

DESIGN STANDARDS

1. **GENERAL:** This section covers standards for limited aspects of cast-in-place structural and architectural concrete. The Architect and their engineers shall otherwise follow applicable industry and regulatory standards.
2. Though not in common use as an exposed finish on the campus, cast-in-place architectural concrete may, in appropriate applications, be used with the approval of the University's Project Manager.
 - 2.1 Color and finish of the architectural concrete shall be chosen for consistency and ease of replication, long term stability, and ease of repair and maintenance. The Architect shall secure a "Design Reference Sample" during the selection of the project finishes for review and approval of the University's Project Manager and to provide the Contractor a clear representation of the expected field finish.
 - 2.2 The Architect shall require Contractor to first provide minimum 1'x1' samples for the initial approval of their proposed match to the Architectural cast-in-place concrete. Once approved, Contractor will provide a field mock-up for each type (color and finish). The scope of the mock-up will be as approved by the University's Project Manager. A suggested scope is to provide 3 4'x'4 samples to demonstrate the finish and consistency in its delivery.
 - 2.3 Architect shall require detailed formwork shop drawings showing all items that visually affect the final finish including form joints, inserts, embeds, and formwork ties.
3. Use continuous cast-in-place water stops in all below grade cast-in-place concrete structure to form a continuous diaphragm.
 - 3.1 Place in accordance with the manufacturer's instructions.
 - 3.2 Coordinate the details for joint widths, embedment, and block-outs as required for architectural details including waterproofing, building expansion joints, and architectural finishes.
 - 3.3 Coordinate the placement and waterproofing details for all below grade mechanical and electrical penetrations to ensure penetration is water tight.
4. Cast-in-place Concrete Slabs:
 - 4.1 Architect shall confirm surface flatness and levelness tolerances for all slab construction with the University's Project Manager for the intended building use.
 - 4.2 Architect shall recommend to the University's Project Manager for approval slab finishes for various areas of the building. Such finishes and their typical use included:
 - 4.2.1 Scratch Finish: While plastic, texture concrete surface that has been screeded and bull floated or darbied. Use stiff brush, broom, or rake to produce a profile amplitude of

¼” in one direction.

Typical Uses: Glass to receive concrete topping or setting beds and high slope exterior vehicular ramps.

4.2.2 Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Re-straighten, cut down high spots, and fill low spots. Repeat float passes and re-straightening until surface is left with a uniform, smooth, granular texture.

Typical Uses: Slabs to receive fluid-applied or sheet waterproofing, built-up roofing, or sanded terrazzo.

4.2.3 Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and re-straighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.

Typical Uses: Slabs to receive resilient flooring, carpet, ceramic, or quarry tile over membrane waterproofing, paint, or other thin-film-finish coating system. Rooms such as mechanical, electrical, or other service areas with exposed slabs.

4.2.4 Trowel and Broom Finish: Apply first trowel finish to surfaces. While concrete is still plastic, lightly scarify surface with a fine to medium bristle broom. Run brooming perpendicular to direction of traffic movement.

Typical Uses: Exterior concrete platforms, steps, and ramps. Parking garage parking and drive surfaces.

4.2.5 Slip Resistive Finish: Before final float, apply slip-resistive finish according to the aggregate manufacturer’s written instructions.

Typical Uses: Concrete stair treads, platforms, and ramps.

5. Quality Assurance

5.1 Require that the ready-mixed concrete products supplier be experienced and that they comply with ASTM C 94/C 94M for production facilities and equipment.

5.2 Require that an independent Concrete Testing Service, qualified according to ASTM C 1077 and ASTM E 329, be engaged for appropriate materials testing related to the cast-in-place concrete work..

5.3 The Architect shall include the requirement for a pre-installation field conference to include representatives of the University, the Architect, the Contractor, subcontractors responsible for the cast-in-place concrete, ready-mix supplier and testing labs, to review:

5.3.1 mix design approvals

5.3.2 inspection and testing procedures, hot / cold weather concreting procedures

5.3.3 shoring and re-shoring procedures

5.3.4 special construction including expansion joints and embed placement

5.3.5 construction tolerance requirements and floor/slab flatness and levelness

5.3.6 and any special requirements related to the particular project requirements.

PRODUCT STANDARDS

1. The Architect shall require that materials utilized in the fabrication and placement meet the current and applicable ASTM system of materials requirements, including but not limited to Portland cement, aggregate, sand, reinforcing, water and admixtures.
2. The University desires that only customary and historically proven admixture be used in the concrete mix designs for their project. Where the structural engineer believes that the use of a special admixture or mix design to meet unique or demanding project requirements the engineer will present a request with supporting documentation for approval to the University's Project Manager.
3. Color Pigments: ASTM C979, synthetic mineral-oxide pigments; color stable, non-fading and resistant to lime and other alkalis.
4. Waterstops:
 - 4.1 Floor and slab curing agents:
 - 4.2 For all slabs that are to receive an adhered floor covering require that a resin dissipating curing compound be used. Require that the Contractor follow the curing agent manufacturer's guidelines to be sure that all traces of the agent has been removed prior to the application of the floor covering.
 - 4.3 For floors and slabs to remain exposed such as mechanical, electrical, telecommunications and storage, use a chemical hardeners and anti-dusting agents designed to be applied as a part of the curing process.
 - 4.4 For floors and slabs used in the drive and parking areas of a vehicular parking structure, use penetrating liquid floor treatment consisting of clear, chemically active, waterborne solution of inorganic silicate or silicate materials and proprietary components; odorless; colorless; that penetrates, hardens and densifies the concrete surfaces.

PERFORMANCE STANDARDS

Not used.

End of Division 3 – Cast-in-Place Concrete