

Division 4 – Masonry

General

Texas Tech desires to create a pleasing aesthetic and to blend in with the existing Spanish Renaissance architectural style of the campus. To that end, Texas Tech desires to maximize the brick on the buildings' facades. These facades should contain at least 80% brick or as determined and approved by the FP&C Vice Chancellor or the Board of Regents.

All façade design shall be approved by the FP&C Vice Chancellor or his designated representative.

A cornerstone shall be placed on each new building and each major addition at the time it is constructed. The cornerstone shall show the year the building was completed and may contain memorabilia appropriate at the time of construction. The cornerstone date shall be Futura font 8 inches tall.

Exposed exterior concrete block shall not be used without prior approval from the Vice Chancellor of FP&C.

Specify one of the following types of weep holes:

1. One-piece, cellular plastic Weep/Vent/screens: flexible extrusion made from UV-resistant polypropylene copolymer, full height and width of head joint and depth 1/8 inch less than depth of outer wythe, in color selected from manufacturer's standard. Weeps shall be provided at a maximum of every 24" at the base of all thru wall flashing.
2. Plastic tubing, medium density polyethylene.

For cavity drainage, specify free-draining mesh, made from polymer strands that will not degrade within the wall cavity. Use Mortar Net or approved equal.

For cavity wall insulation specify extruded-polystyrene board insulation or approved equal: ASTM C 578, Type IV, closed-cell product extruded with an integral skin.

Specify flashings to be Perma-barrier, copper, asphalt copper, stainless steel, or approved equals as determined by the Design Professional. Specify thru-wall flashing and counterflashing bedded in mortar joints whenever possible. When flashing is totally concealed in masonry, specify flexible flashing, copper-laminated flashing, and 7-oz/sq. ft. copper sheet bonded between 2 layers of glass-fiber cloth. Where flashing is indicated to receive counterflashing, specify metal flashing. Where flashing is indicated to be turned down at or beyond the wall face, specify metal flashing.

The use of regular gray concrete masonry units (CMU) for exposed exterior walls is prohibited.

The use of cinder block is prohibited.

The cleaning solution must be included in applicable sections of the Project Specifications. Texas Tech's Project Manager shall approve type of solution.

Masonry Contractor is to engage a masonry Quality Control inspector to supervise, on a full-time basis, all masonry work.

Specify that masonry contractors are to adhere to the Specification for Masonry Structures (ACI 530.1-95/ ASCE 6-95/-95TMS 602-95) for defining certain cold and hot weather construction requirements.

The owner reserves the right to hire an experienced special inspector to observe the installation of all masonry units.

Request submittals for each type of cast, cut, or precast stone units including;

1. The construction details.
2. Material descriptions.
3. Dimensions of individual components and profiles.
4. Finishes of stone units, mortar, and sealants.
5. Inspection recommendations and preventive maintenance plan.
6. Shop drawings showing fabrication and installation details for each stone unit including; details and dimensions, details of reinforcement, lifting connections, anchorages, building elevations, and indication of finished faces. Shop drawings shall be sealed by a licensed Professional Engineer registered in the State of Texas who is legally qualified to practice the engineering services of the kind indicated.
7. Full-size sample for shape of each stone unit required.
8. Manufacturer's qualification data.
9. Current material test reports for each mix.
10. Warranty information on stone, mortar, and sealants.
11. Preventive maintenance plan and inspection recommendations.

For each stone system, request mockups to verify selection made under sample submittals and to demonstrate aesthetic effects and quality standards for materials and execution. Mockup to include typical components, attachments, method of installation, mortar, and/or joint sealant.

Perform preconstruction field testing of sealant's compatibility and adhesion to each type of construction material applicable and to joint substrates before installing joint sealants. Testing to be per Design Professional and manufacturer's recommendations.

The Design Professional will make recommendations to the Owner's Representative on whether masonry mortar beds and joints are to be used and/or sealant joints are preferred for the project. If

Joint sealant is used, specify DOW 756 product. The Dow 756 color selection may include catalog colors at no additional cost to the Owner and will be selected based on mock-up approval by FP&C.

