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*[NOTE TO SPECIFIER: PLEASE ENABLE VIEWING OF HIDDEN TEXT. Notes are interspersed throughout to offer explanations or guidance, and indications on whether to keep certain items.]*

Abbreviations used in notes:

**CBC:** 2016 California Building Code

**TMS 402:** TMS 402, 2013 Building Code Requirements for Masonry Structures and Commentary

**TMS 602:** TMS 602, 2013 Specification for Masonry Structures

**DSA:** Indicates portions of the California Building Code (CBC) modified and adopted by DSA-SS and OSHPD 1 and 4.

This guide specification is based upon TMS 602, a CSI-format, three-part specification as adapted by ACI, and incorporated by reference in the CBC.

Notes appearing in green are related to sustainable design.

Replace the term “Design Professional” with the identity of the design professional as defined in the General and Supplementary Conditions.

## SECTION 04 22 00.13 – CONCRETE UNIT VENEER MASONRY

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Division 01 Sections, Drawings, General Conditions, Supplementary Conditions, and Special Conditions apply to this section.

#### 1.2 SUMMARY

- A. Section Includes:
  1. Concrete masonry units (CMUs).
  2. Mortar and grout.
  3. Masonry joint reinforcement.
  4. Ties and anchors.
  5. Embedded flashing.
  6. Control joint materials.

- B. Products installed, but not furnished, under this Section:

Edit the following as needed

1. Section 05 50 00 Metal Fabrication for steel lintels and shelf angles for unit masonry.
2. Section 07 62 00 Sheet Metal Flashing and Trim.

C. Related Requirements:

Edit the following list as needed.

1. Section 04 05 13 Masonry Mortaring.
2. Section 04 05 16 Masonry Grouting.
3. Section 04 05 19 Masonry Anchorage and Reinforcing.
4. Section 04 05 23 Masonry Accessories.
5. Section 04 22 00 Concrete Unit Masonry.
6. Section 04 22 23.23 Prefaced Concrete Unit Masonry for Astra-Glaze-SW glazed masonry units.
7. Section 04 23 00 Glass Unit Masonry.
8. Section 07 19 00 Water Repellents for application to unit masonry assemblies.
9. Section 07 62 00 Sheet Metal Flashing and Trim for exposed sheet metal flashing.
10. Section 07 84 13 Penetration Firestopping for firestopping at openings in masonry walls.
11. Section 07 84 43 Fire-Resistive Joint Sealants for fire-resistive joint systems at heads of masonry walls.
12. Section 07 92 00 Joint Sealants for sealing control and expansion joints in unit masonry.
13. Section 32 14 13.13 Interlocking Precast Unit Paving.

### 1.3 REFERENCES

A. TMS 602 2013 Specification for Masonry Structures.

B. ASTM International (latest versions):

1. ASTM A82/A82M Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.
2. ASTM A153/A153M Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
3. ASTM A951/A951M Standard Specification for Masonry Joint Reinforcement.
4. ASTM A1008/A1008M Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable.
5. ASTM C90 Standard Specification for Loadbearing Concrete Masonry Units.
6. ASTM C150/C150M Standard Specification for Portland Cement.
7. ASTM C270 Standard Specification for Mortar for Unit Masonry.
8. ASTM C595/C595M Standard Specification for Blended Hydraulic Cements.
9. ASTM C920 Standard Specification for Elastomeric Joint Sealants.
10. ASTM D226 Standard Specification for Asphalt-saturated Organic Felt Used in Roofing and Waterproofing.

### 1.4 SUBMITTALS

- A. Obtain written acceptance of submittals prior to use of the following:
  - 1. Submit mix designs:
    - a. Preblended mortar: mix design indicating types and proportions of materials according to proportion specification of ASTM C270.
  - 2. Submit material certificates for each of the following certifying compliance:
    - a. Concrete masonry units.
    - b. Anchors, ties, fasteners, and metal accessories.
    - c. Elastomeric joint sealants.

For samples required below, state quantity of each.

- B. Samples for Verification: For each type and color of the following:
  - 1. Concrete masonry units.

Include the following if colored mortar is specified.

- C. Mortar, for color selection or confirmation.

