

SECTION 04220

CONCRETE UNIT MASONRY

SECTION 04220 ARCHITECTURAL CONCRETE UNIT MASONRY

PART 1 - GENERAL

1.01. SUMMARY

A. Section Includes:

1. **Split Face** architectural concrete masonry units
2. **Ground Face** architectural concrete masonry units
3. **Polished Face** architectural concrete masonry units
4. **Shot-Blasted** architectural concrete masonry units
4. **Split-Ribbed** architectural concrete masonry units
5. **Smooth, Colored** architectural concrete masonry units
6. **Wall Brick** architectural concrete masonry units

B. Related Sections:

1. Section 04060 – Masonry Mortaring
2. Section 04070 – Masonry Grout
3. Section 04080 – Masonry Anchorage and Reinforcement
4. Section 04090 – Masonry Accessories
5. Section 05120 – Structural Steel Framing
6. Section 05500 – Metal Fabrications
7. Section 07190 – Water Repellants
6. Section 07900 – Joint Protection

1.02. REFERENCES

A. American Concrete Institute (ACI):

1. ACI 117 - Standard Specifications for 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 270 – Standard Specification for Mortar for Unit Masonry
2. ASTM C 90 - Specification for Load-bearing Concrete Masonry Units
3. ASTM C 140 - Methods of Sampling and Testing Concrete Masonry Units.
4. ASTM E 514 – Standard Test Method for Water Penetration and Leakage Through Masonry

1.03. SUBMITTALS

A. Specified in Section 01330 -Submittal Procedures

B. Color Selection

1. For Initial Selection: Unit masonry sample box-sized samples showing the full range of colors and textures available for each different exposed masonry unit required
2. For Verification Purposes: Full-size units or full face shells showing the full range of colors and textures expected in the completed project

1.04. QUALITY ASSURANCE

A. Construction: Construct masonry in accordance with requirements of ACI 530 and 530.1.

B. Special Inspection and Testing: Provide inspection and testing in accordance with the Building Code and as noted on Drawings and will be performed under provisions of Section 01450.

C. Mock-up: Construct a masonry wall mock-up panel to represent the selected exterior masonry wall color, texture characteristics, and bond pattern.

1. Construct wall at least 4 feet long by 4 feet high.
2. Locate where directed by Architect/Owner's Representative.
3. Include bond pattern, joint profile and mortar colors for all face textures and colors.
4. Include reinforcement, flashing and weeps as indicated on drawings.
5. Erect entire mock-up with methods representative of standard, daily construction and in-progress cleaning practices.
6. Mock-up sample panel must receive acceptance by Architect/Owner's Representative before proceeding with masonry installation.
7. Once accepted, mock-up sample panel will be used as the standard of quality for masonry work on the project.
8. Leave mock-up sample panel in place until project completion.

1.05. DELIVERY, STORAGE AND HANDLING

A. Deliver and handle architectural masonry materials as to prevent damage

1. Deliver architectural masonry units wrapped and on wooden pallets
2. Cover stacked masonry units with protective waterproof covering that will allow air circulation between blocks and pallets to prevent excessive moisture accumulation
3. Ground and Polished Face masonry units to be packaged with protective foam membrane between block layers to minimize chipping.

B. Store architectural masonry units in a location as to minimize handling, exposure to excessive moisture, contaminants, corrosion, and materials that could cause staining.

C. Store mortar materials off the ground with waterproof covering and in a dry location

1.06. PROJECT CONDITIONS

A. Environmental Requirements (**Cold Weather**): Follow the requirements of the MIC Hot and Cold Weather Construction.

Include the following construction requirements for cold weather procedures:

1. When ambient air temperatures are above 40 degrees F cover tops of walls and masonry elements with plastic or canvas at end of workday to prevent water from entering masonry.
2. When ambient air temperatures are below 40 degrees F and above 32 degrees F or temperature of masonry units is below 40 degrees F:

