

SECTION 03000 - CONCRETE

PART 1 - GENERAL

1.1 WORK INCLUDED IN THIS SECTION

A. The WORK of this Section includes concrete materials, mixing, placement, formwork, reinforcement and curing.

PART 2 - PRODUCTS

2.1 CONCRETE

- A. All Portland cement concrete shall conform to the provisions of Section 201, 202 and 303 of the Standard Specifications for Public Work Construction (Green Book), latest edition.
- B. The following classes of concrete, as described in the Green Book, Section 201-1.1.2, shall be used:

CLASSES OF CONCRETE		
Class	Type of Work	Max. Slump (Inches)
560-C-3250	All reinforced structures, manhole bases, piers, vaults	4
450-C-2000	Anchors, thrust blocks, encasements, cradles, and miscellaneous unreinforced concrete	4

Maximum water/cement ratio for each of the above classes shall be 0.55.

C. In certain circumstances, rapid setting concrete may be required. Calcium chloride or other accelerating admixtures shall be added to the concrete mix as directed by the DISTRICT.

2.2 GROUT

- A. Grout shall be composed of one (1) part Type II Portland Cement to one and one-half (1-1/2) parts sand.
- B. The sand shall be washed, well-graded sand such that all will pass a No. 8 sieve.
- C. Water shall be clean potable water. The quantity of water to be used in the preparation of grout shall be the minimum required to produce a mixture sufficiently workable for the purpose intended.

- D. Grout shall attain a minimum compressive strength of 2,000 psi in 28 days.
- E. Rapid setting, non-shrink, "5-minute" grout may be required in certain circumstances.

2.3 REINFORCING STEEL

- A. Reinforcing steel shall conform to ASTM A 615, Grade 60.
- B. Reinforcing steel shall be fabricated in accordance with the current edition of the Manual of Standard Practice, published by the Concrete Reinforcing Steel Institute.
- C. Reinforcing steel shall be delivered to the site bundled and tagged for identification.

2.4 WELDED WIRE FABRIC

- A. Welded wire fabric shall conform to ASTM 185.

2.5 TIE WIRE

- A. Tie wire shall be a minimum of 16 gage, black, soft annealed.

2.6 BAR SUPPORTS

- A. Bar supports in beams and slabs exposed to view after form stripping shall be galvanized or plastic coated.
- B. Concrete supports shall be used for reinforcement in concrete placed on grade.

2.7 FORMS

- A. Forms shall be accurately constructed of clean lumber.
- B. Forms shall be braced to provide sufficient strength and rigidity to hold the concrete and to withstand the necessary pressure and consolidation without deflection from the prescribed lines.
- C. The surface of forms against which concrete is placed shall be smooth and free from irregularities, dents, sags or holes. The surface shall leave uniform form marks conforming to the general lines of the structure.

PART 3 - EXECUTION

3.1 FORMWORK

- A. The CONTRACTOR shall notify the DISTRICT a minimum of one working day before his intended placement of concrete to enable the DISTRICT to

check the form lines, grades, and other required items before placement of concrete.

- B. Before placing concrete, the form surface shall be clean and coated with form oil of high penetrating qualities where applicable.
- C. Unless otherwise indicated on the plans, all exposed sharp concrete edges shall be 3/4-inch chamfered.

3.2 REINFORCEMENT

- A. Reinforcing steel shall be placed in accordance with the current edition of Recommended Practice for Placing Reinforcing Bars, published by the Concrete Reinforcing Steel Institute.
- B. All reinforcing steel shall be of the required sizes and shapes and placed where shown on the drawings or as directed by the DISTRICT.
- C. Straightening or re-bending of reinforcing steel in a manner that will damage the material shall not be permitted.
- D. Bars with bends not shown on the drawings shall not be permitted
- E. All steel shall be cold bent - heat shall not be used.
- F. All bars shall be free from rust, scale, oil, or any other coating which would reduce or destroy the bond between concrete and steel.
- G. Reinforcement steel shall be positioned in accordance with the drawings and secured by using annealed wire ties or clips at intersections. Reinforcement steel shall be supported by concrete or metal supports, spacers, or metal hangers.
- H. Metal clips or supports shall not be placed in contact with the forms.
- I. Tie wires shall be bent away from the forms in order to provide the specified concrete coverage.
- J. Bars additional to those shown on the drawings, which may be found necessary or desirable by the DISTRICT for the purpose of securing reinforcement in position, shall be provided by the CONTRACTOR at no expense to the DISTRICT.
- K. Reinforcement shall be placed a minimum of 2 inches clear of any metal pipe or fittings.
- L. Reinforcement shall be secured in position such that it will not be displaced during the placement of concrete.
- M. All reinforcing steel and wire mesh shall be completely encased in concrete.

- N. Reinforcing dowels shall be secured in place prior to placing concrete. Dowels shall not be pressed into the concrete after the concrete has been placed.
- O. Minimum lap for all reinforcement shall be 40 bar diameters.
- P. Additional reinforcement shall be placed around the pipe or openings as indicated on the drawings.
- Q. Wire mesh reinforcement shall be rolled flat before being placed in the form. Wire mesh shall be tied and supported to prevent movement during concrete placement.
- R. Welded wire fabric shall be extended to within 2 inches of the edges of the slab. Splices shall be lapped at least 1 1/2 courses of the fabric and a minimum of 6 inches. Laps and splices shall be tied securely at ends and at least every 24 inches with 16-gage black annealed steel wire. The fabric shall be pulled into position as the concrete is placed by means of hooks. Concrete shall be worked under the steel to ensure that it is at the proper distance above the bottom of the slab.

3.3 EMBEDDED ITEMS

- A. All embedded bolts, dowels, anchors and other embedded items shall be held correctly in place in the forms before concrete is placed.

3.4 MIXING AND PLACING CONCRETE

- A. Concrete, either ready mix or batch mixed, shall be placed in the forms before taking its initial set.
- B. No concrete shall be placed in water except with permission of the DISTRICT.
- C. As the concrete is placed in the forms, or in excavations to be filled with concrete, it shall be thoroughly settled and compacted throughout the entire layer by internal vibration and tamping bars.
- D. All concrete surfaces upon or against which the concrete is to be placed, and to which new concrete is to adhere, shall be roughened, thoroughly cleaned, wetted, and grouted before the concrete is deposited.

3.5 CONCRETE FINISHING

- A. Immediately upon the removal of forms, all voids shall be neatly filled with cement mortar.
- B. Surfaces of concrete to be permanently exposed to view must be smooth, free from projections, and thoroughly filled with mortar.
- C. Exposed surfaces of concrete not finished against forms, such as horizontal or sloping surfaces, shall be screeded to a uniform surface and worked with suitable tools to a light broom finish.

3.6 PROTECTION AND CURING OF CONCRETE

- A. The CONTRACTOR shall protect all concrete against damage.
- B. Exposed surfaces of new concrete shall be protected from the direct rays of the sun and frost by being kept damp for at least two weeks after the concrete has been placed, or by using an approved curing process.

END OF SECTION