## 1.5 SUSTAINABLE DESIGN SUBMITTALS

The EPD and HPDs for Angelus Block CMU cover the great majority of specified cmu and all core product lines. If this specification includes cmu with special aggregate blends or other characteristics not included in Angelus Block publications, please consult your Representative to review applicability of the EPD.

- A. Environmental Product Declaration (EPD) meeting the following criteria:
  - 1. Product-specific, Type III third party verified.
  - 2. EPD based upon ASTM International PCR005: Product Category Rules for Preparing an Environmental Product Declaration for Manufactured Concrete and Concrete Masonry Products.
- B. Health Product Declaration (HPD) for specified products meeting the following criteria:
  - 1. Ingredients reported to 100 ppm.
  - 2. Conforming to Health Product Declaration® Open Standard Version 2.0

See notes for recycled content in Paragraph 2.2 A.3.b.

- C. Recycled Content
  - 1. Manufacturer's certification of type and percentages of recycled content.
- D. Manufacturing and Material Source Locations: Include in manufacturer's certification for CMU supplied under this Section:
  - 1. Location of CMU production plant.
  - 2. Locations of raw material sources for ingredients.

## 1.6 QUALITY ASSURANCE

- A. Sample Panels: Construct an approximate [Width:] wide by [Height:] high panel for representation of completed masonry, joint tooling, design details, and workmanship. Comply with requirements in Division 01 Section "Quality Requirements" for mockups.

If it is desirable to demonstrate particular units or areas of critical detailing, specify them in the following, otherwise delete it.

- 1. Install the following in the sample panel:
  - a. [Specify units]
  - b. [Specify details or conditions]

It is typically good practice to conduct preinstallation meetings to provide opportunity to clarify critical details, schedules, specification intent, inspections etc. If the work under this section is of a minor nature, the following may be deleted.

- B. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination".

## 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Protect all materials of this section to maintain quality and physical requirements.
- B. Store all masonry units on the jobsite so that they are protected from rain, stored off-ground and kept free of contamination.
- C. Store SPEC MIX preblended mortar mix in manufacturer's original, unopened, undamaged containers with identification labels intact, covered and protected from weather, or in a SPEC MIX dispensing silo.

## 1.8 FIELD CONDITIONS

- A. Cover top of unfinished masonry work to protect it from the weather.

Cold-weather and hot-weather masonry construction is addressed in TMS 602 Article 1.8 C and 1.8 D. Include and modify below as necessary.

- B. Cold-weather procedures when ambient temperature falls below 40°F (4°C) or the temperature of masonry units is below 40°F (4°C):
  - 1. Do not install wet or frozen units.
  - 2. Implement cold weather construction procedures in accordance with TMS 602 Article 1.8 C.
- C. Hot-weather procedures when ambient temperature exceeds 100°F (38°C), or exceeds 90°F(32°C) with a wind velocity greater than 8 mph:

- D. Implement hot weather construction procedures in accordance with TMS 602 Article 1.8 D.

## PART 2 - PRODUCTS

Note: we often see specifications for a product covered by an ASTM standard also list its raw material constituents, along with their respective ASTM standards. This is not only redundant, it is not recommended as it may also be unnecessarily limiting. For example, CMU may be made with C150 Portland cement, or with C595 blended cement. Angelus Block is first in our region to move to a blended cement that reduces CO<sub>2</sub> impact. By stating presumed CMU ingredient ASTMs, specifically C150, the project has limited itself from a more eco-friendly product with equal or better characteristics.

TMS 602, Specification for Masonry Structures, is included by reference in the CBC. It does not list sub-ASTMs, simply stating the ASTM standard specific to the material discussed. Each ASTM standard lists within it all allowed ingredients and respective ASTMs.

### 2.1 MANUFACTURER

- A. Concrete masonry units:
  - 1. Angelus Block Co., Inc.
    - a. Sun Valley, CA (818) 767-8576
    - b. Orange, CA (714) 637-8594
    - c. Fontana, CA (909) 350-0244
    - d. Gardena, CA (310) 323-8841
    - e. Oxnard, CA (805) 485-1137
    - f. Indio, CA (760) 347-3245
  - 2. Desert Block Co., Inc.
    - a. Bakersfield, CA (661) 858-2848
- B. Preblended mortar:
  - 1. SPEC MIX Preblended Mortar Mix, by E-Z Mix, Inc.
    - a. Sun Valley, CA (818) 768-0568
    - b. Rialto, CA (909) 874-7686

Include the following if specified in 2.3 D.

