

ENGINEER'S PROJECT NO. B4015 PROJECT: Potable Well No. 12 Reconstruction  
for City of Lake Worth

DATE: December 11, 2014

ADDENDUM NO. 2

TO: ALL PROSPECTIVE BIDDERS

Pursuant to the Invitation to Bid on this Project, you are instructed to make the following modifications to the Project Contract Documents, which modifications shall constitute a portion of the Contract Documents and be an integral part of the Project:

PROJECT MANUAL – TECHNICAL SPECIFICATIONS

- (1) Add Section 03001 CONCRETE to the Specifications.

/s/ MOCK, ROOS ASSOCIATES, INC.

END OF ADDENDUM NO. 2

## SECTION 03001

### CONCRETE

#### PART 1 GENERAL

##### 1.01 SECTION INCLUDES

- A. Formwork.
- B. Concrete reinforcement and accessories.
- C. Cast-in-place concrete.
- D. Pre-cast concrete.

##### 1.02 REFERENCES

- A. ACI 301-96 - Specifications for Structural Concrete.
- B. ACI 318-99 - Building Code Requirements for Structural Concrete.
- C. ACI SP-4 (95) – Formwork for Concrete.
- D. ASTM A185-97 – Steel Welded Wire Fabric, Plain, for Concrete Reinforcement.
- E. ASTM A615-01 - Deformed and Plain Billet Steel for Concrete Reinforcement.
- F. ASTM A775-01 – Epoxy - Coated Reinforcing Steel Bars.
- G. ASTM C31-00 - Making and Curing Concrete Test Specimens in the Field.
- H. ASTM C33-01 - Concrete Aggregates.
- I. ASTM C39-01 - Compressive Strength of Cylindrical Concrete Specimens.
- J. ASTM C42-99 - Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.
- K. ASTM C94-00 - Ready-Mixed Concrete.
- L. ASTM C143-00 - Slump of Hydraulic Cement Concrete.
- M. ASTM C150-00 - Portland Cement.
- N. ASTM C192-90 - Making and Curing Concrete Test Specimens in the Laboratory.
- O. ASTM C260-01 - Air-Entraining Admixtures for Concrete.
- P. ASTM C309-98 - Liquid Membrane - Forming Compounds for Curing Concrete.
- Q. ASTM D1751-99 - Preformed Expansion Joint Filler for Concrete Paving and Structural Construction.

##### 1.03 SUBMITTALS

- A. Four copies of the test mix report showing the proportions of cement, aggregate, fine aggregate, water and admixtures.
- B. Shop Drawings of pre-cast structures for review prior to fabrication.

## PART 2 PRODUCTS

### 2.01 FORM MATERIALS

- A. Conform to ACI 347.

### 2.02 REINFORCING STEEL

- A. Reinforcing Bars: ASTM A615, Grade 60, new deformed billet steel.
- B. Welded Wire Fabric: Plain type, ASTM A185.
- C. Stirrups and Ties: ASTM A615, Grade 40 or Grade 60.
- D. Bar Supports and Spacers: Steel wire with upturned legs. Mortar cubes.
- E. Epoxy - Coated Reinforcing Bars: ASTM A775, Grade 60, new deformed billet steel.

### 2.03 CONCRETE MATERIALS

- A. Cement: ASTM C150, Type I. Type II cement for wastewater structures.
- B. Fine and Coarse Aggregates: ASTM C33.

Nominal maximum size of coarse aggregate not larger than:

- 1. The narrowest dimension between sides of forms, nor
  - 2. 1/3 the depth of slabs, nor
  - 3. 3/4 the minimum clear spacing between individual reinforcing bars or wires, bundles of bars, or ducts.
  - 4. 4 inches.
- C. Water: Clean, fresh, and free from injurious amounts of oils, acids, alkalis, salts, organic materials, or other substances that may be deleterious to concrete or reinforcement.
  - D. Air Entrainment Admixtures: ASTM C260. 'Darex' by the W. R. Grace Company or approved equal.
  - E. Curing Compound: ASTM C309, Type 1 or Type 1-D, Class A.

