# TOWN OF HENNIKER, NH

# REQUEST FOR BIDS
# FOR
# SCREW PRESS DEWATERING SYSTEM

## FOR THE

# HENNIKER WWTF UPGRADE

## SEPTEMBER 2023

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Underwood Engineers, Inc.
99 North State Street
Concord, New Hampshire 03301

UE FILE NO. 2801

# Table of Contents

# SECTION 1 – BIDDING REQUIREMENTS

## 1.1 Request for Bids

The Town of Henniker is requesting submission of bid proposals from select Equipment Manufacturers of screw press dewatering systems for prepurchase followed by installation by a contractor under a separate contract. Equipment Manufacturers that are invited to submit proposals are limited to **BDP, FKC**, and **Huber**. The goal of this bid request package is to select an Equipment Manufacturer from which to prepurchase the equipment upon which installation bidding documents for the Henniker Wastewater Treatment Facility (WWTF) Upgrade project will be based.

The Equipment Manufacturers shall provide one (1) screw press dewatering system and ancillary equipment to replace the existing one (1) belt filter press dewatering system at the Henniker WWTF. The Equipment Manufacturers shall provide a lump sum price for the one (1) screw press unit and all ancillary equipment associated with the screw press dewatering system.

Equipment Manufacturers should submit a sealed bid to the:

**Town of Henniker**
**Attn: Diane Kendall, Town Administrator**
**18 Depot Hill Road**
**Henniker, NH 03242**

Bids shall be submitted no later than **2:00 p.m. on Thursday, October 12th, 2023.** In lieu of mailed bid packages, manufacturers may submit electronic bid packages to Diane Kendall at the following e-mail address: diane.kendall@henniker.org. E-mailed bids must also be received no later than the date and time stated above.

Written questions or requests for interpretation of the Bidding Documents will be accepted via e-mail no later than **Tuesday October 3rd, 2023, at 4 p.m**. Requests should be sent to:

Stephen Smith, Senior Technical Leader
ssmith@underwoodengineers.com

Responses to questions will be compiled and issued by addendum via e-mail to all parties invited to submit a proposal by **5 pm on Thursday October 5th, 2023**.

The Town of Henniker reserves the right to accept or reject any or all bid proposals submitted and waive informalities and technicalities. The Town will review and analyze each proposal and reserves the right to interview selected Equipment Manufacturers. The Town shall select the Equipment Manufacturer, which in the Town's opinion, has made the proposal best suited to the needs and goals of the Town and its operations and deemed in compliance with the terms of the Bid Documents.

**END OF SECTION**

## 1.2 Instruction for Bidders

Manufacturers shall fill in the Bid Schedule in **Section 1.3**, which is a lump sum for the equipment being requested for the Henniker WWTF Upgrade project. The scope of equipment supply includes:

- One (1) Screw Press Unit
- One (1) Polymer Dosing System
- One (1) Polymer Injection Equipment
- One (1) Control Panel

The proposed screw press dewatering system proposals shall also include the following:

- Cutsheets on the recommended screw press to best address the performance criteria listed in the attached Specification 11350. The cutsheets shall also include the equipment weight.
- Dimensional drawings of the screw press unit, polymer dosing system, and control panel. Electrical diagrams shall also be provided.
- How many years your organization has been in business supplying screw presses for wastewater applications, and total number of units sold for wastewater applications.
- List of current New England screw press installations including contact information and noting the type of sludge being dewatered at that installation.
- Discussion on the availability of service representatives to perform maintenance on the screw press as required. Include the locations of these service representatives and the hourly and/or trip rates for service to **Henniker, NH**. Proposals should note the typical durations (hours) between each milestone service, and the approximate time it will take to schedule a service.
- Warranty terms and conditions.
- Payment terms and conditions.
- Delivery schedule once the shop drawing is approved.
- A list of deviations (if any) between the attached Specification 11350 and the proposal.

Interpretations or questions regarding the proposal will be responded to via an Addendum that will be emailed to all parties invited. Questions received less than **7 days** prior to the date on which bids must be submitted by will not be answered. Equipment Manufacturer's must acknowledge receipt of the Addendum.

