ADDENDUM NUMBER TWO
TO
OAK RIDGE WATER TREATMENT PLANT
CITY OF OAK RIDGE, TENNESSEE

Addendum Number Two (2) is issued the 4th day of August 2022 to all parties who hold a set of Bid Documents for the above-named project. Each Bidder shall acknowledge receipt of this Addendum on the Bid and shall incorporate all changes in the Bid. This addendum consists of eight (8) pages and three (3) attachments.

A pre-bid meeting was held for the project on August 3, 2022 at 10:00 a.m. The pre-bid meeting attendees list and meeting summary is attached.

CLARIFICATIONS/QUESTIONS:

1. **Question:** On drawing 350-M-6002 under the AHU equipment schedule, it is indicated that the control valves are to be 2-way, however, on drawing 350-M-7003 under associated schematics, they are shown with 3-way valves. Which is the correct configuration?
   
   **Response:** Provide three way valves for AHU-02 & 03. AHU-01 can be fitted with a two-way valve. The chilled water pump’s minimum speed must remain above 30% of the rated speed to prevent motor overheating. See Addendum No. 2 – MODIFICATIONS - DRAWINGS.

2. **Question:** On drawing 350-M-6004 under the MAU equipment schedule, the same question applies. Does it need a 2-way or 3-way?, as schedule indicates 2-way but schematic shows 3-way.
   
   **Response:** Provide three way valve for MAU. The hot water pump’s minimum speed must remain above 30% of the rated speed to prevent motor overheating. See Addendum No. 2 – MODIFICATIONS - DRAWINGS.

3. **Question:** On drawing 350-M-7001, where the Flow Meter is indicated, there is no line size. Is it to be assumed that line size will be 3” as indicated on 350-M-2003?
   
   **Response:** Correct.

4. **Question:** On drawing 350-M-7004 under the Server Room description, it is indicated that controls for AHU-4 & 5 are to be included under control panel 350-HCP-02, however, there is no AHU-4 or 5 indicated in equipment schedules. Do you mean 350-FC-03 & 04? If so, one of the units ID's is labelled wrong on drawing 350-M-2006.
   
   **Response:** The units serving the Server room are 350-FC-03 and 350-FC-04. See Addendum No. 2 – MODIFICATIONS - DRAWINGS.
5. **Question:** Under the HVAC System Architecture on drawing 350-M-7005 regarding to Raw Pump Station 200 Points List for Control Panel 200-HCP-01, it indicates that 350-EF-09, 10, 11 & 12 are to be controlled by this panel. These exhaust fans are located in Bldg 350 which is indicated to be controlled by Control Panel 350-HCP-03 on drawing 350-M-7004. Is it safe to say that these fans are not controlled from 200-HCP-01?

**Response:** Correct. These fans are not controlled by that panel. See Addendum No. 2 – MODIFICATIONS - DRAWINGS.

6. **Question:** Are the 350-WH-01 thru 12 control valves open/close only?, or do they need to be modulating?

**Response:** Open and close will suffice.

7. **Question:** Regarding to the Heating Mode for the Main Treatment Area on drawing 350-M-7004, do heaters 350-WH-08 thru 12 have their own space temp sensor, and if so, where are they to be located?

**Response:** Heaters in that area will be controlled by one sensor. See below and Addendum No. 2 – MODIFICATIONS - DRAWINGS.

8. **Question:** Where is the Zone Temp Location for 350-MAU-1?

**Response:** See location noted below.
9. **Question:** Where is the Zone Temp Location that serves 350-EF-9, 10, 11 & 12?
**Response:** See location noted below and Addendum No. 2 – MODIFICATIONS - DRAWINGS.

10. **Question:** Where are locations for following Zone Temp Sensors serving 350-EF-01, EF-04 and EF-07?
**Response:** See locations noted below and Addendum No. 2 – MODIFICATIONS - DRAWINGS.
11. **Question:** Regarding to the Building Automation Control System, per System Architecture, other than what is shown or indicated in the points list or sequence of operations, does the process equipment and controls which are provided and installed by others integrate into the building Automation System? or will they work of solely from their own controls?
   **Response:** No. Process systems have their own control network. We will tie to the city network via PLC in panel CP-100 for remote monitoring as shown in the Architecture.

12. **Question:** In specification 409000, there is identified an I/O points list for the PIC. Does the HVAC controls contractor need to have those I/O points brought in on the HVAC control system?, and if so, what communication protocol is to be used to bring those into the control system?, as process controls works differently from HVAC controls.
   **Response:** No process system will be controlled by the HVAC BAS. IO listed in Section 40 90 00 for process do not have to be picked up by the HVAC BAS.

13. **Question:** Regarding to specification 23 09 13-8 & on 23 09 13-9, under Water Pressure(PS) 2a and C:3a Water Differential Pressure, there is a listing for a Dwyer No 630 Series Water Pressure Sensor. This number appears to be some type of mounting bracket. Is there a more accurate part# that is being asked for or what are the specifics that this sensor must have? The other manufacturers numbers that are listed in the specifications also drew up a dead end or have been discontinued, which is the reason for the inquiry on what exactly is being asked for.
   **Response:** See Addendum No. 2 – MODIFICATIONS - SPECIFICATIONS.

14. **Question:** Drawing 350-M-7004 on the bottom indicate the various control panels along with Touchscreen Displays, Hand-Off-Auto Switches, Reset Buttons and indicator lights being sought out. Are the items shown on the panel faces the only items needed?, or does there actually have to be temperature indicating dials/readouts, Potentiometers, timeclocks, etcetera that is indicated in specification 230913? These are not shown on the panels which is the reason for the inquiry.
   **Response:** No indicating dials/readouts, potentiometers, timeclocks are needed. It is what the face panel shows. It may be some internal component of the panels no shown that are required to meet the sequence of operation.

**MODIFICATIONS:**

**CONTRACT DOCUMENTS**

**TABLE OF CONTENTS**
Section 33 16 13.12 – REPLACE section title with “Glass-Lined Bolted Steel Storage Tank”.
SPECIFICATIONS
The following specification section modifications are hereby made a part of the above referenced Project Contract Documents:

Section 01 31 13 Project Coordination
REPLACE the Section in its entirety with the attached.

Section 23 09 13 HVAC Controls, Field Components, and Instruments
Paragraph 2.06.B.2. ADD “Setra Model 230/231” to the list of approved manufacturers.
Paragraph 2.06.C.3. ADD “Setra Model 230/231” to the list of approved manufacturers.

Section 33 16 13.15 Prestressed Concrete Tank with Steel Diaphragm
REPLACE the Section in its entirety with the attached.

Section 43 22 64 In-Line Static Mixer

Section 44 42 01 Traveling Water Screen
Paragraph 2.03.F.3- ADD “or 304/304 L stainless steel.” to the end of the first sentence.
Paragraph 2.03.J.1 – ADD “or 304/304 L stainless steel.” to the end of the first sentence.

DRAWINGS
The following drawing modifications are hereby made a part of the above referenced Project Contract Documents:

350-M-2001 –
1. CHANGE the drawing numbers in the center of the Overall Plan from 305-M-2002-2005 to 350-M-2002-2005 for Areas A-D, respectively.
2. ADD the temperature sensor noted below for 350-WH-08 thru 12
350-M-2004 – Add the note below for the location of Zone Temp Sensor for 350-EF-04:

350-M-2006 –
1. CHANGE the drawing numbers in the center of the Overall Plan from 305-M-2007-2010 to 350-M-2007-2010 for Areas A-D, respectively.
2. ADD the note below for the location of Zone Temp Sensor for 350-EF-09, 10, 11 and 12:
350-M-6002 – Air Handling Unit Schedule – AHU-02 and AHU-03 – CHANGE the Chilled Water Cooling Coil Module Water Side Valve to “3-Way”.


