

Division 03: Concrete

Refer to **CPSM 6.3 CONCRETE DESIGN STANDARDS** for requirements which must be incorporated into all projects. In the case of a conflict between these Design Standards and the CPSM, the CPSM shall take precedence.

03.1. General

- a. All construction documents proposing new structural concrete placement shall include the Statement of Special Inspections in accordance **CPSM 5.15 STRUCTURAL AND SPECIAL INSPECTIONS**.
- b. A comprehensive concrete placement specification should be used on all projects. "Comprehensive" project specific specifications include but are not limited to coordinating work, submittal requirements, mix designs, reinforcing criteria, placement tolerances, finish requirements, curing, testing and inspection criteria.
- c. It is critical that the project specifications require a pre-installation conference attended by the A/E, ODU Project Manager, ODU Project Inspector, Testing Firm, Contractor and relevant Subcontractors to review project requirements and establish acceptable quality levels for all concrete surfaces prior to the placement of any concrete on the project. This does not apply to sidewalk placement or other small projects as determined by the ODU Project Manager.
- d. The inspector and/or testing agency should establish a Standard Quality Control Check List to monitor the placement and finishing of all concrete surfaces.
- e. The inspector and/or agency shall spot check batch times & delivery tickets for proper psi, etc. for large pours. The general contractor shall notify the ODU Project Manager of the need for an inspection at least 24 hours in advance and shall use **APPENDIX U – PROJECT INSPECTION REQUEST** form.
- f. The University shall engage the services of the concrete testing laboratory, per the CPSM, to perform the sampling, cylinder preparation and delivery, testing and reporting. The Contractor shall be responsible for adequate advance notice to the testing laboratory for the Contractor's concrete pours/placement.
- g. The Contractor is responsible for assuring that all exposed concrete surfaces are not vandalized prior to the concrete initial setting. If refinishing or replacement is required due to vandalism during the initial setting the Contractor shall replace the concrete at no cost to the Owner.
- h. Refer to **DIVISION 1 – GENERAL REQUIREMENTS** additional information.
- i. Penetrations and openings shall be located on structural drawings.

03.2. Concrete Mixes

- a. All concrete shall have a minimum 28-day concrete compressive strength of not less than 3,000 psi.

03.3. Cast-in-Place Concrete

- a. Exposed aggregate surfaces shall not be used in building elements without prior approval by the University Architect.
- b. Interior and/or exterior structural concrete surfaces shall not be scheduled to receive a sandblasted finish unless specifically approved by the University Architect.
- c. Fly ash and slag shall not be used in architecturally exposed concrete due to discoloration.
- d. Refer to **DIVISION 1 – GENERAL REQUIREMENTS** for exterior mock ups of architectural concrete.
- e. Chamfer exterior corners and edges of permanently exposed concrete.

- f. Release agents shall meet all current EPA requirements. Only non-staining, water-based agents shall be used.
- g. Finish Quality
 - i. The A/E shall assure that flatness and levelness requirements are specified for concrete floors scheduled to receive finishes. The concrete specification must match the requirements of the finish material and subsequent construction.
 - ii. Special consideration shall be paid to concrete floor slabs that will receive compact rolling shelving now or in the future. Coordinate concrete slab requirements with the compact rolling shelving manufacturer.
- h. Curing
 - i. Wet curing is preferred.
 - ii. Use of a curing compound must be approved and is limited to instances where application of moisture is impractical; where application of such compounds will not jeopardize appearance of concrete or bond to additional concrete; and where concrete surface is to be finished with paint, tiles, waterproofing, roofing, chemical seal or other final finishes. Compatibility with proposed finishes must be confirmed. Curing compound shall be used and applied with uniform thickness and other recommendations by manufacturers including application requirements where surfaces are exposed to sunlight.
 - iii. Concrete Mixing: Contractor to provide batch ticket for each Ready Mixed batch discharged and used in the Work, indicating project identification name and number, date, mix type, mix time, quantity and amount of water added. Record approximate location of final deposit in structure.

03.4. Steel Reinforcement:

- a. Comply with Concrete Reinforcing Steel Institute's recommendations for fabricating, placing and supporting reinforcement.
- b. Secondary Reinforcement
 - i. Use of fibrillated polypropylene fiber for secondary reinforcement to control surface cracking in exposed concrete slabs on grade is encouraged. However, fibrillated polypropylene fiber is not a substitute for reinforcing for structural and expansion/contraction requirements.

