

SECTION 042200 CONCRETE UNIT MASONRY

This specification template contains baseline requirements for concrete masonry construction augmented by industry-recommended practices. It includes both specification language as well as commentary providing insight, background, and additional information related to each article and requirement. While the specification language could be adopted and applied as-is, it is primarily intended to relay the basis and reasoning behind specific requirements common to concrete masonry construction.

SPECIFICATION	SPECIFICATION COMMENTARY
PART 1 – GENERAL	PART 1 – GENERAL COMMENTARY
1.1 SUMMARY	1.1 SUMMARY
A. Work Included: Provide labor, materials, and equipment necessary to complete the work of this Section.	
B. Related Documents: Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.	
C. Section Includes: a) Concrete Masonry Units. b) Concrete Masonry Facing Brick. c) Architectural Concrete Masonry Units. d) Prefaced Concrete Masonry Units. e) Mortar. f) Grout. g) Reinforcement. h) Flashing Systems. i) Beams and Lintels. j) Miscellaneous Masonry Accessories. k) Fabricated Items	C. Section Includes: This specification template does not include all possible products that can be used in conjunction with a concrete masonry project. Instead, it focuses on those materials and products most commonly used in concrete masonry construction. See CMHA CMU-TEC-001-23 for a detailed discussion of the various options available with concrete masonry units.
D. Definitions:	
E. References:	
1.2 ADMINISTRATIVE REQUIREMENTS	1.2 ADMINISTRATIVE REQUIREMENTS
A. Preconstruction Meeting: Conduct a preconstruction meeting at the project site not less than three weeks prior to the start of masonry Work.	A. Preconstruction Meeting: Preconstruction meetings are critically important to the success of any project as they ensure all stakeholders understand their roles and provide an opportunity to address potential issues before construction begins. A sample preconstruction agenda highlight common discussion topics is available here .
1.3 SUBMITTALS	1.3 SUBMITTALS
Obtain written acceptance of submittals prior to the use of the materials or methods requiring acceptance.	
A. Product Data: For each type of product indicated including manufacturer's instructions, if any.	
B. Shop Drawings	

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<p>a) Provide shop drawings for reinforcing steel to be embedded in masonry showing necessary bends, terminations, lap lengths and locations, and placement in compliance with TMS 402/602.</p>	
<p>b) When more than one reinforcing bar will be placed in a closed-bottom masonry unit, provide a drawing showing the dimensions of the vertical cross-section of the closed-bottom unit proposed to be used for the project.</p>	<p>b) This is a specific requirement required by TMS 602. It stems from the lack of any standardized configuration of closed-bottom concrete masonry units. Different unit configurations can affect where and how much longitudinal reinforcing steel can be placed in a course, which in turn can impact the strength and performance of the resulting masonry beam. By providing this detail to the design team, they can ensure the resulting as-built construction meets the design intent.</p>
<p>C. Samples:</p>	
<p>a) For each type and color of masonry unit to be exposed in finished construction, provide four representative samples showing the range of color, texture, dimension, and architectural feature(s).</p>	<p>a) Where a specific CMU color, texture, or feature is desired, coordination with local manufacturers is necessary as some architectural attributes can influence other unit properties such as unit density or compressive strength.</p>
<p>b) For pigmented mortar, provide samples using the same sand, cementitious materials, admixtures, mixing, and tooling procedures to be used on the Project.</p>	<p>b) There are many variables that can influence the color of mortar in masonry construction and it may not always be practical to furnish pigmented mortar samples that will exactly match the final construction. The sample panel constructed prior to the start of Work should be used as the definitive baseline for acceptance of final construction.</p>
<p>c) Masonry accessories to be exposed in finished construction.</p>	
<p>D. Material Certificates</p>	
<p>a) For each type of product, include statement of properties and compliance with these Specifications.</p>	<p>a) The term 'lot' is defined by ASTM C140 as follows: "any number of concrete masonry units or related units, designated by the producer, of any configuration or dimension manufactured by the producer using the same materials, concrete mix design, manufacturing process, and curing method." It is routine to provide units of varying configurations (for example, 8 in. stretcher units and 8 in. bond beam units) or units of different sizes (for example, 8 in. unit and 12 in. units) for a single project. Where units are manufactured using the same materials, mix design, manufacturing process, and curing method – regardless of their size or configuration – they are considered to come from the same 'lot' of units and therefore not evaluated or tested independently from one another.</p>
<p>b) Where indicated, for each masonry unit type, provide statement of average net area compressive strength of masonry units.</p>	
<p>c) Where indicated, for each combination of masonry unit type mortar type, and grout type, provide statement of average net area compressive strength of masonry determined in accordance with TMS 602.</p>	<p>c) The compressive strength of a masonry assembly can be determined by: 1) Construction, curing, and testing of masonry prisms in accordance with ASTM C1314; or 2) The unit strength method that correlates the assembly strength to the strength of the concrete masonry units and the Type of mortar used in their assembly.</p>