350-M-7005 – REPLACE the 200-HCP-01 Control Panel Table with the following:

<table>
<thead>
<tr>
<th>EQUIPMENT TAG</th>
<th>DESCRIPTION</th>
<th>DI</th>
<th>DO</th>
<th>AI</th>
<th>AO</th>
<th>ALARM</th>
</tr>
</thead>
<tbody>
<tr>
<td>200-EF-X; X= 01,02</td>
<td>Run command</td>
<td></td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>200-EF-X; X= 01,02</td>
<td>On status</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td>F</td>
</tr>
<tr>
<td>200-EF-01 (200-MD-01,03)</td>
<td>Intake louver</td>
<td></td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>200-EF-02 (200-MD-02,04)</td>
<td>Intake louver</td>
<td></td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T</td>
<td>Zone temperature</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td>H,L</td>
</tr>
</tbody>
</table>

This Addendum Number Two (2) is issued this the 4th day of August 2022.

Ben Simerl, P.E.

Jacobs

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SECTION 01 31 13  
PROJECT COORDINATION

PART 1    GENERAL

1.01    SUBMITTALS

A. Informational:

1. Statement of Qualification (SOQ) for land surveyor or civil engineer.
2. Photographs:
   a. Digital Images: Submit copies of images within 5 days of being taken. Each image is to have a minimum file size of 1.4 Mb (1,400 Kb) so viewed resolution is high quality. The production of larger file sizes with higher resolution is encouraged.
3. Video Recordings: Submit copies, including updated copy of project video log, within 5 days of being taken.

1.02    RELATED WORK AT SITE

A. General:

1. Other work that is either directly or indirectly related to scheduled performance of the Work under these Contract Documents, listed henceforth, is anticipated to be performed at Site by others.
2. Coordinate the Work of these Contract Documents with work of others as specified in General Conditions, including coordination with the FINISHED WATER TRANSMISSION WATER LINE Contractor.
3. Include sequencing constraints specified herein as a part of Progress Schedule.

B. Power:

1. Agency and Contact Person: City of Oak Ridge Electric Department - Margaret Elgin, telephone number: 865-425-1803.
2. Work to be performed by City of Oak Ridge Electric Department:
   a. Incoming aerial power lines.
   b. Incoming underground power cables, materials, installation, termination, and connection.
   c. Transformers supplying main electrical service to the facility.
   d. Metering facilities, except as indicated.
   e. Relocation of the overhead power line to underground adjacent to the Clearwell.
3. Work to be performed by Contractor:
   a. Coordinate Contractor’s Work with City of Oak Ridge Electric Department.
b. Transformer site preparation and pad(s).
c. Perform Work in accordance with City of Oak Ridge Electric Department requirements and codes.

4. Owner will be responsible for payment of direct charges of Electric Department.

C. Natural Gas

1. Agency and Contact Person: Oak Ridge Utility District-Jeff Patterson telephone number:(865) 483-1377.
2. Work to be performed by Oak Ridge Utility District: Installation of gas service line to site.
3. Work to be performed by Contractor: Connection of gas service line from meter to building service location.
4. Owner will be responsible for payment of direct charges of Oak Ridge Utility District.

1.03 OWNER-FURNISHED PRODUCTS

A. Refer to Section 01 64 00, Owner-Furnished Products.

1.04 UTILITY NOTIFICATION AND COORDINATION

A. Coordinate the Work with various utilities within Project limits. Notify applicable utilities prior to commencing Work, if damage occurs, or if conflicts or emergencies arise during the Work.

1. Electric Company: City of Oak Ridge Electric Department.
   a. Contact Person: Margaret Elgin
   b. Telephone: 865-425-1803
2. Water and Sewer Department: Owner (City of Oak Ridge).
   a. Contact Person: Mark Terry
3. Gas Department: Oak Ridge Utility District
   a. Contact Person: Jeff Patterson

1.05 WORK SEQUENCING/CONSTRAINTS

A. Include the following work sequences in the Progress Schedule:

1. **Electrical Service Coordination** – Electrical service at the site (to the Raw Water Pump Station) must be maintained throughout construction of the new Water Treatment Plant. Contractor shall coordinate proposed work with OWNER and submit a proposed sequence of construction for the electrical service switchover for approval.
2. **Raw Water Pump Station** – The Raw Water Pump Station must remain in service throughout construction of the new Water Treatment Plant. A proposed sequence of construction for the Raw Water Pump Station follows:
   a. Phase 1 - Raw Water Pumps 1-3 are removed from service to provide room for the new Raw Water Pumps to be installed. Connections to existing piping are plugged. Existing Raw Water Pumps 4-6, electrical and instrumentation, and water lines remain in service providing water to the existing WTP.
   b. Phase 2 - New Raw Water Pumps and temporary Raw Water Lines are installed and put into service for the new WTP. Existing Raw Water Pumps 4-6 remain in service for the existing WTP.
   c. Phase 3 - Existing Raw Water Pumps are removed from service. Raw Water header and water line is replaced and connected to new yard piping. New raw water pumps are sequentially connected to the new header. Two of the new raw water pumps must remain in service at all times.

1.06 **FACILITY OPERATIONS**

A. Continuous operation of Owner’s facilities is of critical importance. Schedule and conduct activities to enable existing facilities to operate continuously, unless otherwise specified.

B. Perform Work continuously during critical connections and changeovers, and as required to prevent interruption of Owner’s operations.

C. When necessary, plan, design, and provide various temporary services, utilities, connections, temporary piping and heating, access, and similar items to maintain continuous operations of Owner’s facility.

D. Do not close lines, open or close valves, or take other action which would affect the operation of existing systems, except as specifically required by the Contract Documents and after authorization by Owner and Engineer. Such authorization will be considered within 48 hours after receipt of Contractor’s written request.

E. Construct Work in the following stages to allow for Owner’s continuous occupancy and for uninterrupted operation during construction.

1. New Water Treatment Plant.
2. Raw Water Pump Station Improvements – see Work Sequence.
F. Process or Facility Shutdown:

1. The following may require shutdown at some time during the Work:
   a. Raw Water Pump Station.
   b. Raw Water Pipelines.
2. Provide 7 days advance written request for approval of need to shut down a process or facility to Owner and Engineer.
3. Power outages will be considered upon 48 hours written request to Owner and Engineer. Describe the reason, anticipated length of time, and areas affected by the outage. Provide temporary provisions for continuous power supply to critical facility components.

G. Install and maintain bypass facilities and temporary connections as required to keep Owner’s Raw Water Pump Station and Raw Water Transmission Line on line. Sequences other than those specified will be considered upon written request to Owner and Engineer, provided they afford equivalent continuity of operations.

H. Do not proceed with Work affecting a facility’s operation without obtaining Owner’s and Engineer’s advance approval of the need for and duration of such Work.

I. Relocation of Existing Facilities:

1. During construction, it is expected that minor relocations of Work will be necessary.
2. Provide complete relocation of existing structures and Underground Facilities, including piping, utilities, equipment, structures, electrical conduit wiring, electrical duct bank, and other necessary items.
3. Use only new materials for relocated facility. Match materials of existing facility, unless otherwise shown or specified.
4. Perform relocations to minimize downtime of existing facilities.
5. Install new portions of existing facilities in their relocated position prior to removal of existing facilities, unless otherwise accepted by Engineer.

