

Addendum No. 3

Date: *May 31, 2023*

Solicitation Number: *FY23-ITBCON-35*

Title: *Franklin Water Treatment Plant Clearwell Improvements*

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Bidders should acknowledge receipt of this addendum on the Bid Form. Failure to acknowledge receipt of this addendum may result in the bid not being considered.

All Bidders are responsible for monitoring CLTWater's Contracting Opportunities website ([Invitation to bid \(ITB\) - City of Charlotte \(charlottenc.gov\)](http://charlottenc.gov)) for additional changes or clarifications.

Modifications to the Invitation to Bid:

#	ITB Section # and Name	Page and Paragraph	Modification
1	00003 - Table of Contents	00003-3	In the Division 13 portion of the Table of Contents, Replace the words "Dry Lime Feeders" with "Dry Lime Feed System".
2	13 31 00 – Sodium Carbonate System	Entire Section	Add the attached Specification Section 13 31 00 to the technical specifications.
3	13 32 00 – Dry Lime Feed System	13 32 00 - 1	At the top of the first page of this specification section, replace the words and numerals "SECTION 13 31 00" with "SECTION 13 32 00".

----- END OF ADDENDUM NO. 3 -----

The below listed attachments follow:

- **Section 13 31 00 – Sodium Carbonate System**

SECTION 13 31 00
SODIUM CARBONATE SYSTEM

PART 1 – GENERAL

1.01 THE REQUIREMENT

- A. The Contractor shall furnish and install two (2) complete dry sodium carbonate silo storage and feeder system which will deliver 3% sodium carbonate solution to the feed points as specified herein and shown on the Drawings.

- B. All components in the silo skirt shall be pre-installed, pre-wired and pre-piped by the Manufacturer to the extent possible. Furnish and install silo systems that consist of all components necessary for a complete and operable system to store, feed, and mix dry chemical including, but not necessarily limited to, the following:
 - 1. Silo storage
 - 2. Hopper with bin activator
 - 3. Volumetric Feeder
 - 4. Solution tank
 - 5. Dust collector
 - 6. Dehumidifier
 - 7. Delumper
 - 8. Control panel
 - 9. Truck fill panel

- C. The Contractor shall be responsible for terminating all electrical connections.

- D. The equipment shall be provided in accordance with the requirements of Section 46 00 00 – Equipment General Provisions and Section 40 05 00 – Basic Mechanical Requirements.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 05 05 13 – Galvanizing
- B. Section 05 10 00 – Metal Materials
- C. Section 05 05 23 – Metal Fastening

- D. Section 05 12 00 – Structural Steel
- E. Section 05 13 00 – Stainless Steel
- F. Section 05 14 00 – Structural Aluminum
- G. Section 05 51 33 – Ladders
- H. Section 05 52 00 – Guards and Railings
- I. Section 05 53 00 – Gratings, Checkered Floor Plates and Access Doors
- J. Section 09 90 00 – Painting

1.03 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

- A. Without limiting the generality of the Specifications, all work specified herein shall conform to the applicable requirements of the following documents.
 - 1. North Carolina Building Code AISC – "Code of Standard Practice"
 - 2. ASCE 7
 - 3. AISC – "Specification for Structural Steel Buildings"
 - 4. AISC – RCSC "Specification for Structural Joints Using High Strength Bolts"
 - 5. AWS – "Structural Welding Code ASTM A786 – Hot-Rolled Carbon, Low-Alloy, High-Strength Low-Alloy, and Alloy Steel Floor Plates"

1.04 OPERATING CONDITIONS

- A. The silo storage and feed system shall operate under the following conditions:

PARAMETER	VALUE
Design Plant Flow Rate (mgd)	156
Chemical	Sodium Carbonate
Design Chemical Dose (mg/L as NaCO ₃)	5.11
Chemical Purity (by weight)	0.995
Design System Feed Rate (lb NaCO ₃ /d)	6,681

Chemical Bulk Density (lb/ft ³)	60
Design System Volumetric Feed Rate (ft ³ NaCO ₃ /hr)	4.64
No. of Feeder Units	2
Design Feed Rate Per Feeder Unit ^A (lb NaCO ₃ /hr)	139.2
Maximum Solids Volumetric Feed Rate Per Feeder Unit ^A (ft ³ NaCO ₃ /hr)	2.32
Dry Feeder Auger Turndown Ratio	10:1
Bulk Storage Operating ^B Volume per Unit (ft ³)	1,675
Silo Diameter (ft)	12
Dissolving Tank Operating Volume ^C (gallons)	250
Design Makeup Water Flow Rate Range per Unit (gpm)	10
Design Chemical Solution Concentration (mg/L)	27,818

A – Denotes rate dry chemical is metered through an auger into dissolving tank

B – Denotes volume available for storage, not overall volume.