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	Although the unit strength method is a more conservative approach, its ease and simplicity makes it the far more practical option for most projects.
d) Where indicated, provide certification by concrete masonry unit manufacturer that concrete masonry units have been manufactured with integral water repellent at dosage rate proportioned per integral water repellent manufacturer's recommendations to achieve moisture control.	d) Integral water repellents may be used in the production of concrete masonry units at varying dosage rates depending on the intended performance objective. At lower dosage rates, integral water repellents are effective at mitigating the formation of efflorescence, whereas at higher dosage rates the concrete masonry units become hydrophobic. Where integral water repellents are being specified for water penetration resistance, this clause ensures the correct dosage rate is being stipulated in the product(s) supplied.
e) Where indicated, provide fire resistance rating of concrete masonry by equivalent thickness method, or by other means in accordance with ACI/TMS 216.1.	
E. Cleaning: Include products and techniques to be used for cleaning of finished masonry assemblies.	
F. Hot and Cold Weather Construction: Include procedures, methods, materials, and equipment to be used to comply with the hot and cold weather construction requirements of TMS 602.	
G. Grout Demonstration Panel: When grout placement, consolidation, or reconsolidation methods differ from TMS 602, submit alternative placement and/or means of consolidation and reconsolidation.	
1.4 QUALITY ASSURANCE	
A. Source Limits: Obtain each type of concrete masonry unit from a single manufacturer.	A. There are many manufacturing variables that can result in slight changes in color and texture of concrete masonry. Sourcing each type of concrete masonry unit from a single manufacturer will minimize potential aesthetic inconsistencies that may arise from sourcing a similar product from multiple sources. This is especially true for architectural concrete masonry units.
B. Testing and Inspection Personnel Qualifications: Individuals observing construction or preparing or handling test specimens are to be certified in accordance with the requirements of ACI Masonry Field Testing Technician Certification Program, or equivalent. Individuals performing required laboratory testing are to be certified in accordance with the requirements of ACI Masonry Laboratory Testing Technician Certification Program, or equivalent.	B. Information on the ACI Field Testing Technician certification program is available here . Information on the ACI Laboratory Testing Technician certification program is available here .
C. Special Inspector Qualifications: Masonry special inspectors are to be certified in accordance with the requirements of ICC Structural Masonry Special Inspector program, or equivalent.	C. Information on the ICC Special Inspector Certification program is available here .
D. Testing Agency Qualifications: Testing agencies performing required laboratory testing are to be accredited for conformance to AASHTO, ISO 17025, or equivalent.	
E. Mason Contractor Qualifications: The mason contractor shall demonstrate the ability to execute the	E. Mason Contractor Qualifications: There are multiple state, regional, and national programs that provide owners and designers with an objective method of

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work of the scope and nature defined in the project documents.	assessing a contractor's commitment to quality. There are, however, less formal means of demonstrating compliance with this article, such as providing examples of previous successfully completed jobs similar to the scope and scale of the project under bid.
F. Sample Panel: Build sample panel to verify selections made under sample submittals and to demonstrate aesthetic effects. Comply with requirements in Division 01 for mockups.	F. Sample panels are for assessing quality, color, texture, and blending of masonry units; relationship of mortar and sealant colors to masonry unit colors; tooling of joints; aesthetic qualities of workmanship; clean down; integration and compatibility of products and materials; and other material and construction qualities specifically approved by Architect in writing.
a) Build sample panel for each type of concrete masonry construction of a size necessary to include all indicated products and accessories but not less than 48 inches in length, 48 inches in height, by the full thickness of the finished assembly.	a) The minimum sample panel size per TMS 602 is 4 ft by 4 ft. These dimensions, however, may not be sufficient to capture the full range of assembly/system details. When necessary, increase the size of the sample panel accordingly.
b) Locate sample panel where directed.	b) Site constraints or scheduling logistics may limit where sample panel(s) can be constructed. The location of sample panel(s) should be confirmed during the preconstruction meeting. Where masonry is to match existing, sample panel(s) should ideally be located adjacent and parallel to the existing construction.
c) Clean one-half of exposed face(s) of panel(s) with masonry cleaner and cleaning procedure indicated.	
d) Protect approved sample panels from the elements with weather-resistant membrane.	
e) Sample panel(s) are to remain in place until removal is authorized by Owner or Architect unless sample panel(s) are part of the finished work.	e) Many projects have successfully used a portion of the finished construction as the sample panel(s). Whether doing so is feasible varies project-to-project.
1.5 DELIVERY, STORAGE, AND HANDLING	
A. Store masonry units, materials and accessories on elevated platform(s) in a dry location. If units are not stored in an enclosed location, cover tops and sides with securely tied waterproof sheeting. If units become wet, do not install until they are dry.	A. Concrete masonry units that are sufficiently dry to install will have some residual moisture within the unit. Additional information for evaluating the moisture content of concrete masonry units prior to construction is available in CMHA TEK 03-01C .
PART 2 - PRODUCTS	PART 2 - PRODUCTS COMMENTARY
2.1 PERFORMANCE REQUIREMENTS	
A. As indicated, comply with the fire rated assembly requirements evaluated in accordance with ACI/TMS 216.1.	
2.2 CONCRETE MASONRY UNITS: For each type of concrete masonry unit, provide as indicated and as follows:	
A. Provide concrete masonry units complying with ASTM C90.	
B. Provide concrete masonry units with a XXXXXX density classification as indicated.	B. Concrete masonry units are available in three different density classifications as follows: <ul style="list-style-type: none"> • Normal Weight: Density of 125 lb/ft³ or more. • Medium Weight: Density of 105 lb/ft³ to less than 125 lb/ft³. • Light Weight: Density of less than 105 lb/ft³.

