



PROJECT MANUAL
FOR

Trailer-Mounted Belt Filter Press
FOR THE
TOWN OF LAKE LURE

LAKE LURE, NORTH CAROLINA

Commission No. 2200559.06B

December 2023 r1. 5/8/2024

Note to All Bidders: All Bids must incorporate and adhere to the ARPA required funding provisions, as administered through the NCDEQ Department of Water Infrastructure (DWI) to be considered a valid Bid. Bidders are solely responsible for ensuring Bids meet all applicable funding requirements and shall supply any necessary funding submittals with Bid(s).



Project Manager: Brian R. Houston, PE

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704.376.6423

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DOCUMENT 000310 – ADVERTISEMENT FOR BIDS

**TOWN OF LAKE LURE, NORTH CAROLINA
PORTABLE TRAILER-MOUNTED BELT FILTER PRESS**

ADVERTISEMENT FOR BIDS

Sealed Bids for the purchase of a Portable Trailer-Mounted Belt Filter Press will be received by the Town of Lake Lure at the Lake Lure Municipal Center, 2948 Memorial Highway, Lake Lure NC 28746 until **2:00 PM** local time on **Wednesday, June 5, 2024**, at which time the Bids received will be opened and published on the Town’s website.

Bids shall be on a lump sum basis, with bid items as indicated in the Bid Form. The Town reserves the right to reject any or all bids.

Bidding Documents are published on and may be downloaded from the Town’s website at <https://www.townoflakelure.com/community/page/request-proposals-qualifications-bidding>. Bidders should check this website for Addenda during the bid period and prior to submitting a bid. Neither Owner nor Engineer will be responsible for copies of the Bidding Documents obtained from sources other than that above. The plans and specifications are copyright protected.

No pre-bid conference will be held. Questions may be submitted to the Engineer, Brian Houston at BHouston@LaBellaPC.com or by phone at 704.249.8069 not later than one week prior to the deadline for submission of bids.

Owner: **Town of Lake Lure**
By: **Olivia Stewman, MPA**
Title: **Town Manager**
Date: **May 8, 2024**

++ END OF ADVERTISEMENT FOR BIDS ++

SECTION 001030 — INSTRUCTIONS TO BIDDERS

ARTICLE 1 – NOT USED

ARTICLE 2 – COPIES OF BIDDING DOCUMENTS

- 2.01 Complete sets of the Bidding Documents may be obtained from the Issuing Office in the number and format stated in the advertisement or invitation to bid.
- 2.02 Complete sets of Bidding Documents shall be used in preparing Bids; neither Owner nor Engineer assumes any responsibility for errors or misinterpretations resulting from the use of incomplete sets of Bidding Documents.
- 2.03 Owner and Engineer, in making copies of Bidding Documents available on the above terms, do so only for the purpose of obtaining Bids for the Equipment and do not authorize or confer a license for any other use.

ARTICLE 3 – QUALIFICATIONS OF BIDDERS

- 3.01 **In addition to the Qualifications Statement to be included with Bidder's Bid**, to further demonstrate Bidder's qualifications to provide the Equipment, after submitting its Bid and within two (2) days of Owner's request, Bidder shall submit written evidence establishing its qualifications such as financial data, previous experience, and present commitments.
- 3.02 A Bidder's failure to submit required qualification information within the times indicated may disqualify Bidder from receiving an award of the Purchase Order.
- 3.03 No requirement in this Article 3 to submit information will prejudice the right of Owner to seek additional pertinent information regarding Bidder's qualifications.
- 3.04 Bidder is advised to carefully review those portions of the Bid Form requiring Bidder's representations and certifications.

ARTICLE 4 – NOT USED

ARTICLE 5 – BIDDER'S REPRESENTATIONS

- 5.01 It is the responsibility of each Bidder before submitting a Bid to:
 - A. examine and carefully study the Bidding Documents, and any data and reference items identified in the Bidding Documents;
 - B. become familiar with and satisfy itself as to all Laws and Regulations that may affect cost;
 - C. promptly give Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder discovers in the Bidding Documents and confirm that the written resolution thereof by Engineer is acceptable to Bidder;
 - D. determine that the Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the furnishing of the equipment; and
 - E. agree that the submission of a Bid will constitute an incontrovertible representation by Bidder that Bidder has complied with every requirement of this Article, that without exception the Bid and all prices in the Bid are premised upon furnishing the equipment required by the Bidding Documents.

ARTICLE 6 – NOT USED

ARTICLE 7 – INTERPRETATIONS AND ADDENDA

- 7.01 All questions about the meaning or intent of the Bidding Documents are to be submitted to Engineer in writing. Interpretations or clarifications considered necessary by Engineer in response to such questions will be issued by Addenda delivered to all parties recorded as having received the Bidding Documents. Questions received less than seven days prior to the date for opening of Bids may not be answered. Only questions answered by Addenda will be binding. Oral and other interpretations or clarifications will be without legal effect.
- 7.02 Addenda may be issued to clarify, correct, supplement, or change the Bidding Documents.

