ADDENDUM NUMBER 3

LAKE HARTWELL WTP RAW WATER PUMP STATION IMPROVEMENTS

FOR

ANDERSON REGIONAL JOINT WATER SYSTEM

GMC PROJECT NO. CGRE250033

1. **Revisions to the Project Manual**

   1.1. The following revisions are hereby added as Addendum No. 3 to the referenced Project Manual and shall be considered when preparing bids. All documents listed below are included with this Addendum.

   - Revise Specification 43 23 13 – VERTICAL TURBINE PUMPS

2. **Questions**

   2.1. Will bid bond be required for the Base Bid price or Base Bid with Additive Alternate #1 price?
   2.1.1. Bid Bond should include the Base Bid with Additive Alternate #1 price.

   2.2. Will warranty be required – stricken in Addendum 2 from 43 23 13 – VERTICAL TURBINE PUMPS?
   2.2.1. Yes, warranty is required. See updated specification attached (Revision 2).

3. **Acknowledgement**

   3.1 Receipt of Addendum No. 3 shall be acknowledged in the following way.

   3.1.1 Note on Bid Form of the Project Manual – Bidder acknowledges receipt of "Addendum No. 3" and date of "June 13th, 2025".

4. **Attachments**

   4.1 Updated Specification for 43 23 13 – VERTICAL TURBINE PUMPS

5. **Conclusion**

   5.1 This is the end of Addendum Number 3, dated Friday, June 13th, 2025.

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SECTION 43 23 13 – VERTICAL TURBINE PUMPS – REVISION 2

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Vertical turbine pumps for raw water pump station.

1.2 REFERENCE STANDARDS

A. American Bearing Manufacturers Association:

1. ABMA 9 - Load Ratings and Fatigue Life for Ball Bearings.
2. ABMA 11 - Load Ratings and Fatigue Life for Roller Bearings.

B. ASME International:

1. ASME B16.5 – Pipe Flanges and Flanged Fittings.

C. ASTM International:

1. ASTM A29 - Standard Specification for General Requirements for Steel Bars, Carbon and Alloy, Hot-Wrought.
2. ASTM A36M – Standard for Carbon Structural Steel.
3. ASTM A48 – Standard Specification for Gray Iron Castings.
4. ASTM A53 – Standard for Pipe, Steel Black and Hot Dipped, Zinc Coated, Welded and Seamless.
5. ASTM A108 – Standard for Steel Bars, Carbon and Alloy, Cold Finished.
6. ASTM B148 – Standard for Aluminum-Bronze Sand Castings.
7. ASTM A276 – Standard for Stainless Steel Bars and Shapes.
8. ASTM A536 - Standard Specification for Ductile Iron Castings.
9. ASTM A582M – Standard for Free-Machining Stainless Steel Bars.
10. ASTM B584 – Standard for Copper Alloy Sand Casting for General Applications
11. ASTM A744 - Standard Specification for Castings, Iron-Chromium-Nickel, Corrosion Resistant, for Severe Service.

~~1.3 COORDINATION~~

~~A. Section 01 31 00 - Project Management and Coordination: Requirements for coordination.~~

~~B. Coordinate installation and startup of Work of this Section with plant operations.~~

~~C. Work of this Section shall not interfere with the continuous operation of the raw water pump station. Contractor shall follow the written construction sequencing plan to allow for transition to the new system with no or extremely limited downtime.~~

D. Contractor may submit an RFI proposing alternate methods of construction sequencing that also allow for continuous operation to be approved by Engineer.

1.4 SCHEDULING

A. Section 01 31 00 - Project Management and Coordination: Requirements for scheduling.

B. Schedule Work of this Section to install pumps prior to connecting piping Work.

1.5 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.

B. Product Data: Submit manufacturer information for materials of construction and fabrication.

C. Shop Drawings:

1. Submit detailed dimensions for materials and equipment, including wiring and control diagrams, performance charts and curves, installation and anchoring requirements, fasteners, and other details.
2. Include manufacturer's specified displacement tolerances for vibration at operational speed specified for pumps.

D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

E. Manufacturer Instructions: Submit detailed instructions on installation requirements, including storage and handling procedures, anchoring, and layout.

F. Source Quality-Control Submittals: Indicate results of shop/factory tests and inspections.

G. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.

H. Manufacturer Reports: Certify that equipment has been installed according to manufacturer instructions.

1.6 CLOSEOUT SUBMITTALS

A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for submittals.

B. Project Record Documents: Record actual locations and final orientation of equipment and accessories.

1.7 WARRANTY

A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for warranties.

