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Design & Construction Standards:
TECHNICAL GUIDELINES

Division 04
04 05 16 Masonry Grouting
04 20 00 Unit Masonry

FACILITY MANAGEMENT

April 2016

SECTION 04 05 16

MASONRY GROUTING

PART 1 GENERAL

1.01 REFERENCES

- A. In the absence of other information, the methods and recommendations of the National Concrete Masonry Association (NCMA), Brick Institute of America (BIA), and Rocky Mountain Masonry Institute (RMMI) shall be followed.
- B. Refer to other Division 4 standards for other structural engineering design guidelines.

PART 2 PRODUCTS

2.01 MATERIALS

- A. General:
 - 1. Admixtures such as air-entraining and antifreeze compounds are prohibited.
 - 2. Calcium chloride is prohibited.
- B. Mortar:
 - 1. Portland cement, ASTM C150.
 - 2. Hydrated lime, ASTM C207, Type S.
 - 3. Pigmented mortar is prohibited.
- C. Mortar accessories:
 - 1. Mortar control (such as Mortar Net or equivalent)
 - 2. Weeps: Louvered or plastic cellular venting type at head joints.
 - a) Tube weeps, open head joints, wicks, and nylon weeps are prohibited.
- D. Grout:
 - 1. Specify grout strength per ASTM 28-day strength.
 - 2. Specify grout mix design appropriate for high- or low-lift grouting. Grout mixes designed by Contractor, Engineer specify high/low lift grouting.
 - 3. Grout aggregate shall not exceed $\frac{3}{8}$ " in diameter.
- E. Inserts and anchors: Galvanized steel:
 - 1. Plastic inserts and anchors are prohibited.
- F. Ventilators: 10'-0" maximum vertical interval (or centerline of wall 11 feet to 20 feet tall)

2.02 MORTAR MIXES

- A. Pre-mixed mortar, factory blended to design specification and delivered to jobsite in packages labeled with mortar design, is preferred over job-mixed mortar.

PART 3 EXECUTION

3.01 MORTAR MIXING

- A. For job-mixed mortar, measurements for site batching of mortar shall be taken with calibrated measuring instruments. "Shovel" portions will not be accepted.
- B. Blend mortar in a mechanical mixer.
- C. Retempering is not permitted.

3.02 MORTAR AND GROUT INSTALLATION

- A. Mortar control is mandatory for cavity wall construction.
- B. See other Division 4 standards for mortar and grout installation.

3.03 FIELD QUALITY CONTROL

- A. Contractor shall work with the Owner to schedule Owner’s masonry inspections and testing.
- B. Owner will provide special inspection services as required by IBC, ACI 530 and ACI 530.1.
- C. Concrete Masonry Units: Provide test reports for unit strength tests, ASTM C140. Prefer unit strength method in lieu of prism tests.
- D. Mortar: Contractor shall perform mortar testing necessary to assure compliance with the Contract Documents. Such testing shall be at the Contractor’s expense. Test results shall be distributed to Architect and Owner. During construction, mortar test reports will be reviewed by design team for consistency of values.
- E. Grout: Owner will provide for testing and inspection of masonry grout and grouting for Owner’s information at Owner’s expense.
 - 1. Quality control testing for low-lift grouting will be performed during construction for each 25 cubic feet of grout or 2,500 square feet of wall area, whichever comes first.
 - 2. Quality control testing for high-lift grouting will be performed during construction for each grout pour.
 - 3. Contractor will be provided with Owner’s testing information and may use test information as a part of Contractor’s quality control. However, Owner does not represent that the frequency or type of testing is adequate to assure compliance with contract requirements. Contractor shall provide additional testing needed to assure contract compliance, at Contractor’s expense.
 - 4. Additional tests or re-tests required for quality control shall be at Contractor’s expense.
 - 5. A/E shall review engineered unit masonry after the first course is laid, and review grouting locations for reinforcing placement (dowels) prior to placement of the first lift of grout. This review does not relieve special inspection requirements.

END OF SECTION 04 05 13

SECTION 04 20 00

UNIT MASONRY

PART 1 GENERAL

1.01 REFERENCES

- A. In the absence of other information, the methods and recommendations of the National Concrete Masonry Association (NCMA), Brick Institute of America (BIA), and Rocky Mountain Masonry Institute (RMMI) shall be followed.
- B. Design and detail control and expansion joints to meet, at least, the minimum guidelines of the BIA and NCMA.
- C. Refer to Section 09 91 00 for anti-graffiti coatings.
- D. Matching of existing brick, delivery time, and future availability often determine brick specification criteria.