	<p>Additional information on the density-related characteristics of concrete masonry units and assemblies in available in CMHA CMU-TEC-001-23.</p>																							
<p>C. Provide concrete masonry units with a minimum net average compressive strength of XXXXXXX as indicated.</p>	<p>C. In accordance with ASTM C90, all concrete masonry units must have a minimum average compressive strength of 2,000 psi. When laid in Type S mortar, the resulting assembly strength for design (f'_m) is 2,000 psi in accordance with the unit strength table of TMS 602. This specification template stipulates the use of Type S mortar for loadbearing applications. As such, unless a higher specified compressive strength (f'_m) is desired, the specified property requirements of this template will yield an f'_m of 2,000 psi. For reference, the table here illustrates the various combinations of unit strength and mortar Type and their resulting assembly compressive strength.</p> <p>Table 2: Compressive Strength of Masonry based on the Compressive Strength of Concrete Masonry Units and Type of Mortar Used in Construction</p> <table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <thead> <tr> <th rowspan="2" style="text-align: center;">Net area compressive strength of concrete masonry, psi (MPa)¹</th> <th colspan="2" style="text-align: center;">Net area compressive strength of ASTM C90 concrete masonry units, psi (MPa)</th> </tr> <tr> <th style="text-align: center;">Type M or S mortar</th> <th style="text-align: center;">Type N mortar</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">1,750 (12.07)</td> <td style="text-align: center;">---</td> <td style="text-align: center;">2,000 (13.79)</td> </tr> <tr> <td style="text-align: center;">2,000 (13.79)</td> <td style="text-align: center;">2,000 (13.79)</td> <td style="text-align: center;">2,650 (18.27)</td> </tr> <tr> <td style="text-align: center;">2,250 (15.51)</td> <td style="text-align: center;">2,600 (17.93)</td> <td style="text-align: center;">3,400 (23.44)</td> </tr> <tr> <td style="text-align: center;">2,500 (17.24)</td> <td style="text-align: center;">3,250 (22.41)</td> <td style="text-align: center;">4,350 (28.96)</td> </tr> <tr> <td style="text-align: center;">2,750 (18.96)</td> <td style="text-align: center;">3,900 (26.89)</td> <td style="text-align: center;">-----</td> </tr> <tr> <td style="text-align: center;">3,000 (20.69)</td> <td style="text-align: center;">4,500 (31.03)</td> <td style="text-align: center;">-----</td> </tr> </tbody> </table> <p><small>¹ For units of less than 4 in. (102 mm) nominal height, use 85 percent of the values listed.</small></p>	Net area compressive strength of concrete masonry, psi (MPa) ¹	Net area compressive strength of ASTM C90 concrete masonry units, psi (MPa)		Type M or S mortar	Type N mortar	1,750 (12.07)	---	2,000 (13.79)	2,000 (13.79)	2,000 (13.79)	2,650 (18.27)	2,250 (15.51)	2,600 (17.93)	3,400 (23.44)	2,500 (17.24)	3,250 (22.41)	4,350 (28.96)	2,750 (18.96)	3,900 (26.89)	-----	3,000 (20.69)	4,500 (31.03)	-----
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<p>D. Specified Sizes: XXXXXXX inches wide by XXXXXXX inches high by XXXXXXX inches long as indicated.</p>																								
<p>E. Provide concrete masonry units with a minimum fire resistance rating of XXXXXXX as indicated.</p>	<p>E. Information on determining the fire resistance rating of various concrete masonry assemblies is available in CMHA TEK 07-01D.</p>																							
<p>F. Provide special shapes for lintels, corners, jambs, sashes, movement joints, bond beams, and other special conditions as indicated.</p>																								
<p>G. For units exposed to weather, provide units made with integral water repellent admixture for moisture management.</p>																								
<p>H. Where indicated, provide units containing rigid, specialty-shaped insulation inserts.</p>																								
<p>2.3 CONCRETE MASONRY FACING BRICK: For each type of concrete masonry facing brick, provide as indicated and as follows:</p>																								
<p>A. Provide concrete masonry units complying with ASTM C1634.</p>																								
<p>B. Provide concrete masonry facing brick with a XXXXXX density classification as indicated.</p>	<p>B. Concrete masonry facing brick are available in three different density classifications as follows:</p> <ul style="list-style-type: none"> • Normal Weight: Density of 125 lb/ft³ or more. • Medium Weight: Density of 105 lb/ft³ to less than 125 lb/ft³. • Light Weight: Density of less than 105 lb/ft³. <p>Additional information on the density-related characteristics of concrete masonry units and assemblies in available in CMHA CMU-TEC-001-23.</p>																							