B. The Manufacturer and Contractor shall furnish a warranty extending twelve (12) months after substantial completion date or eighteen (18) months from shipment, whichever occurs first.

PART 2 - PRODUCTS

2.1 VERTICAL TURBINE PUMPS

A. Manufacturers:

1. The vertical turbine pumps shall be manufactured by:

   a. Flowserve
   b. Xylem Goulds Water Technology
   c. Floway
   d. Patterson Pump Company
   e. Pentair
   f. Or approved equal.

B. Description: Vertical multi-stage type, consisting of a fabricated steel discharge head, vertical hollow shaft motor, discharge column and shafting, and bowl assembly electric motor. In general, pumps should be designed to meet Hydraulic Institute recommended standards and NSF 61 requirements.

C. Pump Designation:

1. Pump 5 (Base Bid)
2. Pump 2 (Alternate #1)

D. Performance and Design Criteria:

Criteria	Pump 5 (Base Bid)	Pump 2 (Alternate #1)
Design Flow Rate (GPM)	6,950	11,500
Design TDH (FT)	156	156
Number of Stages	2	2
Maximum Motor Horsepower	400	600
~~Maximum~~ Minimum Efficiency at Design Flow Rate	80%	80%
Maximum Pump Speed (RPM)	1180	1180
Minimum Column Diameter (Inch)	~~20~~ 16	20
Minimum Pump Discharge Diameter (Inch)	~~20~~ 16	20
Minimum line shaft diameter (Inch)	~~1.50~~ 1.94	~~2.75~~ 2.69
Column and Bowl Assembly	Must allow for installation within 38” x 33” opening.	

E. Critical Elevations

1. Sole Plate Elevation: 676.5 Feet
2. Top of Structure: 676 Feet
3. Centerline of discharge: 665 Feet
4. Bottom of Structure: 613 Feet
5. Critical elevations for the pump have been taken from record drawings.

F. Bowl Assembly:

1. Suction Bell: Shall be constructed of cast iron and machined for bolting to the bowls. The suction bell shall be a smooth bell-shaped entrance as a waterway to the impellers and shall incorporate an integrally cast suction manifold bearing housing. The housing shall have a Vesconite Hi-Lube engineered thermoplastic bearing and a cast iron suction manifold plug. Bowl inlet shall include a 304 stainless steel inlet strainer with 3/4 inch openings.
2. Pump Bowls: Shall be constructed of ASTM A48 Class 30 close grained cast iron with integrally cast diffusion vanes. The bottom bowl shall be machined to bolt to the suction bell. Each bowl shall be equipped with a Vesconite Hi-Lube engineered thermoplastic bearing. Each bowl interior shall be enameled or coated with TNEMEC 21 epoxy or approved equal to provide smooth passage of water and increase efficiency.
3. Impellers: Shall be semi-open type for maximum hydraulic efficiency, constructed of ASTM B148 C95200 aluminum bronze or ASTM A743 Type 316 stainless steel, dynamically and statically balanced. The impeller vanes shall be machined to match the contours of the suction bell, and also the contour of the series case. Impeller shall be secured by means of ASTM A582 S41600 stainless steel key and split rings to the bowl shaft. The impeller shaft shall be ASTM A582 Type 416 stainless steel and shall be not less than the minimum diameter noted above. The total hydraulic down-thrust for pump shall be minimized. Up-thrust developed upon starting shall be acceptable, but pumps that operate in continuous upthrust shall not be acceptable and will not be considered. Verification of thrust values shall be provided and documented with standard manufacturers published information. Failure to verify thrust calculations shall be basis for rejection of equipment.

G. Column Assembly:

1. The Column Assembly: The pump shall be of open lineshaft construction designed for lubrication by the pumped media. Column pipe shall be flanged and shall be fabricated of ASTM A53 Grade B, carbon steel. Column assembly shall have fabricated carbon steel bearing retainers that are welded into the column sections. Each guide shall contain a water lubricated cutlass Vesconite Hi-Lube bearing designed for open line shaft, vertical turbine service. Maximum length of one column section shall be 10 feet. Column sections located directly below the discharge head and directly above the pump bowl assembly shall not generally exceed 5’-0” in length. Column sections shall be secured by means of ASTM F593-Gr 316. CW2 stainless bolts and ASTM F594-Gr 316.CW2 stainless steel nuts or threaded flanges.
2. Line Shafting: Shall be of ASTM A582 Type 416 stainless steel, ground and polished. Shafting shall be connected by means of ASTM A582 Type 416 stainless steel couplings. All shaft journals shall be provided with AISA 304 S.S. sleeves at the location of each shaft bearing. The use of flame sprayed stainless steel or chrome plating is not considered an acceptable alternate to the specified shaft sleeves. Shafting size shall be determined from the thrust characteristics of the particular pump bowl under consideration but shall in no case be less than one inch in diameter, and shall be adequate size to transmit the full motor horsepower without failure. Undersized shafting shall be basis for rejection of the pump. Pump supplier shall submit manufacturer's published data to verify shafting selection. Failure to verify shaft sizing shall be basis for rejection of the equipment.

