**SECTION 03300**

**CAST-IN-PLACE CONCRETE**

1. **GENERAL**
	1. WORK INCLUDED
		1. Work in this section includes all cast-in-place concrete applications.
		2. The work shall include the providing of all proper materials, equipment, tools, accessories, labor and services required to install the water system, complete-in-place, using sound standard engineering techniques and construction practices.
		3. Reference specifications are referred to by abbreviations as follows:

ACI - American Concrete Institute

ASTM - ASTM International

CRSI - Concrete Reinforcing Steel Institute

* + 1. Concrete work shall meet requirements of ACI 318 “Building Code Requirements for Reinforced Concrete”, latest edition.
		2. Submit all concrete mix design to the Engineer for approval.
		3. Certain concrete structures may be allowed to be precast. Specifications and dimensions for cast-in-place also apply to all precast concrete.
		4. Contractor shall adhere to the following references at a minimum:
			1. ACI 318 – Building Code Requirements for Structural Concrete
			2. ACI 301 – Specifications for Structural Concrete
			3. ACI 305 – Guide to Hot Weather Concreting
			4. ACI 306 – Guide to Cold Weather Concreting
			5. CRSI – “Placing Reinforcing Bars”
			6. ASTM C33 – Standard Specification for Concrete Aggregates
			7. ASTM C94 – Standard Specification for Ready Mix Concrete
			8. ASTM C618 – Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
			9. ASTM C150 – Standard Specification for Portland Cement
			10. ASTM C260 – Standard Specification for Air-Entraining Admixtures for Concrete
			11. ASTM C494 – Standard Specification for Chemical Admixtures for Concrete
1. **PRODUCTS**
	* 1. Concrete work shall meet the requirements of ACI 301 “Specification for Structural Concrete for Buildings”, with the following modifications and supplements:
		2. Work and materials shall be type as specified on Drawings, Standard Details, or elsewhere in the Contract Documents.
		3. Cement: ASTM C150 as follows:
			1. Type 1 for general purpose, above grave concrete
			2. Type 2 for slabs, thrust blocks, or other concrete structures in contact with soil and/or water
			3. Other types when specified elsewhere in the Contract Documents by the Engineer
		4. Aggregates: ASTM C33 and as herein specified. Provide aggregates from a single source for all exposed concrete.
		5. Fine aggregate: Natural sand, manufactured sand, or a combination thereof, free from loam, clay, lumps, or other deleterious substances.
		6. Coarse aggregate: Clean, uncoated, processed aggregate containing no clay, mud, loam, or foreign matter as follows:
			1. Crushed stone, processed from natural rock or stone.
			2. Washed gravel, either natural or crushed. Use of pit or bankrun gravel is not permitted.
			3. Maximum aggregate size is to be no larger than:
				1. 1/5 of the narrowest dimension between sides of forms,
				2. 1/3 or the depth of slab
				3. 3/4 of the minimum clear spacing between individual reinforcing bars or bundles of bars.
				4. These limitations may be waived if, in the opinion of the Engineer, workability and methods of consolidation are such that concrete can be placed without honeycomb or voids.
		7. Unless otherwise noted on Drawings, Standard Details, or elsewhere in the Contract Documents, concrete strengths shall be as follows:
			1. High Early concrete – 3000 psi at 24 hours
			2. Standard concrete – 4000 psi at 28 days
		8. Concrete shall be air-entrained. Maximum air entrainment shall be 4% to 8%.
		9. No admixtures will be permitted except for pozzolanic admixutres, air-entraining admixtures, and/or water-reducing admixtures meeting ASTM C494. Water-reducing admixtures used must be approved in writing by Engineer.
		10. Pozzolanic admixture (fly ash) shall meet requirements of ASTM C618 and shall be limited to a maximum of 15% by weight of cementitious materials.
		11. The minimum cement content shall be 6 bags/yd3.
		12. Maximum water/cement ratio (by weight) shall be 0.5 for all structures.
		13. Reinforcing steel shall be ASTM A615 Grade 60. Welded wire fabric shall be ASTM A185.
		14. Welding of rebar shall be done only with written permission of Engineer.
		15. Unless otherwise note, reinforcing steel splices shall be Class B.
2. **EXECUTION**
	* 1. Minimum curing time before removing forms shall be 7 days except that it shall be reduced to 3 days for high-early.
		2. Earth cuts may be used as forms only for footings and those portion of thrust blocks bearing called for to bear directly against undisturbed earth.
		3. Reinforcing steel shall be placed in accordance with CRSI handbook referenced above.
		4. All concrete shall be placed in accordance with ACI 301, 305, 306, and 318

END OF SECTION