C – Operating volume denotes volume between tank discharge and overflow nozzles

1.05 SUBMITTALS

- A. The following items shall be submitted with the Shop Drawings in accordance with, or in addition to, the submittal requirements in Section 01 33 00.
1. Performance Affidavit
 2. Complete, detailed, dimensioned drawings of the feeder system including all components and the support structure.
 3. Detailed electrical drawings, including wiring diagrams, layout drawings, and detailed bill of material for control panel components.
 4. Detailed Bill of Materials
 5. Complete detailed structural drawings and calculations for the silo system (including elevated walkway and base anchorage) signed and sealed by a Professional Engineer currently registered in the state of North Carolina who is a recognized expert in this type of construction. The calculations and drawings shall be submitted to the Engineer prior to fabrication and concrete foundation placement.
 6. Comprehensive anchor design for all silo foundation anchorage. Anchor design shall include embedment depth and any necessary additional reinforcement to accommodate loads to foundation. If silo manufacturer desires anchor embedment

and details to be designed by others, submittal shall include maximum factored reactions in tension and compression at each anchor. Factored reactions shall be for the worse case load combinations to provide the maximum factored reactions in accordance with the North Carolina Building Code and ASCE 7.

- B. Submit O&M Manuals in accordance with Section 01 78 23

1.06 WARRANTY

- A. Warranty shall be as specified in Section 46 00 00 – Equipment General Provisions, with the exception that the warranty shall be for 2 years.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Dry silo storage and feeder system shall be manufactured by Acrison Inc. of Moonachie, NJ.
- B. Silo systems and all associated components shall be the responsibility of a single manufacturer.
- C. The manufacturer shall have a minimum of 15 years of experience in providing similar equipment in water treatment.

2.02 STORAGE SILO

- A. The silo shall be of all welded steel construction, with welds being full penetration. The silo shall be supported by its skirted section. Each silo shall include a double door assembly, in accordance with Section 08 11 13 – Steel Doors and Frames. The doors shall include closers with mechanical hold open devices.
- B. The silo shall be designed for center fill and center single discharge. The silo design shall take into consideration the pressure due to pneumatic loading of the silo, and vacuum due to withdrawal of the product.
- C. The silo shall be designed for the seismic, wind and gravity parameters indicated on the Contract Drawings. The indicated parameters represent minimum requirements for design in accordance with the ASCE 7 and the North Carolina Building Code
- D. The elevated walkway between the silos shall be designed by the Silo Manufacturer. The Silo design shall account for the loads imparted by the walkway in accordance with ASCE 7 and the North Carolina Building Code. The walkway shall be designed for a minimum live load of 100 psf.