H. Discharge Head

1. The pump discharge head shall be fabricated steel type. The head shall be suitable for floor mounting and shall be furnished with a steel sole plate to facilitate future removal. Sole plate mounting surface shall be fully machined to provide a perfectly flat base for accurate leveling of the discharge head, and the sole plate shall be accurately leveled to the tolerances specified by the manufacturer prior to installation of the pump. The discharge head base shall be machined to accept the sole plate and shall include a Class 150 integral discharge flange. The head shall have provisions for the mounting and securing of a vertical hollow -shaft motor. The motor mounting flange shall be machined for a perfect fit and angular misalignment shall not be allowed.
2. Lifting lugs shall be provided on the discharge head and shall be capable of supporting the entire weight of the pump. A 1-inch NPT drain connection, 1/2-inch NPT pre-lube connection, and a 1/4-inch NPT gauge connection shall be provided. The pump discharge flange shall be provided. The pump discharge flange shall conform to CL 150 ANSI standard drilling for pipe flanges. The pump shall be sealed at the discharge head by means of graphited packing. A Vesconite Hi-Lube engineered thermoplastic bushing and a A743 Type 316 stainless steel two-piece packing gland shall secure the packing and allow for adjustment for lubrication. A removable coupling guard comprised of two (2) large hinged doors constructed of framed expanded steel and coated per Specification Section 09 96 00 for the non-wetted discharge head exterior shall be provided to protect operating personnel from accidental contact with the shaft or flanged coupling during operation.
3. Lubrication shall be with process water only, no external water source is provided.
4. The pump discharge head shall be provided with shaft critical speed calculations, and a structural natural frequency analysis shall be performed on the discharge head and motor combination to ensure low-vibration operation. The pumps will be driven by reduced voltage auto-transformer starters. ANSI/HI Standard 9.6.8 calculations are required per Level 1 for lateral and structural analysis, and Level 2 for torsional analysis. Separation margin by calculation shall be 25% for the Level 1 analyses and 15% for the Level 2 analysis. The calculations and results shall be provided in the pump submittal data, for review and approval by the engineer.

I. Motor

1. Each turbine pump shall be driven by a vertical hollow shaft motor suitable for 4160 volt, 3 phase, 60 hertz. See design criteria for motor size. The motor shall be an integral part of the pumping unit and shall be suitable for mounting as shown on the plans. All motors shall be sized so that they will not be overloaded at their rated capacity at any point on the pump performance curves. Motors shall be WP-1 with Class H insulation and shall have a minimum service factor of 1.15. Pumps will be driven by reduced voltage auto-transformer starters.
2. Each motor shall be inverter duty for future VFD.
3. The main terminal box shall be made of welded sheet steel, sized for stress cones and have a minimum size of ANSI type II.
4. Each motor hall have thrust bearing(s) capable of carrying the dead weight of all rotating parts of the pump plus the hydraulic thrust incurred during operation.
5. Motor shall be vertical hollow shaft, squirrel cage induction type and shall conform to IEEE standards. Each motor shall be equipped with a non-reverse coupling. A coupling at the top of the motor shall facilitate vertical adjustment of the impellers of the pump. The motor shall also be furnished with a protective cap. All bearings shall be oil or grease lubricated, with proper provisions made to guard against the escape of lubricant.

6. A 120v space heater shall be supplied with the motor.
7. Two 100 ohm RTDs shall be provided in the windings of each phase to afford protection of the motor against excessive operating temperature. (6 total).
8. Upper and lower bearing RTD shall be provided and be similar to the winding RTDs.
9. Vibration protection shall be provided. Vibration switches recommended are Robertshaw 366 or Approved Equal.
10. Space heaters, RTD leads and vibration sensors shall be directed to a separate junction box, for field wiring by the contractor. These leads shall not be routed through the primary junction box.
11. Motors shall conform to Specification Section 26 05 93 – Common Motor Requirements for Process Equipment