**END OF SECTION**

**1.3 Bid Schedule**

| *Bid Item* | *Est. Qty.* | *Bid Item Description and Unit Price in Words* | *Unit Price in Figures (Dollars and Cents)* | *Extended Total in Figures (Dollars and Cents)* |
|---|---|---|---|---|
| **BID: SCREW PRESS DEWATERING SYSTEM** | | | | |
| 1 | Lump Sum | Screw Press Dewatering System and Ancillary Equipment:<br>_____<br>_____Dollars and<br>_____Cents per L.S. | per_____<br>L.S. | _____ |

NOTE: BIDS shall include sales tax and all other applicable taxes and fees.

TOTAL BID PRICE:

(In figures) $_____

(In words) _____ Dollars and

_____ Cents

BID CONDITIONS

1. This Proposal shall be filled in by the BIDDER with prices written in both words and numerals and the extensions made by him/her. In case of discrepancy between words and numerals, the amount shown in words shall govern.
2. In the case of discrepancy between the Unit Price given and the Total Price of an Item, the Unit Price shall govern.
3. The BIDDER agrees that the Bid shall be valid and may not be withdrawn for a period of **sixty (60) calendar days** after the scheduled closing time for receiving bids.

**END OF SECTION**

SECTION 11350

SCREW PRESS DEWATERING SYSTEM

## PART 1 – GENERAL

### 1.1 SCOPE OF WORK

A. The screw press equipment specified in this section shall be provided by a single supplier to ensure coordination and compatibility of equipment.

B. The screw press manufacturer is advised to familiarize themselves with the overall plant process in order to evaluate the compatibility of their equipment to dewater the particular sludge generated.

C. The manufacturer shall provide one (1) complete Screw Press dewatering system as specified herein. The system shall include the following: screw press unit, polymer dosing system, and control panel. The screw press dewatering system must be complete and integrated such that it can operate in a fully interlocked manner while achieving the performance requirements as specified in this document.

D. The dewatering system shall be designed to concentrate and dewater wastewater sludge by means of a screw press. The connected ancillary equipment as stated within this specification shall be supplied by the Screw Press Manufacturer to ensure system compatibility and system responsibility.

### 1.2 DESCRIPTION OF SYSTEM AND PERFORMANCE CRITERIA

A. Screw Press Operational Requirements: The Screw Press (referred to as “screw press” or “press” in the remainder of this document) shall meet the following operating parameters when processing the sludge specified.

1. The screw press unit shall be capable of meeting the performance criteria as set forth below:

a. Performance:

| PARAMETER | REQUIREMENT |
|---|---|
| Sludge Type | Secondary Waste Activated Sludge |
| Sludge Feed Solids (% wt) | 0.5 – 0.8 |
| Solids Throughput (dry lb/hr) | 123 |
| Sludge Flow Rate (gpm) | 31 to 49 |
| Maximum Polymer Dosage (act. lb/dry ton) | 60 |
| Minimum Discharge Cake Solids (% wt) | 14 |
| Minimum Solids Capture (%) | 95 |

B. Process Performance Test and Guarantee: Once a representative sludge has been established, the manufacturer shall operate the press at or above the required flow rate and solids loading for a minimum period of 6 hours with samples of feed, discharge cake, and filtrate collected hourly. Samples will be analyzed per ASTM standards for total suspended solids (TSS) and total solids (TS), and the results averaged. The average cake solids and polymer dosage must be better than the above requirements in order to demonstrate compliance. Should the screw press fail to meet the minimum standards specified, the following shall occur:

   1. Plant operating procedures shall be reviewed to determine that the sludge is in fact representative of normal operation and within the design specifications.
   2. If it is determined that the sludge is representative and within these specifications, the manufacturer shall make any modifications necessary to accomplish the specified performance levels.
   3. If the sludge can be demonstrated as representative and within specified parameters and if the manufacturer cannot meet the performance, the owner may elect to have the manufacturer remove the unit and refund any monies paid.