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<p>C. Provide concrete masonry facing brick with a minimum net average compressive strength of XXXXXXX as indicated.</p>	<p>C. Because concrete masonry facing brick are typically used in veneer (nonloadbearing) applications, the minimum average compressive strength of 3,500 psi required by ASTM C1634 is generally sufficient for most applications.</p>
<p>D. Specified Sizes: XXXXXXX inches wide by XXXXXXX inches high by XXXXXXX inches long as indicated.</p>	
<p>E. Provide concrete masonry facing brick XXXXXXX color(s) as indicated.</p>	
<p>F. Provide concrete masonry facing brick with XXXXXXX architectural finish as indicated.</p>	
<p>G. For units exposed to weather, provide units made with integral water repellent admixture for moisture management.</p>	
<p>2.4 ARCHITECTURAL CONCRETE MASONRY UNITS: For each type of concrete masonry unit, provide as indicated and as follows:</p>	
<p>A. Provide architectural concrete masonry units complying with ASTM C90.</p>	
<p>B. Provide architectural concrete masonry units with a XXXXXX density classification as indicated.</p>	
<p>C. Provide architectural concrete masonry units with a minimum net average compressive strength of XXXXXXX as indicated.</p>	
<p>D. Specified Sizes: XXXXXXX inches wide by XXXXXXX inches high by XXXXXXX inches long as indicated.</p>	
<p>E. Provide architectural concrete masonry units with a minimum fire resistance rating of XXXXXXX as indicated.</p>	
<p>F. Provide concrete masonry facing brick XXXXXXX color(s) as indicated.</p>	
<p>G. Provide concrete masonry facing brick with XXXXXXX architectural finish as indicated.</p>	
<p>H. Provide special shapes for lintels, corners, jambs, sashes, movement joints, bond beams, and other special conditions as indicated.</p>	
<p>I. For units exposed to weather, provide units made with integral water repellent admixture for moisture management.</p>	
<p>J. Where indicated, provide units containing rigid, specialty-shaped insulation inserts.</p>	
<p>2.5 PREFACED CONCRETE MASONRY UNITS: For each type of concrete masonry unit, provide as indicated and as follows:</p>	
<p>A. Provide prefaced concrete masonry units complying with ASTM C744.</p>	
<p>B. Provide prefaced concrete masonry units with a XXXXXX density classification as indicated.</p>	
<p>C. Provide prefaced concrete masonry units with a minimum net average compressive strength of XXXXXXX as indicated.</p>	
<p>D. Specified Sizes: XXXXXXX inches wide by XXXXXXX inches high by XXXXXXX inches long as indicated.</p>	

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E. Provide prefaced concrete masonry units with a minimum fire resistance rating of XXXXXX as indicated.	
F. Provide prefaced concrete masonry facing brick XXXXXX color(s) as indicated.	
G. Provide special shapes for lintels, corners, jambs, sashes, movement joints, bond beams, and other special conditions as indicated.	
2.6 MORTAR	
A. Provide mortar of the type and color indicated and conforming to ASTM C270 or ASTM C1714 and the following:	A. The mortar section is very streamlined. It does not include all options, but those that are applicable to the majority of projects. Mortar mix designs are often stipulated as part of the submittal package, however, these mix designs may not be known, particularly when the mortar is batched to meet the property requires of ASTM C270 or prebagged to comply with ASTM C1714. As such, mortar proportions are not included in this template.
a) For loadbearing masonry, reinforced masonry, or masonry in contact with earth, use Type S mortar.	a) The most common mortar Type used for the construction of loadbearing concrete masonry assemblies is Type S mortar. However, other mortar Types are permitted. Any cement type (portland, masonry, or mortar cement) is permitted.
i) For partially grouted loadbearing masonry that is part of a structure assigned to Seismic Design Category D, E, or F, use portland cement-lime mortar or mortar cement mortar.	i) TMS 402 includes some restrictions on the type(s) or mortar permitted in the construction of masonry assemblies that are part of the lateral force-resisting system in high seismic conditions. If such assemblies are partially grouted, then Type S cement-lime or mortar cement mortars are required. If these assemblies are full grouted, then any mortar cement type is permitted.
b) For nonloadbearing masonry, unreinforced masonry, or masonry veneers, use Type N mortar.	b) For nonloadbearing assemblies, including veneers, industry recommendations encourage the use of Type N mortars. Any cement type (portland, masonry, or mortar cement) is permitted.
d) Pigmented Mortar: Use pure, concentrated mineral mortar pigments complying with ASTM C979/C979M. Use only pigments with a record of satisfactory performance in masonry mortar.	
i) Premixed Colored Cement Products: Packaged blend made from mortar mixes and mortar pigments formulated as required to produce selected color. Do not add pigments to colored cement products unless approved.	
ii) Site Mixed Colored Mortar: Select and proportion pigments with other ingredients to produce selected color. Comply with TMS 602 for maximum permitted amount of pigments.	
iii) Color: As indicated.	
e) Mortar Admixture: As indicated, use mortar admixtures complying with ASTM C1384.	
i) Integral Water Repellent Admixture: Use in combination with masonry units manufactured with integral water repellent. Provide water-repellent	