### 2.04 CONCRETE MIX

- A. Mix concrete in accordance with ASTM C94.
- B. Compressive Strength: 3000 psi minimum at 28 days for cast-in-place concrete and 4000 psi minimum at 28 days for pre-cast concrete (unless otherwise noted on Drawings).
- C. Slump: 5 inches maximum (Vertical Pours)  
3 inches maximum (Horizontal Pours)  
2 inches minimum (Unless noted otherwise i.e. tremie, curb machine)
- D. Mixing water not to exceed 6 gallons per sack of Portland Cement. This includes water entering the batches as surface moisture on the aggregates, which must be deducted from the specified 6 gallons to determine the amount of mixing water for each batch.
- E. Contain not less than 5 sacks of cement per cubic yard of concrete for 3000 psi concrete and not less than 6 sacks of cement per cubic yard of concrete for 4000 psi concrete.

- F. Air-Entraining admixture to produce 5 percent (+/- 1.5%) entrained air.

## PART 3 EXECUTION

### 3.01 FORMWORK ERECTION

- A. Conforms to the shapes, lines, and dimensions of the members as called for on the Drawings.
- B. Provide bracing to ensure stability of formwork.
- C. Design and construct forms, bracing, and supports to withstand the pressure of freshly placed concrete without bow or deflection.
- D. Hand trim sides and bottom of earth forms; remove loose dirt.
- E. Coordinate Work on Drawings in forming and setting openings, recesses, chases, sleeves, bolts, anchors, and other inserts.
- F. Substantial and sufficiently tight to prevent leakage of mortar. Check forms prior to placing concrete and tighten as required to produce flush surfaces.
- G. Tie metal remaining in the concrete to be at least 3 inches back of the concrete face. Plug holes left by the tie ends with grout.
- H. Chamfer corners of beams, columns, walls and exposed edges or corners of concrete with 3/4 inch by 3/4 inch wood chamfer strips unless otherwise shown on Drawings.
- I. Clean forms and apply form release agents or wet forms prior to concrete placement.
- J. Remove forms in such a manner as to insure the complete safety of the structure. Where the structure as a whole is supported on shores, the removable floor forms, beams and girder sides, columns and similar vertical forms may be removed only after concrete has reached 2/3 of its design strength by test and is sufficiently hard not to be injured during form removal. In no case should supporting forms or shoring be removed until the members have acquired sufficient strength to support their weight and the load safely thereon.

### 3.02 REINFORCEMENT

- A. Before placing concrete, clean reinforcement of foreign particles or coatings.
- B. Place, support, and secure reinforcement against displacement.
- C. Lap welded wire mesh at least one full mesh and lace splices with wire. Offset end laps in adjacent widths to prevent continuous laps in either direction.
- D. Avoid splices at points of maximum stress. Provide sufficient lap to transfer the stress between bars by bond and shear.
- E. Make bends for stirrups and ties on bars 5/8 inches in diameter and less, around a pin having a diameter not less than four times the thickness of the bar. Make bends for other bars around a pin having a diameter not less than six times the minimum thickness of the bar, except that for bars larger than one inch but less than 1-3/4 inches, the pin can not be less than eight times the minimum thickness of the bar. Bend all bars cold.
- F. Splices and Offsets in Reinforcement: In slabs, beams, and girders, avoid splices of reinforcement at points of maximum stress. Provide sufficient lap to transfer the stress between bars by bond and shear and meet the requirements of ACI 318.

Where changes in the cross section of a column occur, offset the longitudinal bars in a region where lateral support is afforded. Where offset, the slope of the inclined portion should not be more than one in six, and in the case of tied columns, space the ties not more than 3 inches on center for a distance of one foot below the actual point of offset.

- G. Protection of Reinforcement: Protect the metal reinforcement by the thickness of concrete indicated on the Drawings. Where not otherwise shown, the thickness of concrete over the reinforcement should be as follows:

Where concrete is deposited against ground without the use of forms, not less than 3 inches for beams and slabs.

Where concrete is exposed to the weather or exposed to the ground but placed in forms, not less than 2 inches for bars more than 5/8 inch in diameter and 1-1/2 inches for bars 5/8 inch or less in diameter.