Specify that anchors for cut stone and precast stone shall be fabricated from stainless steel, ASTM A 666, Type 304, temper as required to support loads imposed without exceeding allowable design stresses. Dowels and pins for anchors shall be fabricated from stainless steel, ASTM A 276, Type 304. Shelf angles shall be hot-dip galvanized steel, ASTM A 36/A 36M for materials and ASTM A 123/A 123M for galvanizing. Stone anchors shall be designed and shop drawings stamped by a registered engineer in the State of Texas.

Mortar and Masonry Grout

Mortar for unit masonry is to be job mixed. Specify by types listed in ASTM C-270. Do not specify mortar, which may corrode steel reinforcement or structure (i.e., Sara-bond).

Specify the following types of mortar for applications stated unless another type is indicated.

1. For masonry below grade or in contact with earth, use Type S or M (Use M only if it is structurally required).
2. For reinforced masonry, use Type S
3. For mortar parge coats, use Type S.
4. For exterior, above-grade, load-bearing and non-load-bearing walls and parapet walls; for interior load-bearing walls; for interior non-load-bearing partitions; and for other applications where another type is not indicated, use Type S (The use of Type N will be allowed only if approved by the FP&C Design Team and the Project's structural engineer of record).
5. For interior walls non-load bearing, use Type S or N.

For each type of mortar and grout, request description of type and proportions of ingredients.

1. Request test reports for mortar mixes required to comply with property specification. Tests shall conform to ASTM for compressive strength, water retention, and air content.
2. Request test reports, according to ASTM for grout mixes required to comply with compressive strength requirement.

Joints shall be 3/8" with a concave profile unless the work is repair to or immediately adjacent to buildings with flush joints.

Request mortar ingredients of a uniform quality, including color, from one manufacturer for each cementitious component and from one source or producer for each aggregate throughout the project.

Masonry Reinforcement

Reinforcement to be uncoated steel reinforcing bars per ASTM A 615/A 615M. or ASTM A 996/A 996M, Grade 60. General masonry joint reinforcement per ASTM A 951/A951M.

Masonry Joint Reinforcement for single-wythe masonry is to be either ladder or truss type with single pair of side rods. All joint reinforcement will be hot dip galvanized.

Masonry Joint reinforcement for multiwythe masonry to be adjustable (two-piece) type, either ladder or truss design, with one side rod at each face shell of backing wythe and with separate adjustable ties with pintle-and-eye connections having a maximum adjustment of 1-1/4 inches. Size ties to extend at least halfway through facing wythe but with at least 5/8-inch cover on outside face. Ties shall have hooks or clips to engage a continuous horizontal wire in the facing wythe.

Wire mesh type joint reinforcement is prohibited.

Ties and Anchors

Brick veneer and stone ties to be per Design Professional's specification and Owner Representative's approval.

Brick

Brick masonry is to be designed and constructed per the Brick Institute of America standards and per ASTM C 216 Requirements.

Brick shall be equivalent to masonry products manufactured by ACME Brick Company, Perla Plant, Modular and Ruff Texture Face Brick, Product Code 070050122 "Texas Tech Blend" or Approved Equal. Brick to be grade SW (Severe Weather) and type FBS (Face Brick Standard) complying with ASTM C216 and ASTM C62 with a minimum compressive strength of not less than 1500 psi. Initial Rate of Absorption of less than 30 g/30 sq. in. per minute when tested per ASTM C 67. "Utility" sized brick can be used with the approval of the FP&C Vice Chancellor.

The following blend is the current TTU standard as approved by the BOR and should be considered as the base blend and adjusted to match existing work or adjacent buildings.

Shade 2 - 10%

Shade 3 - 35%

Shade 4 - 47%

Shade 4D - 08%

Obtain brick units through a single source from a single manufacturer throughout the project.

Treating of brick surface with stain or other surface treatment or simulation to obtain a color blend is prohibited unless approved by the FP&C Vice Chancellor.

The Contractor shall submit to Texas Tech's Project Manager manufacturer's certification that bricks show no efflorescence when tested in accordance with ASTM Method C67 and is rated "not effloresced."

Specify that the Contractor shall agree that before starting work, they will build one or more sample panels for inspection and approval. Build panel on a firm foundation, in location indicated by Texas Tech. Panel shall be F shaped, with long side a minimum of five (5) feet four (4) inches long by three (3) feet four (4) inches high, with one corner return at least two (2) feet long and with one intersecting six (6) inch thick concrete block wall two (2) feet long. Construct long side and return of materials and construction consistent with the exterior design. Panel shall show color range and texture of masonry units, bond, mortar joints, and workmanship. Completed masonry work in the building shall be equal to that shown in the approved panel. Do not remove panel until masonry work is completed or until removal is authorized. Panel shall include sample of openings.