1.3 QUALIFICATIONS

A. The screw press equipment shall be furnished by a single supplier who has a minimum of twenty years' experience in the manufacture of sludge dewatering equipment. The equipment shall be designed, constructed, and installed in accordance with the best practices and methods, and shall be equal to Basis of Design.

B. The equipment manufacturer must meet all of the following criteria:

   1. Equipment manufacturer shall be a certified UL508 panel shop for the last 10 years.
   2. All buy-out items on the screw press shall be standard off-the-shelf mounts. The screw press manufacturer must also supply all of the original part numbers for all original equipment manufacturers' buy-out items as well as a list of local suppliers located near the installed location.

C. These specifications describe equipment of a certain level of quality and process capability. There are specific areas affecting process functions, operation and maintenance, and reliability under which no exceptions shall be allowed. These are as follows:

   1. High Strength Tubular Stainless-Steel Frame Construction with Machined Bearing Pads.
   2. 304 Stainless Steel Construction.

D. The balance of this specification shall determine the quality level under which equipment shall be reviewed.

E. The owner and engineer reserve the right to reject any bid that does not meet all of the machine requirements as detailed in this specification.

## PART 2 - MATERIALS AND EQUIPMENT

### 2.1 GENERAL

A. The equipment covered by these specifications is intended to be screw press dewatering equipment of proven ability as manufactured by reputable concerns having long experience in the production of such equipment. The equipment furnished shall be designed and constructed in accordance with the best practice and methods.

B. All components of the sludge dewatering equipment shall be engineered for long continuous and uninterrupted service. Provisions shall be made for easy lubrication, adjustment, or replacement of all parts. Corresponding parts of multiple units shall be interchangeable. Except as otherwise specified, steel plates and shapes shall have a minimum thickness of 1/4" and bolts shall have a minimum diameter of 1/2".

C. All welding shall be in accordance with the latest acceptable codes of the American Welding Society ANSI/AWS D1.6.

D. All material used in the construction of the sludge dewatering equipment shall be of the best quality and entirely suitable in every respect for the service required. All structural steel shall conform to the ASTM standard specification for structural stainless steel, designation A554-MT304. All iron casting shall conform to the ASTM standard specification for gray iron casting, designation A48-76, and shall be of a class suitable for the purpose intended. Other materials shall conform to ASTM specifications where such specifications exist; the use of such material shall be based on continuous and successful use under the similar conditions of service.

E. Unless otherwise specified herein, all metal parts in contact with polyelectrolyte or sludge shall be type 304L stainless steel. All fasteners, pins, and anchor bolts shall be type 304L stainless steel.

F. All fiberglass-reinforced plastics (FRP) shall be manufactured in conformance with NBS standards PS15-69.

### 2.2 SURFACE PROTECTION

A. The main frame and other misc metals, excluding drives, shall be stainless steel per ASTM A554-MT304 specification. Buyout items will be covered with the following paint system:

   1. First coat of Tnemec #66 epoxy of contrasting color to a minimum of four (4) dry mils thickness.

   2. Apply a second coat of Urethane topcoat, finished color, minimum of four (4) mils thickness. Total thickness of the two (2) coats will be a minimum of eight (8) mils dry.

   3. Flame sprayed galvanizing is not acceptable.

B. All pre-painted purchased equipment such as electrical motors, gear boxes, etc., are to be painted with a final coat of the above system.

C. The control panel enclosure shall be Nema 4 X constructed of type 304 stainless steel. Inside of the box shall be white.

## 2.3 MECHANICAL DETAILS

A. Main Structural Frame

1. The frame shall be fabricated from stainless steel structural members designed to adequately support all components and accessories. Steel shall meet the requirements of ASTM A554-MT304; all welding shall be performed in accordance with ANSI/AWS D1.6. Where frame components are bolted, stainless steel fasteners shall be used.
2. The fabricated steel frame shall be designed to withstand the maximum stresses imposed on the individual members with a safety factor of 5. Specifically, the maximum actual stress on any member, connection, plate, etc., shall not exceed 1/5 of the yield strength of the frame material used. The deflection ratio of any structural member shall not exceed L/600 where L is the member span.
3. Drip pans shall be fabricated of a minimum 14-gauge type 304L stainless steel and shall collect filtrate.
4. The framework shall be constructed in such a manner that it will insure absolute plane parallelism of all rotating elements by machined bearing pads.
5. The framework shall be of welded and/or bolted construction. No disassembled component shall weigh more than 5,000 lbs. Lifting lugs shall be provided as necessary to afford convenient access to maintenance points throughout the screw filter.