In slabs and walls not exposed to the ground or to the weather, not less than 1-1/2 inches. In beams, girders and columns not exposed to the ground or to the weather, not less than 1-1/2 inches.

In all cases, the thickness of concrete over the reinforcement must be at least 1-1/2 inches.

- H. Protect reinforcement bars, intended for bonding with future extensions, with approved adequate covering.

### 3.03 JOINTS

- A. Expansion and Contraction Joints: Provide expansion joints when slabs on grade join other construction and elsewhere as indicated. Expansion joints are to be one-half (1/2) inch thick when not otherwise noted. Tool edges of slabs at expansion and contraction joints to a one-fourth (1/4) inch radius.
- B. Construction Joints: In jointing fresh concrete to that which has already set, the surface of the concrete in place must be thoroughly cleaned and have all laitance removed by cutting with a suitable tool. In addition, wet and slush with a coat of grout, no leaner than one (1) part cement to two (2) parts sand.

### 3.04 CONCRETE MIXING

- A. Mix until there is a uniform distribution of the materials and discharge completely before the mixer is recharged.
- B. For job-mixed concrete, rotate the mixer at a speed recommended by the manufacturer and mix continuously for at least one minute after all materials are in the mixer.
- C. Mix and deliver ready-mixed concrete in accordance with ASTM C-94.
- D. Wet batches of concrete may be transported in either agitating or nonagitating trucks. When non-agitator trucks are used, the elapsed time between the addition of water to the mix and depositing the concrete in place must not exceed 45 minutes except that when a retardant admixture is used such elapsed time must not exceed 75 minutes. When the handling is done in truck agitators, such elapsed time must not exceed 60 minutes, except that when a retardant admixture is used a maximum elapsed time of 90 minutes will be permitted.
- E. When concrete arrives on site with slump below that suitable for placing, as indicated by the Specifications, water may be added only if neither the maximum permissible water-cement ratio nor the maximum slump is exceeded.

### 3.05 PLACING CONCRETE

- A. Notify Engineer a minimum of 24 hours prior to commencement of concreting operations.
- B. Equipment for chuting, pumping and pneumatically conveying concrete must be sized and designed as to insure a practically continuous flow of concrete at the delivery end without separation of the materials.
- C. Prevent separation or loss of materials when conveying concrete from mixer to place of final deposit.
- D. No concrete that has partially hardened or been contaminated by foreign material may be deposited on the Work nor retempered.
- E. Deposit as nearly as practicable to its final position to avoid segregation due to rehandling or flowing.
- F. During placement, thoroughly work concrete around reinforcement and embedded fixtures and into the corners of the forms.
- G. At all times, concrete is to be plastic and flow readily into the space between the bars.

When concreting is once started, carry on as a continuous operation until the placing of the panel or section is completed. The top surface to be generally level.

- H. Consolidate placed concrete by mechanical vibrating equipment supplemented by hand-spading, rodding or tamping. Use vibrators designed to operate with vibratory element submerged in concrete.

### 3.06 UNDER-WATER PLACING (Done only on approval of Engineer)

- A. When conditions require placing through water, a tremie or drop-bottom bucket should be used and the Work must be well supervised. Every precaution must be taken to prevent the cement from washing out of the concrete. The tremie is to be water-tight and large enough to allow a free flow of concrete. It must be kept filled with concrete at all times while depositing. Discharge concrete and spread by moving the tremie as to maintain as nearly as practicable a uniform flow and avoid dropping the concrete through water. If the charge is lost while depositing, the tremie must be withdrawn and refilled. Maintain concrete slump between 6 and 7 inches. Tremie concrete must be pumped into place instead of gravity placed.

### 3.07 COLD WEATHER PLACEMENT

- A. Provide adequate equipment for heating the concrete materials and protecting the concrete during freezing or near-freezing weather. No frozen materials or materials containing ice can be used.
- B. All concrete materials and all reinforcement, forms, fillers and ground with which the concrete is to come in contact must be free from frost. Whenever the temperature of the surrounding air is below 40 degrees F, all concrete placed in the forms must have a temperature of between 70 degrees F and 80 degrees F, and adequate means to provide for maintaining a temperature of not less than 70 degrees F for 3 days or 50 degrees F for 5 days. The housing covering or other protection used in connection with curing must remain in place and intact at least 24 hours after the artificial heating is discontinued. No dependence can be placed on salt or other chemicals for the prevention of freezing.