Brick shall be laid with modular coursing, three (3) courses to eight (8) inches. Only full coursing will be permitted at the head of any type of opening. A flemish bond pattern will be designed into the project at the direction and amount per the FP&C Vice Chancellor's direction.

Face brick elevations shall include structural considerations for division of such elevations into panels to accomplish structural support of the brick face and expansion joints for control of thermal expansion damage.

Non-standard brick is prohibited unless approved by the FP&C Vice Chancellor. Brick shall be modular size (3 $\frac{5}{8}$ " X 2 $\frac{1}{4}$ " X 7 $\frac{5}{8}$ ").

Concrete Masonry Units (CMU)

Specify normal weight standard sized units conforming to ASTM C 90 with a minimum average net-area compressive strength of 1900 psi.

Specify units made with integral water repellent.

Integral water repellent to be liquid polymeric, integral water-repellent admixture that does not reduce flexural bond strength. Units made with integral water repellent, when tested according to ASTM E 514 as a wall assembly made with mortar containing integral water-repellent manufacturer's mortar additive, with test period extended to 24 hours, shall show no visible water or leaks on the back of test specimen.

Mortar for concrete masonry:

1. Portland Cement; ASTM C150, Type I. Use Type III for cold weather construction.
2. Masonry Cement; ASTM C91, Type S.
3. Aggregate; graded per ASTM C144.

Grout for concrete masonry:

1. Portland Cement; ASTM C150, Type I. Use Type III for cold weather construction.
2. Masonry Cement; ASTM C91, Type S.
3. Aggregate; graded per ASTM C404, size No. 8.
4. Do not use Calcium Chloride, Air-Entraining, or Water-Reducing Admixtures in grout.
5. Grout slump shall be between 10 & 11 inches.
6. Masonry mortar or concrete shall not be used for grout.

Cut Stone

This section includes all exterior cut and carved stone. All work shall be preceded by a pre-construction meeting to review shop drawings, specifications, anchorage, supports, sealants/mortar, cleaning, and sealing.

Dimensional stone includes the following:

1. Panels set with individual anchors.
2. Panels set with wire ties.
3. Trim units, including bands, copings, sills, jambs, and pilasters.
4. Units with carving or inscriptions

Specify that the Contractor shall use a qualified manufacturer of dimensional stone cladding systems that is similar to those indicated for this project that has sufficient production capacity to manufacture required units. Dimensional stone units shall be obtained through a single source from a single manufacturer throughout the project. References will be made available upon request.

Specify that the Installer shall have a minimum of 5 years documented experience and is qualified for installing cut stone to the level of this project. References will be made available upon request.

Do not allow use of frozen materials or materials mixed or coated with ice or frost. Do not allow building on frozen substrates. Contractor shall comply with cold weather construction requirements in ACI 530.1/ASCE 6/TMS 602 and comply with hot-weather construction requirements in ACI 530.1/ASCE 6/TMS 602.

Building stone is to be carved stone, with the exception of steps, porches, or landings that receive foot traffic, and shall be limestone equal to Leuders Quarry, Jones County, Texas. Limestone is to comply with ASTM C 568 and be classified as medium density.

Exterior traffic surfaces are to be an equal of the original "Carthage Stone" for exterior steps, porches, landings and other traffic surfaces.

Setting Mortar shall be composed of:

1. 1 part Portland Cement, ASTM C150 (non-staining), Type I.

2. 1 part hydrated lime, ASTM C207, Type N.
3. 6 parts sand, ASTM C144 except graded with 100% passing the No. 16 sieve for joints of ¼ inch or less.

Pointing Mortar shall be composed of:

1. 1 part white Portland Cement, ASTM C150 (non-staining), Type I.
2. 1 part hydrated lime, ASTM C207, Type N.
3. 3 parts sand, ASTM C144 except graded with 100% passing the No. 16 sieve for joints of ¼ inch or less.

Tool joints concave with a round tool having a diameter 1/8 inch larger than the joint width.

Setting shims shall be stainless steel or plastic buttons of the thickness required for the joint size.