B. Flocculation/Conditioning System - To achieve rapid contact between sludge particles and a solution of dilute polyelectrolyte, provide:

1. One (1) 316L stainless steel, venturi mixer. The mixer shall be equipped with a Vortex polymer injection ring with four (4) tangentially mounted polymer injectors. The mixer shall be located upstream of the screw presses. The screw press manufacturer shall recommend the proper layout of the system.

C. Pressure Zone

1. The screw press shall be supplied with a tapered shaft design with a smaller diameter at the inlet and a large diameter at the discharge.
2. Designs that utilize a variable pitch with constant shaft diameter, or designs with two-stage shaft diameters are not allowed.
3. The basket assembly around the screw must be constructed of stainless steel with slotted openings to allow for maximum porosity and avoidance of small diameter holes that tend to plug.
4. Designs that utilize basket assemblies constructed of wedge wire or moving rings will not be allowed.
5. The design of the screw auger shall be a tapered shaft to reduce the volume and therefore provide an increasing pressure profile on the solids. The tapered shaft of the screw is designed to force the sludge closer to the slotted screen, thus reducing the path length for liquid to be expressed from the cake. The tapered shaft reduces the potential of plug formation, where the cake turns with the screw and is not conveyed to the discharge point.

6. The high-pressure section shall consist of a variable pressure cone shaped plate on the discharge opening of the screw press. The cone shall be pneumatically adjustable for automatic operation that avoids binding.
7. Units that do not include a pressure cone will not be considered.
8. The cone shall be actuated pneumatically in both directions.
9. Minimum effective filtration area of the pressure zone of the screw press shall be 56 sq. ft.

D. Shower Wash System

1. A wash station shall wash the screw press. The wash system shall use high-pressure water spray nozzles. The spray assembly shall be housed in an enclosure in a manner that contains the spray pattern and mist within the housing assembly. The housing and nozzle assembly shall be readily removable. The housing shall be fabricated from type 304 stainless steel.
2. The screw shower shall be pneumatically actuated with an adjustable timer setting on the OIT.
3. The screw system shower bar shall have nozzles placed to wash both the basket and the inside of the enclosure for simplified operation.
4. Wash water required shall not exceed an average of 4 GPM per unit at 80 psi.
5. The shower system shall include a dual basket strainer.
6. Each screw press shall be provided with a 3 HP wash water booster pump that will be installed as shown on the contract drawings. The wash water booster pump shall be a Goulds model eSV or approved equal.
7. Each shower header shall include a motorized ball valve for remote control of the shower as well as for pre-set timed intervals to wash the equipment.

E. Drives

1. The screw press drive shall be a 3.0 HP variable speed with a variable frequency AC drive unit. Multiple belt drives shall not be acceptable.
2. The nominal input horsepower rating of each gear or speed reducer shall be at least equal to the nameplate horsepower of the drive motor. Each drive unit shall be designed for 24-hour continuous service.
3. Each gear reducer shall be totally enclosed, water spray proof, oil lubricated with anti-friction bearings throughout. All motors shall be TEFC.
4. The screw auger drive shall be a 3.0 HP, shaft-mounted motor and gear reducer assembly. The drive must be on the discharged end of the screw shaft to reduce wear on the screen and flights due to deflection of the screw shaft.
5. The drives shall be furnished with provisions for use on 480-volt, 60 hertz, 3-phase power supply.

F. Safety Guards -All equipment having exposed moving parts such as fans, V-belts, gears, couplings, chains, and including the pressure roll section, shall be provided with safety guards as required by OSHA standards.