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admixture manufactured by same manufacturer of water-repellent admixture used in masonry units.	
2.7 GROUT	
A. Provide coarse grout complying with ASTM C476 as indicated and the following:	A. ASTM C476 has options for coarse grout, fine grout, and self-consolidating grout. Coarse grout is most commonly used in concrete masonry construction unless the spaces to be grouted are congested. The primary difference between coarse grout and fine grout is the size of the aggregate in the mix, with the smaller aggregate size required of fine grout necessary to facilitate the placement and consolidation of the grout in tight spaces. As such, a fine grout can be substituted for coarse grout with no detrimental impact to the construction or performance of the masonry. However, if a fine grout is specified because of reinforcement congestion or small clearances, a fine grout complying with ASTM C476 should be used as a coarse grout may result in consolidation issues and voids within the final construction.
a) Minimum compressive strength at 28 days XXXXXXXX when tested in accordance with ASTM C1019.	
b) Do not use admixtures in grout unless approved.	b) Admixtures are occasionally used in grout, typically either accelerators for cold weather construction or retarders for hot weather construction. ASTM C476 includes several options of admixtures that have been successfully used in grout.
2.8 REINFORCEMENT	
A. Provide Grade 60 deformed steel reinforcement complying with TMS 602.	A. Although TMS 402/602 permit the use of both Grade 40 and Grade 60 reinforcing bars, Grade 60 reinforcement is by far the most commonly used.
B. For single wythe masonry, provide 9 gauge ladder-type joint reinforcement complying with ASTM A951 having a single pair of longitudinal wires spaced for placement over each face shell.	B. Joint reinforcement is commonly available in both truss-type and ladder-type. This specification defaults to ladder type joint reinforcement as it is recommended when the masonry assembly contains vertically reinforced cells as the cross wires do not cross the cells of the unit, which can potentially lead to issues with positioning the vertical reinforcement or grout placement/consolidation.
a) For exterior walls and as indicated, provide hot-dip galvanized joint reinforcement and wire conforming to ASTM A153/A153M (1.5 oz/ft ²).	a) Due to accelerated corrosion potential, joint reinforcement located in exterior walls, exposed to earth, or exposed to high humidity environments are required to be hot-dip galvanized. Per TMS 602, environments where the relative humidity is above 75% is considered to be a high humidity environment.
b) For interior walls and as indicated, provide mill galvanized joint reinforcement and wire conforming to ASTM A641/A641M (0.1 oz/ft ²).	
C. For multi-wythe masonry, provide 9 gauge ladder type joint reinforcement complying with ASTM A951 having a single pair of longitudinal wires spaced for placement over each face shell with "eyes" to receive pintle anchors spaced at not more than 16 inches. Size anchors to extend minimum 1-1/2 inches into veneer with minimum 5/8 inch cover to exterior face	

a) For exterior walls and as indicated, provide hot-dip galvanized joint reinforcement and wire conforming to ASTM A153/A153M (1.5 oz/ft ²).	
b) For interior walls and as indicated, provide mill galvanized joint reinforcement and wire conforming to ASTM A641/A641M (0.1 oz/ft ²).	
2.9 FLASHING SYSTEMS	
A. Metal Flashing: Provide metal flashing complying with SMACNA's "Architectural Sheet Metal Manual" and as follows:	A. SMACNA's Architectural Sheet Metal Manual is available here .
<ol style="list-style-type: none"> 1. Stainless Steel: ASTM A240/A240M or ASTM A666, Type 304, 0.016 inch (0.40 mm) thick. 2. Copper: ASTM B370, Temper H00, cold-rolled copper sheet, 16-oz./sq. ft. (4.9-kg/sq. m) weight or 0.0216 inch (0.55 mm) thick or ASTM B370, Temper H01, high-yield copper sheet, 12-oz./sq. ft. (3.7-kg/sq. m) weight or 0.0162 inch (0.41 mm) thick. 3. Fabricate continuous flashings in sections 96 inches (2400 mm) long minimum, but not exceeding 12 feet (3.7 m). Provide splice plates at joints of formed, smooth metal flashing. 	
<ol style="list-style-type: none"> 4. Fabricate metal drip edges from stainless steel. Extend at least 3 inches (76 mm) into wall and 1/2 inch (13 mm) out from wall, with outer edge bent down 30 degrees[and hemmed]. 5. Fabricate metal sealant stops from stainless steel. Extend at least 3 inches (76 mm) into wall and out to exterior face of wall. At exterior face of wall, bend metal back on itself for 3/4 inch (19 mm) and down into joint 1/4 inch (6 mm) to form a stop for retaining sealant backer rod. 6. Fabricate metal expansion-joint strips from [stainless steel] [copper] to shapes indicated. 	Note – Retain 4 and/or 5 for use with flexible flashing, if required.
B. Flexible Flashing: Use [one of] the following unless otherwise indicated:	
1. Copper-Laminated Flashing: [5-oz./sq. ft. (1.5-kg/sq. m)] [7-oz./sq. ft. (2-kg/sq. m)] copper sheet bonded between two layers of glass-fiber cloth. Use only where flashing is fully concealed in masonry.	
2. Rubberized-Asphalt Flashing: Composite flashing product consisting of a pliable, adhesive rubberized-asphalt compound, bonded to a high-density, cross-laminated polyethylene film to produce an overall thickness of not less than [0.030 inch (0.76 mm)] [0.040 inch (1.02 mm)].	
3. Butyl Rubber Flashing: Composite, self-adhesive, flashing product consisting of a pliable, butyl rubber compound, bonded to a high-density polyethylene film, aluminum foil, or spunbonded polyolefin to produce an overall thickness of not less than [0.030 inch (0.76 mm)] [0.040 inch (1.02 mm)].	
4. Elastomeric Thermoplastic Flashing: Composite flashing product consisting of a polyester-reinforced ethylene interpolymer alloy.	