PART 2 PRODUCTS

2.01 BRICK MATERIALS

- A. Face brick:
 - 1. Grade SW, type FBS (ASTM C-216-87).
 - 2. Specify minimum of two brick manufacturers.
 - 3. Provide Type N mortar.
- B. Concrete masonry units:
 - 1. Hollow load-bearing concrete block, ASTM C90.
 - 2. Specify minimum of two concrete masonry unit manufacturers.
 - 3. Ends: Concave; bullnose at interior exposed corners.
 - 4. Special shapes
 - a) Provide special manufactured shapes of concrete masonry units including solid units, lintel blocks, bond beams, facing units, etc.
 - b) Sound absorbing acoustic units: NRC 65 minimum rating.
- C. Ties:
 - 1. Two-piece slotted or clip-and-loop only.
 - 2. Single-piece flat stock, corrugated, wire ties, and ferrous materials are prohibited.
- D. Horizontal joint reinforcement:
 - 1. Use ladder type joint reinforcement where vertical reinforcement is involved and truss type elsewhere.
- E. Accessories:
 - 1. Embedded flashings.
 - 2. Control joint materials.
 - 3. Expansion joint materials.
 - 4. Other masonry accessories per standard Section 04 05 16.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Mortar joints
 - 1. Lay units with full mortar beds on bed faces and minimum 85% coverage on head joints.

2. For units requiring grouting, apply mortar to webs also.
 3. Exposed-to-view mortar joints shall be tooled to a smooth, concave finish.
 4. Mortar joints not exposed to view in the finished construction shall be cut flush with masonry.
 5. Strike joints flush at surfaces scheduled to receive plaster.
- B. Rake back top of wall at end of workday. Tothing of subsequent masonry is not acceptable.
 - C. Protect top of masonry walls and veneers to prevent water infiltration, wicking, and efflorescence.
 - D. Cavities and spaces to contain reinforcement and grout:
 1. Aligned, continuous and unobstructed; no more than 10% mortar obstruction.
 2. 2" minimum clear in any dimension.
 - E. Water repellents are not allowed on masonry surfaces.
 - F. All interior unit masonry all outside corners shall be bullnosed.

3.02 REINFORCEMENT

- A. Horizontal masonry joint reinforcement shall be placed so that longitudinal wires are located over face-shell mortar beds, and are fully embedded in mortar.
 1. Minimum mortar coverage: 5/8" to exterior face of wall; 1/2" all other locations.
 2. Lap reinforcement 6" minimum.
 3. Use factory-fabricated corner and intersection sections.
 4. Unless otherwise indicated, install horizontal reinforcement at 16" O.C. beginning with first course (8" above base of masonry).
- B. Continuity of horizontal reinforcing is required below fenestration (windows and other wall openings and penetrations).

3.03 GROUTING

- A. Spaces around openings, frames and other built-in items shall be filled solid as each course is laid.
- B. Grout all cells which occur at corners, door and window jambs, changes in parapet or foundation elevations (both sides of step), control joints (both sides of joints), and cores with reinforcement.
- C. Slush fill hollow metal frames with grout at masonry and concrete walls.

3.04 CLEANING

- A. Clean new masonry per RMMI recommendations, 1 week minimum, 2 weeks maximum, after placement.
- B. Cleaning solutions shall be water-based and approved by the masonry manufacturer.
- C. Muriatic acid solutions are prohibited.

3.05 TOLERANCES

- A. Use ACI 531 tolerances.

3.06 FIELD QUALITY CONTROL

- A. Contractor shall work with the Owner to schedule Owner's masonry inspections and testing.
- B. Refer to DPS Standard 04 05 16 for other masonry testing.
- C. Owner will provide masonry unit strength testing and inspection for Owner's information at Owner's expense. Prism testing may be performed if allowed on project-specific basis. A/E to specify locations and frequency of prism testing, if allowed.

- D. Contractor will be provided with Owner's testing information and may use test information as a part of Contractor's quality control. However, Owner does not represent that the frequency or type of testing is adequate to assure compliance with contract requirements. Contractor shall provide additional testing needed to assure contract compliance, at Contractor's expense.
- E. Additional tests or re-tests required for quality control shall be at Contractor's expense.
- F. Owner will provide required structural special inspections per ACI 530 and 530.1, IBC, or local building code, whichever is more stringent.

END OF SECTION 04 20 00