

**DESIGN STANDARDS**

1. **GENERAL:** This section contains guidelines and criteria for the design, material selection, installation, and maintenance of exterior materials and finishes covered in Division 4 sections, including, but not limited to: Unit masonry assemblies, stone veneer, cast stone, and architectural precast.
  - 1.1 **Veneer Construction:** Concrete masonry backup is preferred for masonry and stone veneer construction. Metal stud backup may be considered with approval by the University's Project Manager.
  - 1.2 **Façade Design:**
    - 1.2.1 The campus has a strong heritage of stone and masonry façade design founded with William Ward Watkins's designs for the first campus buildings. The University desires that architects respect and acknowledge this heritage using it as a resource while creating innovative and quality design for the facades for new buildings.
  - 1.3 Unit masonry assembly design shall include definition of all veneer materials including dimensions and thicknesses, through-wall and embedded flashings, cavity waterproofing and drainage, and anchorage systems. See product standards for additional information.
  - 1.4 **Coordination Drawings:** Except where recommended as unnecessary by the Architect and subsequently approved by the University's Project Manager, the Architect shall require the contractor to provide complete façade coordination drawings. The drawings shall show each façade and shall delineate each material, its relationship to each other including coursing and joint widths and offsets. The coordination drawings shall indicate the type and location of veneer anchorage used and the type and extent of all required joint reinforcing. The coordination documents shall include sections and details as necessary to define the façade construction including anchorage and waterproofing systems.
  - 1.5 **Field Mock-ups:** The use of field mock-ups is encouraged to both demonstrate important façade design elements and material selection while also providing the contractor an opportunity to work out sequence and procedures for anchorage and cavity moisture control and waterproofing systems.
    - 1.5.1 The Architect shall work with the University's Project Manager to determine if a field mock-up is required, and if so, shall work together to define the complete scope of the mock-up to be included in the Architect's construction documents and specifications.
  - 1.6 The Architect shall retain the services of an engineer registered in the State of Texas to provide for the design of the backup system and the building structure to which it is tied, whether unit masonry, metal stud, or other construction to ensure it meets the local wind load requirements.

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1.6.1 When metal stud back up is accepted by the University's Project Manager, the engineer may complete preliminary design for the stud system, including the determination of the stud width, typical spacing and points of attachment to the building structure, including intermediate bracing. The Architect shall then require the Contractor to retain the services of a separate engineer registered in the State of Texas to provide the completed design of the stud back-up system, including but not limited to final stud placements, stud gauges, construction details for attachments and anchorages and any required movement joints. All details shall be required to be coordinated with the work of other trades that adjacent to or anchors to the stud system.

1.7 Historically, natural limestone block and trim has been used in the façade design. Cast stone and precast elements have been utilized in combination with the natural stone in recent designs to respond to budget. The Architect's selection of material shall be sensitive to budget considerations, visual aesthetics including adjacencies, closeness of visual inspection, and importantly, the long term performance and maintenance requirements. Final decisions on the selection and use of these materials shall be as approved by the University's Project Manager.

**PRODUCT STANDARDS**

1. Approved Manufacturers: Subject to compliance with requirements, manufacturers offering materials that may be incorporated into the Work include, but are not limited to, the following:

1.1 Embedded Flashing Materials:

1.1.1 Preferred Flashing: 5 oz./sq. ft. minimum copper complying with ASTM B 370, soft temper.

1.1.2 For Rubberized Asphalt Flashing, use Perm-A-Barrier Wall Flashing by W.R. Grace & Co.

1.1.3 For Stainless Steel Flashing, use ASTM A 167, type 305, 2D finish, fully annealed or dead tempered.

1.1.4 Fabricate through-wall metal flashings with bi-directional deformation for integral mortar bond.

1.2 Sheet or fluid applied waterproofing, vapor and air barriers requirements are included in Division 7.

2. Materials:

Stone

2.1 Ensure that stone units are inspected at quarry or fabrication plant for compliance with requirements for appearance, vein cut, finish material, and fabrication. The Architect shall ensure that stone sizes and shapes comply with the requirements indicated:

2.1.1 Granite to comply with recommendations of NBGQA's "Specifications for Architectural Granite."

2.1.2 Limestone to comply with recommendations of ILI's "Indiana Limestone Handbook." The limestone used on campus includes Indiana Cream and Texas Leuters.