- C. Grout additive:
  - 1. PRE-MIX Products Grout Additive, by E-Z Mix, Inc.
    - a. Sun Valley, CA (818) 768-0568
    - b. Rialto, CA (909) 874-7686

### 2.2 CONCRETE MASONRY UNITS

- A. Concrete Masonry Units: ASTM C90.

The majority of architectural masonry units is specified and produced in the Medium Weight classification; therefore, the greatest availability in Southern California of architectural cmu is in Medium Weight. Edit below if structural design considers a different weight classification.

1. Weight Classification: Medium Weight unless otherwise indicated.

Although it is common to call out colors and textures on elevation drawings or legend tables within the drawings set, it is helpful to also coordinate and list them here. Examples of Color: Sandstone, Warm Gray. Examples of Texture: Precision, Split Face, Burnished. If compatible mortar color other than natural gray is intended, specify in paragraph 2.3 A.

2. Color(s) and texture(s):
  - a. [Color] [Texture]

In addition to the Sustainable Design Submittals in Article 1.5, which report the “as-is” state of submitted cmu, you may include specified green characteristics here. However, before doing so, please consult with your Angelus Block Representative to ensure the specified cmu will meet the intended characteristics.

3. Sustainable Characteristics:

See discussion for paragraph 1.5 A.

- a. Concrete masonry units shall be included in a current Type III Environmental Product Declaration.

Recycled content: Though most production plants and products contain recycled content, the amounts vary by plant and product. Custom percentages may be possible depending upon size of the project; please consult your Angelus Block Representative.

Please note that as recycled content increases, the variations in color and texture may also increase. For architectural cmu, a balance must be reached between high recycled content and more pronounced variation.

- b. Recycled content in specified CMU shall be [percent or range]. include range, minimum, or maximum after consulting with your Angelus Representative; multiple entries here may be appropriate depending on types of cmu specified

Regional material criteria of “within 500 miles” under LEED v3 and other rating systems is a certainty with Angelus Block cmu. *Everything* – raw materials and production – is well within 500 miles of our service region.

LEED v4 changes applicability, definition, and distance. As of this specification update, current language and interpretation stipulates *ALL* raw material sources and production locations must be within 100 miles of the project, without any calculations for portions of raw materials. It’s all or nothing. Many product mix designs incorporate aggregates which simply are not available within 100 miles of the metroplex regions. Therefore, if this project is seeking certification under LEED v4, please consult your Representative before stating this as a required characteristic. Otherwise, it may be included for LEED v3 and other rating systems as follows.

- c. Obtain CMU produced, and with raw materials sourced, within 500 miles of the project site.

## 2.3 MORTAR MATERIALS

Preblended mortar below provides greater control and consistency than field-mixed. SPEC MIX meets both proportion and properties requirements of ASTM C270.

- A. SPEC MIX Masonry Mortar Type S preblended factory mix: ASTM C270 and ASTM C1714/C1714M (or, if a separate Section is included for mortar, append the foregoing with ", in accordance with Section 04 05 13 Masonry Mortaring", and delete the following color specification).

Natural gray is often used, including use with colored cmu. If compatible mortar colors are desired, specify here. Consult your Angelus representative or [www.angelusblock.com](http://www.angelusblock.com) for current compatible Spec Mix mortar colors. For stock colors (Sandstone, Spice, and Harvest), specify the stock mortar color, "Medium Tan".

- 1. Natural gray color.

- B. Water: Potable.

- C. Admixtures:

- 1. Do not use admixtures except as specified herein, or as approved by the Design Professional and the Building Official.

## 2.4 REINFORCEMENT AND METAL ACCESSORIES

The following items may instead be included in their respective specification Sections: 04 05 19 Masonry Anchorage, 04 05 23 Masonry Accessories. If so, replace details below with a reference to the appropriate Section.

