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## SECTION 04 22 23 ARCHITECTURAL CONCRETE UNIT MASONRY

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### SECTION 04 22 23 ARCHITECTURAL BLOCK CONCRETE UNIT MASONRY

#### PART 1 - GENERAL

##### 1.1 SUMMARY

- A. Section Includes:
  - 1. Split Face, Integrally Colored Architectural Concrete Masonry Units (ACMU's)
  - 2. Smooth Face, Integrally Colored Architectural Concrete Masonry Units
- B. Related Sections:
  - 1. Section 04 05 13 – Masonry Mortar
  - 2. Section 04 05 16 – Masonry Grout
  - 3. Section 04 05 19 – Masonry Anchors and Reinforcement
  - 4. Section 04 05 23 – Masonry Accessories
  - 5. Section 05 12 23 – Structural Steel
  - 6. Section 05 50 00 – Metal Fabrications
  - 7. Section 07 19 00 – Water Repellents (post-applied)
  - 8. Section 07 90 00 – Joint Protection

##### 1.2 REFERENCES

- A. American Concrete Institute (ACI)
  - 1. ACI 117 – Standard Tolerances for Concrete Construction and Materials
  - 2. ACI 530 – Building Code Requirements for Masonry Structures
  - 3. ACI 530.1 – Specification for Masonry Structures
- B. American Society for Testing and Materials (ASTM)
  - 1. ASTM C 90 – Specifications for Loadbearing Concrete Masonry Units
  - 2. ASTM C 91 – Standard Specification for Masonry Cement
  - 3. ASTM C 140 – Methods of Sampling and Testing Concrete Masonry Units
  - 4. ASTM C 270 – Standard Specification for Mortar for Unit Masonry
  - 5. ASTM C 476 – Standard Specification for Grout for Masonry
  - 6. ASTM C 618 – Standard Specification for Coal Fly Ash for Use in Concrete
- C. National Concrete and Masonry Association (NCMA)

1. NCMA TEK 10-1A – Crack Control in Concrete Masonry Walls
  2. NCMA TEK 10-2C – Control Joints for Concrete Masonry Walls
  3. NCMA TEK 19-1 – Water Repellents for Concrete Masonry Walls
  4. NCMA TEK 19-2A – Design for Dry Single-Wythe Concrete Masonry Walls
  5. NCMA TEK 19-4A – Flashing Strategies for Concrete Masonry Walls
  6. NCMA TEK 19-5A – Flashing Details for Concrete Masonry Walls
  7. NCMA TEK 19-06 – Joint Sealants for Concrete Masonry Walls
  8. NCMA TEK 19-7 – Characteristics of Concrete Masonry Units with Integral Water Repellent
- D. Masonry Standards Joint Committee (MSJC)
1. Specification for Masonry Structures – The Masonry Society (TMS 602-08), American Concrete Institute (ACI 530.1-08), American Society of Civil Engineers (ASCE 6-08)
  2. Building Code Requirements for Masonry Structures – TMS 402-08/ACI 530-08/ASCE 5-08

### 1.3 SUBMITTALS

- A. Refer to Section 01 33 00 – Submittal Procedures
- B. Samples for Color and Texture Selection – In accordance to requirements of ASTC C90, Section 7.3 and including:
1. Initial Selection
    - a. From standard selection of color guide OR
    - b. From standard selection of sample box-sized pieces
    - c. Indicate Split face OR Smooth Face texture
  2. Verification Basis
    - a. Request three (3) full-sized units showing full range of colors and textures OR
    - b. Request three (3) 8x16 face shells showing full range of colors and textures
- C. Certification of Compliance
1. Test Reports – Indicate compliance with requirements of Contract Documents including:
    - a. Unit compressive strength on like units, tested in accordance to ASTM C 140 by independent laboratory.
    - b. Unit moisture content on like units, tested in accordance to ASTM C 140 by independent laboratory.  
Unit oven dried weight on like units, tested in accordance to ASTM C 140 by independent laboratory.
  2. Performance Compliance – Criteria set forth in NCMA TEK 19-7 for water repellency:
    - a. Water Droplet – Water repellent architectural concrete masonry units (ACMU) delivered to the job site shall be able to repel water applied directly to the surface of the unit.
    - b. Spray Bar – Water repellent ACMU's delivered to the job site shall be able to limit the amount of moisture that migrates through the face shell of the masonry unit.