J. Miscellaneous

1. Data Plates: Each pump shall be equipped with a data plate securely fastened to the pump that contains the manufacturer's name, pump size and type, serial number, pump speed, impeller data, capacity and head rating, and any other pertinent information.
2. A fabricated 40” x 40” steel sole plate shall be provided with each pump to facilitate installation and future removal. The plate shall be sized by the manufacturer including anchor bolts and tapped holes corresponding to drilling of the pump discharge head base bolting. Anchor bolts shall be embedded hardened steel J-bolts cast into the pedestal. J-bolts and connection hardware to be sized and provided by the pump vendor. Contractor shall remove and replace existing pedestal per structural details with minimum compressive strength as indicated in Structural General Notes to the size required by pump vendor for sole plate sizing and floor opening. A suitably sized hole shall be accurately cut in the center of the plate to allow passage of the pump, and the top surface shall be accurately machined to provide a perfectly flat surface for mounting the discharge head. Raw or mill finished steel plate is not considered acceptable. The base plate shall be grouted in place by the Contractor, in the position as indicated on the Plans.
3. Testing: The pump shall be performance tested prior to shipment to confirm pump performance. Test shall comply with ANSI/HI 14.6 Grade 1U requirements, and shall include, but not be limited to, checking the unit at its rated speed, capacity, head, efficiency, and brake horsepower at such conditions of head and capacity so as to properly establish the actual performance curve. Certified copies of the test reports shall be submitted for review prior to shipment. Hydrotesting shall also be provided for the discharge head, column pipe sections, and bowl assembly to confirm integrity of the components. Hydrotesting shall be performed with water at the pump manufacturer’s facility, with certified test results being provided for review and approval prior to shipment.
4. Painting: All equipment comprising each pumping unit shall be painted with a potable epoxy finish meeting NSF 61 requirements by the pump manufacturer prior to shipment. Epoxy shall be Carboline 891, TNEMEC 21, or approved equal, and shall be applied to the discharge head ID/OD, column pipe ID/OD, and bowl OD for a total dry film thickness of 16 mils on all wetted components, factory finish coated. Non-wetted components including the discharge head exterior and sole plate shall be factory primer coated with TNEMEC 66, Carboline 825, or approved equal and field finished to match color coating.
5. All pumps shall be completed assembled to the greatest extent possible at the manufacturer’s facility prior to shipment. Pumps may require some on-site assembly to facilitate shipment, but only to the extend required to keep the assembly within the required shipping dimensions.

K. Operation:

1. Electrical Characteristics: As specified in Division 26 – Electrical and the following:

    a. Voltage: 4160V, three phase, 60 Hz.

2. Control Panel: Existing.
3. Disconnect Switch: Factory mounted on existing equipment.
4. Operation Sequences:

    a. The purpose of the vertical turbine pumps is to pump raw water from the intake well to the water treatment plant. The pumps are vertical turbine type, and are on auto-transformer reduced voltage starters. The pumps are turned on and off by the SCADA system based on operator control.

L. Fabrication:

1. Shaft Guard: Enclose shaft and pump threaded coupling with hinged door type guard complying with OSHA standards. Also, install a reverse ratchet to prevent the impeller from loosening if the motor turns in reverse.
2. Pump and Drive Mating Surfaces: Machine finished.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install pumps where indicated on Drawings and according to manufacturer instructions.

B. Provide and connect piping, power, and control conduit, and wiring to make system operational and ready for startup.

C. Flush piping with clean water after installation.

3.2 FIELD QUALITY CONTROL

A. Section 01 40 00 - Quality Requirements: Requirements for inspecting and testing.

B. Section 01 70 00 - Execution and Closeout Requirements: Requirements for testing, adjusting, and balancing.

C. Preoperational Check: Before operating system or components, perform following:

1. Check pump and motor alignment.
2. Check for proper motor rotation.
3. Check pump and drive units for proper lubrication.

D. Startup and Performance Testing:

1. Operate pump on clear water at design point for continuous period of two (2) hours, under supervision of manufacturer's representative and in presence of Engineer.

E. Manufacturer Services: Furnish services of manufacturer's representative experienced in installation of products furnished under this Section for not less than two (2) eight-hour days on Site for installation, inspection, startup, field testing, and instructing Owner's personnel in maintenance of equipment

F. Verify pump performance by performing time-fill test.

G. Check pump and motor for excessive vibration according to manufacturer instructions. Check for motor overload by taking ampere readings.

H. Equipment Acceptance:

1. Adjust, repair, modify, or replace system components that fail to perform as specified and rerun tests.
2. Make final adjustments to equipment under direction of manufacturer's representative.

END OF SECTION 43 23 13