

DIVISION 3 – CONCRETE

3.1 ACI Requirement

All concrete work shall be in compliance with the American Concrete Institute, latest edition, including reinforcement and finishes.

3.2 Reinforcement Requirements

All reinforcing shall be fabricated, installed and supported in accordance with the “Manual of Standard Practice” of the Concrete Reinforcing Steel Institute.

All reinforcement bars shall conform to the ASTM Specification Designation A615, Grade 60. Support for reinforcing shall be provided by protected metal spacers, chairs, bolsters, and/or ties.

3.3 Concrete Type

Concrete shall be composed to Type I Portland Cement conforming to ASTM C150, fine and coarse aggregates conforming to ASTM C33, and mixing water free of oil , acid, or injurious amounts of alkalis and other salts. Accelerating and decelerating admixtures are not permitted. Water-reducing admixtures conforming to ASTM C494 Type A may be used, however, their use shall not relax the maximum allowable slump noted herein. Air-entraining admixtures shall conform to ASTM C260.

3.4 Properties

Physical properties of the concrete shall be as identified on the table below:

	Minimum Compressive Strength	28-day	Maximum Allowable Slump	Air Entrainment
Footings	3,000 psi		3 inches	Not Required
Column Piers & Foundation Walls	4,000 psi		4 inches	Required
Floor Slabs	4,000 psi		4 inches	Not Required
Exterior Concrete Slab	4,000 psi		4 inches	Required
Office Slab	4,000 psi		4 inches	Not Required

Where noted as required, air entrainment of 4.5% (+ or – 1%) shall be achieved. Mix designs shall be submitted to FXG for review prior to placement of concrete.

3.5 Floors, Pavements, and Reinforcements

- A. Dock, Garage, Maintenance Area, and Switchgear Room floors shall be a minimum 6” thick, concrete slab reinforced with macro – synthetic fibers in lieu of welded wire fabric. Dock floor shall be capable of supporting 150 psf loads.
- B. Office floor shall be a minimum 4” thick, concrete slab reinforced with macro – synthetic fibers in lieu of welded wire fabric.
- C. Exterior concrete pavements, including aprons and dolly pads, shall be a minimum 8” thick and reinforced with macro – synthetic fibers, unless noted otherwise (refer to Drawings for locations of exterior concrete pavements). All concrete pavement and floor slabs shall be installed over a minimum 4” base course of compacted 1” slag or crushed stone placed over compacted subgrade. Thicknesses

on Drawings, where shown, shall govern over Specifications. Construction joints in footings and walls shall be keyed. Key shall measure 3/4" deep by 1-1/2" wide for walls or slabs 6" or less in thickness, and 3/4" deep by 2" wide for walls or slabs 8" to 12" thick. Key shall measure 1-1/2" deep by 3-1/2" wide for strip footings. Top and bottom of keys shall be tapered 10 degrees. Construction joints for poured concrete shall be spaced no greater than 150'-0" center-to-center. Reinforcing in strip footings shall be continuous through all construction joints.

- D. Macro – Synthetic Fiber Reinforcement: Macro – synthetic fiber reinforced concrete shall provide a minimum post – crack equivalent flexural strength of 250 psi as measured by ASTM C-1399 and shall meet the requirements of ASTM C-1116 for the type III synthetic fibers. Minimum tensile strength shall be 70 ksi (when tested by ASTM D-2256). Minimum aspect ratio will be 70. Minimum fiber length 1- 1 / 2 “. Add synthetic macro fibers to the concrete mix at a rate of 3.0 to 5.0 pounds per cubic yard of concrete as instructed by the fiber manufacturer. Synthetic macro fibers shall be : “ TUF – STRAND SF “ by the Euclid Chemical Company (1-800-321-7628), or approved equal.
- E. The use of a water reducing superplasticizer admixture to increase the workability of the concrete is permitted. Use Eucon 37, by the Euclid Chemical Company, or approved equal. Said admixture will be added during the batching process in strict compliance with the manufacturer’s Directions for Use.

3.6 Quality and Finish of Work

- A. All work directly related to, and associated with, the placement of concrete shall be performed in accordance with ACI 301-02 “Specification for Structural Concrete”.
- B. All concrete work shall be free of the formation of laitance, cold joints, voids, and surface defects.
- C. Any concrete defects, including surface defects, shall be remedied, or otherwise corrected, in accordance with ACI 301-02 “Specifications for Structural Concrete”.
- D. Concrete finishes shall be as defined by ACI 301-02 “Specification for Structural Concrete, and shall be applied as follows:
 - 1. Vertical exposed formed surfaces: Smooth form finish
 - 2. Horizontal surfaces:
 - a. P&D van Dock floor area only: Light broom finish
 - b. All other Dock floor areas: Steel trowel finish
 - c. Office Floor: Steel trowel finish
 - d. Garage (if any): Steel trowel finish
 - e. Ramps (if any): Broom finish

3.7 Interior Floor Sealers

- A. All interior floor areas, including warehouse (unless noted otherwise) not receiving final floor coverings shall receive a “SUPER Floor Coat” floor sealer as manufactured by The Euclid Chemical Company (1-800-321-7628), or approved equal. Spray apply according to manufacturer’s directions to achieve a 300 square foot per gallon coverage. Ozone Transport Commission (OTC) compliance: For areas requiring OTC Regulation compliance for VOC ; substitute “ Super Diamond Clear VOX” by the Euclid Chemical Company (1-800-321-7628), or approved equal.

NOTE: FOR AUTOMATED SATELLITES ONLY. The P&D van floor area shall receive a “Eucothane VOX” floor sealer as manufactured by The Euclid Chemical Company or approved equal. Apply in strict accordance with the manufacturer’s recommendations.

- B. Garage Floor (if any): Floor sealer shall be Koester VAP 1 2000 One coat waterproofing system, as manufactured by Koester American Corporation at (757)425-1206, www.koesterusa.com. Strictly follow the manufacturer's surface preparation and application instructions.

3.8 Control Joints

All concrete slabs shall be saw cut as soon as the concrete will support the sawing equipment and does not ravel during the sawing operation. All saw cutting shall be performed the same day the concrete is placed. Saw cuts shall be 1/8" wide with depths of at least 25% of the slab thickness. Jointing pattern shall be in a square pattern, with maximum spacings of 15'-0" for 6" thick slabs and 20'-0" for 8" thick slabs, unless noted otherwise.

3.9 Curing

- A. All concrete flat work shall be covered immediately following saw cutting and maintained continuously wet for a minimum of seven days after placing. Curing sheets shall be used, and are to remain in place, during this period. Curing compound may be used on vertical surfaces only, and must be applied per manufacturer's recommendations.
- B. The foundation, including foundation walls for the structure, shall be reinforced concrete and designed by a Professional Engineer, who shall give due consideration to the subsurface conditions at the site and the design requirements of the local building code. Wall thicknesses shall not be less than that shown on the Drawings.

3.10 Grounding Installation

Concrete contractor shall make certain that the conductor for building steel grounding has been installed before pouring concrete.

3.11 Flyash Admixture

The use of flyash is permitted when used in accordance with ACI document 232.2R-96, "Use of Flyash in Concrete," limited to 15% max content.

Permissible type: Strictly limited to Type 'C' and Type 'F'.

END OF SECTION

