

5.01 SCOPE OF WORK

The work under this section shall include all materials, labor and equipment necessary to achieve a finished product, including but not limited to the items in these specifications and those shown on the working drawings. Work includes, but is not limited to building footings, floor slabs, sidewalks, curb and gutter, driveways, etc.

All procedures and materials under this section, where not specifically stated, shall be in accordance with standards and recommendations of the American Concrete Institute's Building Code Requirements for reinforced concrete (ACI 318 - latest edition).

5.02 MATERIALS

- A. Cement: Portland cement shall conform to "Standard Specifications for Portland Cement" (ASTM C150 - latest edition) and shall be Type I, IA, III or IIIA.
- B. Aggregates: Concrete aggregates shall conform to "Standard Specifications for Concrete Aggregates" (ASTM C33 - latest edition). Maximum coarse aggregate size for all members less than eight (8) inches in thickness shall be 3/4 inch. For members with thicknesses greater than or equal to eight (8) inches, the maximum coarse aggregate size shall be 1-1/2 inches.
- C. Mixing Water: All water used in concrete shall be from a potable water supply.
- D. Admixtures: Air-entraining admixtures shall conform to "Standard Specifications for Air-Entrained Admixtures for Concrete" (ASTM C260 - latest edition).
- E. Concrete Mix Proportions

Section 4.3.1. (ACI-318) shall be used for developing mixture portions. The Contractor shall furnish, for the Engineer's approval, all records to show that his concrete supplier is in compliance with all provisions of Section 4.3.1. If the concrete supplier is unable to furnish all records to comply with Section 4.3.1, Sections 4.3.1.2 and 4.3.2.2 can be used. If no records are available for any of the above ACI Sections, Section 4.3.3.2 shall be used to develop a concrete mix design.

5.03 EXECUTION

A. Concrete Quality

All concrete shown on the working drawings or referred to in the specifications shall be from an approved batch plant and shall have a minimum compressive strength of 2500 psi and a maximum water-cement ratio of 0.64.

Air entrainment shall be 5%, more or less, 1% for concrete with maximum aggregate size of 1-1/2 inches and shall be 6%, more or less, 1% for concrete with a maximum aggregate size of 3/4 inch.

The concrete shall be of a consistency to work easily into corners, angles of forms and around reinforcement. The slump shall not exceed 4 inches.

B. Mixing And Placing Concrete

1. Preparation of Equipment and Place of Deposit:

- a. Before placement, all equipment for mixing and transporting the concrete shall be cleaned and all debris and ice shall be removed from the places to be occupied by the concrete. Forms shall be thoroughly wetted (except in freezing weather) or oiled and masonry filler units that will be in contact with concrete shall be well drenched (except in freezing weather).
- b. Water shall be removed from place of deposit before concrete is placed unless otherwise permitted by the Engineer. All latents and other unsound material shall be removed from hardened concrete before additional concrete is added.
- c. Expansion joint material shall be placed at all locations where concrete is placed against a structure.

2. Mixing:

- a. Ready mixed concrete shall be mixed and delivered in accordance with "Standard Specification for Ready Mixed Concrete (ASTM C94 - latest edition). Mixing and transporting equipment shall be capable of providing concrete which meets the ASTM C94 requirements for uniformity.
- b. For job mixed concrete, the mixer shall be rotated at a speed recommended by the manufacturer. If mixer performance tests are not made, each batch of 1 cubic yard or less shall be mixed for at least 1 minute after all materials are in the mixer. The mixing time shall be increased 15 seconds for each additional cubic yard or fraction thereof. The entire batch shall be discharged before the mixer is recharged.

3. Conveying:

- a. Concrete shall be conveyed from the mixer to the place of final deposit by methods that will prevent separation or loss of materials.
- b. Equipment for chuting, pumping and pneumatically conveying concrete shall be of such size and design as to ensure a practically continuous flow of concrete at the delivery end without separation of materials.

4. Placing:

- a. Concrete shall be deposited, as nearly as practicable, in its final position to avoid segregation due to rehandling or flowing. Concrete shall be placed at such a rate that it is at all times plastic and flows readily. No concrete contaminated by foreign material shall be used nor shall retempered concrete be used unless approved by the Engineer.
- b. When placing is started, it shall be carried on as a continuous operation until placement is completed.
- c. All concrete shall be thoroughly consolidated during placement. It shall be thoroughly worked around embedded fixtures and into the corners of the forms.

5. Cold Weather Requirements:
 - a. Adequate equipment shall be provided for heating concrete materials and protecting concrete during freezing or near-freezing weather. No frozen materials or materials containing snow or ice shall be used.
 - b. All reinforcement, forms, fillers and ground with which the concrete is to come in contact shall be free from snow and ice.
 - c. Construction during cold weather shall be performed in accordance with ACI 306, "Recommended Practice for Cold Weather Concreting", or as directed by the Engineer.