SECTION IX. PORTLAND CEMENT CONCRETE

A. Specifications
B. Materials
C. Testing & Mixing
D. Placement
E. Contractor Responsibility

A. SPECIFICATIONS

Portland cement shall conform to the "Standard Specifications for Portland Cement", ASTM Designation C-150-56, and subsequent revisions or addendum, and shall be Type II. In areas where there is no exposure to sulfates in the soil or ground water, Type I cement is permissible.

1. Analysis: A certified analysis of the cement shall be presented to the City Engineer upon request.

2. Decrease of Content: Cement content shall not be decreased because of the addition of certain admixtures.

B. MATERIALS

1. Fine and Course Aggregates: Fine and course aggregates shall conform to the specifications for concrete aggregates, ASTM Designation C-33-57, and subsequent revisions or addendum.

2. Aggregate Size: The maximum size of the aggregate shall not be larger than one-fifth (1/5) of the narrowest dimension between forms of the member for which the concrete is to be used, nor larger than three-fourths (¾) of the minimum clear spacing between reinforcing.

3. Water: Water used in mixing concrete shall be clean and free from strong acids, alkalies, oils, salts, organic materials or other deleterious materials.

4. Number of Bags; Strength: The concrete shall contain a minimum of six (6) bags (94#/bag) cement per cubic yard, and have a minimum compressive strength at twenty eight (28) days of four thousand (4,000) psi.

5. Frozen Materials: No frozen materials or materials containing ice shall be used. All concrete materials, forms, fillers and ground with which the concrete is to come in contact shall be free from frost. Whenever the temperature of the surrounding air is below forty

degrees Fahrenheit (40°F), all concrete, when placed in forms, shall have a minimum temperature of fifty five degrees Fahrenheit (55°F), and shall be maintained at a temperature of not less than forty degrees Fahrenheit (40°F) for at least seventy two (72) hours.

6. City's Right of Refusal: The City or the City Engineer reserves the right to forbid the use of material from any plant, pit or source when the character of material, equipment in use or the method of operation is such as to make it doubtful that a reasonable uniform class of material will be furnished.

C. TESTING & MIXING

Not less that one test shall be made for each two hundred fifty (250) cubic yards of concrete, nor less than one test for each day's concreting. Proper mixing shall be accomplished either by truck or by stationary mixers.

D. PLACEMENT

1. Preparation for Deposit: The place of deposit shall be prepared by adequate forming, proper compaction, necessary drainage and sufficiently moistened to minimize loss from the freshly placed concrete. Plywood forms shall be in a condition to prevent blowouts or stripping of the plies that leave wood particles in the finished concrete surface.

2. Joining New Concrete to Old: In joining new concrete to old, the old concrete shall be thoroughly soaked with water for seventy two (72) hours immediately preceding the placing of the new concrete. All surface film shall be removed from the old concrete, the surface roughened and thoroughly washed to remove loose particles. The methods employed to prepare the surface of the old concrete shall be approved by the City Engineer in advance. A layer or mortar of the same proportions and consistency as the mortar used in the new concrete shall be thoroughly broomed into the surface of the old concrete, immediately before the new concrete is placed, but no pools of water shall be permitted on the surface of the old concrete when the mortar is placed.

3. Transporting: The transporting equipment shall be such as to deliver the concrete to the place of use without segregation and without undue loss of moisture.

4. Placing: If the concrete is being placed in walls or structures more than five feet (5') high, it shall be deposited into final position by means of elephant trunks, tremies or similar equipment, and the maximum lateral movement of the concrete from any point or deposit shall not be more than five feet (5'). It shall be deposited in even layers, not more than eighteen inches (18") in depth, and each layer shall be thoroughly puddled and worked with appropriate tools into the preceding lift and next to the forms to ensure a smooth surface

and the removal of air pockets. Particular attention shall also be given to working of the concrete around reinforcing steel and embedded fixtures in such manner as to produce a continuous homogeneous mass filling all corners and eliminating segregation of aggregate and air pockets.

5. Compaction: An internal vibrator shall then be inserted vertically at intervals of from eighteen inches (18") to thirty inches (30"), depending on the thickness of the concrete. It shall be held in position and gradually withdrawn when air bubbles no longer come to the surface, this will usually require from five (5) to fifteen (15) seconds. All concrete shall be vibrated shall not permitted to come in contact with the forms, the reinforcing steel or embedded fixtures or to over-vibrate the concrete at any point. Concrete shall not be transported laterally by means of vibrators.

6. Removal of Forms: Forms may be removed when the concrete has sufficient strength to carry its own weight and the loads upon it with safety (approximately 75 percent of design strength).

7. Finish: Finishing shall provide a pleasant appearing surface, as well as a protective coat against weathering effects.

8. Curing: All concrete surfaces shall be cured for a period of seven (7) days by keeping the surface of the concrete continually visibly moist. An acceptable curing compound/sealer may be substituted for water.

E. CONTRACTOR RESPONSIBILITY

In all cases, the contractor shall assume all responsibility arising from preparing, placing and the removal of forms, and shall assure himself/herself that the concrete is properly cured to sustain loads before forms are removed.