ARTICLE 8 – NOT USED

ARTICLE 9 – CONTRACT TIMES

- 9.01 BIDDERS SET CONTRACT TIME: Bidder shall indicate on the Bid Form in the space provided the number of days from issuance of a Purchase Order by which the equipment will be delivered complete to Owner (the Delivery Date). Bidder shall consider 21 calendar days for Engineer’s review of submittals, not including subsequent reviews for initially non-conforming submittals. See Article 19 regarding consideration of delivery time in evaluation of bids, and ARTICLE 10 – regarding liquidated damages for late delivery and incentives for early delivery.

ARTICLE 10 – LIQUIDATED DAMAGES & INCENTIVE PAYMENTS

- 10.01 **Liquidated Damages of \$9,000** will be applied deductively to the amount owed for **each 30 calendar days** beyond the Delivery Date (as provided by the selected Bidder) during which the Equipment has not been delivered to Owner.
- 10.02 An **Incentive Payment of \$9,000** will be applied additively to the amount owed for **each 30 calendar days** in advance of the Delivery Date by which the Equipment has been delivered complete to Owner.

ARTICLE 11 – SUBSTITUTE AND “OR-EQUAL” ITEMS

- 11.01 The Purchase Order for the Equipment, as awarded, will be on the basis of equipment specified or described in the Bidding Documents without consideration during the bidding and Purchase Order award process of possible substitute or “or-equal” items.
- 11.02 All prices that Bidder sets forth in its Bid shall be based on the presumption that the bidder will furnish the materials and equipment specified or described in the Bidding Documents, as supplemented by Addenda. Any assumptions regarding the possibility of post-Bid approvals of “or-equal” or substitution requests are made at Bidder’s sole risk.

ARTICLE 12 – SUBCONTRACTORS, SUPPLIERS, AND OTHERS

- 12.01 Provide all documents indicated as required by the NC Division of Water Infrastructure with Bid where indicated as ‘Provided by all bidders to be responsive’. Provide any/all other Supplement item(s) as applicable within two (2) days after bid opening if Bid is apparent low, or for any other Bidder as requested by Owner.

ARTICLE 13 – PREPARATION OF BID

- 13.01 The Bid Form is included with the Bidding Documents.
- A. All blanks on the Bid Form shall be completed in ink and the Bid Form signed in ink. Erasures or alterations shall be initialed in ink by the person signing the Bid Form. A Bid price shall be indicated for each section, Bid item and alternate listed therein.
- 13.02 A Bid by a corporation shall be executed in the corporate name by a corporate officer (whose title must appear under the signature), accompanied by evidence of authority to sign. The corporate address and state of incorporation shall be shown.
- 13.03 A Bid by a partnership shall be executed in the partnership name and signed by a partner (whose title must appear under the signature), accompanied by evidence of authority to sign. The partnership's address for receiving notices shall be shown.
- 13.04 A Bid by a limited liability company shall be executed in the name of the firm by a member or other authorized person and accompanied by evidence of authority to sign. The state of formation of the firm and the firm's address for receiving notices shall be shown.
- 13.05 A Bid by an individual shall show the Bidder's name and address for receiving notices.
- 13.06 A Bid by a joint venture shall be executed by an authorized representative of each joint venturer in the manner indicated on the Bid Form. The joint venture's address for receiving notices shall be shown.
- 13.07 All names shall be printed in ink below the signatures.
- 13.08 The Bid shall contain an acknowledgment of receipt of all Addenda, the numbers of which shall be filled in on the Bid Form.
- 13.09 Postal and e-mail addresses and telephone number for communications regarding the Bid shall be shown.

ARTICLE 14 – BASIS OF BID

- 14.01 Lump Sum Base Bid with Alternates (if any)
- A. Bidders shall submit a Bid on a lump sum basis for the base Bid.
- 14.02 Delivery Days
- A. Indicate in the Bid Form space provided the number of days from issuance of a Purchase Order by which the equipment will be delivered complete to Owner.
- B. See Article 9 for more information.

ARTICLE 15 – SUBMITTAL OF BID

- 15.01 With each copy of the Bidding Documents, a Bidder is furnished one separate unbound copy of the Bid Form. The unbound copy of the Bid Form is to be completed and submitted with the other documents required to be submitted under the terms of Article 7 of the Bid Form.
- 15.02 A Bid shall be received no later than the date and time prescribed and at the place indicated in the advertisement or invitation to bid and shall be enclosed in a plainly marked package with the Project title, the name and address of Bidder, and shall be accompanied by other required documents. If a Bid is sent by mail or other delivery system, the sealed envelope containing the Bid shall be enclosed in a separate package plainly marked on the outside with the notation "BID

ENCLOSED.” A mailed Bid shall be addressed to the recipient and the address indicated on the Bid Form.