The Design Professional will make recommendations to the Owner's Representative on whether masonry mortar beds and joints are to be used and/or sealant joints are preferred for the project. If seal coat for cut stone is recommended by the Design Professional, use SureKleen Weather Seal Natural Stone Treatment WB. If seal coat is required, concealed surfaces are to be sealed before setting. Seal coat will be installed in accordance with industry standards and after the moisture in the stone has stabilized. If Joint sealant is used, specify DOW 756 product. The Dow 756 color selection may include catalog order colors at no additional cost to the Owner and will be selected based on mock-up approval by FP&C.

Stone should not come in contact with the ground surface.

Precast Concrete Stone

Architectural Precast Concrete is to comply with PCI Design Handbook and with applicable portions of ACI 301. In general, use white Portland Cement for exposed faces. Specify facing aggregate and finish. Reinforcement and anchors shall be galvanized or stainless steel. Embedded/recessed lifting eyes shall have epoxy or other approved coated rebar or steel.

Specify that a qualified manufacturer of precast concrete units similar to those indicated for this project that has sufficient production capacity to manufacture the required units. Precast units shall be obtained through a single source from a single manufacturer throughout the project. References will be made available upon request.

Specify that the Installer shall have a minimum of 5 years documented experience and is qualified for installing precast concrete stone to the level of this project. References will be made available upon request.

Cast Stone (Wet Cast Only)

Cast stone includes the following:

1. Window sills.
2. Lintels.
3. Surrounds.
4. Coping.
5. Wall caps.
6. Belt courses.
7. Water tables.
8. Pilasters.
9. Column covers.
10. Medallions.

Specify a qualified manufacturer of cast stone units similar to those indicated for this project that has sufficient production capacity to manufacture required units, and is currently certified by the Cast Stone Institute (CSI). Cast stone units shall be obtained through a single source from a single manufacturer throughout the project. References will be made available upon request.

Specify that the Installer shall have a minimum of 5 years documented experience and is qualified for installing cast stone to the level of this project. References will be available upon request.

Do not allow use of frozen materials or materials mixed or coated with ice or frost. Do not allow building on frozen substrates. Comply with cold-weather construction requirements in ACI 530.1/ASCE 6/TMS 602. Comply with hot-weather construction requirements in ACI 530.1/ASCE 6/TMS 602.

Specify cast stone units complying with CSI Standards and ASTM C 1364 using wet-cast method. Vibrant dry tamp method will not be allowed. Specify units that are resistant to freezing and thawing as determined by laboratory testing according to ASTM C 666/C 666M, Procedure A, as modified by ASTM C 1364. Specify only admixtures specified or approved by Design Professional. Reinforcement to be epoxy coated deformed steel bars complying with ASTM A 615/A 615M, Grade 60.

Cast stone shall be thoroughly cured and seasoned at the manufacturing facility before delivery.

Cast stone mortar:

- A. Setting Mortar shall be composed of:
 1. 1 part Portland Cement, ASTM C150 (non-staining), Type I.
 2. 1 part hydrated lime, ASTM C207, Type N.
 3. 6 parts sand, ASTM C144 except graded with 100% passing the No. 16 sieve for joints of $\frac{1}{4}$ inch or less.

- B. Pointing Mortar shall be composed of:
 1. 1 part white Portland Cement, ASTM C150 (non-staining), Type I.

2. 1 part hydrated lime, ASTM C207, Type N.
3. 3 parts sand, ASTM C144 except graded with 100% passing the No. 16 sieve for joints of $\frac{1}{4}$ inch or less.

The Design Professional will make recommendations to the Owner's Representative on whether masonry mortar beds and joints are to be used and/or sealant joints are preferred for the project. If a seal coat for cast stone is recommended by the Design Professional, use SureKleen Weather Seal Natural Stone Treatment WB. If a seal coat is required, concealed surfaces are to be sealed before setting. The seal coat will be installed per Cast Stone Institute recommendations and after the moisture in the stone has stabilized. If Joint sealant is used, specify DOW 756 product. The Dow 756 color selection may include catalog order colors at no additional cost to the Owner and will be selected based on mock-up approval by FP&C.

Setting shims shall be stainless steel or high density impact plastic buttons of the thickness required for the joint size.

Owner may engage a qualified independent testing agency to sample and test cast stone units according to ASTM C 1364.