- c. Water Uptake – Water repellent ACMU's delivered to the job site shall be able to limit the capillary pressures within the matrix of the unit and thus limit the initial rate of water absorbed in an uptake test.

#### 1.4 QUALITY ASSURANCE

- A. Construction: Construct masonry in accordance with requirements of TMS 402-08, ACI 530-08 & ASCE 5-08
- B. Mockup – Construct a masonry wall to represent the integrally colored masonry stated on project documents.
  - 1. Size: Four (4) feet high by four (4) feet long
  - 2. Locate where directed by Architect or Owner's Representative
  - 3. Include the following in the wall:
  - 4. All masonry colors, sizes and textures
  - 5. Bond pattern
  - 6. Reinforcement and control joints
  - 7. Mortar colors and joint tooling profiles
  - 8. Flashing and weeps
  - 9. Clean and seal one-half of the wall to represent final, finished appearance and leave remainder of wall for comparison purposes.
  - 10. View panel for acceptance at a distance of not less than 20 feet under diffused light.
  - 11. Mockup must receive Architect or Owner's Representative approval before proceeding with architectural masonry installation.
  - 12. Upon acceptance, mockup panel will become the basis of acceptance for masonry units and masonry workmanship for the project.
  - 13. Leave mockup panel in place until project completion and final acceptance of masonry construction.
  - 14. Cover top of mockup panel to prevent moisture intrusion.

#### 1.5 DELIVERIES, STORAGE AND HANDLING

- A. Evaluate delivered architectural masonry units for acceptance based on the requirements for chippage and dimensional tolerances according to ASTM C 90, Sections 6 and 7.
- B. Deliver, store and handle architectural masonry units to prevent damage and discoloration.
- C. Store architectural masonry units off the ground.
- D. Store architectural masonry units in a location as to minimize handling, exposure to excessive moisture contaminants, corrosion and materials that could cause staining or damage.
- E. Wrap single-stacked architectural masonry units with waterproof material to permit air circulation around units and prevent excess moisture accumulation.

#### 1.6 PROJECT CONDITIONS

- A. Environmental Requirements: Cold Weather and Hot Weather Construction – comply with requirements contained in TMS 602-08, ACI 503.1-08 and ASCE 5-

08.

- B. Protection of Masonry – During construction, cover tops of walls, projections and sills with waterproof sheeting at the end of each day’s work to prevent water intrusion. Cover partially completed masonry when construction is not in progress.
- C. Stain Prevention – Prevent grout, mortar and soil from staining the face of the masonry to be left exposed. Immediately remove grout, mortar and soil that come in contact with such masonry.

## 1.7 SCHEDULING

- A. Schedule manufacture and delivery of architectural masonry units to coincide with construction schedule to prevent storage for extended periods.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURED MASONRY UNITS

- A. Acceptable manufacturers:
  - 1. TARMAC AMERICA LLC (a Titan America Company)  
Contact: 800-226-8167 (FL Corporate Headquarters) or  
[www.titanamerica.com](http://www.titanamerica.com)
- B. Substitutions:
  - 1. Specified in Section 01 25 00 – Substitution Procedures
  - 2. Manufacturers of products of equal quality and meeting the Certification of Compliance referenced in Section 1.3.C must be submitted and approved by the designer of record prior to bid date.