5. EPDM Flashing: Sheet flashing product made from ethylene-propylene-diene terpolymer, complying with ASTM D4637/D4637M, 0.040 inch (1.0 mm) thick.	
C. Single-Wythe CMU Flashing System: System of CMU cell flashing pans and interlocking CMU web covers made from UV-resistant, high-density polyethylene. Cell flashing pans have integral weep spouts designed to be built into mortar bed joints and that extend into the cell to prevent clogging with mortar.	
D. Solder and Sealants for Sheet Metal Flashings: As specified in Section 076200 "Sheet Metal Flashing and Trim."	
E. Adhesives, Primers, and Seam Tapes for Flashings: Flashing manufacturer's standard products or products recommended by flashing manufacturer for bonding flashing sheets to each other and to substrates.	
2.10 BEAMS AND LINTELS	
A. Loose Steel Lintels: Refer to Section 05 5000 - Metal Fabrications.	
B. Masonry Lintels: Field assembled CMU, in color, pattern, size, and texture matching adjacent CMU wall with reinforcing bars as indicated on Drawings. Solid grout unless indicated otherwise.	
C. Precast Masonry Lintels: Complying with ASTM C1623 with reinforcing bars as indicated on Drawings	
2.11 MISCELLANEOUS MASONRY ACCESSORIES	
A. Compressible Filler: Premolded filler strips complying with ASTM D1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from [neoprene] [urethane] [or] [PVC].	
B. Preformed Control Joint Gasket: Provide control joint shear key material designed to fit standard sash block concrete masonry units and that conforms to one of the following: a) ASTM D2000 with a minimum durometer hardness of 80. b) ASTM D2287 with a minimum durometer hardness of 85. c) ASTM C920	
C. Bond-Breaker Strips: Asphalt-saturated felt complying with ASTM D226/D226M, Type I (No. 15 asphalt felt).	
D. Adjustable Veneer Anchors: 2-piece anchors that permit differential movement between masonry veneer and back-up wall, hot-dip galvanized conforming to ASTM A153/A153M, Class B and TMS 602.	
E. Connections from Masonry to Structural Frame: Provide flexible anchors consisting of two components as follows: 1. Receiver Component: 1/4 inch diameter carbon steel rod with 3/8 inch offset or 12 gauge carbon steel straps with 4 inch adjustment for triangular anchors; galvanized per ASTM A641/A641M (0.10 ounces per square foot).	

2. Triangular Anchors: 3/16 inch diameter steel wire, ASTM A82 with closed end minimum 1 inch wide and split-end opening no more than 1/2 inch. Hot-dip galvanized, ASTM A153/A153M Class B-2 (1.5 ounces per square foot, carbon steel). Extend anchor at least 1-1/2 inches into masonry wythe but with at least 5/8 inch cover on outside face.	
F. Grout Retainer: Mesh screen, width 1 inch less than masonry unit width. Use at bottom of open bottom unit to retain grout without use of special shaped CMUs and without breaking mortar bond.	
G. Post-Cleaning Field-Applied Water Repellent: CMU manufacturer's recommended water repellent, compatible with integral water repellent.	
H. Masonry Cleaners: Cleaner products recommended by masonry material manufacturers for each type of masonry surface and approved Masonry Cleaning Plan. I. Sealant and Backings: Refer to Section 07 9200 - Joint Sealants.	
J. Asphalt Emulsion: Provide asphalt emulsion as follows: a) For metal surfaces: ASTM D1187 Type II b) For porous surfaces: ASTM D1227 Type III, Class 1.	
2.12 FABRICATED ITEMS	
A. Accessories: Provide as indicated as in accordance with TMS 602.	
B. Masonry: Prefabricated masonry assemblies shall comply with ASTM C901.	
PART 3 – EXECUTION	PART 3 – EXECUTION COMMENTARY
3.1 EXAMINATION	
A. Examine conditions for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.	
a) Inspect concrete foundations for compliance with tolerances of TMS 602, and verify reinforcing dowels are positioned in accordance with Drawings.	
b) Prepare written report listing deficiencies.	
B. Examine rough-in and built-in construction for utilities, equipment, pipes and ducts to verify and coordinate actual locations of connections.	
C. Do not proceed with installation until unsatisfactory conditions have been corrected.	
3.2 PREPARATION	
A. Prepare foundation surface for adequate masonry bond.	
B. Do not wet concrete masonry units before placing. Wet cutting is permitted.	
C. Prior to grouting, ensure grout spaces are free of mortar dropping, debris, loose aggregates, and any material deleterious to masonry grout, then place reinforcement.	
D. Provide cleanouts in walls to be grouted when height of constructed wall exceeds 5 feet 4 inches in height.	