- 15.03 Bids received after the date and time prescribed for the opening of bids, or not submitted at the correct location or in the designated manner, will not be accepted and will be returned to the Bidder unopened.

ARTICLE 16 – MODIFICATION AND WITHDRAWAL OF BID

- 16.01 A Bid may be withdrawn by an appropriate document duly executed in the same manner that a Bid must be executed and delivered to the place where Bids are to be submitted prior to the date and time for the opening of Bids. Upon receipt of such notice, the unopened Bid will be returned to the Bidder.
- 16.02 If a Bidder wishes to modify its Bid prior to Bid opening, Bidder must withdraw its initial Bid in the manner specified in Paragraph 16.01 and submit a new Bid prior to the date and time for the opening of Bids.
- 16.03 If within 24 hours after Bids are opened any Bidder files a duly signed written notice with Owner and promptly thereafter demonstrates to the reasonable satisfaction of Owner that there was a material and substantial mistake in the preparation of its Bid, that Bidder may withdraw its Bid, and the Bid security will be returned. Thereafter, if the Equipment is rebid, that Bidder will be disqualified from further bidding on the Equipment.

ARTICLE 17 – OPENING OF BIDS

- 17.01 Bids will be opened at the time and place indicated in the advertisement or invitation to bid and, unless obviously non-responsive, available for public inspection at that location. An abstract of the amounts of the base Bids and major alternates, if any, will be made available to Bidders after the opening of Bids.

ARTICLE 18 – BIDS TO REMAIN SUBJECT TO ACCEPTANCE

- 18.01 All Bids will remain subject to acceptance for the period of time stated in the Bid Form, but Owner may, in its sole discretion, release any Bid prior to the end of this period.

ARTICLE 19 – EVALUATION OF BIDS AND AWARD OF PURCHASE ORDER

- 19.01 Owner reserves the right to reject any or all Bids, including without limitation, nonconforming, nonresponsive, unbalanced, or conditional Bids. Owner will reject the Bid of any Bidder that Owner finds, after reasonable inquiry and evaluation, to not be responsible. If Bidder purports to add terms or conditions to its Bid, takes exception to any provision of the Bidding Documents, or attempts to alter the contents of the Contract Documents for purposes of the Bid, then the Owner will reject the Bid as nonresponsive; provided that Owner also reserves the right to waive all minor informalities not involving price, time, or changes in the Equipment. If Owner reasonably believes a Bid to be unbalanced, Owner may require substantiating documentation and/or rebalancing (without changing the Bid Basis value), or may reject such Bid.
- 19.02 If Owner awards the Purchase Order for the Equipment, such award shall be to the responsible Bidder submitting the lowest responsive Bid, considering Delivery Time.
- 19.03 Evaluation of Bids

- A. In evaluating Bids, Owner will consider whether or not the Bids comply with the prescribed requirements and other data as may be requested in the Bid Form or prior to the Notice of Award.
- B. **DELIVERY TIME: FOR COMPARISON OF BIDS WHICH INCLUDE DIFFERING DELIVERY TIMES, THE DIFFERENCE IN DELIVERY TIMES SHALL BE MULTIPLIED BY \$300 PER CALENDAR DAY AND ADDED TO THE TOTAL BID PRICE FOR THE BID WITH THE LONGER DELIVERY TIME. EXAMPLE BELOW:**

<i>BIDDER:</i>	<i>'A'</i>	<i>'B'</i>
<i>BID PRICE:</i>	<i>\$400,000</i>	<i>\$390,000</i>
<i>DELIVERY TIME:</i>	<i>230 DAYS</i>	<i>270 DAYS</i>
<i>VALUE OF TIME DIFFERENCE:</i>		<i>\$12,000 (\$300 x 40)</i>
<i>VALUE CONSIDERING TIME:</i>	<i>\$400,000</i>	<i>\$402,000</i>

*****BIDDER 'A' IS APARENT LOW BIDDER*****

- 19.04 In evaluating whether a Bidder is responsible, Owner will consider the qualifications of the Bidder.
- 19.05 Owner may conduct such investigations as Owner deems necessary to establish the responsibility, qualifications, and financial ability of Bidders.

ARTICLE 20 – NOT USED

ARTICLE 21 – NOT USED

ARTICLE 22 – SALES AND USE TAXES

- 22.01 North Carolina state sales and use taxes on materials and equipment shall be included in the Bid.