G. Bearings

1. The shafts shall be equipped with heavy-duty greaseable type, self-aligning ball or roller bearings in sealed, splash proof housings. The housing shall be sealed to provide adequate protection from moisture and grime.
2. All bearings shall have a minimum B-10 bearing life of 500,000 hours based on ANSI-B13.6-1972. The B-10 bearing life of 500,000 hours shall be based on the maximum summation of all forces applied to the bearing.
3. Bearings and housings shall be US manufactured and shall be manufactured by FMC Corporation, Link-Belt Division, Indianapolis, Indiana; Reliance Electric Industrial Company, Dodge Division, Greenville, South Carolina, or approved equal.

H. Drainage Pans - Drainage pans shall be supplied as necessary to contain all filtrate and wash water within the unit and to reduce rewetting of downstream cake. Filtrate and wash water pans shall be constructed of minimum 14-gauge type 304 stainless steel. All drainage piping shall be furnished adequately sized for the intended service and rigidly attached to the press frame.

## 2.4 POLYMER FEED SYSTEM

A. General Requirements

1. The press manufacturer shall provide as a part of the total dewatering equipment package, One (1) polymer feed system capable of automatically metering, diluting, activating and feeding a liquid polymer with water.

B. Polymer Dosing Unit

1. Polymer and water shall be mixed in a chamber designed to create sufficient mixing energy. This design shall include a progressive cavity metering pump, solenoid valve and pressure regulator.
2. The pumps shall have an adjustable speed with a variable frequency drive. The pumps shall be supplied with a 1/2 hp, 120 volt AC motor.
3. A motor driven impeller mixer shall be provided that will mix the polymer and water into solution.

C. Polymer Feed Pump

1. The polymer system shall be equipped with progressive cavity pump each capable of pumping up to 5 GPH.
2. The pump shall be designed with a high viscosity wet end pump capable of pumping neat polymer solution to the mixing chamber.
3. The pump shall be a Seepex, Netzsch, or approved equal.
4. The drive motor shall be a variable speed, 1/2 horsepower, complete with an SCR control unit. The SCR control unit shall have local speed adjustment, ON-OFF switch and

running indication. The control unit shall provide adjustments of feed rate over a range of 20 to 1.

D. Dilution Capability

1. The primary dilution shall feed into the motorized mixing chamber and shall be capable of 1200 GPH.
2. The dilution capability shall be adjustable with a clear rotameter with a stainless steel float.
3. Furnish a solenoid valve or ON-OFF control of dilution water supply

E. Emulsion Unit Control Panel

1. Each polymer system shall be supplied with a NEMA 4X control panel that provides an automated mixing system. The controls for the polymer make-down system shall be supplied in the screw press control panel.
2. The control panel shall include all timers and relay for a complete manual and auto system. The polymer mixer chamber and metering pump shall turn on and the water solenoid valve shall open.
3. The polymer feed pump shall include start/stop indicating lights, potentiometer and local remote control.
4. The polymer mixer and polymer metering pump shall be provided with start/stop pushbuttons, indicating lights and motor starters.
5. Single phase, 120 volt, 60 Hertz power shall be supplied to the main control panel.
6. All devices within the panels shall be permanently identified. Nameplates shall be made of laminated phenolic materials with a black face and white core.

## 2.5 ELECTRICAL REQUIREMENTS

A. General Requirements

1. Provide one (1) control panel constructed of 304 stainless steel, NEMA 4X construction.
2. The panel shall be a full operating panel complete with all motor control and supervisory devices for press-mounted and ancillary equipment. All electrical work shall be performed in accordance with applicable local and national electric codes. The control panel shall include an Allen Bradley Compact Logix PLC and a 12” color OIT Panel View Plus 7 touch screen. An Ethernet connection shall be provided for communication with plant control system. Allen Bradley AC Power Flex 525 Variable Frequency Drives shall be used for each of the following individual components in the local control panels: Screw Press drive, and the Filtrate Recycle Pump drive.
3. The ancillary equipment to be controlled by this panel includes the sludge feed pumps, polymer blending unit, washwater booster pump, discharge conveyor system. The washwater booster pump will have a motor starter in the control panel. All motor starters and VFDs will be protected by in-line dedicated circuit breakers. The PLC will include logic for all necessary system interlocks and will control process and emergency shutdowns.