Items below are typically used. Revise as required by structural design.

- A. Provide metal reinforcement and accessories conforming to TMS 602 Article 2.4 (if separate sections are included for these items, append the foregoing with ", in accordance with Section 04 05 19 Masonry Anchorage and Reinforcing and Section 04 05 23 Masonry Accessories", and delete the remainder of this article).
- B. Masonry Joint Reinforcement: ASTM A951/A951M.
  - 1. Masonry joint reinforcement used in exterior walls shall be hot-dipped galvanized, conforming to ASTM A153, Class B, minimum coating of 1.5 oz./ft<sup>2</sup>.

For Seismic Design Categories E or F, include the following for joint reinforcement:

- 2. Provide continuous single wire joint reinforcement of wire size W1.7 (MW11).
- C. Sheet Metal Anchors and Ties: ASTM A1008/A1008M.
  - 1. Sheet metal anchors and ties used in exterior walls shall be hot-dipped galvanized, conforming to ASTM A153, Class B.

D. Wire Ties and Anchors: ASTM A82.

1. Wire ties and anchors used in exterior walls shall be hot-dipped galvanized, conforming to ASTM A153, Class B, minimum coating of 1.5 oz./ft<sup>2</sup>.

For Seismic Design Categories E or F, include the following anchor requirement:

2. Anchor shall provide a hook, clip, notch, or other means to mechanically engage the joint reinforcement.

A continuous water-resistive barrier is required where the backing is constructed of studs.

2.5 WATER-RESISTIVE BARRIER

1. Provide No. 15 asphalt felt, complying with ASTM D226 for Type 1.

2.6 FLASHING MATERIALS

- A. Provide metal flashing in accordance with Section 07 62 00 Sheet Metal Flashing and Trim.

2.7 MISCELLANEOUS MASONRY ACCESSORIES

A. Control joint materials:

1. Elastomeric joint sealer per ASTM C920.
2. Use size and shape of joint filler per joint sealer manufacturer recommendations.

2.8 MASONRY CLEANER

- A. Use potable water and detergents to clean masonry unless otherwise approved.
- B. Do not use acid or caustic solutions unless otherwise approved.

2.9 MIXING

A. Mortar:

1. Mix SPEC MIX Masonry Mortar preblended factory mix per manufacturer's recommendations.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Prior to the start of masonry installation, verify all conditions pertinent to the performance of work in this Section are acceptable.



- B. Proceed with masonry work only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION

- A. Select and arrange units for exposed masonry to produce a uniform blend of colors and textures.
  - 1. Mix units from several pallets or cubes as they are placed.
- B. Construct masonry veneer in compliance with TMS 402/ACI 530/ASCE 5 and TMS 602.
- C. Cut units as required to fit; use motor-driven masonry saw. Install cut units with cut surfaces edges concealed as much as possible.
- D. Lay dry units only, unless otherwise approved.
- E. Select and arrange units for exposed masonry to produce a uniform blend of colors and textures.
  - 1. Mix units from several pallets or cubes as they are placed.
- F. All masonry shall be laid true, level, plumb, and in accordance with the drawings.

Running bond is the typical pattern. If stack bond or another pattern is to be used, edit the following item, or refer to drawings.

- G. Lay exposed masonry in running bond unless otherwise indicated in Project Drawings.

### 3.3 MORTAR BEDDING AND JOINTING

- A. Place mortar in accordance with TMS 602 Article 3.3 B. (or, if a separate Section is included for mortar, append the foregoing with ", and with Section 04 05 13 Masonry Mortaring", and delete the following items)
- B. Initial bed joint shall not be less than 1/4 in. or more than 3/4 in.
- C. All head and bed joints, except initial bed joints, shall be a nominal 3/8 in. thick, unless otherwise required.
- D. Lay solid units with full head and bed joints. Do not fill head joints by slushing with mortar. Bed joints shall not be furrowed deep enough to produce voids.

If another joint profile is used, revise the following or refer to Drawings. Note that some decorative joint profiles are not recommended for weather exposure; consult your Angelus Block representative.