### 2.2 MATERIALS

- A. Integrally Colored Architectural Concrete Masonry Units:
  - 1. Texture: Split Face, Smooth Face
  - 2. Color(s): [            ] [            ] [            ]
  - 3. Type: Load bearing, meeting ASTM C 90: Lightweight, Medium Weight, or Normal Weight masonry units.
  - 4. Compressive Strength:
    - a. Average of three units: 1,900 lb/in<sup>2</sup> (13.1 MPa), net area compressive strength
    - b. Individual units: 1,700 lb/in<sup>2</sup> (11.7 MPa) minimum, net area compressive strength
  - 5. Water Absorption: Maximum 10 lb/ft<sup>3</sup> (160 kg/m<sup>3</sup>) tested in accordance to ASTM C 140
  - 6. Oven Dried Concrete Weight lb/ft<sup>3</sup> (kg/m<sup>3</sup>): Lightweight < 105 (1,680), Medium Weight 105 to 125 (1,680 to 2,000), or Normal Weight > 125 (2,000)  
Dimensional Tolerances: Evaluated in accordance to ASTM C90, Section 6.2.2. Variation in overall dimensions for width, height and length of units of +/- 1/8 inch (3.2 mm) from specified dimensions. On faces that are split, overall dimensions will vary.
- B. Water Repellent and Efflorescence Control: Provide integral polymeric water-

repellent admixture during manufacture of masonry units.

1. Rheopel® Plus Admixture by BASF, per recommended dosage rates.
  2. Substitutions: As per Section 01 25 00, approved by the designer of record prior to bid date and meeting Certification of Compliance referenced in Section 1.3.C.
- C. Water Repellent for Masonry Mortar: Polymeric water-repellent admixture added during masonry mortar mixing
1. Rheopel® Plus Mortar Admixture by BASF, per recommended dosage rates.
  2. Substitutions: As per Section 01 25 00, approved by the designer of record prior to bid date and meeting Certification of Compliance referenced in Section 1.3.C.
- D. Mortar for Unit Masonry – Integral Colored Masonry Cement
1. Comply with ASTM C 270, Proportion Specification.
  2. Comply with ASTM C 91
  3. Quikrete® Mason Mix, Preblended Colored Mortar; Type, “S”, “M” or “N” – Specifically matched to Tarmac Americas’ integrally colored masonry unit color(s), unless specified otherwise.
  4. Substitutions: As per Section 01 25 00, approved by the Architect of record prior to bid date.
- E. Flashing Materials – refer to Section 04 05 23 – Masonry Accessories, include the following flashing systems for masonry exposed to exterior weather conditions:
1. Single-Wythe Exposed CMU Flashing System: Blok-Flash® by Mortar Net® USA, Ltd.
  2. Multi-Wythe Exposed CMU Cavity Wall Flashing System:
    - a. Total Flash® by Mortar Net® USA, Ltd.
    - b. CavClear® Masonry Mat by Archovations, Inc.
  3. Substitutions: As per Section 01 25 00, approved by the designer of record prior to bid date.
- F. Masonry Cleaners
1. Sure Klean® Custom Masonry Cleaner by PROSOCO, Inc.
  2. Sure Klean® Vana Trol Masonry Cleaner by PROSOCO, Inc.
  3. Substitutions: As per section 01 25 00, approved by designer of record prior to bid date.
- G. Masonry Water Repellents (Field Applied)
1. Sure Klean® Custom Masonry Sealer by PROSOCO, Inc.
  2. Sure Klean® Blok-Guard® and Graffiti Control Ultra by PROSOCO, Inc.
  3. Sure Klean® Siloxane Water Based Concentrate by PROSOCO, Inc.
  4. Substitutions: As per section 01 25 00, approved by designer of record prior to bid date.
- H. Grout – Refer to Section 04 05 16