- a. Remove visible ice on masonry units before units are placed in the wall.
 - b. Do not lay masonry units having a temperature below 20 degrees F.
 - c. Heat sand and mixing water to produce mortar temperatures between 40 degrees F and 120 degrees F at the time of mixing.
 - d. Maintain mortar and grout temperatures above freezing until used in masonry.
 - e. Cover tops of walls and masonry elements with weather resistive membrane at end of workday to prevent water from entering masonry.
3. When ambient air temperatures are below 32 degrees F and above 25 degrees F or temperature of masonry units is below 40 degrees F:
- a. Remove visible ice on masonry units before units are placed in the wall.
 - b. Do not lay masonry units having a temperature below 20 degrees F.
 - c. Heat sand and mixing water to produce mortar temperatures between 40 degrees F and 120 degrees F at the time of mixing.
 - d. Maintain mortar and grout temperatures above freezing until used in masonry.
 - e. Completely cover walls and masonry elements with weather resistive membrane at end of work day and keep covers in place for 24 hours.
4. When ambient air temperature is below 25 degrees F and above 20 degrees F:
- a. Remove visible ice on masonry units before units are placed in the wall.
 - b. Do not lay masonry units having a temperature below 20 degrees F.
 - c. Heat sand and mixing water to produce mortar temperatures between 40 degrees F and 120 degrees F at the time of mixing.
 - d. Maintain mortar and grout temperatures above freezing until used in masonry.
 - e. Use heat source on both sides of masonry under construction.
 - f. Install wind breaks when wind velocity is in excess of 15 mph.
 - g. Completely cover walls and masonry elements with insulated blankets or equivalent protection at end of workday and keep covers in place for 24 hrs.
5. When ambient temperature is below 20 degrees F:
- a. Remove visible ice on masonry units before units are placed in the wall.
 - b. Do not lay masonry units having a temperature below 20 degrees F.
 - c. Heat sand and mixing water to produce mortar temperatures between 40 degrees F and 120 degrees F at the time of mixing.
 - d. Maintain mortar and grout temperatures above freezing until used in masonry.
 - e. Provide an enclosure for the masonry under construction.
 - f. Use heat sources to maintain temperatures above 32 degrees F within the enclosure.
 - g. Maintain masonry temperature above 32 degrees F for 24 hours after construction by enclosure with supplementary heat, electric heating blankets, infrared heat lamps, or other acceptable methods.

B. Environmental Requirements (**Hot Weather**): Follow the requirements of the MIC Hot and Cold Weather Construction. Include the following construction requirements for hot weather procedures:

1. When ambient temperature is above 115 degrees F or ambient air temperature is above 105 degrees F and wind velocity exceeds 8 mph:
 - a. Shade materials and mixing equipment from direct sunlight.
 - b. Maintain sand piles in damp loose condition.
 - c. Provide necessary conditions and equipment to produce mortar and grout having temperatures below 120 degrees F.
 - d. Use cool mixing water for mortar and grout.
 - e. Maintain temperatures of mortar and grout below 120 degrees F.
 - f. Flush mixer, mortar and grout transport container, and mortarboards with cool water before they come in contact with mortar or grout.
 - g. Maintain mortar consistency by re-tempering with cool water.
 - h. Use mortar within 2 hours of initial mixing.
 - i. Fog spray all newly constructed masonry until damp, at least three times a day until the masonry is 3-days old.
2. When ambient temperature is above 100 degrees F or ambient air temperature is above 90 degrees F and wind velocity exceeds 8 mph:

- a. Maintain sand piles in damp loose condition.
- b. Provide necessary conditions and equipment to produce and maintain mortar and grout having temperatures below 120 degrees F.
- c. Maintain mortar and grout temperatures below 120 degrees F.
- d. Flush mixer, mortar and grout transport container, and mortarboards with cool water before they come in contact with mortar or grout.
- e. Maintain mortar consistency by re-tempering with cool water.
- f. Use mortar within 2 hours of initial mixing.
- g. Fog spray all newly constructed masonry until damp, at least three times a day until the masonry is three days old.