1.07 ADJACENT FACILITIES AND PROPERTIES

A. Examination:

1. After Effective Date of the Agreement and before Work at Site is started, Contractor, Engineer, and affected property owners and utility owners shall make a thorough examination of pre-existing conditions including existing buildings, structures, and other improvements in vicinity of Work, as applicable, which could be damaged by construction operations.
2. Periodic reexamination shall be jointly performed to include, but not limited to, cracks in structures, settlement, leakage, and similar conditions.

B. Documentation:

1. Record and submit documentation of observations made on examination inspections in accordance with Article Construction Photographs and Article Audio-Video Recordings.
2. Such documentation shall be used as indisputable evidence in ascertaining whether and to what extent damage occurred as a result of Contractor’s operations, and is for the protection of adjacent property owners, Contractor, and Owner.

1.08 CONSTRUCTION PHOTOGRAPHS

A. General:

1. Photographically document all phases of the Project including preconstruction, construction progress, and post-construction.
2. Engineer shall have right to select subject matter and vantage point from which photographs are to be taken.
3. Digital Images: No post-session electronic editing of images is allowed. Stored image shall be actual image as captured without cropping or other edits.

B. Preconstruction and Post-Construction:

1. After Effective Date of the Agreement and before Work at Site is started, and again upon issuance of Substantial Completion, take a minimum of 48 photographs of Site and property adjacent to perimeter of Site.
2. Particular emphasis shall be directed to structures both inside and outside the Site.
3. Format: Digital, minimum resolution of 2176 by 3264.

C. Construction Progress Photos:

1. Photographically demonstrate progress of construction, showing every aspect of Site and adjacent properties as well as interior and exterior of new or impacted structures.
2. Weekly: Take 48 photographs using digital, minimum resolution of 2176 by 3264.
D. Documentation:

1. Digital Images:
   a. Electronic image shall have date taken embedded into image.
   b. Archive using a commercially available photo management system that provides listing of photographs including date, keyword description, and direction of photograph.
   c. Label file folders or database records with Project and Owner’s name, and month and year images were produced.

1.09 AUDIO-VIDEO RECORDINGS

A. Prior to beginning the Work on Site or of a particular area of the Work, and again within 10 days following date of Substantial Completion, videograph Site and property adjacent to Site.

B. In the case of preconstruction recording, no work shall begin in the area prior to Engineer’s review and approval of content and quality of video for that area.

C. Particular emphasis shall be directed to physical condition of existing vegetation, structures, and pavements within pipeline alignment and areas adjacent to and within the right-of-way or easement, and on Contractor storage and staging areas.

D. Engineer shall have right to select subject matter and vantage point from which videos are to be taken.

E. Video Format and Quality:

1. DVD format, with sound.

2. Video:
   a. Produce bright, sharp, and clear images with accurate colors, free of distortion and other forms of picture imperfections.
   b. Electronically, and accurately display the month, day, year, and time of day of the recording.

3. Audio:
   a. Audio documentation shall be done clearly, precisely, and at a moderate pace.
   b. Indicate date, project name, and a brief description of the location of recording, including:
      1) Facility name.
      2) Street names or easements.
      3) Addresses of private property.
      4) Direction of coverage, including engineering stationing, if applicable.
F. Documentation:

1. DVD Label:
   a. DVD number (numbered sequentially, beginning with 001).
   b. Project name.
   c. Date and time of coverage.
2. Project Video Log: Maintain an ongoing log that incorporates above noted label information for DVDs on Project.

1.10 REFERENCE POINTS AND SURVEYS

A. Owner’s Responsibilities:

1. Establish bench marks convenient to Work and at least every 500 feet on pipelines and roads.
2. Establish horizontal reference points or coordinate system with bench marks and reference points for Contractor’s use as necessary to lay out Work.
3. Establish baseline from which facilities may be located.
4. Establish clearing limits, centerlines of roads and pipelines, set toe of fill and top of cut stakes, and set bench marks convenient for use as necessary to establish basic layout of the Work.
5. For pressure pipelines over 500 feet in length, set offset stakes indicating locations of pipelines at approximate 200-foot intervals along line and indicate depth of cut when required.
6. Establish location at all poles and anchors.
7. Provide cut data sheets to Contractor.

B. Location and elevation of bench marks are shown on Drawings.

C. Contractor’s Responsibilities:

1. Provide additional survey and layout required to layout the Work.
2. Notify Engineer at least 3 working days in advance of time when grade and line to be provided by Owner will be needed.
3. Check and establish exact location of existing facilities prior to construction of new facilities and any connections thereto.
4. In event of discrepancy in data or staking provided by Owner, request clarification before proceeding with Work.
5. Retain professional land surveyor or civil engineer registered in state of Project who shall perform or supervise engineering surveying necessary for additional construction staking and layout.
6. Maintain complete accurate log of survey work as it progresses as a Record Document.
7. On request of Engineer, submit documentation.
8. Provide competent employee(s), tools, stakes, and other equipment and materials as Engineer may require to:
   a. Establish control points, lines, and easement boundaries.
   b. Check layout, survey, and measurement work performed by others.
   c. Measure quantities for payment purposes.

PART 2  PRODUCTS (NOT USED)

PART 3  EXECUTION

3.01 SALVAGE OF MATERIALS
   A. Materials to be salvaged include:
      1. Existing Raw Water Pumps (1-3) and Motors.
   B. Salvage materials for Owner’s use:
      1. Remove material with extreme care so as not to damage for future use.
   C. Meet with Engineer and Owner prior to starting to dismantle equipment or piping designated to be salvaged. Engineer will indicate locations where equipment is to be disconnected.
   D. Provide new or repair damaged equipment or material specified or indicated to be salvaged. Clean and protect equipment from dust, dirt, natural elements, and store as directed.

3.02 CUTTING, FITTING, AND PATCHING
   A. Cut, fit, adjust, or patch Work and work of others, including excavation and backfill as required, to make Work complete.
   B. Obtain prior written authorization of Engineer before commencing Work to cut or otherwise alter:
      1. Structural or reinforcing steel, structural column or beam, elevated slab, trusses, or other structural member.
      2. Weather-resistant or moisture-resistant elements.
      3. Efficiency, maintenance, or safety of element.
      4. Work of others.
   C. Refinish surfaces to provide an even finish.
      1. Refinish continuous surfaces to nearest intersection.
      2. Refinish entire assemblies.
3. Finish restored surfaces to such planes, shapes, and textures that no transition between existing work and the Work is evident in finished surfaces.

D. Restore existing work, Underground Facilities, and surfaces that are to remain in completed Work including concrete-embedded piping, conduit, and other utilities as specified and as shown on Drawings.

E. Make restorations with new materials and appropriate methods as specified for new Work of similar nature; if not specified, use recommended practice of manufacturer or appropriate trade association.

F. Fit Work airtight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces and fill voids.

G. Remove specimens of installed Work for testing when requested by Engineer.

END OF SECTION
PART 1 GENERAL

1.01 SCOPE OF WORK

A. This section specifies the design and construction of an ANSI/AWWA D110 wire-wound prestressed concrete storage tank with a Type II or Type III core wall and galvanized steel diaphragm including all reinforcing, concrete work, accessories, disinfection and testing directly related to the tank.