- E. The silo storage shall be designed to provide complete use of the operating storage volume. The bottom of the silo shall terminate in a 60-degree conical hopper with an outlet diameter of 5 feet minimum.
- F. The silo roof shall have a non-skid surface with a 10-degree slope and shall include an aluminum handrail assembly with toe board and shall have following at minimum:
 - 1. 24-inch diameter access manhole with an 8-inch pressure/vacuum relief valve
 - 2. Target box
 - 3. Openings for level measuring instruments (high level and continuous)
 - 4. Heavy-duty flange for mounting of the dust collector
 - 5. Two lifting lugs
- G. Each silo shall be equipped with an aluminum ladder that complies with applicable OSHA regulations and includes a fall arrest system and safety harness. Locate the ladder assembly such that silo level probes can be accessed safely along the ladder travel path. Each ladder assembly shall be equipped with a step-off platform at the silo roof level.
- H. The silo system shall have an interconnecting elevated walkway (crosswalk) which shall span the distance between the silo roofs. The walkway support structure (girders, crossbeams, braces, fastening, etc) shall consist of galvanized or painted structural steel. The walking surface shall be of aluminum grating and shall be protected by aluminum guards and toe boards at all free edges.
- I. Each silo shall have three silo level probes for signaling "high", "intermediate", and "low" level conditions in the silo. Sensing units of the probes shall be suitable for outdoor mounting. The high level probe shall be mounted on the roof of the silo and be equipped with an extended shaft.
- J. A non-contacting radar level transmitter shall be mounted on the roof to allow for a continuous display of silo level on the control panel. The transmitter shall be equipped with an aimer flange to allow for adjustment of the beam path. An air purge connection shall also be included to allow for self-cleaning of the sensor.
- K. An equipment support platform shall be provided and shall span the entire skirt of the silo to provide an even walking surface.
- L. Each silo support skirt shall be designed to support the silo, the elevated walkway as well as all other appurtenances and to enclose the chemical feed equipment. The interior walls of the skirted section of the silo shall be insulated with 1" thick, closed cell insulation. Insulation installation shall be such that no chemical dust shall collect between the insulation and silo walls. Silo support skirt shall include the following:

1. 6'-0" x 6'-8" aluminum insulated double door
 2. Exhaust fan mounting flange
 3. Water supply connection
 4. Solution discharge connection
 5. Compressed air connection
 6. Electrical conduit connections
 7. Equipment support beams
- M. All components bolted to the silo shall have 316 stainless steel hardware.

2.03 TRUCK FILL ASSEMBLY

- A. Provide a fill line of appropriate length made from 4-inch Schedule 40 steel pipe for conveying the chemical to the top of the silo. The fill line shall have minimum 48-inch long radius elbows, compression type couplings, fasteners, target box.
- B. Maximum pressure for tank filling operation shall be set at 10 psi.
- C. The target box shall be furnished on the silo roof and designed to dissipate the velocity of the chemical being conveyed and allow it to drop into the silo in an even pattern. The target box shall be constructed of carbon steel plate and furnished with a removable end plate to facilitate cleaning of the fill pipe.
- D. Provide an appropriate number of evenly spaced standoff brackets, with stainless steel U-bolts and nuts to properly support and secure the fill line in place alongside the silo.
- E. Paint the fill line with the silo.
- F. A sun/rain shield over each of the truck fill panel shall be provided.
- G. Truck fill panels shall match in design, components and layout to the lime system truck fill panels.

2.04 DUST COLLECTION SYSTEM

- A. A silo bin vent filter dust collector of pulse jet design shall be provided for mounting on top of the silo, with compressed air system. The dust collector shall be suitable for outdoor use. A single fan shall provide active dust collection, while compressed air is used for cleaning the filters. The Operator shall manually turn on the dust collector prior to transferring material.

- B. The dust collector shall be equipped with Torit 20 six-inch diameter, long spun bond polyester cartridge filters, to provide 460 square feet of filter area, resulting in air-to-cloth ratio of 4.33 to 1 minimum or as required by the delivery truck transfer blower.
- C. The reverse jet cleaning mechanism shall consist of a 4" diameter compressed air header, five ¾" diameter right angle diaphragm valves, five 1/8" solenoid valves mounted in a NEMA 4 enclosure, a pressure gauge, and a condensate drain petcock. .
- D. The dust collector shall be fabricated of 12-gauge carbon steel and shall be painted with the silo. All connection hardware shall be stainless steel.
- E. Each dust collector shall be equipped with Dwyar Magnehelic differential pressure indicator transmitter with 4-20mA output.
- F. A spare set of dust collector filters shall be supplied for each dust collector. The manufacturer of the dust collector for these soda ash towers shall be same as the lime towers.

2.05 AIR RECEIVER

- A. A compressed air tank with a minimum volume of 60 gallons shall be supplied in each silo to act as an accumulator for pressurized air.