PART 2 - PRODUCTS

2.01. Manufacturers

A. Acceptable Manufacturers:

1. **CEMEX USA**, Florida Region; Telephone (888) 279-1654 www.cemexusa.com
2. **CEMEX USA**, Atlantic Region; Telephone (800) 786-5620 www.cemexusa.com

B. Substitutions:

1. Products of equal quality must be submitted and approved by Architect **at least ten (10) days prior to bid date**
2. No substitutions will be accepted after General Contractor is awarded

2.02 Concrete Masonry Units

A. Concrete Masonry Units – General:

1. Provide concrete masonry standard units as indicated and scheduled with face dimensions of 16 inches long by 8 inches high, nominal; 15-5/8 inches long by 7-5/8 inches high, actual, by thicknesses indicated on drawings
2. Provide special masonry units for bond beams, control and expansion joints, and lintels.
3. Hollow and solid load-bearing block: ASTM C-90, normal weight, 125 pounds per cubic foot dry weight minimum.

B. Architectural Concrete Masonry Units: **CEMEX USA** Architectural Block; all colored units produced with integral water repellent admixture – DryBlock by WR Grace, or approved equal.

1. Face: **Split Face**; rough exposed aggregate, uneven natural split texture
 - a. Manufactured with a vertical chamfered edge on each side to insure a controlled, straight split on the unit face shell
2. Face: **Ground Face**; machine ground, smooth exposed aggregate texture
 - a. Manufactured with a minimum of three (3) grinding heads to insure a smooth, consistent face shell texture
3. Face: **Polished Face**; machine polished smooth, exposed aggregate texture
 - a. Manufactured with a minimum of nine (9) polishing heads to insure a smooth, polished face shell texture
4. Face: **Shot-Blasted**; steel bead, machine shot-blasted, exposed aggregate texture
 - a. Standard Texture
 - b. Course Texture
5. Face: **Split-Ribbed**; vertically split-ribs (4, 8, or 16), rough exposed aggregate texture
 - a. Manufactured with a vertical chamfered edge on each side and ribs to insure a controlled, straight split on the unit face shell.
6. Face: **Smooth, Colored**; smooth-finished concrete masonry unit texture
7. Face: **Wall Brick**; ½ high, smooth texture, blended color face

- 8. Size(s): _____ (OR)
- 9. Size(s): As indicated on drawings
- 10. Color(s): _____ (OR)
- 11. Color(s): As selected by Architect from manufacturer's full line of each specified face
- 12. Shapes: Provide special masonry units for bond beams, corners, sills, caps, control and expansion joints, and lintels

2.03. ANCHORAGE AND REINFORCING

- A. Specified in Section 04080

2.04. ACCESSORIES

- A. Specified in Section 04090

PART 3 - EXECUTION

3.01. INSPECTION

- A. Prior to the start of masonry construction the Contractor shall verify:

- 1. Foundations are constructed with tolerances conforming to ACI 117.
- 2. Reinforcing dowels are positioned in accordance with Project Drawings.
- 3. Verify items provided by other Sections of the Work are properly sized and located.

- B. If conditions are not met notify the Architect/Owners Representative.

3.02. 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.

3.03. COURSING AND BONDING

- A. Placement: Place masonry units to lines and levels indicated on plans.

- B. Uniformity: Maintain masonry coursing and horizontal joints of uniform width and thickness.

- C. Bond Patterns: Place masonry units in running bond pattern unless otherwise noted on plans.

- D. Course Height: Course one masonry unit and one mortar joint to equal 8 inches (4 inches for $\frac{1}{2}$ high units)

3.04. PLACING

- A. Bed and Head Joints:

- 1. Joint Thickness:
 - a. Construct $\frac{3}{8}$ -inch bed and head joints unless otherwise indicated.
 - b. Construct bed joint at starting course on foundation not less than $\frac{1}{4}$ inch and not more than $\frac{3}{4}$ inch.
- 2. Fill holes not specified in exposed and below grade masonry with mortar.

3. Tool head and bed joints concave unless below grade or above ceiling height and to be concealed.
 - a. Use tool with large enough radius that joint is not raked free of mortar.
4. Remove masonry protrusions extending $\frac{1}{2}$ inch or more into cells or cavities to be grouted.