B. The tank contractor is responsible for furnishing all labor, materials, tools and equipment necessary to design and construct the prestressed concrete storage tank, including all exterior coatings, as indicated on the Drawings and as described in this Specification.

1.02 REFERENCES

A. ACI 350/350R – Code Requirements for Environmental Engineering Concrete Structures and Commentary.

B. ACI 350.3 – Seismic Design of Liquid-Containing Concrete Structures and Commentary.


J. ASTM A615/A615M Standard Specification for Deformed and Plain Carbon Steel Bars for Concrete Reinforcement.
K. ASTM A653/653M – Standard Specification for Steel Sheet, Zinc Coated (Galvanized) or Zinc Iron Alloy Coated (Galvannealed) by Hot Dip Process.


V. Design Criteria noted on General Structural Notes Drawings.


1.03 SUBMITTALS

A. Action Submittals:

1. Shop Drawings:
   a. Design Data:
      1) Proposed details, concepts, and manhole opening for prestressed tank walls.
      2) Details for sealing vertical joints of steel diaphragm shell.
      3) Details of prestressed tank accessories.
b. Curing methods for dome concrete.
c. Description of construction method and materials.

2. Samples: Vertical joint of steel diaphragm shell together with integral pumped epoxy material or other approved method to show evidence of satisfactory seal.

B. Informational Submittals:

1. Manufacturer’s Certificate of Compliance:
   a. Shotcrete sand.
   b. Concrete and shotcrete admixtures do not contain chlorides or other corrosive chemicals.

2. Manufacturer’s Certificate of Proper Installation.

3. Statements of Qualification:
   a. Registered professional engineer.
   b. Prestressed tank installer.

4. Written Test Reports of Each Test and Inspection:
   a. Shotcrete.
   b. Test reports for prestressing steel components.
   c. Mill test data for circumferential prestressing material regardless of manufacture. Include chemical composition, physical properties, and dimensions of steel prior to galvanizing. Mill test data for at least three samples of final prestressing material taken from material delivered to Site. Identify each roll that Samples were taken from. Identify packages or rolls of prestressing material with mill and heat number.

5. Design Data:
   a. Calculations for design of tank and accessories.
   b. For design loads and foundation criteria, show calculations and details based on the seismic zone forces.
   c. Calculations shall be stamped by professional engineer.
   d. Shop Drawings shall be stamped by a professional engineer.

C. Warranty Document: Submit warranty document in Owner’s name in accordance with Article Warranty of this Specification.

1.04 QUALITY ASSURANCE

A. Qualifications:

1. Qualified Design Engineer: Registered in the state of Project.
2. Prestressed Tank Installer: Company specializing in design and construction of prestressed tanks. Minimum 5 years’ experience on tanks of similar size and type required for Project. Company has
designed and built no less than five comparable prestressed (wire or strand wrapped) tanks now in use and are giving satisfactory service. Tanks shall have been constructed within the last 5 years. Include name and address of owners.

1.05 WARRANTY

A. The tank construction company shall provide a warranty for workmanship and materials on the complete structural portion of the tank for a five-year period from the date of acceptance of the work. The warranty shall not apply to any accessory, equipment or product that is not a structural part of the tank and is manufactured by a company other than the tank construction company.

B. If any leakage or other defects appear within the five-year period, the tank construction company shall promptly repair the tank at its own expense upon written notice by the Owner that such defects have been found. Leakage is defined as a stream flow of liquid appearing on the exterior of the tank, the source of which is from the inside of the tank. The tank construction company shall not be responsible for, nor liable for, any subsurface condition.

C. The tank construction company shall install all tank coatings and shall provide a warranty for workmanship and materials on all exterior coatings for a 5-year period from the date of the acceptance of the Work.

D. A coating system failure is defined as either (1) delamination of the coating, (2) a breach of the coating exposing the substrate below, or (3) chipping and peeling of the coating system not caused by physical damage or abrasion to the tank. Changes in color shall not be deemed a coating failure.

1.06 DESIGN CRITERIA

A. The design shall be in conformance with applicable portions of American Concrete Institute (ACI) 372R Design and Construction of Circular Wire- and Strand-Wrapped Prestressed Concrete Structures, ANSI/AWWA D110 Wire- and Strand-Wound, Circular, Prestressed Concrete Water Tanks with Type II or Type III core walls, and currently accepted engineering principles and practices for the design of such structures.

B. The following loadings shall be utilized in the design:

1. Capacity: As noted on the Drawings.
2. Dimensions: As noted on the Drawings.
3. Fluid Loads: Shall be the weight of all liquid when the tank is filled to overflow depth. The unit weight of the liquid material shall be 63 lbs/ft³.
4. Roof Live Loads: Consideration shall be given to all applicable roof design loads in accordance with ANSI/AWWA D110, Section 3.3 and ASCE 7. Roof live load for the structure shall be 12 psf.

5. Dead Loads: Consideration shall be given to all permanent imposed loads including concrete and steel.

6. Seismic Loads:
   a. Seismic forces and moments resulting from water sloshing and seismic accelerations of the tank dome, wall, and water loads shall be calculated in accordance with ACI 350.3 or ANSI/AWWA D110.
   b. If sufficient freeboard height is not provided to prevent uplift forces due to sloshing, the impulsive participation shall be increased due to the constrained motion of liquid, and the tank roof and its connection shall be designed to resist the uplift forces in accordance with P.K. Malhotra's "Earthquake Induced Sloshing in Tanks with Insufficient Freeboard".

7. Soil Pressure: Earth loads shall be determined by rational methods of soil mechanics. Soil pressure shall not be used in the design of the core wall to counteract hydraulic loads or provide residual compression in the wall.

8. Differential Backfill Loads: Forces from differential backfill loads shall be considered in the design and shall be based on the at-rest coefficient. Passive resistance shall not be used to resist differential backfill loads.

C. Wind Loads: Wind loads shall be considered in the design in accordance with ASCE 7.

D. Maximum Differential Settlement: In accordance with ACI 372 and settlement recommendations in Clearwell Geotech report.

E. Floor: The design of the floor for the prestressed concrete tank shall conform to the following:
   1. Concrete membrane floors shall be a minimum of 4-inch thick and have a minimum thickness of 8 inches of concrete over all pipe encasements and around sumps.
   2. A minimum percentage of 0.60 percent reinforcing steel shall be used in the membrane floor. The minimum percentage shall apply to all thickened sections and shall extend a minimum of 2 feet into the adjacent membrane floor.

F. Core wall:
   1. The wire-wound, prestressed concrete tank core wall shall be designed as a thin shell cylindrical element using shotcrete and an embedded, mechanically bonded, galvanized steel shell diaphragm.
2. The design of the core wall shall account for appropriate edge restraint. To compensate for bending moments, shrinkage, differential drying, and temperature stresses, the following minimum reinforcing steel shall be incorporated into the design:
   a. The top 2 feet of core wall shall have not less than 1 percent circumferential reinforcing.
   b. The bottom 3 feet of core wall shall have not less than 1 percent circumferential reinforcing.
   c. Inside Face:
      1) The inside face of the core wall shall utilize the diaphragm as effective reinforcing.
      2) Additional vertical and horizontal reinforcing steel bars shall be used as required by design computations.
   d. Outside Face:
      1) Vertical reinforcing steel in the outside face of the core wall shall be minimum of No. 4 bars at 12 inch center to center.
      2) Additional vertical and horizontal reinforcing steel bars shall be used as required by design computations.
3. The minimum core wall thickness shall be 3-1/2 inch.
4. Reinforcing steel used in the core wall shall be designed using a maximum allowable design tensile stress, \( f_s \), of 18,000 psi.
5. Allowable compressive stress in the core wall due to initial prestressing force, \( f_{gi} \), shall be:
   a. 1250 psi plus 75t psi/in. with 0.5 \( f'_{gi} \) maximum or less (where \( f'_{gi} \) is defined as compressive strength at time initial prestressing force is applied and \( t \) is the thickness of the core wall in inches).
   b. Maximum of 2250 psi.
6. Allowable compressive stress in the core wall due to final prestressing force, \( f_g \), shall be:
   a. 1250 psi plus 75t psi/in. with 0.45 \( f'_{g} \) maximum (where \( f'_{g} \) is defined as compressive strength required for final prestressing force and \( t \) is the thickness of the core wall in inches).
   b. Maximum of 2025 psi.
7. Maximum of 2025 psi.