CMU CONSTRUCTION SPECIFICATION TEMPLATE

Locate cleanouts at each vertical reinforcing bar or maximum 32 inches on center when fully grouting.	
E. Protect adjacent surfaces during construction.	
3.3 INSTALLATION	
A. Install masonry in conformance with the construction tolerance requirements of TMS 602.	A. Construction tolerances required by TMS 602 are summarized in CMHA TEK 03-01C .
B. Use full-size units without cutting where possible. Where cutting is required, provide clean, sharp, unchipped edges. Allow units to dry before laying. Install cut units with cut surfaces concealed.	
C. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and where possible, at other locations.	
D. Place masonry units in running bond pattern unless otherwise noted.	
E. Do not use units with less than nominal 4 inch horizontal face dimensions at corners and jambs.	
F. For exposed Work, do not install concrete masonry units or facing brick with more than 5 percent damage to the face.	
G. Select and arrange units for exposed Work to produce a uniform blend of colors and textures. Mix units from several pallets or cubes as they are placed.	
H. Construct 3/8 inch (plus or minus 1/8 inch) mortar bed joints when masonry units are compressed onto mortar, except at foundation. At foundation, construct mortar beds joints are not less than 1/4 inch and not more than 3/4 inch for ungrouted and partially grouted masonry and not more than 1-1/4 inch for solid grouted first course of masonry on a concrete foundation.	
I. Construct 3/8 inch (minus 1/4, plus 3/8 inch) mortar head joints when masonry units are shoved into mortar.	
J. Lay hollow units with face shell mortar bedding and with head joints of depth equal to bed joints. Mortar cross webs where cells are to be grouted, unless all cells are grouted. Lay solid units in fully mortared bed and head joints.	
K. When mortar is thumbprint hard, tool mortar joints to a concave profile, using a jointer larger than joint thickness, on exposed interior face of wall and exterior exposed face. Strike mortar joints flush on exterior (cavity) face of backup wythe unless otherwise indicated.	
L. Remove mortar joint protrusions extending 1/2 inch or more into CMU cells to be grouted.	
M. Retempering of non-colored mortar is permitted. Retempering of pigmented mortar is not permitted.	
N. Movement Joints: Construct movement joints where indicated on Drawings.	N. If movement joints are not indicated, seek clarification from Architect/Engineer.

O. Solidly fill cells below lintel and beam bearing as noted on Drawings and not less than 24 inches.	
P. Keep masonry surfaces clean during construction. Remove mortar droppings, tags, and stains before mortar cures. Use light brush sweep with a soft brush across exposed masonry surfaces upon initial mortar set to minimize smearing. Prevent grout from staining face of masonry. Immediately remove and clean grout spills. Remove mortar build-up from scaffold and turn over planks to avoid mortar splashes when not working.	
Q. Cover tops of masonry walls at completion of each day's work. Maintain covering to minimize water and debris intrusion into ungrouted cells until permanent closure at top of walls is complete.	
3.4 REINFORCEMENT	
A. Reinforcing Bars: Place reinforcing bars in accordance with sizes, types, spacing, and locations indicated. Restrain reinforcement to prevent displacement caused by construction loads or by placement of grout or mortar beyond allowable tolerances.	A. Locate spliced reinforcement only where indicated on the project drawings or on the approved shop drawings.
a) Provide lap splices of minimum length indicated or splice bars with mechanical couplers. When accepted in writing, splice bars by welding.	
b) Provide continuous or discontinuous reinforcement at control joints through bond beams as detailed on Drawings.	
c) Secure bar reinforcement to prevent displacement during placement of grout.	
d) Maintain a clear distance between reinforcement and unit cell wall of at least 1/4 inch for fine grout and 1/2 inch for coarse grout.	
e) Place reinforcing bars within spacing and location tolerances of TMS 602.	
f) Permit in-place reinforcement to be inspected before placing grout.	
B. Joint Reinforcement: Place joint reinforcement in bed joints at not more than 16 inches on center vertically or not more than 12 inches on center vertically where the nominal unit height is 4 inches or less.	
a) Locate joint reinforcement so longitudinal wires are embedded in mortar, including wires within lap length. Place cross wire over webs of hollow units.	
b) Provide minimum lap length of joint reinforcement of 8 inches.	
c) Place joint reinforcement with at least 5/8 inch mortar cover when exposed to weather or earth and 1/2 inch when not exposed.	
3.5 MOVEMENT JOINTS	
A. As Work progresses, install movement joints as indicated in accordance with CMHA CMU-TEC-009-25 .	

B. Do not extend horizontal reinforcing bars or joint reinforcement through movement joints unless otherwise indicated.	
3.6 GROUTING	
A. Comply with the clean out, grout placement, pour height, lift height, consolidation, and reconsolidation requirements of TMS 602 unless a grout demonstration panel using alternative grouting practices is submitted and approved.	
B. Grout beams and lintels in a single lift.	
3.7 FLASHING	
A. Install flashing on clean, solid, and undamaged surfaces as indicated.	
a) Form end dams, 2 inches high, at horizontal terminations of flashings.	
b) At lintels and shelf angles, extend flashing a minimum of 6 inches into masonry at each end. At heads and sills, extend flashing 6 inches at ends and turn up not less than 2 inches to form end dams.	
c) Where flashing is in direct contact with drainage material, terminate flashing a minimum of 6 inches above top of drainage material on vertical surface of back-up substrate. Where flashing is not in direct contact with drainage material, terminate flashing a minimum of 8 inches on vertical surface of back-up substrate.	
d) Mechanically fasten vertical leg of flashing by continuous termination bar with sealant applied at bar's top edge. Ensure both vertical and horizontal legs of flashing are continuous at corners. Lap flashings a minimum of 4 inches and seal as recommended by flashing manufacturer and as follows:	
i. Provide two continuous beads of non-skinning butyl sealant between sheets of lapped sheet metal flashing and sheet metal drip edges.	
ii. Roll laps in self-adhering flashing and apply manufacturer's mastic at exposed cut edges	
B. Terminate outside horizontal edge of flashing as follows or as detailed on Drawings.	
a) At lintels, shelf angles, and locations other than base-of-wall, install metal drip edges with 45-degree hemmed drips beneath flexible flashing at exterior face of wall. Adhere flexible flashing to top of metal drip edge and hold flexible flashing 1/2 inch back from outside face of masonry. Apply sealant below 45 degree hemmed edge.	
b) At base of wall locations, terminate non UV-sensitive flexible flashing flush with exterior face of masonry with no metal drip edge. [Fully bed non-self-adhering flashing in non-asphaltic mastic or adhesive or non-skinning butyl sealant.] [Install self-adhering flashing so it protrudes from face of masonry and cut it flush, consistent with workmanship demonstrated in approved mock-up.]	