4. The controls shall be such that selection of the desired ancillary equipment is easily accomplished at the OIT touchscreen for the Screw Press.
5. Three phase, 460 volt, 60-Hertz power shall be supplied to the control panels. A control transformer will be provided for 120-volt, single phase power source for motor starter coils, lights, relays, timers, controllers, and other related items.
6. The control panel shall be provided with terminal blocks for power wiring to and from the panel. The incoming terminal blocks shall be provided with a single magnetic circuit breaker disconnect switch. Circuit breaker protected motor starters with thermal overloads shall be supplied for each motor furnished with the unit.
7. All electrical equipment controls located on each screw press shall have NEMA 4X enclosures and wired, through PVC conduit, to a single common NEMA 4X terminal box.
8. All devices within the panel shall be permanently identified. Nameplates shall be provided on the face of the panel or on the individual device as required. Nameplates shall be made of laminated phenolic materials with a white face and a black core.
9. The panel shall be designed for manual starting and stopping of all drives. A master manual / auto system switch shall be supplied to override the alarm system and allow operation of any drive through a momentary contact pushbutton. The control panel shall contain start/stop pushbuttons, run lights, and alarm indications for all ancillary equipment.
10. The operator interface terminal (OIT) touchscreen shall be equipped with a start/stop switch and run light for each adjustable piece of equipment. The screw drive, and polymer solution pumps as hereafter specified, shall also incorporate speed control and speed indication. The control panel shall include start/ stop pushbutton, run lights, speed control and 4 to 20 mA signal generators for the polymer solution and sludge pumps controls.
11. Alarm lights, sensors, and related circuitry shall be provided for the following functions: zero speed, emergency stop push button on each side of the press, low water pressure, and low air pressure. In the event of any of the above malfunctions, the machine will shut down and an alarm sound. The alarm system shall include an audible horn rated at 90 DBA at 10'. The system shall include silencing provisions, but the function alarm indicating light shall remain lit until the alarm condition is satisfied. A separate set of alarm contacts shall be provided for remote alarm indication.
12. Arrange control panel to allow either manual or automatic control of screw press equipment. When “MANUAL” operation is selected, all equipment associated with the screw press shall be controlled by “START/STOP” pushbuttons. When “AUTOMATIC” operation is selected, control of equipment shall be “AUTOMATIC/START” and “AUTOMATIC/STOP” pushbuttons, and programmable controller:
    a. Local screw press control panel shall include OIT touchscreens with the following:
        1) One control mode selector switch marked “AUTOMATIC/ MANUAL.” When “MANUAL” operation is selected, all equipment associated

with screw press shall be controlled by "START/STOP" pushbuttons. Provide one "START" and one "STOP" pushbutton for each of the following:

a) Screw Press Drive.

b) Sludge Pump

c) Polymer Pump

d) Discharge Conveyor.

2) One speed potentiometer for manual adjustment of each drive speed.

3) Digital indicators for sludge feed flow rate. Indicators shall accept 4 to 20 mA DC field input and shall be calibrated in gpm.

4) Green indicating lights for "RUNNING" status for each unit operated from panel, including wash water solenoid valve energized indication.

5) Red indicating lights for "OFF" status for each unit operated from panel, including wash water solenoid valve de-energized indication.

6) One each "AUTOMATIC/START" and one "AUTOMATIC/STOP" momentary pushbuttons, for automatically starting and stopping each screw press system. Sludge cake conveyor shall be manually controlled when screw press control mode selector switch is in the "MANUAL" position.

7) One "EMERGENCY STOP" red mushroom pushbutton.

13. Automatic Controls and Sequencing:

a. General:

1) Program the PLC for automatic control of screw press, system sequencing, and interlock functions as specified.

2) Configuration and programming of PLC system shall be the responsibility of screw press manufacturer. System documentation including memory loading, I/O configuration and programming shall be provided.