### 3.08 HOT WEATHER PLACEMENT

- A. Cool ingredients before mixing to maintain concrete temperature at time of placement below 90 degrees F. Mixing water may be chilled, or chopped ice may be used to control the concrete

temperature, provided the water equivalent of the ice is calculated to the total amount of mixing water.

- B. A shorter mixing time than specified in ASTM C94 may be required. When the air temperature is between 85 and 90 degrees F, reduce the mixing and delivery time from 90 minutes to 75 minutes, and when the air temperature is above 90 degrees F, reduce the mixing and delivery time to 60 minutes.

Cover reinforcing steel with water-soaked burlap if it becomes too hot, so that the steel temperature will not exceed the ambient air temperatures immediately before embedment in concrete. Wet forms thoroughly before placing concrete.

Do not use retarding admixtures without the written approval of the Engineer.

### 3.09 FINISHING CONCRETE

- A. Rough finish for concrete surfaces not exposed to view in the finish Work or covered by other construction.
- B. Strike - off smooth and finish with a texture matching adjacent formed surfaces at tops of walls, horizontal offsets and similar unformed surfaces occurring adjacent to formed surfaces.
- C. Provide a uniform smooth rubbed finish on exposed formed concrete walls, columns, and beams.
- D. Float finish monolithic slab surfaces that are to receive trowel finish or other finish.
  - 1. Trowel Finish: After floating, begin first trowel finish operation using a power-driven trowel. Begin final troweling when surface produces a ringing sound as trowel is moved over surface. Consolidate concrete surface by final hand-troweling operation, free of trowel marks, uniform in texture and appearance, and with a surface plane tolerance not exceeding 1/4" in 10 feet when tested with a 10 foot straight-edge. Grind smooth surface defects which would show through applied floor covering system.
  - 2. Non-slip Broom Finish: Apply non-slip fine-hair broom finish to sidewalks, driveways, handicap ramps, curbs, or other items as noted on the Drawings.

### 3.10 CURING

- A. Protect freshly placed concrete from premature drying or heat, and maintain without drying at a relatively constant temperature for a period of time necessary for hydration of cement and proper hardening.
- B. Start initial curing as soon as free water has disappeared from concrete surface after placing and finishing. Weather permitting, keep continuously moist for not less than 72 hours.
- C. Continue curing for a least 7 days and in accordance with ACI 301 procedures. Avoid rapid drying at end of final curing period.
- D. In lieu of moist curing, spray a clear liquid membrane curing compound on all new concrete immediately after initial set. Rate of application to be 200 square feet per gallon or as recommended by the manufacturer.

### 3.11 TESTS

- A. Testing and analysis of concrete will be performed by an independent testing laboratory.
- B. Test firm will take cylinders and perform compression tests in accordance with ASTM C31, ASTM C39, and ASTM C192.

- C. Number of cylinders and frequency of tests will be designated by the Engineer.
- D. One slump test will be performed per ASTM C143 for each set of test cylinders taken.
- E. Cure specimens under laboratory conditions except that when in the opinion of the Engineer, there is a possibility of the surrounding air temperature falling below 40 degrees F., additional specimens may be required and cured under job conditions.
- F. If the average strength of the laboratory control cylinders for any portion of the structure falls below the compressive strengths called for on the Drawings, the Engineer has the right to order a change in the proportions or the water content for the remaining portion of the structure. If the average strength of the job-cured cylinders falls below the required strength the Engineer has the right to require conditions of temperature and moisture necessary to secure the required strength and may require tests in accordance with ASTM C42, or order load tests to be made on the portions of the structure so affected. Remove or replace failing concrete if directed by the Engineer.

### 3.12 PROTECTION

- A. Protect concrete from damage until final acceptance of Work.

END OF SECTION