ARTICLE 23 – NOT USED

END OF INSTRUCTIONS TO BIDDERS

BID FORM

**TOWN OF LAKE LURE, NORTH CAROLINA
PORTABLE TRAILER-MOUNTED BELT FILTER PRESS**

ARTICLE 1 – BID RECIPIENT

1.01 This Bid is submitted to:

**Town of Lake Lure
2948 Memorial Highway
Lake Lure, NC 28746
ATTN: Olivia Stewman, Town Manager**

1.02 The undersigned Bidder proposes and agrees, if this Bid is accepted, to enter into an Agreement with Owner in the form included in the Bidding Documents to supply all Equipment as specified or indicated in the Bidding Documents for the prices and within the times indicated in this Bid and in accordance with the other terms and conditions of the Bidding Documents.

ARTICLE 2 – BIDDER’S ACKNOWLEDGEMENTS

2.01 Bidder accepts all of the terms and conditions of the Instructions to Bidders. This Bid will remain subject to acceptance for 60 days after the Bid opening, or for such longer period of time that Bidder may agree to in writing upon request of Owner.

ARTICLE 3 – BIDDER’S REPRESENTATIONS

3.01 In submitting this Bid, Bidder represents that:

A. Bidder has examined and carefully studied the Bidding Documents, and any data and reference items identified in the Bidding Documents, and hereby acknowledges receipt of the following Addenda:

<u>Addendum No.</u>	<u>Addendum Date</u>
_____	_____
_____	_____
_____	_____
_____	_____

- B. Bidder is familiar with and has satisfied itself as to all Laws and Regulations that may affect cost of the Work.
- C. Bidder has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder has discovered in the Bidding Documents, and confirms that the written resolution thereof by Engineer is acceptable to Bidder.
- D. The Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance and furnishing of the Work.

- E. The submission of this Bid constitutes an incontrovertible representation by Bidder that Bidder has complied with every requirement of this Article, and that without exception the Bid and all prices in the Bid are premised upon furnishing the Equipment required by the Bidding Documents.

ARTICLE 4 – BIDDER’S CERTIFICATION

4.01 Bidder certifies that:

- A. This Bid is genuine and not made in the interest of or on behalf of any undisclosed individual or entity and is not submitted in conformity with any collusive agreement or rules of any group, association, organization, or corporation;
- B. Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid;
- C. Bidder has not solicited or induced any individual or entity to refrain from bidding; and
- D. Bidder has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for the Contract. For the purposes of this Paragraph 4.01.D:
 - 1. “corrupt practice” means the offering, giving, receiving, or soliciting of anything of value likely to influence the action of a public official in the bidding process;
 - 2. “fraudulent practice” means an intentional misrepresentation of facts made (a) to influence the bidding process to the detriment of Owner, (b) to establish bid prices at artificial non-competitive levels, or (c) to deprive Owner of the benefits of free and open competition;
 - 3. “collusive practice” means a scheme or arrangement between two or more Bidders, with or without the knowledge of Owner, a purpose of which is to establish bid prices at artificial, non-competitive levels; and
 - 4. “coercive practice” means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process or affect the execution of the Contract.

ARTICLE 5 – BASIS OF BID

5.01 Bidder will provide the Equipment in accordance with the Contract Documents for the following price(s):

A LUMP SUM BASE EQUIPMENT BID – TRAILER-MOUNTED BELT FILTER PRESS

in numerals: \$ _____

in words: _____

_____dollars

B. DELIVERY TIME (see Article 9 of the Instructions to Bidders)

in numerals: _____ days following issuance of a Purchase Order

in words: _____days

ARTICLE 6 – TIME OF COMPLETION

6.01 Bidder agrees that the Equipment will be delivered complete to the Owner by the number of days following issuance of a Purchase Order as indicated in Article 5 above.

6.02 Bidder accepts the provisions of the Instructions to Bidders, which shall be reiterated in the Purchase Order, as to liquidated damages.

ARTICLE 7 – ATTACHMENTS TO THIS BID

7.01 The following documents are submitted with and made a condition of this Bid:

A. Supplier Qualifications Statement, on the form included immediately following this Bid Form

7.02 If and as requested by the Owner and required by the bid documents, the following documents are submitted and made a condition of this Bid:

A. List of Equipment Installation References;

B. Required Bidder Qualification Statement with supporting data

ARTICLE 8 – BID SUBMITTAL

BIDDER: *[Indicate correct name of bidding entity]*

By:

[Signature] _____

[Printed name] _____

(If Bidder is a corporation, a limited liability company, a partnership, or a joint venture, attach evidence of authority to sign.)