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- 2.1.3 Marble to comply with ASTM C503.
- 2.1.4 Embedded anchors, horizontal joint reinforcing and related accessories for all masonry veneer construction shall be fabricated from type 304 2D finish stainless steel.
- 2.1.5 Horizontal joint reinforcing for unit masonry back up wall construction may be either galvanized or stainless steel.

Cast Stone

- 2.2 Cast stone to comply with ASTM C 1364. Embedded anchors and related accessories shall be fabricated from 304 2D finish stainless steel.

Unit Masonry Assemblies

- 2.3 The traditional face brick used on campus are the light rose and dark rose blends as manufactured by St. Joe. Face brick are to comply with ASTM C90; design professional shall specify the net area compressive strength (f'm) at 28 days for masonry units and mortar types as required by the Houston Building Code and ACI 530.1/ASCE 6/TMS 602.

Architectural Precast Concrete

- 2.4 Architectural Precast Concrete elements shall 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 are to be galvanized.

**PERFORMANCE STANDARDS**

- 1. Specification for all natural stone products shall include the source information including contact information: name, phone number, and address.
- 2. For architectural precast concrete elements, it is best to procure an actual sample prior to the bid process. For bidding purposes, the specification shall describe the technical process of providing the finish and indicate that the fabricator is to match that architect's sample.
  - 2.1 Request from fabricator that:
    - 2.1.1. Fabricator must participate in the Precast/Prestressed Concrete Institute's (PCI) Plant Certification Program and be designated a PCI Certified Plant for Group A1 – Architectural Precast Concrete.
    - 2.1.2. Fabricator shall be required to meet the requirements of local authorities having jurisdiction, including registration, certifications, and fabrication documents sealed calculations, and fabrication drawings.
  - 2.2 Request that fabrication/installation of Architectural Precast Concrete comply with:

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- 2.2.1. PCI Design Standard: Comply with the recommendations of PCI's MNL-120 "PCI Design Handbook-Precast and Prestressed Concrete" applicable to types of architectural precast concrete units indicated.
  - 2.2.2. PCI Quality-Control Standard: Comply with requirements of PCI's MNL-117 "Manual for Quality Control for Plants and Production of Architectural Precast Concrete Product," including manufacturing procedures and testing requirements, quality-control recommendations, and dimensional tolerances for types of units required.
  - 2.2.3. Calculated Fire-Test-Response Characteristics: When fire-resistance-rated assemblies are indicated, provide architectural precast concrete units whose fire resistance has been calculated according to PCI's MNL-124 "Design for Fire Resistance of Precast Prestressed Concrete" and is acceptable to authorities having jurisdiction.
  - 2.2.4. Request that Architectural Precast Concrete be coated with clear penetrating water repellent coatings, specified in Division 7.
  - 2.2.5. Prohibit field patching unless reviewed and accepted by Architect.
  - 2.2.6. Request that Architect must review and accept first full unit cast before fabrication of either panels/elements.
- 2.3 Specify thru-wall flashing for veneer composite wall. Specify type, location and spacing of weep holes.
- 2.4 Specify waterproofing on exterior side of composite backup wall.
- 2.5 Specify water repellent coating in Division 7 for decorative Masonry Veneer walls.
3. The Fabricator/Installer of Exterior Materials/Finishes:
- Fabricator shall have a minimum of ten years of experience in producing units similar to those required for project. Installer of the Masonry Wall products shall have a minimum of 5 years experience in projects of similar scale and complexity.
4. The architect shall make provisions to ensure that the contractor does not proceed with installation until unsatisfactory field conditions have been corrected. The architect shall ensure that the contractor coordinates with installers of other work about specific requirements for the placement of reinforcement, anchors, ties, flashing, and other similar items to be built into stone masonry veneer.
5. The Architect shall request shop drawings showing location and extent of each application and installation details, together with structural calculations signed and sealed by structural engineer registered in the State of Texas.

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6. Request samples for verification for each color, texture, and pattern specified, showing the full range of variations expected in these characteristics.
7. Request maintenance data indicating cleaning procedures and recommended cleaning agents.

End of Division 4 – Stone and Masonry