03.5. Footings

- a. At the contractor's option, clean cut earth forms are acceptable for non-exposed concrete footings where soil is stable enough to permit it. Where earth forms are used, footing width shall be increased a minimum of 3" each side (6" total).
- b. The horizontal ledge, or top of all footings, shall be parged away from the vertical surface of the foundation and incorporated into the below-grade damp or water-proofing foundation design.

03.6. Foundations

- a. Where finished floor is below adjacent exterior grade, provide exterior drain tile that drains to daylight or an approved stormwater system.
 - i. Drain tile shall be located adjacent to the bottom of the footing.
 - ii. Drain tile shall be protected against infiltration of stone or fine granular material by the use of a "sock" or other approved encasing material.
 - iii. If pile foundations are required, consideration of vibration monitoring shall be discussed with the ODU Project Manager for any adjacent structures. Quantity and location of test piles will be

determined by an independent laboratory in cooperation with the A/E. The laboratory will locate the test piles such that if the test piles meet the project requirements, they may be used in the building foundation system.

03.7. Slab on Grade

- a. Slab on grade floors in all academic, public use and service buildings; and public use, mechanical, laundry and storage rooms in buildings on campus shall be minimum five inches (5") thick with WWF 6x6- W2.9xW2.9 minimum reinforcing. Reinforcing top cover shall be one inch (1") minimum to two inches (2") maximum.
- b. The A/E shall provide project specific concrete specification where terrazzo flooring shall be installed and shall include a control joint plan at terrazzo locations following manufacturer's recommendations to avoid cracking.
- c. Slabs shall have a minimum 6" porous fill below vapor barrier. Porous fill shall be sand with no more than 5% fines. Porous fill shall be deeper where recommended by geotechnical engineering report. Install, protect and repair vapor-barrier sheets (minimum of 15- mils, reinforced) according to manufacturer's specifications. Place sheets in position with longest dimension parallel with direction of pour. Lap joints 6 inches and seal with manufacturer's recommended tape. Under-slab vapor barrier shall be continuous, extending under and around all sides of the building footing and incorporated into the exterior foundation water-proofing system. Repair damage and reseal vapor barrier before placing concrete. Repairs to the vapor barrier shall be reviewed by the project inspector prior to being covered up.
- d. Limit the number of vapor barrier penetrations. The A/E shall specify requirements for vapor barrier penetrations. General Contractor to review intent for repairs with PI when anticipating vapor barrier disruptions or damage due to work sequence or other circumstances.
- e. Exposed interior concrete floors shall be sealed in accordance with the building design using a penetrating sealer. A hardener shall be required where the floor surface is subject to heavy, impact, and/or rolling loads. Acrylic sealants are not desirable.
- f. All slabs on grade shall incorporate an approved expansion joint at all slab edges.
- g. Strip Waterstops shall be used for cast-in-place concrete at a minimum and where they are shown on drawings and where new concrete pours meet existing concrete or masonry surfaces.
- h. Slabs with Terrazzo Finish: Concrete slabs to receive a terrazzo finish shall be cured for at least 28 days. Slabs shall be flat (not exceeding 1/4" in 10 foot span) and have a steel troweled finish. Slab control joints and construction joints shall be coordinated with the A/E.

03.8. Stair Treads and Landings

- a. Ensure that the placement/screening method for stairwells and landings is uniform, flat and/or properly sloped. Stair treads are to slope down 1/8" per foot interior, 1/4" per foot exterior, riser to nose. A screed template is to be used for stair treads to assure consistency.
- b. A/E should monitor and coordinate with the ODU project manager to ensure that the requirements for floor finishes are acceptable on all concrete filled stairs.
 - i. All exterior concrete stairs shall have cast aluminum nosings provided with integral anchors. Bituminous paint to be applied to concealed surfaces of nosings.
 - ii. Provide temporary protection for nosings on interior concrete steps. Treads of exposed concrete steps shall be provided with non-slip surface.

- c. All exterior stairs, exposed to weather, shall be cast concrete including all stairs in parking garages. Concrete filled, metal pan stairs are not allowed in these instances.

03.9. Architectural Precast Concrete

- a. Fabrication Qualifications: Engage a firm experienced in producing architectural pre-cast concrete units and fabricator must participate in the Pre-Cast/Pre-Stressed Concrete Institute's (PCI) Plant Certification Program and be designated a PCI certified plant for Group A1-Architectural Concrete at the time the project is bid.
- b. The A/E and/or ODU Project Manager shall visit the precast concrete plant. The university reserves the right to engage a 3rd party to inspect the precast concrete plant.

03.10. Elevated Slabs: **REFER TO CHAPTER 4 - DIVISION 5 METALS**

03.11. Sidewalks and other site concrete – refer to **CHAPTER 3 – CAMPUS DESIGN** for requirements.