G. Dome:
1. The dome roof shall be constructed of reinforced concrete and shall be circumferentially prestressed.
2. Dome shell reinforcement shall consist of reinforcing bars or welded wire fabric, not galvanized. Bolsters for wire fabric and reinforcing bars shall be plastic. Wire ties shall be galvanized.
3. The dome ring girder shall be prestressed with sufficient wire to withstand the dome dead load and design live loads. The ring girder shall have cross section suitable to accept the applied prestressing forces.
4. The high water level in the tank shall be permitted to encroach on the dome shell no higher than the upper horizontal plane of the dome ring girder.

5. Overflow outlets or the overflow pipe shall be capable of providing an overflow open area three times the area of the largest influent pipe.

6. Overflow outlets plus the dome ventilator shall be capable of providing an open area three times the area of the largest pipe.

7. The dome shall be designed as a free-span, spherical thin shell with one-tenth rise in accordance with the following:
   a. Typical Dome Design: The typical dome thickness and steel reinforcement shall meet the requirements of ANSI/AWWA D110.
   b. In all cases, the thickness of the dome shall be no less than 3 inches.
   c. Dome Edge Design: The dome edge and upper wall shall be designed to resist the moments, thrusts, and shears that occur in this region due to dome and wall prestressing and loading conditions. The design of the edge region shall conform to the following:
      1) Dome Edge Thickness:
         a) A determination of the buckle diameter shall be made, as defined by:

         \[ d_b = 2.5 \cdot \sqrt{r_d \cdot t_d} \]

         rounded up to the next foot

         Where:
         \[ d_b = \text{buckle diameter in feet} \]
         \[ r_d = \text{dome radius in feet} \]
         \[ t_d = \text{typical dome thickness in feet} \]

         b) Dome edge thickening shall begin at a radial location on the dome, defined as \( s_2 \), which is at least one buckle diameter away from the tank wall.

         c) A springline haunch shall be provided, which extends radially from the inside face of the tank wall to radial location \( s_1 \) which is defined as:

         \[ s_1 = 0.6 \cdot \sqrt{1.5 \cdot r_d \cdot t_d} \]

         rounded up to the next foot

         Where:
         \[ s_1 = \text{distance from inside face of wall to haunch in feet} \]
         \[ s_2 = \text{distance from inside face of wall to typical dome thickness in feet} \]
This springline haunch shall begin at the inside face of the tank wall with a springline thickness as required by paragraph (f) below and shall end at radial location $s_1$ with the following thickness:

$$t_{d1} = 1.33 \cdot t_d$$

Where: $t_{d1} =$ minimum thickness at $s_1$ in feet  
$t_d =$ typical dome thickness in feet at one buckle diameter from tank wall  

d) Beginning at $s_1$ and continuing to $s_2$ the dome shell shall have a uniform straight line taper.

e) Parameters (b), (c), and (d) above are not required for domes where the calculated typical dome thickness is less than 75 percent of the actual typical dome thickness.

f) Sufficient concrete thickness at the springline of the dome shall be provided so that no more than 2 feet of the springline haunch is considered in calculating the effective dome edge ring cross sectional area. Compressive stress in this area shall not exceed 1,000 psi when subjected to initial prestressing, offset by dead load only.

2) Dome Edge Steel Reinforcement:

a) Throughout the dome edge, the percentage of steel reinforcement, both radially and circumferentially, shall be no less than 0.25 percent of the gross cross sectional area of concrete.

b) Along the dome edge, steel reinforcement shall be distributed between the upper and lower layers unless finite element analysis calculations indicate that tensile stress does not exist in the concrete along the bottom face of the dome edge. In that case, only top bars are required radially and circumferentially. In addition, radial and circumferential reinforcing bars will not be required along the bottom face of the dome edge where the calculated typical dome thickness is less than 75 percent of the actual typical dome thickness.

c) Where reinforcing bars are required in the bottom layer, they shall be placed near the tank wall to insure adequate development at the intersection between dome and wall.
d) In all cases, the percentage of circumferential steel reinforcement in the effective dome ring shall be no less than one percent of the gross cross sectional area of concrete. The effective dome ring is defined as 1/4 of the haunch length not to exceed 2 feet.

e) Where bottom dome edge steel reinforcement is required, vertical steel reinforcement along the inside face of the tank wall shall be no less than 0.5 percent of the cross sectional area of wall shotcrete.

H. Prestressing:

1. Circumferential prestressing of the tank shall be achieved by the application of cold-drawn, high-carbon steel wire placed under high tension.

2. A substantial allowance shall be made for prestressing losses due to shrinkage and plastic flow in the shotcrete and due to relaxation in the prestressing steel.

3. The prestressing design shall conform to the following minimum requirements:
   a. Working stress for the tank wall, $f_s$, shall be a maximum of 115,000 psi.
   b. Working stress for the dome ring, $f_{sd}$, shall be a maximum of 120,000 psi.
   c. The allowable design tensile stress in the prestressing wire before losses, $f_{si}$ shall be 145,600 psi or no greater than 0.63 $f_u$, where $f_u$ is defined as the ultimate strength of the wire.
   d. Areas to be prestressed will contain no fewer than 10 wires per foot of wall for 8 gauge and 8 wires per foot of wall for 6 gauge.
   e. A maximum of 24 wires per layer per foot for 8 gauge and 20 wires per layer per foot for 6 gauge will be allowed.

I. Wall Openings:

1. When it is necessary for a pipe to pass through the tank wall, the invert of such pipe or sleeve shall provide no less than 18 inch of prestressing above at the bottom of the wall. The prestressing wires required at the pipe elevation shall be distributed into circumferential bands immediately above and below the opening to maintain the required prestressing force while leaving an unbanded strip around the entire tank.

2. Unbanded strips shall have a vertical dimension of no more than 36 inches unless an axi-symmetric shell analysis is performed to account for compressive forces plus shear and moments caused by displacement of the prestressing wires into adjacent bands.
PART 2 PRODUCTS

2.01 CONCRETE

A. In accordance with Section 03 30 00, Cast-in-Place Concrete, except that a 3/8-inch maximum size aggregate may be used for dome concrete if designed for strength and maximum density.

B. Minimum Design Strengths:
   1. Dome Roof: 4,000 psi.
   2. Core Wall: 4,000 psi.
   3. Floor Slab: 4,000 psi.

C. Admixtures: As specified in Section 03 30 00, Cast-in-Place Concrete.

2.02 SHOTCRETE

A. Shotcrete shall conform to the requirements of ACI 506.2 except as modified herein.

B. All shotcrete mixes shall utilize Type I/II cement.

C. A maximum of 25 percent of cementitious material may be fly ash.

D. All shotcrete in contact with diaphragm or prestressing wire shall be proportioned to consist of not more than three parts sand to one part Portland cement by weight. All other shotcrete shall be proportioned to consist of not more than four parts sand to one part Portland cement by weight.