Attest:

[Signature] _____

[Printed name] _____

Title: _____

Submittal Date: _____

Address for giving notices:

Telephone Number: _____

Fax Number: _____

Contact Name and e-mail address: _____

Town of Lake Lure
Portable Trailer-Mounted Belt Filter Press

Supplier Qualifications Statement

The award of a Contract for this project to the lowest responsive and responsible bidder is contingent on that bidder meeting the requirements of Section 467621.01 regarding experience in manufacturing and supply of the specified equipment. Bidder is required to provide the following information with their Bid:

MANUFACTURER NAME: _____

YEARS ENGAGED IN THE MANUFACTURE OF BELT FILTER PRESSES FOR SLUDGE DEWATERING:

_____ (minimum 10 per 467621.01 / 1.7.A)

YEARS ENGAGED IN THE MANUFACTURE OF TRAILER-MOUNTED BELT FILTER PRESSES FOR SLUDGE DEWATERING:

_____ (minimum 5 per 467621.01 / 1.7.B)

NUMBER OF WASTEWATER TREATMENT PLANTS IN THE UNITED STATES FOR WHICH MANUFACTURER HAS PROVIDED BELT FILTER PRESS(ES):

_____ (minimum 20 per 467621.01 / 1.7.B)

Attach client references (name, location, phone number and/or email address, and installation years) who can attest to the above qualifications.

I CERTIFY THAT THE ABOVE INFORMATION IS TRUE AND CORRECT:

Bidder Name (same as signatory on Bid)

Signature

Date

SECTION 467621.01 – PACKAGED TRAILER-MOUNTED BELT FILTER PRESSES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Trailer-mounted belt filter presses and accessories, complete, installed, tested, and calibrated by the belt filter press Manufacturer within an FHWA-approved trailer that is fully ready for operation and dewatering practices.
- B. All equipment detailed in this section shall be furnished and delivered to the Owner's site by the belt press manufacturer to comprise a complete dewatering system. Only units with a minimum actual belt width of [1.0] meter and flow capacity of 70 gpm or greater to accommodate flow from the Packaged Mini-Dredging System.
- C. Trailer system shall be an FHWA-approved trailer, less than or equal to 102 inches in width having the capability of being registered with the North Carolina Department of Transportation.
 - 1. The Trailer system shall be appropriately sized and configured with sufficient clearances to allow for ease of routine maintenance of all equipment housed within the Trailer. The overall dimensions and configuration of the Trailer shall be such that the installation of the press allows the following:
 - a. Fixed roof with structural capacity to accommodate snow loads and have accordion-type curtain sides that can be fully closed off to protect equipment from the elements when not in use.
 - b. Fold-down platforms and railings to create cantilevered walkways for trailer-mounted presses to meet required minimum clearances from obstructions to perform proper maintenance.
 - c. Minimum clearance of 3' 0" is required on all other sides of the press.
- D. 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.
- E. Furnish one (1) belt filter press complete with in-line sludge mixing device, control panel as specified, and all spare parts and other appurtenances as required in this specification.
- F. The following equipment, as specified herein, shall be supplied and/or be specified by the belt press manufacturer, or trailer-mounted belt filter press fabricator utilized to assemble the packaged system, to ensure the overall packaged system meets or exceeds the performance and compatibility requirements of this specification and the overall project goals.
- G. All wiring and controls shall conform to applicable standards of UL, NEC and any applicable state and/or local codes. Where conflicts exist, the NEC shall prevail.
- H. Drive motor shall be inverter duty. Enclosure shall be TEFC, severe duty and conform to current NEMA standards.
- I. Materials:
 - 1. Main Frame: Carbon Steel Channel. Fully welded, blasted to SP-10 near-white specification. Galvanized with 4-6 mils of 99% pure zinc using a thermal spray method, followed by 4-6 mils of a two-component epoxy coating for additional corrosion resistance.

2. Rollers: Carbon steel stub shaft construction with fully welded dual end plates. Coated with 0.250 minimum 65 durometer rubber and machined for concentricity.
3. Bearings: Double row spherical roller type with triple-tec seals. nylon coated, minimum 1,000,000 hrs L-10 life.
4. Belt Tracking and Tensioning: Automatically controlled via pneumatic system.
5. Belt Wash System: 304 Stainless pipe with recessed nozzles and manually operated internal cleaning brush.
6. Fasteners: 304 Stainless Steel.
7. Belt Support Grid: 304 Stainless Steel.
8. Containment Barriers: 304 Stainless Steel, minimum 14 gauge.
9. Beltwash Enclosures: 304 Stainless Steel, minimum 14 gauge.
10. Filtrate Collection Pans: 304 Stainless Steel, minimum 14 gauge.
11. Doctor Blades: UHMW Plastic.
12. Plow Blades: UHMW Plastic.
13. Wiper Blades: UHMW Plastic.