- E. All mortar joints on exposed walls shall be concave, unless otherwise indicated, and struck to produce a dense, slightly concave surface well bonded to the surface of the masonry unit.

- F. Remove and re-lay in fresh mortar any unit that has been disturbed to the extent the initial bond is broken.

3.4 MASONRY JOINT REINFORCEMENT, TIES, AND ANCHORS

- A. Embed joint reinforcement, ties, and anchors in mortar and extend into the veneer a minimum 1 1/2 in., with minimum 5/8 in. cover to outside face.

Select from the table to fill in the values for B and C below:

<b>Anchor spacing.</b>	
Max. area:	2-pc. Adjustable – 2.67 ft <sup>2</sup> ; Others – 3.5 <sup>2</sup>
	Seismic Design Category D – Reduce to 75 percent of above.
	High winds areas (>40 psf ≤ 55 psf) – Reduce to 70 percent of above.
Max. horiz:	32 in. for running bond, not to exceed max area above.
	High winds areas (>40 psf ≤ 55 psf) – 18 in.
Max. vert:	25 in., not to exceed max area above.
	Other than running bond – 18 in.

- B. Place ties and anchors
  1. Provide at least one anchor for each [ ] square feet of wall area
  2. Space anchors at a maximum [ ] in. horizontally and [ ] in. vertically.
- C. Place single wire joint reinforcement at maximum spacing of [ ] in. on center vertically. Mechanically attach anchors to the joint reinforcement with clips or hooks.

3.5 WATER-RESISTIVE BARRIER

- A. Attach No. 15 asphalt felt to the studs or sheathing, incorporating flashing as shown on the drawings.

3.6 CONTROL AND EXPANSION JOINTS

- A. Construct control joints as detailed in the drawings as masonry progresses.

Include the following article for Field Quality Control if any of the following are true:

- Under CBC: The Seismic Design Category is D, E, or F, AND the veneer is greater than 30 ft. in height above grade or walking surface (CBC 1705.11.5).
- Under CBC: The structure is classified as Risk Category IV (CBC 1705.4.1).
- Under DSA: The Seismic Design Category is D, E, or F (CBC 1705A.11.5).
- Under DSA: The structure is classified as Risk Category II, II, or IV (CBC 1705A4.1).

3.7 FIELD QUALITY CONTROL

Statement of Special Inspections per CBC Sections 1704.3 (1704A.3. for DSA).

- A. Inspection tasks and frequency shall be performed in accordance with the Statement of Special Inspections.

3.8 POINTING, AND CLEANING

- A. Point and tool holes in mortar joints to produce a uniform, tight joint.
- B. During construction, minimize any mortar or grout stains on the wall. Immediately remove any staining or soiling that occurs.
  - 1. For precision or textured units, except as noted below, clean masonry by dry brushing before tooling joints.
  - 2. For burnished, glazed, or pre-finished concrete masonry units, immediately remove any green mortar smears or soiling with a damp sponge.

Always utilize the mildest method possible to clean the masonry. Note that efflorescence is common to products containing cementitious and aggregate materials, and is typical to new construction. The darker the unit color, of course, the more visible it is. Typical cleaning, however, removes it.

Also note darker colors can be more sensitive to aggressive cleaning methods. It is important to test the proposed cleaning procedure prior to its implementation.

- C. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry surfaces of stains, efflorescence, mortar or grout droppings, and debris. Specify preferred cleaner below and edit as necessary.
  - 1. Use appropriate masonry cleaner as tested on the sample panel and as approved by the Design Professional, strictly following manufacturer's recommendations.
  - 2. Do not use acids.
- D. At completion of masonry work, remove all scaffolding and equipment used during construction, and remove all debris, refuse, and surplus masonry material from the site.
  - 1. Comply with Construction Waste Management plan.

An application of water repellent is a critical component of the masonry wall and may be included here for emphasis, coordinated with Section 07 19 00 Water Repellents.

3.9 WATER REPELLENT APPLICATION

- A. Cleaning shall be complete and accepted by the Design Professional, and wall surfaces shall be thoroughly dry.
- B. Apply water repellent in strict accordance with Section 07 19 00 and the water repellent manufacturer's instructions.

END OF SECTION