<p>c) At base of wall locations, install metal drip edge with 180 degree bend beneath flexible flashing so that outer edge is flush with exterior face of wall. Fully bed drip edge in non-asphaltic mastic or adhesive or non-skinning butyl sealant. Adhere flexible flashing to top of metal drip edge and hold flexible flashing 1/2 inch back from outside face of masonry.</p>	
<p>C. Install weeps and cavity drainage material directly on top of horizontal leg of flashing in clean cavity. Provide weep spacing of 24 inches on center maximum.</p>	
<p>D. Install flashing systems in accordance with manufacturers published installation instructions.</p>	
<p>E. Where dowels, reinforcing bars and fastening devices penetrate flashing, seal penetration with sealing compound.</p>	
<p>3.8 BUILT-IN WORK</p>	
<p>A. As work progresses, install built-in metal door frames, window frames, loose steel lintels, shelf angles, brickwork support lintel system, and other items to be built into work and furnished under other sections. Fill in solidly with masonry around built-in items.</p>	
<p>B. Install built-in items plumb, level, and true-to-line.</p>	
<p>C. Coordinate installation of mechanical, plumbing, and electrical components furnished by others.</p>	
<p>D. Do not cut masonry to accommodate installations afterward.</p>	
<p>3.9 BEAMS AND LINTELS</p>	
<p>A. Install loose steel lintels where indicated.</p>	
<p>B. Install reinforced masonry lintels over openings where steel or precast lintels are not scheduled.</p>	
<p>C. Maintain minimum 8 inch nominal bearing on each side of opening</p>	
<p>D. Masonry Lintels: Field assembled CMU, in color, pattern, size and texture matching adjacent CMU wall with reinforcing bars as indicated on Drawings, placed and filled with grout.</p>	
<p>3.10 BRACING AND SHORING</p>	
<p>A. Temporary Bracing: Design, provide, and install bracing that will ensure stability of masonry during construction.</p>	<p>A. For guidance, refer to “Standard Practice for Bracing Masonry Walls Under Construction” and “Masonry Wall Bracing Design Handbook”, published by The Mason Contractors Association of America. www.masoncontractors.org.</p>
<p>B. Allow bond beams and masonry lintels to attain sufficient strength to support loads imposed during construction before removing temporary supports.</p>	
<p>C. Construct formwork and shores as needed to support reinforced masonry elements during construction. 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.</p>	
<p>3.11 FIELD QUALITY CONTROL</p>	

<p>A. Testing and Inspecting: Owner will engage third party agency(s) to perform tests and inspections and prepare reports. Allow testing agencies and inspectors access to work areas as needed. Retesting of materials that fail to comply with specified requirements will be done at Contractor's expense.</p>	
<p>B. Perform verification and inspection tasks in accordance with Level 1/2/3 of TMS 602.</p>	
<p>C. Grout Testing: For each type of grout, perform compressive strength testing of grout samples in accordance with ASTM C1019. Form grout specimens using units to be grouted. Do not use cardboard forms unless written approval is obtained based on comparative preconstruction testing performed with units used for this project.</p>	
<p>D. Assembly Testing: For each type of loadbearing masonry indicated, verify the compressive strength at the frequency indicated.</p>	
<p>E. Place grout only after inspectors have verified compliance of grout spaces and of grades, sizes, and locations of reinforcement.</p>	
<p>3.12 CLEANING</p>	
<p>A. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.</p>	
<p>B. Final Cleaning: After mortar is cured, clean exposed masonry as follows:</p>	
<p>a) Remove large mortar and grout particles by hand using nonmetallic tools.</p>	
<p>b) Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.</p>	
<p>c) Protect adjacent surface from cleaning procedures.</p>	
<p>3.13 MASONRY WASTE DISPOSAL</p>	
<p>A. Waste Disposal as Fill Material: Dispose of clean masonry waste, including excess or soil-contaminated sand, waste mortar, and broken masonry units, by crushing and mixing with fill material as fill is placed. Do not dispose of masonry waste as fill within 18 inches of finished grade.</p>	
<p>B. Salvageable Materials: Unless otherwise indicated, excess masonry materials are the installers property.</p>	
<p>C. Masonry Waste: At completion of Work, remove masonry waste and recycle or legally dispose of off the Site.</p>	

END OF SECTION

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