1.2 DEFINITIONS

- A. HDPE: High-density polyethylene.
- B. TSS: Total suspended solids.
- C. UHMWPE: Ultra-high-molecular-weight polyethylene.
- D. ANSI: American National Standards Institute.
- E. IEEE: Institute of Electrical and Electronics Engineers.
- F. NEC: National Electrical Code.
- G. U.L.: Underwriters Laboratories

1.3 REFERENCE STANDARDS

- A. American Bearing Manufacturers Association:
 1. ABMA 11 - Load Ratings and Fatigue Life for Roller Bearings.
- B. American Gear Manufacturers Association:
 1. AGMA 2001 - Fundamental Rating Factors and Calculation Methods for Involute Spur and Helical Gear Teeth.
- C. ASTM International:
 1. ASTM A36/A36M - Standard Specification for Carbon Structural Steel.
 2. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
- D. National Electrical Manufacturers Association:
 1. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).

1.4 SUBMITTALS

1. Product Data: Submit manufacturer's information for system materials and component equipment, including electrical characteristics.
- B. Shop Drawings:
 1. Indicate system materials and component equipment.
 2. Submit wiring and control diagrams, installation and anchoring requirements, fasteners, and other details.
- C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- D. Manufacturer Instructions: Submit detailed operation and maintenance manual.
- E. Field Quality-Control Submittals: Indicate results of Manufacturer-furnished tests and inspections.
- F. Qualifications Statements:
 1. Submit qualifications for manufacturer.

1.5 MAINTENANCE MATERIAL SUBMITTALS

- A. Spare Parts:
 1. Press manufacturer shall supply the following spare parts, as well as any additional parts recommended for one year's operation:
 2. Parts shall be packaged in a protective enclosure suitable for storage, and shipped separately to minimize the possibility of loss or damage.
- B. Tools:
 1. Furnish special wrenches and other devices required for Owner to maintain and calibrate equipment.

1.6 QUALITY ASSURANCE

- A. Perform Work according to Town of Lake Lure Department of Public Works, and North Carolina Department of Environmental Control, North Carolina Department of Motor Vehicles/Transportation, and other federal standards.

1.7 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this Section with a minimum **[ten] (10)** years' **[documented]** experience.
- B. Only manufacturers having produced trailer-mounted belt filter presses of the type specified herein operating for a period of five (5) years in a minimum of twenty (20) wastewater treatment plants in the United States shall be considered. Manufacturers not meeting the experience requirement shall not be acceptable.

1.8 PATENTS

- A. The manufacturer warrants that the use of this system and its equipment, in the process for which the system has been expressly designed, will not infringe any U.S. or foreign patents or patents pending. In the event of any claim of infringement, the manufacturer shall defend and indemnify the owner free from any liabilities associated with the use of the patented equipment or process.
- B. The manufacturer hereby grants to the owner, in perpetuity, a paid-up license to use any inventions covered by patent or patents pending, owned, or controlled by the manufacturer in the operation of the facility being constructed in conjunction with the equipment supplied under this contract, but without the right to grant sublicenses

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.
- B. Store materials according to manufacturer instructions.
- C. Protection:
 - 1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.
 - 2. Provide additional protection according to manufacturer instructions.

1.10 WARRANTY

- A. The belt filter press manufacturer, or trailer-mounted belt filter press fabricator utilized to assemble the packaged system, shall warrant, in writing, that all equipment supplied by them shall within be free from defects in material and workmanship, for a period of twelve (12) months from the date of start-up, not to exceed eighteen (18) months from the date of delivery, unless noted otherwise within the specifications.
- B. Belt Filter Press
 - 1. Warranty permit to commence from the date of startup and testing Furnish [**five**] (5) -year manufacturer's warranty for belt filter press equipment and accessories.
 - 2. Furnish [**five**] (5)-year manufacturer's warranty for roller bearings.
- C. Polymer Unit
 - 1. The system shall be covered by a [**one**] (1) year limited warranty against defects in materials and workmanship.
 - 2. The mixing chamber shall be warranted for the life of the system against failure for plugging for any reason. The warranty shall exclude failure due to excessive water pressure or freezing.
- D. Trailer System
 - 1. Warranty permit to commence from the date of delivery.
 - 2. Furnish [**two**] (2) year trailer manufacturer's warranty for trailer equipment and accessories, or 50,000 miles.

PART 2 - PRODUCTS

2.1 BELT FILTER PRESS

A. Manufacturers:

1. Alfa Laval, Inc.
2. Andritz
3. Komline-Sanderson.
4. Or-Tec
5. PHOENIX Process Equipment Co.
6. Sebright Products Inc.
7. Or Equal

- B. Only manufacturers offering equipment which meets the mechanical, structural, process and performance requirements of these specifications shall be considered acceptable. If proposed alternate equipment requires differing equipment arrangement, or if details of construction and design differ from the specified equipment, contractor shall prepare and submit for review all necessary architectural, structural, electrical, process and instrumentation drawing revisions. Above data must be submitted to the engineer no later than fourteen (14) days prior to the bid date. A complete listing of all design and construction deviations from specified equipment must be submitted for review.

