SECTION 03 30 00

CAST-IN-PLACE CONCRETE

PART 1: GENERAL

1.1 SCOPE OF WORK

Provide concrete for structures such as manholes, wastewater lift stations, valve or meter vaults, storage tanks, above ground junction boxes, thrust blocking, manhole bases, pipe encasement, curbs, sidewalks and pavement in accordance with this Specification Section. This section in not applicable to flowable fill.

1.2 SUBMITTALS

Subcontractor shall submit a certification from the concrete producer, as well as supporting data, stating that the cement concrete conforms to the compressive strength needed for the proposed project.

PART 2: PRODUCTS

2.1 MATERIALS

A. Portland Cement shall be Type I or Type III and conform to "Specification for Portland Cement" ASTM C150.

B. Air-Entraining Agent from approved manufacturer shall be added in accordance with manufacturer's directions to the normal Portland cement to entrain 4½ percent air ± 1 percent with all other ingredients and strength or as specified by Owner. Air-entraining admixtures shall conform to "Specifications for Air-Entraining Admixtures for Concrete" ASTM C260.

C. Concrete Aggregates shall conform to "Specifications for Concrete Aggregates" ASTM C33. Coarse aggregates shall be a maximum of 1½-inches in size in footings and plain concrete. Pea gravel shall be used for sections 3-inches or less in thickness.

D. Water used in mixing concrete shall be clean and free from injurious amounts of oils, acids, alkalis, organic materials, or other deleterious substances. In effect, the water used shall be potable water.

E. Reinforcing Bars shall be billet steel grade (60,000 psi minimum yield) conforming to the requirements of ASTM A615, Grade 60. Reinforcing bars shall be new stock, free from rust, scale, or other coatings that tend to destroy or reduce bonding. Epoxy coated rebar required?

F. Welded Wire Mesh shall conform to "Specifications for Welded Steel Wire Fabric for Concrete Reinforcements" ASTM A185.

G. Pre-molded Expansion Joint Material shall be provided where shown on the Drawings or directed by the Owner. This non-extruding compressible joint material shall conform to the requirements of "Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction", ASTM D1751.

2.2 CONCRETE MIXES

Ready-mixed concrete shall conform to "Specifications for Ready-Mixed Concrete", ASTM C94.

A. All concrete mixes shall produce a dense durable concrete. The minimum 28-day compressive strength of the concrete shall be:

1. 3,000 psi - thrust blocking, sidewalks, curbs and pipe encasement.
2. 4,000 psi – manhole, meter vaults and manhole bases, manhole channels, road pavement, walls and slabs for pump stations, meter vaults, foundations for water storage tanks, and the like.

B. Water/cement ratio for the concrete shall not exceed a maximum as shown in Table 4.4 of the ACI Standard 318 latest edition, Building Code Requirements for Reinforced Concrete, when strength data from field experience or trial mixtures are not available. A workable concrete with minimum slump of 3-inches and a maximum slump of 5-inches shall be produced without exceeding the water/ cement ratio.

PART 3: EXECUTION

3.1 FORMWORK

A. Build all forms mortar tight and of sufficient rigidity to prevent distortion due to the pressure of the concrete and other loads incidental to the construction operations. Construct and maintain forms so as to prevent warping and the opening of joints.

B. The forms shall be substantial and unyielding. Design the forms so that the finished concrete conforms to the proper dimensions and contours. Design the forms to take into account the effect of the vibration of concrete during placement.

3.2 PLACING REINFORCING STEEL

A. Place all steel reinforcement accurately in the positions shown on the Drawings. Secure the steel reinforcements firmly in place during the placing and setting of concrete. When placed in the work, it shall be free from dirt, detrimental rust, loose scale, paint, oil or other foreign material. When spacing between crossing tiebars is one foot or more, tie all bars at all intersections. When spacing is less than one foot in each direction, tie alternate intersections of bars.

B. Maintain distances from the forms by means of stays, blocks, ties, hangers or other approved supports. Continuous high chairs will not be permitted. Furnish all reinforcement in full lengths as indicated on the Drawings. Splicing of bars will not be permitted without the approval of the Owner, except where shown on the Drawings. Stagger splices as far apart as possible. Unless otherwise shown on the Drawings, bars shall be lapped 36 diameters to make the splice.

C. Lap welded wire mesh at least 1½ meshes plus end extension of wires but not less than twelve 12-inches in structural slabs. Lap welded wire mesh at least ½ mesh plus end extension of wires but not less than 6-inches in slabs on the ground.

3.3 CONVEYING AND PLACING CONCRETE

A. Convey concrete from the mixer to the forms as rapidly as practical by approved methods which will prevent segregation and loss of ingredients.

B. Clean formwork of dirt and construction debris, drain water, and remove snow and ice. After the forms have been inspected, deposit the concrete in approximately horizontal layers to avoid flowing along the forms. Place all concrete in the dry free from standing water. Deposit all concrete continuously or in layers of a thickness such that no concrete will be deposited on concrete which has hardened sufficiently to cause the formation of seams and planes of weakness within the sections. Place the concrete to create a monolithic structure the component parts of which are securely bonded together. Compact the concrete during placement by suitable means. Work the concrete around the reinforcement and embedded fixtures and into corners and angles of forms, taking care to avoid overworking which may result in segregation.

C. Do not drop concrete into forms from a height greater than 5 feet. Use a spout to deposit concrete from a greater height; or, provide openings in the forms limit the height of drop. Obtain the approval of Owner before using any other method of placing concrete from a height greater than 5 feet.

D. Direct concrete through chutes to prevent it from striking reinforcement or sides of the form above the level of placement. Avoid segregation and coating of the surfaces with paste which may dry before concrete reaches its level.

E. Submit a concrete mix design to Owner for approval prior to placing any concrete by pumping.

3.4 THRUST BLOCKING

A. See the thrust blocking details. Notify Owner whenever field conditions are noted which are more restrictive than the thrust block design data included on details.

B. Construct blocking against the vertical face of undisturbed earth or sheeting left in place. Prevent the concrete from enclosing more than half the circumference of the pipe unless it is a straddle block. Keep the concrete away from joints or bolts in the piping.

C. If thrust blocks are employed, place thrust blocking for hydrants to allow the hydrant to drain.

3.5 PLACING CONCRETE IN COLD AND WARM WEATHER

A. Follow the provisions of ACI 306, ACI 308 and Paragraph 3.8 of USACE, Standard Practice for Concrete for Civil Works Structures, when the ambient temperature is less than 40°F at time of placement or expected to be less than 40°F during the curing period.

B. Control concrete setting time with the use of accelerating admixtures as required to facilitate placing and finishing operations. Do not use calcium chloride in excess of 2% by weight in the concrete free of steel reinforcement. Where steel reinforcement is employed and concrete with calcium chloride is permitted, Contractor must use galvanized or coated steel satisfactory to the Owner.

C. Exposed subgrade, formwork and reinforcing shall be warmer than 33°F prior to placement of concrete.

D. The temperature of the concrete during placing shall be between 55°F and 75°F. Maintain the temperature of the concrete between 55°F and 75°F for a minimum of 5 days by providing insulating blankets, heated enclosures, or other methods of thermal protection. Provide a means of maintaining atmospheric moisture when dry heat is used. Provide proper curing for a minimum of days or as approved by the Owner.

E. In case of low air temperatures (below 40°F), submit a plan to comply with this section. Owner may, at their discretion, raise the minimum limiting temperatures for water, aggregates and mixed concrete when temperatures drop below 40°F.

F. Protect all earth-supported concrete from damage due to frost heave.

--END OF SECTION 03 30 00--