2.06 DEHUMIDIFIER

- A. A desiccant dehumidifier shall be provided by the Manufacturer and installed on the plant air supply line at each silo.
- B. Desiccant dehumidifier shall be of the rotary silica gel wheel type, rated for 197 cubic feet per minute of process air flow.
- C. The dehumidifier shall be mounted to the same structural steel members inside the equipment section of the silo that support the silo discharge valve.
- D. The outlet of the dehumidifier shall be piped through the silo wall, up along the exterior side, and discharge into the silo roof.
- E. A 5" diameter pneumatically actuated butterfly valve shall be mounted at the end of the dehumidifier discharge piping to isolate the dehumidifier during a silo fill cycle.
 - 1. The valve shall have a ductile iron body, stainless steel disc and an EPDM seat.
 - 2. The valve shall be equipped with a double acting pneumatic actuator with limit switches.

2.07 BIN ACTIVATOR

- A. A vibrating bin activator shall be included to provide positive discharge of the material on a first-in/first-out basis, without causing compaction, degradation, or attrition.
- B. Bin activator shall be 5 feet in diameter, have a minimum outlet diameter of 11 inches, and shall be mounted to the silo discharge flange prior to shipment.
- C. The bin activator shall have an internal cone-shaped baffle, which is rigidly attached to the body of the bin activator by means of structural members.
- D. Vibration shall be produced by a totally enclosed, permanently lubricated, adjustable motor driven vibrator. Vibrator shall be 1.5 HP and power requirements shall be 230/460/3/60.
- E. The bin activator shall be constructed of carbon steel. Outside of bin activator shall be painted with the manufacturer's standard paint.
- F. Silos that utilize air for material flow are not acceptable.

2.08 SILO DISCHARGE VALVE

- A. A dust-tight manually operated knife gate valve shall be provided between the bin activator discharge and the delumper inlet for both maintenance purposes and to allow the delumper to start a Beach-load condition. The valve shall be supported from the side of the silo and shall not hang from the bin activator or rest on the feeder hopper.
- B. The valve shall be of a diameter at least the size of the bin activator outlet to allow unobstructed material flow to the feeder, have manual chain wheel actuator at an elevation that can be accessed from ground level. Flexible connectors with stainless steel clamps shall be provided to connect the knife gate to the equipment above and below.
- C. Components in contact with the stored chemical shall be 316 stainless steel.

2.09 DELUMPER

- A. A delumper shall be installed between the silo outlet and the feeder hopper to ensure that any hardened pieces of stored chemical are reduced to powder before entering the feeding mechanism.
- B. The delumper shall be equipped with a smooth, rotating drum with specially designed teeth that intermeshes with various sizing combs to reduce lumps without overgrind or heat.
- C. The delumper shall be provided with a 5 HP constant speed motor. .

2.10 VOLUMETRIC DRY FEEDER

- A. The feeder shall be the volumetric dry solids type for auguring chemical into the solution tank. The feeder shall employ a metering auger to ensure accurate, continuous, constant density material flows without flooding, bridging or voids. The two 10-inch diameter agitators and the smaller metering auger shall be driven at dissimilar speeds by utilizing independent drives. Minimum throat area of the feeder's feed chamber shall be 350 square inches.
- B. The feeder housing shall be of dust-tight construction. The feeder shall be heavy-duty and designed to provide easy cleaning without the need for removing the feeder from its mounting or disassembling flexible connectors or hoppers. The feeder shall be constructed to provide complete access to its internal components by removing its front plate.
- C. Each feeder's metering auger, drive shafts, and seal housing shall be constructed of 304 stainless steel; the seals shall be synthetic.
- D. All areas of the feeder in contact with the stored chemical shall be constructed of 304 stainless steel. Minimum sheet metal thickness shall be 11 gauge and all welds shall be continuous.
- E. The metering auger shall be double concentric type in which the outside auger unpacks the dry bulk chemical and the inside auger meters the chemical into the dissolving tank. The auger shall be powered by a single, 1 HP , AC inverter duty motor.
- F. The feeder shall have a volumetric metering accuracy of +/- 1% for free flowing chemicals and a maximum of +/- 2% for non-free flowing chemicals based on a given number of consecutive one-minute samples.
- G. The feeder shall be supplied with an integral supply hopper. The hopper shall be constructed of 11 gauge 304 stainless steel and have vertical walls. The feeder/hopper assembly shall be placed on a steel frame base capable of supporting the feeder and its accessories. The base shall be supplied by the feeder manufacturer and finished same as the feeder. The storage hopper shall be equipped with low and high-level paddle type probes to start and stop the operation of the bin activator.