2.2 POLYMER UNIT

A. Manufacturers:

1. PHOENIX.
2. VeloDyne.
3. Jesco.
4. Or Equal.

2.3 TRAILER-MOUNTED BELT FILTER PRESS SYSTEM DESCRIPTION:

- A. The belt filter press shall be of the continuous belt design, having three (3) distinct dewatering zones: A gravity drainage zone, a fully adjustable wedge zone, and a pressure/shear zone. The design shall consist of a structural main frame, two (2) dewatering belts, inlet distributor, belt support/wiper assembly, furrowing devices, rollers, bearings, doctor blades, belt drive unit, belt tracking and tensioning systems, belt wash system, and a filtrate/washwater drainage and collection system.

B. Performance and Design Criteria:

1. Width [3.3] feet ([1.0] m).
2. Sludge Type: [municipal waste-activated sludge, & lake bottom silt & sediment].
3. Solids:
 - a. Minimum Feed TSS: [variable] percent.
 - b. Minimum Dewatered Sludge TSS: [20.0] percent
 - c. Design Solids Content within Fluid: [15% to 30%]
 - d. Design Maximum Solids Particle Size: [1.0 inch (26 mm)]

- e. Design Maximum Solids Specific Gravity: [2.67].
- 4. Minimum Hydraulic Loading: **70 gal./m-min**
- 5. Design:
 - a. Adjustments and Routine Maintenance during Operation: Possible without interrupting sludge dewatering process.
 - b. Devices Requiring Operator Interface: Located above operating platform for accessibility and visibility.
 - c. Side Skirts: Mounted on either side of belt and at inlet.
- C. Accessories:
 - 1. Odor control cover.
 - 2. Hardware: Stainless steel.

2.4 TRAILER-MOUNTED BELT FILTER PRESS SYSTEM DESCRIPTION EQUIPMENT

A. Sludge Conditioning System

- 1. System shall consist of an in-line polymer injection ring, which shall be mounted in the sludge line feeding the belt filter press. The injection ring shall be fitted with four equally spaced nozzles for even distribution of polymer in the incoming slurry. Following the injection ring shall be a stainless-steel variable orifice mixing valve with adjustable counterweight to vary mixing energy. Mixer shall have a removable side plate for inspection and cleaning.
- 2. The sludge conditioning system shall be capable of providing the following performance:
 - a. The polymer and sludge must be instantly mixed (less than 1.0 second at 60 GPM).
 - b. Mixing energy must be independently adjustable during operation.
 - c. Flocculation time must be independently adjustable, by the displacement of flanged pipe sections, with the mixer, at a minimum of three locations in the sludge feed piping. The three locations shall be 15, 30, and 45 seconds upstream from the belt filter press as calculated using the sludge feed design flow rate and velocity.
- 3. The manufacturer shall be required to demonstrate, during the start-up and calibration phase, that one man can adjust flocculation time within sixty minutes. The sludge conditioning system shall meet the following mechanical specifications:
 - a. The in-line mixer shall have a flanged, cast housing, an adjustable orifice plate, with shaft and o ring seal, connected to an externally mounted lever and counterweight, and a removable side plate for inspection and cleaning.
 - b. The inlet to the flow-splitting manifold shall be fitted with a 3/4-inch male hose fitting connection. The four manifold outlets and polymer injection ring inlets shall be fitted with 1/2-inch male hose fittings that provide for the interconnection of clear flexible tubing. The Manufacturer shall provide four feet of 3/4 inch clear flexible tubing, sixteen feet of 1/2 inch clear flexible tubing, and all necessary hose clamps with the sludge conditioning system.
 - c. The open throat area of the mixer shall be fully adjustable downward and shall open automatically to prevent clogging.

- d. The position of the counterweight on the externally mounted orifice plate lever shall be fully adjustable, within a 360-degree circle, to allow for adjustment of the mixing energy, regardless of the mounting angle, while the unit is in operation.
4. The polymer mixer shall be designed specifically for its intended use. The use of modified check valves, static mixers, or mixers requiring a tank and motor-driven propeller shall not be acceptable to this specification.