## 2.3 ACCESSORIES

Specified in Section 04 05 23

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. All masonry work shall be performed under the direct, onsite supervision of a "Certified Structural Mason" employed by a "Certified Mason Contractor" as recognized by the Masonry Education Foundation (MEF).
- B. The Mason Contractor shall submit credentials from the MEF to the designer of record for review and approval prior to starting masonry work.
- C. Prior to the start of masonry construction the Mason Contractor shall perform the following:
  - 1. Examine surfaces that will support masonry work to assure completion to proper lines and grades.
  - 2. Verify that foundations are constructed to meet tolerances given in ACI 117
  - 3. Reinforcing dowels are positioned in accordance with Project Drawings and applicable codes.
  - 4. Verify items provided by other Sections of work are properly sized and located.
- D. The Mason Contractor shall notify the designer of record or Owner's Representative, in writing, of all unsatisfactory conditions.
- E. Unsatisfactory conditions shall be corrected prior to start of masonry work.

### 3.2 PREPARATION

- A. Establish Lines, Levels and Coursing:
  - 1. Protect lines from disturbance
  - 2. Use non-corrosive materials in contact with masonry
- B. Surface Preparation – Prior to placing masonry units, remove loose aggregate or any other materials that would prevent mortar from bonding to the foundation.
- 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.

### 3.3 CONSTRUCTION

- A. COURSING AND BONDING
  - 1. Place masonry units to lines and levels indicated on Project Drawings.
  - 2. Maintain masonry coursing and horizontal joints of uniform width and thickness.
  - 3. Place masonry units in running bond pattern unless otherwise noted on Project Drawings
  - 4. Course one masonry unit and one mortar joint to equal 8 inch (203 mm) or 4 inch (102 mm) for ½ high units.
- B. MIXING AND PLACING MORTAR

1. Mix mortar in accordance with the requirements of ASTM C 270
2. Discard mortar not used within 2-1/2 hours of initial mixing.
3. Retempering colored masonry mortar is not permitted.
4. Construct 3/8 inch (9.4 mm) bed and head joints with the minimum depth of masonry unit face shell, unless otherwise indicated on Project Drawings
5. Construct bed joint at starting course on foundation not less than 1/4 inch (7 mm) and not more than 3/4 inch (19 mm).
6. Use tuck-pointing procedures as specified in ASTM C270 to fill voids in below grade and exposed masonry.
7. Tool head and bed joints with *Concave* profile for all masonry exposed to exterior weather conditions.
  - a. Use a non-marking tool with large enough radius that joint is not raked free of mortar.
8. Remove masonry protrusions extending 1/2 inch (12.5 mm) or more into cells or cavities to be grouted.

#### C. PLACING MASONRY UNITS

1. Do not install masonry units that are cracked, broken or chipped in excess of tolerances noted in ASTC C 90, Section 7.2.1
2. When possible, orient masonry units so that small chips, cracks and minor imperfections are not visible on exposed side of walls as noted in ASTM C 90, Section 7.2
3. Pull colored masonry units from at least three (3) different pallets for proper blending and appearance.
4. Clean units of surface dirt and contaminants before placing in contact with mortar.
5. Vertical cells to be grouted must be aligned and have unobstructed openings for grout
6. For single-wythe exposed masonry construction: Install approved flashing at first above-grade course and as indicated on drawings according to manufacturer's standard installation instructions.
7. For multi-wythe cavity, exposed masonry construction: Install [Total-Flash®] or [CavClear®] as indicated on drawings and according to manufacturer's standard installation instructions.
8. Keep cavity airspace and weep holes clean of mortar, clean out properly if mortar falls into cavity airspace or plugs weep holes.
9. Remove excess mortar before it hardens and place units such that mortar does not run down the face of the wall or smear into the masonry face.

#### D. ADJUSTMENTS

1. Do not shift or tap masonry units after mortar has taken initial set.
2. Where adjustments must be made, remove mortar and replace.
3. Protect wall cavities during construction to prevent rainwater saturation and excessive moisture accumulation
4. Stop horizontal runs at end of work day by racking back one-half unit length in each course. Do not tooth. When resuming work, clean masonry surfaces that are to receive mortar, remove loose masonry units and mortar.