B. Unit Placement:

1. Lay masonry units with bed and head joints filled from the faces of the units to a distance in not less than the thickness of the face shell.
 - a. Vertical cells to be grouted are aligned and unobstructed openings for grout must be provided in accordance with drawings.
2. Keep cavity airspace and weep holes clean of mortar, clean out promptly if mortar falls into cavity airspace or plugs weep holes.
3. Remove excess mortar
 - a. Protect wall from mud splatter and mortar droppings.
 - b. Place masonry units such that mortar does not run down the face of the wall or smear the masonry face.
4. Adjustments:
 - a. Do not shift or tap masonry units after mortar has taken initial set.
 - b. Where adjustments must be made, remove mortar and replace.
5. Protection: Protect wall cavities during construction to prevent rainwater saturation and excessive moisture accumulation.

3.05. TOLERANCES: Erect masonry within the following tolerances from specified dimensions:

A. Dimension of Elements:

1. In cross-section or elevation: minus $\frac{1}{4}$ inch, plus $\frac{1}{2}$ inch
2. Mortar joint thickness:
 - a. Bed joints: plus or minus $\frac{1}{8}$ inch
 - b. Head joints: plus $\frac{3}{8}$ inch to minus $\frac{1}{4}$ inch
 - c. Collar joints: plus $\frac{3}{8}$ inch to minus $\frac{1}{4}$ inch

B. Elements

1. Variation from level:
 - a. Bed joints: plus or minus $\frac{1}{4}$ inch in 10 feet; plus or minus $\frac{1}{2}$ inch maximum.
 - b. Top surface of bearing walls: plus or minus $\frac{1}{4}$ inch in 10 feet; plus or minus $\frac{1}{2}$ inch maximum.
2. Variation from plumb: plus or minus $\frac{1}{4}$ inch in 10 feet; plus or minus $\frac{3}{8}$ inch in 20 feet; plus or minus $\frac{1}{2}$ inch max.
3. True to line: plus or minus $\frac{1}{4}$ inch in 10 feet; plus or minus $\frac{3}{8}$ inch in 20 feet; plus or minus $\frac{1}{2}$ inch maximum.
4. Alignment of columns and walls (bottom versus top):
 - a. Bearing: plus or minus $\frac{1}{2}$ inch.
 - b. Non-bearing: plus or minus $\frac{3}{4}$ inch

C. Location of elements:

1. Indicated in plan: plus or minus $\frac{1}{2}$ inch in 20 feet; plus or minus $\frac{3}{4}$ inch maximum
2. Indicated in elevation: plus or minus $\frac{1}{4}$ inch in story height; plus or minus $\frac{3}{4}$ inch max.

C. Notification: If the above conditions cannot be met, notify Architect/Owner's Representative.

3.06. ANCHORAGE AND REINFORCING

A. Specified in Section 04080

3.07. GROUT PLACEMENT

A. Specified in Section 04070

3.08. CLEANING

A. In-Progress Cleaning: Clean unit masonry as work progresses within seven days by dry brushing to remove excess mortar and smears before tooling joints, as described in section 3.04.B.3.

B. Final Cleaning: Clean exposed masonry as follows:

1. Clean masonry before installing windows, door, 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 with wooden paddles and non-metallic tools
4. Always test cleaner on sample panel or small area to demonstrate products, procedures and stain suitability of each type of stain
5. Materials: Clean masonry units with the following masonry cleaners:
 - a. For Polished Face, Ground Face, Wall Brick or Smooth Face use:
 - i. Sure Klean Burnished Custom Masonry Cleaner, by Prosoco as per manufacturer's instructions and cleaning procedures
 - b. For Split Face, Split-Ribbed and Shot-Blasted use:
 - i. Sure Klean Custom Masonry Cleaner, by Prosoco as per manufacturer's instructions and cleaning procedures

3.16. FIELD QUALITY CONTROL

A. Masonry: Specified in Section 01450.

=====
END OF SECTION