2.11 BIN VENT FILTER

- A. An automatic pulse-jet bin vent filter shall be connected to the hopper cover to vent and filter the displaced air in the hopper as it is being filled by the silo bin activator. The filter shall be periodically and automatically cleaned by a reverse blast of dry, filtered compressed air, at 60-70 psig. The bin vent filter shall be constructed of 304 stainless steel.

2.12 DISSOLVING TANK

- A. A dissolving tank for each silo shall be provided complete with mechanical mixer, scrubber and level probes.
- B. Each tank shall be fabricated of 11 gauge, 304 stainless steel and shall be complete with a full gasketed cover.
- C. Each tank shall have a water supply inlet, drain, discharge outlet, overflow outlet, and a bottom flange for fastening to the equipment pad.
- D. The feeder discharge housing, where material is fed into the solution tank, shall be equipped with a removable inspection cover. Each tank cover shall be equipped with a bolted and gasketed access hatch to allow for operator access to the tank internals.
- E. Each tank shall have an intermediate speed mechanical mixer having a 316 stainless steel shaft and impeller, totally enclosed motor directly coupled to the mixer shaft. The mixer shall be on an angle riser, supported by the tank cover with adequate support. The mixer shall be 110V.
- F. A fan powered scrubber shall be mounted on each solution tank cover to act as a dust and vapor remover. The scrubber shall be designed such that the blower creates a suction inside of the tank without having the air from inside the tank pass through the fan itself. The scrubber shall include a plastic filter media section, with spray nozzles washing the media from both above and below.
- G. A stainless steel float valve shall be provided in the solution tank to ensure a constant level in the tank.
- H. The dissolving tank shall include high and low-level 316 stainless steel conductance type level probes for alarm purposes. The level probes shall be mounted on the dissolving tank cover in a water-tight 316-stainless steel housing.
- I. Each tank shall be equipped with a suitably sized PVC/acrylic rotameter, and a brass solenoid valve to control water inflow to the dissolving tank.

2.13 ADDITIONAL COMPONENTS

- A. A suitably sized exhaust fan shall be factory installed in the silo skirt to circulate the air at a minimum rate of 10 air changes per hour.
- B. A heater shall be factory installed in the silo skirt and shall be wired to a thermostat.
- C. Three interior light fixtures shall be factory installed in the silo skirt and wired to a light switch located near the entrance door.
- D. A duplex receptacle shall be factory installed in the silo skirt at a convenient location.

- E. Power to the heater, fan, light fixtures, and receptacle shall be provided through the subpanel.
- F. The mounting height of the exhaust fan, heater, and light fixtures shall be less than or equal to 10 feet above finished floor.

2.14 ELECTRICAL AND CONTROL REQUIREMENTS

- A. Electrical loads and power requirements of silo components shall be as follows:

Component	Quantity per Silo	Motor	Power
Bin Activator Vibrator	1	1.5 HP	230/460/3/60
Delumper	1	5 HP	480/3/60
Metering Auger	1	1 HP	480/3/60
Agitators	2	1/3 HP	480/3/60
Tank Mixer	1	½ HP	115/1/60

- B. Main Control Panel

1. A NEMA 4X control enclosure shall be mounted outside the silo skirt. The enclosure shall house a PLC with Ethernet connectivity for control of the system, the VFD motor controller for the feeder, and motor starters for all motor-driven equipment. The front of the panel shall include a color touchscreen HMI. A main disconnect switch shall also be provided. Design of the new panels shall be provided to by the Vendor/Installer (Combs Technologies, Inc.) to match the quality and components of the panels provided for the lime tower upgrade.
2. Control panel shall operate on 480/3/60 power and include a step-down transformer for control functions.
3. The control panel shall include the functions, switches and statuses necessary and crucial to the successful operations of the silo system. The manufacturer shall provide a complete list during the submittal phase. At minimum the panel will include the following if applicable to the Manufacturer:
 - a. Feeder Hand/Off/Auto Switch
 - b. Feeder Running Light
 - c. Feeder Alarm Light
 - d. Solenoid Open/Close/Auto Switch
 - e. Solenoid Open Light