### 3.4 TOLERANCES

- A. Comply with construction tolerances used in the MSJC Specification (ACI 530.1/ASCE 6/TMS 602) and with the following:
1. Dimension of Elements:
    - a. In cross-section or elevation, - 1/4 inch (7 mm), + 1/2 inch (12.5 mm)
    - b. Mortar joint thickness; bed joints +/- 1/8 inch(3.5 mm), head joints - 1/4 inch(7 mm), + 3/8 inch (9.4 mm).
  2. Elements:
    - a. Variations from Level: bed joints +/- 1/4 inch (6.4 mm) in 10 ft. (3 m), +/- 1/2 inch (12.7 mm) maximum
    - b. Variations from Plumb: +/- 1/4 inch (6.4 mm) in 10 ft. (3 m), +/- 3/8 inch (9.5 mm) in 20 feet (6.1 m), +/- 1/2 inch (12.7 mm) maximum
    - c. True to Line: +/- 1/4 inch(6.4 mm) in 10 ft. (3 m), +/- 3/8 inch(9.5 mm) in 20 ft. (6.1 m), +/- 1/2 inch(12.7 mm) maximum
    - d. Alignment of Columns and Walls: +/- 1/2 inch (12.7 mm) for bearing walls, +/- 3/4 inch (19 mm) for non-bearing walls.
  3. Location of Elements:
    - a. Indicated in Plan: +/- 1/2 inch (12.7 mm) in 20 ft. (6.1 m), +/- 3/4 inch (19 mm) maximum
    - b. Indication in Elevation: +/- 1/4 inch (6.4 mm) in story height, +/- 3/4 inch (19 mm) maximum
  4. For faces of adjacent exposed masonry units, do not vary from flush alignment by more than 1/16 inch (3.2 mm) except due to warpage of masonry units within the tolerances specified in ASTM C 90.
  5. For exposed bed joints and head joints of stacked bond, do not vary from a straight line by more than 1/16 inch (3.2 mm) from one masonry unit to the next.
- B. Notification – If the above conditions cannot be met, notify Architect or Owner's Representative in writing

### 3.5 ANCHORAGE AND REINFORCING

- A. Refer to Section 04 05 19

### 3.6 CONTROL AND EXPANSION JOINTS

- A. Refer to Section 04 05 23 13

### 3.7 JOINT SEALERS

- A. Refer to Section 07 90 00

### 3.8 GROUT PLACEMENT

- A. Refer to Section 04 05 16

### 3.9 CLEANING AND WATER REPELLENTS

- A. In Progress Cleaning – Clean masonry units as work progresses by dry brushing to remove mortar fins and smears before tooling joints.
- B. Final Cleaning – Clean exposed architectural masonry with approved cleaners as

follows:

1. Clean masonry before installing windows, doors, finished flooring, metal fixtures, hardware, light fixtures, roofing materials and other non-masonry items.
  2. If already installed, protect from cleaning solution with polyethylene film or waterproof masking tape.
  3. Remove large mortar particles by hand using wooden paddles and non-metallic tools.
  4. Apply masonry cleaner as per manufacturer's standard application methods
  5. Always test each surface and type of stain for suitability, dilution rates and desired results before overall application.
- C. Final Water Repellent Application – Apply approved field-applied water repellent as follows:
1. Protect people, property, vehicles, plants, windows, painted surfaces, anodized aluminum and all non-masonry surfaces that may come into contact with product.
  2. Surface should be clean, dry and absorbent. Newly constructed surfaces and repointed surfaces should cure for 28 days before application.
  3. Sealing and caulking compounds should be in place and cured before application.
  4. Apply masonry water repellent as per manufacturer's standard application methods.

### 3.10 FIELD QUALITY CONTROL

- A. Specified in Section 01 45 16.

END OF SECTION 04 22 23