3) Provide and install auxiliary relays and wiring for equipment and devices specified in this Section required for implementing functional requirements specified.

b. "AUTOMATIC START/AUTOMATIC STOP" Cycle (typical for all screw presses):

1) Automatic start cycle request to PLC shall be initiated by "AUTOMATIC/START" pushbutton.

2) Control logic for an "AUTOMATIC/START" cycle shall start screw press in the following order after "AUTOMATIC/START" command has been initiated and interlocks are complete.

a) Wash water motorized ball valve.

b) Screw Shower "Pre-Wash"

c) Discharge conveyors.

d) Screw press drive.

e) Polymer solution pump drive.

f) Sludge feed pump drive.

3) Each drive shall not start until previous drive is running and necessary time delay has elapsed. The screw press manufacturer shall determine where time delays are required and shall program settings to provide smooth start-up of equipment.

4) Once all drives are confirmed running by motor run contacts from their respective starters, PLC shall cause the run indicating light to illuminate. Loss of run status contact for a drive once cycle logic is complete shall shut down screw press and associated equipment.

5) Upon "AUTOMATIC /STOP" command, system shall shut down in order that is reverse of specified start-up order with necessary time delays.

c. Interlocks: The following interlocks shall be satisfied when control mode selector switch is in either "AUTOMATIC" or "MANUAL" position. Failure of any one signal during start cycle or after cycle is complete shall shut down all associated screw press equipment.

1) Sludge cake conveyors servicing the screw press shall be operating and confirmed by conveyor zero speed switches.

2) Washwater must be on and sufficient washwater pressure must be sensed at a specified level.

3) Air pressure must be sensed at a specified level.

4) Polymer activation tank level must be at specified level.

5) Control mode selector switch shall be in "AUTOMATIC" position.

6) "EMERGENCY STOP" pushbutton shall be in operating position.

14. Annunciation and Alarms:

a. Provide audible alarm and detailed alarm history in screw press control panel for alarming of the following:

1) Screw drive failure.

2) Local emergency stop initiated at either screw press control panel, screw press frame-mounted buttons or conveyor pull cord switches.

3) Pump/VFD fail at sludge feed pump.

4) Low wetwell level for sludge feed.

5) Low washwater pressure.

6) Low air pressure.

7) Discharge conveyors zero speed switches.

8) Polymer pump failure.

9) Sludge pump failure.

10) Polymer activation tank low level alarm.

b. Wire all alarms to PLC system for relaying to remote location.

15. Additional stations shall be included as hereinafter specified for other ancillary drives or systems.

B. Electric Motors furnished with this equipment shall meet the following requirements:

1. Rated for continuous duty at 40$^{o}$C ambient and insulated with a minimum of Class F insulation, with Class B temperature rise. All motors shall be totally enclosed, fan cooled or non-ventilated. All motors supplied shall be rated at 150% nameplate horsepower of the required horsepower maximum service condition.

2.6 AIR COMPRESSOR

A. A complete pneumatic system shall be provided and shall include an air compressor and air drier. This package shall include pump, motor, valves, air tank, all controls and piping as necessary to provide a complete and operating system. The unit shall include a low-pressure switch, system pressure gauge, and pressure relief.

B. The air compressor shall be an Ingersoll Rand T30 2 stage compressor with a 5 HP TEFC motor.

C. The air drier shall be an Ingersoll Rand D31EC.

D. The air compressor unit will be floor mounted away from the press to eliminate wash down spray.

E. The installation contractor shall supply air tubing from the air compressor unit to the press. The contractor shall include quick disconnects for air hose connections.

2.7 FLOW METER

A. The screw press manufacturer shall supply a totalizing flow meter for the screw press, as supplied by Siemens or approved equal. Each flow meter shall include a 3” ANSI flange connection, a digital display, and 30 feet of display cord.

B. The electromagnetic induction flow meter shall generate a voltage linearly proportional to flow for full-scale velocity setting from 2 to 33 feet per second. Standard accuracy of plus output shall be +/- 0.5% of rate for all meters.