E. Admixtures will not contain more than trace amounts of chlorides, fluorides, sulfides or nitrates.

F. Fine aggregate shall meet the requirements of ASTM C33/C33M.

G. Shotcrete mixes used in the tank construction shall conform to the following:

<table>
<thead>
<tr>
<th>Mix</th>
<th>Compressive Strength (psi)</th>
<th>Maximum W/C Ratio</th>
<th>Slump (in)</th>
<th>Fiber Reinforcement (lbs/cyd)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Core Wall</td>
<td>4000</td>
<td>0.42</td>
<td>5&quot; +/-1&quot;</td>
<td>-</td>
</tr>
<tr>
<td>Covercoat</td>
<td>4000</td>
<td>0.42</td>
<td>5&quot; +/-1&quot;</td>
<td>-</td>
</tr>
</tbody>
</table>
2.03 MOISTURE BARRIER
   A. The moisture barrier shall be polyethylene, Class A, conforming to
      ASTM D4397 with a minimum thickness of 6-mils.

2.04 PRESTRESSED REINFORCEMENT
   A. The prestressing wire shall conform to the requirements of
      ASTM A821/A821M, Type B.
   B. The prestressing wire size shall be 0.162 inch (8 gauge), 0.192 inch (6 gauge)
      or larger, but no larger than 0.250 inch.
   C. The ultimate tensile strength, fu shall be, 231,000 psi or greater for 8 gauge
      wire, 222,000 psi or greater for 6 gauge.
   D. Splices for horizontal prestressed reinforcement shall be ferrous material
      compatible with the prestressing reinforcement and shall develop the full
      strength of the wire.

2.05 NON-PRESTRESSED REINFORCEMENT
   A. Non-prestressed mild reinforcing steel shall be new billet steel meeting the
      requirements of ASTM A615/A615M with a minimum yield strength, fy, of
      60,000 psi.
   B. Welded wire reinforcing shall be plain wire conforming to the requirements of
      ASTM A1064/A1064M with a minimum yield strength, fy, of 65,000 psi.

2.06 GALVANIZED STEEL DIAPHRAGM
   A. The galvanized steel diaphragm used in the construction of the core wall shall
      be 26 gauge with a minimum thickness of 0.017 inch conforming to the
      requirements of ASTM A653/A653M. Weight of zinc coating shall be not less
      than G90 of Table 1 of ASTM A653/A653M.
   B. The diaphragm shall be formed with re-entrant angles and erected so that a
      mechanical key is created between the shotcrete and diaphragm.
   C. The diaphragm shall be continuous to within 3 inch of the top and bottom of
      the wall. Horizontal joints or splices will not be permitted.
   D. All vertical joints in the diaphragm shall be rolled seamed, crimped and sealed
      watertight using epoxy injection.
   E. In all tanks designed to use a waterstop at the floor/wall joint, the steel shell
      diaphragm shall be epoxy bonded to the waterstop.
2.07 PVC WATERSTOPS, BEARING PADS AND SPONGE FILLER

A. Plastic waterstops shall be extruded from an elastomeric plastic material of which the base resin is virgin polyvinylchloride (PVC). PVC waterstops shall conform to the requirements of CRD-C-572-74.

B. The profile and size of the waterstop shall be suitable for the hydrostatic pressure and movements to which it is exposed.

C. Bearing pads used in floor/wall joints shall consist of neoprene, natural rubber or polyvinyl chloride.

D. Sponge filler at the floor/wall joint shall be closed-cell neoprene.

2.08 EPOXY

A. Epoxy Sealants:

1. Epoxy shall conform to the requirements of ASTM C881/C881M.
2. Epoxy used for sealing the diaphragm shall be Type III, Grade 1, and shall be 100 percent solids, moisture insensitive, low modulus epoxy.
3. Epoxy used for placing the waterstop shall be Type II, Grade 2, and shall be 100 percent solids, moisture insensitive, low exotherm epoxy.
4. When pumped, maximum viscosity of the epoxy shall be 10 poises at 77 degrees F.
5. The epoxy sealants used in the tank construction shall be suitable for bonding to concrete, shotcrete, PVC and steel.

B. Bonding Epoxy: Epoxy resins used for enhancing the bond between fresh concrete and hardened concrete shall conform to the requirements of ASTM C881/C881M.

C. Epoxy resins shall be a two-component, 100 percent solids, moisture-insensitive epoxy and shall be Type II, Grade 2.

2.09 SEISMIC RESTRAINT CABLES

A. When required by design, seismic restraint cables shall be seven-wire strand conforming to ASTM A416/A416M.

B. The strand shall be protected with a fusion-bonded, grit-impregnated epoxy coating conforming to ASTM A882/A882M or galvanized.

C. The minimum yield strength of the seven-wire strand shall be 270,000 psi.
2.10 TANK ACCESSORIES

A. Wall Manways: Type 316 or Type 316L if subjected to welding, stainless steel frame and cover with swing hinge. Design to resist hydraulic loading without excessive deflection. Clear opening size as noted on the Drawings. Number of manways per tank as noted on the Drawings.

B. Guardrails/Handrails: As specified in Section 05 52 16, Aluminum Railings. Locate as shown on the Drawings and as specified herein.

C. Fiberglass reinforced plastic (FRP) components shall conform with Section 06 82 00, Glass-Fiber-Reinforced Plastic, as applicable.

D. Aluminum Accessories:
   1. Aluminum accessories shall be shop fabricated and fully welded. All welding shall be in accordance with American Welding Society (AWS) D1.2 to fuse materials without distortion of the material. Mechanical splices shall only be used at field splice locations.
   2. Aluminum accessories shall have a "mill" finish.
   3. Aluminum surfaces in contact with concrete shall be protected with a coat of bituminous paint.

E. Exterior Ladder: Aluminum ladder with safety climb device and lockable security cover plate.

F. Interior Ladder: Fiberglass reinforced plastic (FRP) ladder with Type 316 stainless steel safety post and Type 316 stainless steel climb device, belt, and rail extension.
   1. Provide a locking aluminum box adjacent to the roof hatch to store the safety climb device rail extension and safety climb belt.

G. Through-wall pipe sleeves shall be Type 316 stainless steel sleeves with neoprene modular seal units. Waterstop rings on wall-pipes shall be Type 316 stainless steel.

H. Accessory hardware, unless otherwise noted, shall be Type 316 stainless steel conforming to ASTM F593.

I. Pipe Connections:
   1. Pipe connections shall be oriented, shall extend below the bottom of the reservoir, and shall terminate with end connections, as indicated on the Drawings. Pipe and fittings shall be ductile iron as specified in the
ductile iron pipe section. Encasement shall extend as noted on the Drawings beyond the reservoir footing. Extra reinforcement shall be provided in the reservoir floor slab around pipe connections, as indicated on the standard concrete details drawing.

2. Pipe connections shall be flush with the reservoir floor unless otherwise indicated on the Drawings. Removable silt stops and baffles are required where indicated on the Drawings. The removable silt stops and baffles shall be fabricated from minimum 3/16-inch thick stainless steel or minimum 1/4-inch thick fiberglass-reinforced plastic.

J. Overflow: The overflow shall be equipped with a weir box capable of discharging the specified overflow rate with a water level 12 inches above the weir.

