AND EXPANSION JOINTS:

A. General: Provide vertical and horizontal expansion, control and isolation joints in masonry where shown. Build-in related items as the masonry work progresses.

B. Build-in non-metallic joint fillers where indicated.

3.9 LINTELS:

A. Provide steel lintels where shown and wherever openings of more than 1'-0" for brick size units and 2'-0" for block size units are shown without structural steel or other supporting lintels. Refer to Metal Fabrications specification section additional information.

B. Provide minimum bearing of 8" at each jamb, unless otherwise indicated.

3.10 FLASHING OF MASONRY WORK:

A. General: Provide concealed flashing in masonry work at, or above, shelf angles, lintels, ledges and other obstructions to the downward flow of water in the wall so as to divert such water to the exterior. Prepare masonry surfaces smooth and free from projections which could puncture flashing. Place through-wall flashing on sloping bed of mortar and cover with mortar. Seal penetrations in flashing with mastic before covering with mortar. Extend flashings through exterior face of masonry and turn down to form drip. Do not allow any penetrations in flashing.

B. Extend flashing the full length of lintels and shelf angles and minimum of 4" into masonry each end. Extend flashing from exterior face of outer wythe of masonry, through the outer wythe, turned up a minimum of 4", and through the inner wythe to within 1/2" of the interior face of the NM wall in exposed work. Where interior surface of inner wythe is concealed by furring, carry flashing completely through the inner wythe and turn up approximately 2". At heads and sills turn up ends not less than 2" to form a pan/end dam.

C. Fabricate through-wall metal flashings embedded in masonry with ribs formed in sawtooth pattern at 3-inch intervals along length of flashing to provide a 3-way integral mortar bond and weep hole drainage as indicated.

D. Interlock end joints of deformed metal flashings by over-lapping deformations not less than 1-1/2" and seal lap with elastic sealant.

E. Install flashing to comply with manufacturer's instructions.

F. Provide weep holes as specified.

G. Install reglets and nailers for flashing and other related work where shown to be built into masonry work.

3.11 REPAIR, POINTING AND CLEANING:

A. Remove and replace masonry units which are loose, chipped, broken, stained or otherwise damaged, or if units do not match adjoining units as intended. Provide new units to match adjoining units and install 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 work to provide a neat, uniform appearance, prepared for application of sealants.

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

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

2. Test cleaning methods on sample wall panel; leave 1/2 panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.

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

   a. Detergent.
   b. Acidic Cleaner; apply in compliance with directions of cleaner manufacturer.

4. Clean concrete unit masonry to comply with masonry manufacturer's directions and applicable NCMA "Tek" bulletins.

5. Clean stone trim to comply with stone supplier's written instructions.

   a. Clean limestone units to comply with recommendations in ILI's "Indiana Limestone Handbook."

D. Protection: Provide final protection and maintain conditions in a manner acceptable to Installer, which ensures unit masonry work being without damage and deterioration at time of substantial completion.

END OF SECTION

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