C. The meter shall incorporate a high impedance amplifier of 1012 ohms or greater, eliminating the need for electrode cleaning systems the meter shall utilize bipolar pulsed DC coil excitation with auto-integrated zeroing each half-cycle. Manual zero adjustments shall not be required – even at start-up. Power consumption shall be no more than 15 VA, independent of meter size. Input power required will be from 85 to 260 VAC, 46-65 Hz, with DC input option available.

D. The magnetic flow meter shall be microprocessor based with integral electronics. The electronics shall be interchangeable for all sizes from 1/12” to 78”. The housing is to be powder coated cast aluminum with a NEMA 4X rating.

E. The meter's analog and pulse outputs shall be independently selected by push buttons. The analog output shall be an isolated 4-20mA DC into 700 ohms load. The pulse output shall be an open collector output with a maximum frequency of 1,000 Hz with configurable pulse width (0.5 to 2 sec). An open collector status output shall indicate either system or process error or flow direction. An auxiliary input shall be available to positive zero return. A low flow cutoff will be standard which can be turned on or off by pushbuttons.

F. A 2-line, 16-digit LCD backlit display shall indicate flow rate and/or total flow. The totalizer value is protected by EEPROM during power outages, and utilizes an overflow counter. The display shall also be capable of indicating error messages such as empty pipe condition, error condition and low flow cutoff.

## PART 3 - INSTALLATION

### 3.1 INSTALLATION SUPERVISION

A. The manufacturer shall provide the services of a qualified factory representative to advise the installing contractor on proper installation, setting, piping, and wiring procedures. The installing contractor is responsible for all interconnections between the supplied equipment and plant utilities, including but not limited to, all piping, valves, wiring, conduits, foundation work, building and concrete work. The manufacturer shall provide two (2) days onsite over one (1) trip for installation supervision.

### 3.2 OPERATION & MAINTENANCE MANUALS

A. Two (2) paper copies and an electronic copy (in .pdf format) of operation and maintenance manuals shall be furnished. The manuals shall be prepared specifically for this installation and shall include detailed operating and maintenance instructions and specifications relative to the assembly, alignment, checking, lubrication, placing in operation, adjustment, and maintenance of each unit of equipment and auxiliaries furnished under this contract, together with complete parts lists, copies of dimension drawings, electrical drawings, and a copy of the manufacturer's start-up report.

### 3.3 START-UP SERVICES

A. Before the equipment is started up, the manufacturer shall make a thorough inspection of the installation to make sure the press has been installed properly and that all equipment relating to it has been installed according to the needs of the press. The equipment manufacturer shall provide two (2) days onsite over one (1) trip for mechanical check-out and pre-startup inspection.

B. The manufacturer shall provide three (3) days over one (1) trip of onsite services of a qualified factory representative to place the units in operation and conduct performance testing. The owner shall assist the manufacturer by starting up and operating all support systems such as water, sludge feed pumping, polymer mixing, electrical power and instrumentation, and other ancillary equipment as needed. The services provided by the manufacturer shall be as detailed in the O&M manuals and shall include at least the following:

   1. Check equipment alignment and assure that there are no unusual internal stresses.
   2. Calibrate all instrumentation.

3. Check systems to insure proper operation.
4. Check lubrication in all drives.
5. Check Motor rotations, etc.
6. Adjust spray wash angles and discharge cone pressure system.
7. Start the drives and assure they are operating properly with no binding and with correct rotation.
8. Ensure that all ancillary systems have been properly adjusted, including polymer and sludge feed.

3.4 TRAINING SUPERVISION

A. During the start-up procedures, the equipment manufacturer shall provide training to the owner's employees for proper operation and maintenance of the sludge dewatering equipment.

B. At a minimum, the manufacturer shall make an additional two (2) follow-up training and inspection trips after the equipment has been in operation at least 90 days at the owner's request.

PART 4 - MISCELLANEOUS

4.1 SPARE PARTS

A. The screw press manufacturer shall provide the following spare parts to the Owner.
   1. Ten (10) spare spray nozzles.
   2. Two (2) relays of each type and size.
   3. One (1) full set of screw wipers.

END OF SECTION