K. The overflow box shall be fabricated from minimum 3/16 inch thick stainless steel plates or minimum 1/4 inch thick fiberglass reinforced plastic, and shall be provided with a flanged connection on the bottom. The overflow pipe shall extend vertically to the flanged connection. The overflow pipe shall be ductile iron conforming to the ductile iron pipe section. The top half of the overflow pipe inside the reservoir shall be braced to the reservoir wall at not less than four equally spaced locations. All bracing, hardware, and anchoring devices shall be AISI Type 316 stainless steel and shall conform to the requirements of the structural and miscellaneous metals section.

L. Emergency Overflows: Emergency overflow outlets shall be installed on the dome roof at the locations indicated on the Drawings and shall combined provide an overflow open area capable of passing a minimum flow of 12,000 gpm. Overflow outlets shall be precast concrete construction with removable 24 mesh fiberglass screen.

M. Roof Hatch: A roof hatch, fabricated from fiberglass with integrally molded fiberglass stiffeners, shall be provided on the reservoir near the outside ladder and shall be provided with stainless steel hinges and a hasp for locking. The hatch shall have a minimum opening dimension in any direction of 76 inches. The opening shall have a curb at least 4 inches high, and the cover shall have a downward overlap of at least 2 inches. The cover shall be provided with a neoprene gasket. Fiberglass shall be provided with protection from ultraviolet light.

N. Vent: A vent of the mushroom type fabricated from fiberglass at least 1/4 inch thick shall be provided. The vent shall be screened with 24 mesh fiberglass insect screening, and shall have a net free area of at least 2,000 square inches. The vent shall be located at the center of the dome roof. The vent opening shall be provided with a curb at least 4 inches high. The fiberglass vent shall be provided with protection from ultraviolet light.
O. Baffle Curtains:

1. Baffle curtains shall be provided in the location and orientation indicated on the Drawings and shall be provided complete with AISI Type 316 stainless steel fasteners and supports. Openings at the base of the baffle curtains shall be provided to allow water to flow to drain. Openings shall be provided in the baffle curtains to allow water to flow from the influent to the effluent side of the curtain. The location of the openings are indicated on the Drawings. Openings shall be sized by equipment manufacturer.

2. The reservoir contractor shall design the baffle curtains. Baffle curtains shall be designed for a 20 psf lateral load minimum. The baffle curtains shall be held in place by an upper cable and angle system attached to the dome, and shall also be anchored to the floor. Grommets, additional material thickness, or other means shall be provided to eliminate elongation, stretching, and tearing of the fabric. Each baffle curtain shall be constructed to the shape required to fit the dimensions of the location where it is to be installed and for proper attachment to the baffle anchoring system.

3. The fabric shall be NSF 61 compliant geo-membrane. The fabric shall have a knitted polymer coated polyester fabric with a 6.5 oz/sq yd. minimum weight. The fabric shall be of good appearance and free of all defects such as holes, tears, blisters and any other defects that may affect its serviceability. The coated fabric shall not be less than 30 mils thickness with a plus 10 percent allowable variation. There shall be not less than 7 mils thickness of polymer coating over the base fabric.

PART 3 EXECUTION

3.01 GENERAL

A. Concrete encase piping under tank foundation.

B. Subgrade elevations shall be verified prior to starting tank construction. Subgrade shall be prepared in accordance with the Clearwell Geotechnical Report.

C. Floor:

1. A 6-mil polyethylene vapor-barrier shall be placed after subgrade preparation has been completed.

2. Form and screed boards shall be of proper thickness and sufficiently braced to ensure that the floor is constructed within proper thickness tolerances.
3. Plate bolsters shall be used to support reinforcing steel supported directly on the subgrade to ensure positive control of placement of reinforcing steel.
4. The floor shall be vibratory screeded to effect consolidation of concrete and proper encasement of floor reinforcing steel.
5. The floor shall be water cured for a minimum of 7 days after casting.
6. The floor shall receive a light broom finish.

D. Core Wall:

1. The wall shall be constructed utilizing diaphragm and shotcrete with each conforming to the following:
   a. Diaphragm Erection: The diaphragm shall be protected against damage before, during, and after erection. Nail or other holes shall not be made in the diaphragm for erection except in the top 3 inches. Holes shall not be made in the diaphragm except for inserting wall pipes or sleeves, reinforcing steel, bolts, or other special appurtenances. Such penetrations shall be sealed with an epoxy sealant which complies with Article: Epoxy.
   b. Shotcrete:
      1) All shotcrete shall be applied by or under direct supervision of experienced nozzlemen certified by the American Concrete Institute (ACI) as outlined in ACI certification publication CP-60.
      2) Each shotcrete layer shall be broomed prior to final set to effect satisfactory bonding of the following layer.
      3) No shotcrete shall be applied to reinforcing steel or diaphragm that is encrusted with overspray.
      4) No less than 1/8 inch thick shotcrete shall separate reinforcing steel and prestressing wire.
      5) The diaphragm shall be encased and protected with no less than 1 inch of shotcrete in all locations.
      6) The interior shotcrete shall receive a light broom finish.
   c. Curing: Interior and exterior portions of the shotcrete wall shall be water cured for a minimum of 7 days or until prestressing is completed.

E. Epoxy Injection:

1. Epoxy injection shall be carried out from bottom to top of wall using a pressure pumping procedure.
2. Epoxy injection shall proceed only after the diaphragm has been fully encased, inside and outside, with shotcrete.
F. Dome:

1. All concrete shall be consolidated by means of a vibrator for proper encasement of reinforcing steel and welded wire fabric.
2. All surfaces at the joint between the wall and the dome shall be coated with bonding epoxy which complies with Section 2.8 Epoxy.
3. Plastic bolster shall be used to support reinforcing steel and welded wire reinforcement to ensure positive control on placement of steel.
4. The exterior surface of the dome shall receive a light broom finish.
5. The dome shall be water cured for a minimum 7 days after casting or until dome band prestressing is completed.

G. Prestressing:

1. The initial tension in each wire shall be read and recorded to verify that the total aggregate force is no less than that required by the design. Averaging or estimating the force of the wire on the wall shall not be considered satisfactory evidence of correct placement of prestressing wires.
2. Placement of the prestressing steel wire shall be in a continuous and uniform helix of such pitch as to provide in each lineal foot of core wall height an initial force and unit compressive force equal to that shown on the design drawings. Splicing of the wire shall be permitted only when completing the application of a full coil of wire or when removing a defective section of wire.
3. Shotcrete shall be used to completely encase each individual wire and to protect it from corrosion. To facilitate this encasement, the clear space between adjacent wires is to be no less than one wire diameter.
4. Prestressing shall be accomplished by a machine capable of continuously inducing a uniform initial tension in the wire before it is positioned on the tank wall. Tension in the wire shall be generated by methods not dependent on cold working or re-drawing of the wire. In determining compliance with design requirements, the aggregate force of all tensioned wires per foot of wall shall be considered rather than the force per individual wire, and such aggregate force shall be no less than that required by the design and as shown on approved drawings.
5. The tank construction company shall supply equipment at the construction site to measure tension in the wire after it is positioned on the tank wall. The stress measuring equipment shall include: electronic direct reading stressometer accurate to within 2 percent, calibrated dynamometers and a test stand to verify the accuracy of the equipment.
6. After circumferential prestressing wires have been placed, they shall be protected by encasement in shotcrete. This encasement shall completely encapsulate each wire and permanently bond the wire to the tank wall.
7. When multiple layers of wire are required, shotcrete cover between layers shall be no less than 1/8 inch thick.