- f. Bin Activator Hand/Off Auto Switch – In auto, the bin activator shall respond to the level probes in the feeder hopper.
- g. Bin Activator Running Light
- h. Bin Activator Failure Light
- i. Pneumatic Slide Gate Hand/Off/Auto Switch
- j. Pneumatic Slide Gate Open Light
- k. Pneumatic Slide Gate Closed Light
- l. Delumper Hand/Off/Auto Switch
- m. Delumper Run Light
- n. Delumper Alarm Light
- o. Mixer On/Off Switch - With motor starter for mixer.
- p. Mixer Running Light
- q. Mixer Alarm Light
- r. Scrubber Hand/Off/Auto Switch
- s. Scrubber Running Light
- t. Scrubber Alarm Light
- u. Dehumidifier Hand/Off/Auto Switch
- v. Dehumidifier Running Light
- w. Dehumidifier Alarm Light
- x. Butterfly Valve Open/Close/Auto Switch
- y. Butterfly Valve Open Light
- z. Butterfly Valve Closed Light
- aa. Hopper Low Level Alarm Light
- bb. Hopper High Level Light
- cc. Bin Venter Filter Manual Pulse Button

- dd. Solution Tank Low Level Alarm Light
- ee. Solution Tank High Level Alarm Light

C. Sub Panel

1. The sub-panel shall be a NEMA 4X enclosure and shall be mounted adjacent to the system control panel.
2. The subpanel shall include branch circuit breakers for the exhaust fan, heater, lights, and receptacles.
3. Power for the sub-panel shall be supplied by a separate 208/3/60 power supply independent of the main control panel. Provide sub-panel with 60 amp main circuit breaker.

D. Truck Fill Panel

1. Provide a NEMA 4X stainless steel truck fill panel as described herein with terminals for all external circuits and devices. Panel shall be mounted adjacent to the fill pipe and then disconnected for shipping. The contractor shall mount and reconnect the panel in the field.
2. The system shall operate on 115/1/60 power, received from the main control panel.
3. The panel shall be equipped with the following components:
 - a. Audible Alarm Horn
 - b. Power On/Off Switch
 - c. Power On Light
 - d. Dust Collector On/Off Switch
 - e. Dust Collector On Light
 - f. Silo Low Level Alarm Light
 - g. Silo Mid Level Alarm Light
 - h. Silo High Level Alarm Light
 - i. Alarm Acknowledge Pushbutton
 - j. Dust Collector Differential Pressure Indicator

- k. The panels shall be NEMA 4X stainless steel and shall have a UL label after fabrication.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. Contractor to verify field measurements and dimensions. The system shall be installed by the Contractor in strict conformance with the manufacturer's installation instructions. Checkout of final installation, start-up, and instruction of operating personnel shall be performed by the manufacturer's field service personnel.
- B. Contractor is responsible for supplying anchor bolts and pumps referred in this specification.

3.02 TESTING AND START-UP

- A. Testing shall demonstrate the ability of the feeders to operate under all operating conditions stipulated in the table in Paragraph 1.02.A of this section. If the dry feeder fails to meet any of the said operating conditions, perform necessary modifications with the approval of the Engineer, and test again. Repeat this procedure until a successful test has been completed.
- B. Upon successful completion of testing, start up the dry feeders into permanent operation. Successful start-up shall be defined as operating for 10 consecutive calendar days of meeting set chemical dosing rates without fault, failure, repair, or adjustment of the dry feeder, the makeup water supply system, and the entire silo system. Upon successful start-up, the Manufacturer's Technical Representative shall provide training.
- C. The services of a qualified manufacturer's technical representative shall be provided in accordance with Section 46 00 00 – Equipment General Provisions. The Contractor shall coordinate with the Manufacturer to ensure all installation, testing and start-up work is performed and/or supervised onsite by the Manufacturer's Technical Representative. The Manufacturer's Technical Representative shall make as many trips and spend as many hours as required to provide these services as specified for a successful installation and operation of the system. If such services require more trips and/or time than provided for in the Manufacturer's Proposal to meet the required operating conditions specified herein, additional visits for Manufacturer's services shall be at no cost to the Owner.

END OF SECTION