H. Covercoat:
   1. After all circumferential prestressing wires have been placed, a shotcrete cover having a thickness of no less than 1 inch shall be placed over the prestressing wires.
   2. Horizontal sections of the wall shall form true circles without flat areas, excessive bumps or hollows.
   3. The covercoat shall receive a sliced trowel finish.

I. Wall Openings: All wall pipes, sleeves and manholes passing through the wall shall be sealed to the diaphragm by epoxy injection.

3.02 CURING

A. Dome Concrete:
   1. Water cure dome concrete for 7 days by keeping surface continuously wet.
   2. Schedule wire wrapping and application of shotcrete so curing shall not be interrupted, and water from curing shall not wash or damage shotcrete wire coats.
   3. Begin curing after initial concrete set has occurred.

B. Shotcrete:
   1. Keep shotcrete between layers of wire and cover damp by hand watering or fine mist spray.
   2. Continuously water cure completed shotcrete surfaces for period of 7 days after application, or until subsequent shotcrete coats are applied prior to end of the 7-day curing period.
   3. Remove laitance from wall by light sandblasting after curing period.
   4. Do not use curing compounds.

3.03 PAINTING

A. Paint exterior surface of tank as specified in Section 09 90 00, Painting and Coating.
3.04 FIELD QUALITY CONTROL

A. Inspection and Testing:

   1. Concrete and Shotcrete Testing:
      a. Shall be as specified in 03 30 00, Cast-In-Place Concrete.
      b. Slump testing not required for shotcrete.

   2. Hydrostatic Testing: Shall be as specified in Section 03 30 00,
      Cast-in-Place Concrete.

3.05 CLEANING AND DISINFECTION

A. The interior of the tank shall be cleaned to remove debris, construction items, and equipment prior to testing and disinfection.

B. In accordance with Section 33 13 00, Disinfection of Water Utility Distribution Facilities.

END OF SECTION
Subject: Pre-Bid Meeting

Project: City of Oak Ridge – Water Treatment Plant

Date/Time: August 3, 2022 @ 10:00 AM local time

Location: Oak Ridge Central Services Center
100 Woodbury Lane
Oak Ridge, TN

1. Introductions and Attendance Record (See attached)

2. Project Overview - The Project consists of the following work:
   a. Existing Raw Water Pump Station improvements including
      i. Demolition of existing equipment,
      ii. Replacement of existing traveling screens,
      iii. New submersible raw water pumps, motors, and VFDs,
      iv. Lighting, power, instrumentation HVAC, and controls.
   b. Site Improvements including grading, paving, fencing, piping, and lighting.
   c. Flocculation Basin - Dual-stage Flocculation.
   d. Water Treatment Building including:
      i. Ultrafiltration Membrane Filtration System.
      ii. Chemical Storage and Feed Systems.
      iii. Laboratory and Control Rooms.
      iv. Operator and Superintendent Offices and Maintenance Rooms.
      v. Finished Water Pump Station with VFDs and Surge Protection.
      vi. Lighting, HVAC, Plumbing, and Fire Protection.
   e. Clearwell Storage Tank – 1MG.
   f. Residuals and Sewer Pump Stations.
   g. Residuals Storage and Dewatering Tanks – 2 x 200,000 gal.
   h. Electrical, Instrumentation, and Control Systems.

3. Bid Opening: August 30th @ 2:00 PM local time at Oak Ridge Central Services Center.

4. Interpretations and Addenda: 00 21 13, Instructions to Bidders, Paragraph 7
   a. Transmit via email, on company letterhead in PDF format, to Ben Simerl (ben.simerl@jacobs.com), Pam Bybee (pam.bybee@jacobs.com), and Lyn Majeski
Pre-Bid Meeting

(Imajeski@oakridgetn.gov). Subject line of email is to be “Oak Ridge Water Treatment Plant – Bidder Questions”

b. Deadline for Questions: August 23rd @ 5:00 PM local time
c. Last Addendum – August 26th @ 5:00 PM local time
d. Addenda will be posted on QuestCDN.com
e. It is the Bidders responsibility to acknowledge receipt and ensure they have received all Addenda.

5. Instructions to Bidders
   a. Carefully review all requirements
   b. Article 13 – Preparation of Bid - markings on the outside of the envelope.
   c. Article 15 – Submittal of Bid – In Person or Overnight to 100 Woodbury Lane, not City Hall.
   d. Article 22 - Equipment and materials are exempt from Tennessee sales and use taxes. Contractor to apply for exemption from the TN Dept of Revenue.
   e. Article 25 – Contract to be Assigned - Membrane Filtration System – Owner Purchase Order will be assigned to the Construction Contract.

6. Submitting a Bid
   a. Contractor to print necessary bid submittal documents from those provided, email Pam Bybee for editable forms.
   b. Bid Form:
      i. Acknowledge all Addendums and review all representations and certifications
      ii. Lump sum for all work
      iii. Bid Alternates
      iv. Scrap Iron Index – provide cost/ton in effect on date of Bid, submit certified statement as documentation
      v. Ensure all required attachments are included (Paragraph 7 on page 6 of Bid Form)

7. Bid Documents: 5 volumes total
   a. Volumes 1-3 are procurement/contracting requirements & specifications,
   b. Volume 4 is Appendices – Membrane Equipment Package, Geotechnical Reports, Permits.
   c. Volume 5 is drawings

8. Project Funding
a. TDEC-SRF Loan, EPA WIFIA Loan, and EPA FY 2022 Appropriation Grant
   i. AIS – American Iron and Steel Requirements
   ii. BABA – Build America, Buy American Requirements
   iii. Davis Bacon Wage Rates
   iv. DBE – Bidder Solicitation Requirements
      1. 10 Certified Letters (and Return Receipts) to DBEs.

9. 01 31 13, Project Coordination
   a. Paragraph 1.03 – Work Sequencing/Constraints
   b. Paragraph 1.04 - Facility Operations: The Raw Water Intake must remain in service
      throughout the project. Any disruption of operations must be carefully planned with the
      Owner.
   c. Coordination with Finished Water Pipeline Contractor.
   d. Paragraph 3.01 Salvage of Materials

10. Project Schedule
    a. Contract Time: 700 days to Substantial Completion and 730 days to Final Completion.
    b. Project Award - City Council – September 12th
    c. Notice to Proceed - October 1st (tentative – pending funding agency approval)

11. Site Visit
    a. Contractor Site Visits beyond today’s site walk must be coordinated with Mark Terry
       (mterry@oakridgetn.gov)
# SIGN IN SHEET

**Water Treatment Plant**

**City of Oak Ridge, TN**

**Pre-Bid Meeting:** August 3, 2022 at 10:00 a.m.

Central Services Complex, Oak Ridge, Tennessee 37830

<table>
<thead>
<tr>
<th>NAME</th>
<th>COMPANY</th>
<th>EMAIL ADDRESS</th>
<th>PHONE</th>
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</thead>
<tbody>
<tr>
<td>Ben Siméral</td>
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## SIGN IN SHEET

**Water Treatment Plant**

City of Oak Ridge, TN

Pre-Bid Meeting: August 3, 2022 at 10:00 a.m.

Central Services Complex, Oak Ridge, Tennessee 37830

<table>
<thead>
<tr>
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<tr>
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# PRE-BID CONFERENCE
## WATER TREATMENT PLANT
### FY2023-015
#### AUGUST 3, 2022 at 10:00 A.M.

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<tr>
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