B. Structural Main Frame

1. The belt press frame shall be fabricated of fully welded structural members conforming to ASTM Standard Specifications for Structural Steel, Designation A36-77a, into a rigid structure, adequately braced to withstand intended loads without excessive vibration or deflection. Due to the potential for misalignment and loosening of members precipitated by loading, shipping, unloading, and/or vibration during operation. Bolted frames shall not be acceptable. All welding shall conform to the American Welding Society Structural Welding Code.
2. Maximum load on the frame, rollers, and bearings shall be based on the summation of forces applied to the frame from roller mass forces, weight of the rollers including the sludge and belts, and static belt tension of 30 pounds per linear inch (pli) per belt plus the tension produced by the driving torque of the motor. The frame shall have a minimum design safety factor greater than 5, and frame deflection shall not exceed 0.030 inches under the above-specified loading forces.
3. After fabrication, the completed frame shall be blasted and prepared to SSPC SP-10 near-white finish, then receive a minimum of 4 mils of 99% pure zinc for corrosion protection. Zinc shall be applied by thermal spray metalizing to ensure proper coating thickness and leave a surface that is superior for adhesion of other coatings. Following the application of zinc, 4-6 mils of a two-component, catalyzed epoxy shall be applied for maximum protection.
4. The structure shall be designed for installation on a prepared concrete foundation or FHWA-approved trailer and secured with anchor bolts. The entire system shall be enclosed and protected by removable 14-gauge stainless steel safety shields. The construction of the belt press with the shields removed shall allow easy access and visual inspection of all internal components.
5. The manufacturer shall warrant the frame and the coating for a period of three years from the date of start-up, not to exceed three and a half years from the date of delivery. The frame shall not require preventive maintenance during the warranty period. Any defects or corrosion occurring within the warranty period shall be repaired or replaced at no additional cost to the Owner.

C. Gravity Zone

1. Each belt filter press shall be furnished with a gravity drainage section to accept sludge from the sludge conditioning system. The gravity drainage section shall be furnished with a sludge feed baffle to evenly distribute conditioned sludge over the effective width of the moving filter belt.
2. The conditioned sludge shall be contained on the belt with adjustable containment barriers equipped with replaceable rubber seals to prevent leakage. The rubber seals shall be designed for attachment to the containment barriers by friction fit, to allow for easy replacement without the use of tools.

3. The gravity drainage section shall have an effective dewatering area of 28.7 square feet, which is defined as the effective width of the belt press times the length of the gravity deck.
4. A carbon steel hot-dipped galvanized grid fitted with high-density polyethylene wiper bars shall support the filter belt while in the gravity drainage section. The wiper bars shall be spaced at a maximum of two and one-half inches and shall have a nominal wear thickness of one-half inch, to minimize the frequency of replacement. The belt support grid shall be a minimum of 2 inches wider than the belt on each side and so designed to reduce belt wear. Wiper bars constructed of fiberglass, other high friction materials, or table rollers that require extra maintenance due to coatings and additional bearings shall not be considered an acceptable substitute to this specification.
5. The gravity drainage section shall be furnished with chicanes (plows) to adequately furrow the conditioned sludge to facilitate drainage. Each row of chicanes shall be provided with a single lifting handle, designed to remove the entire row of chicanes at least 6 inches from the belt, out of the sludge flow, to facilitate cleaning. Chicanes shall be designed to be individually adjustable laterally and shall pivot to allow them to pass over obstructions on the belt. A minimum of 5 rows of chicanes shall be supplied in the gravity section.
6. The manufacturer shall be required to demonstrate that each individual chicane shall be capable of allowing a one-inch vertical obstruction on the belt to pass under them without damage to the equipment.
7. Vacuum-assisted, inclined gravity drainage sections that are subject to flooding, or independent gravity drainage sections that require a separate belt drive motor and tensioning device will not be considered an acceptable substitute to this specification.

D. Pressure/Shear Zone

1. Each belt filter press shall be furnished with a pressure section following the gravity drainage section. The pressure section shall consist of two stages.
2. The first stage of the pressure section shall be the increasing pressure (wedge) zone, where the upper and lower belts gradually converge with the sludge between the belts. In the wedge zone the sludge cake is prepared for the shear pressure zone by generating continuously increasing pressure on the sludge as it travels through the zone.
3. The minimum effective dewatering area in the increasing pressure shall be 9.7 square feet. Grids as defined in the materials of construction section shall support the belt in the increasing pressure zone.
4. The horizontal wiper bars shall give a wiping action to the bottom of the belt in the wedge zone that will quickly remove water from the belt allowing faster drainage. The belt-supporting grid in the wedge zone shall be horizontal and blend into a gradual downward curve that shall be tangent to a radius pressure grid.
5. The second stage of the pressure section shall be the shear pressure zone consisting of rollers arranged to provide an S shaped pattern of belt travel. The curved grids shall enhance dewatering by causing the pressure on the sludge between the belts to increase and press out free water.
6. Rollers shall be constructed as specified under "Rollers". The rollers shall be supported by bearings mounted on the end shafts as specified under "Bearings".
7. The minimum effective dewatering area in the pressure zone shall 38.1 square feet. The effective dewatering area in the shear pressure zone shall be defined as the area of the one (1) pressure grids and the six (6) rollers in contact with the belts.
8. A 304 SS sump pan shall be provided under the press to catch filtrate and wash water directed by sch 80 PVC piping. The sump pan shall have a discharge point on each side. Outlets shall be sized for maximum flow rates.

E. Cake Discharge

1. UHMW polyethylene doctor blade shall be provided in the area of the discharge rollers to aid in the removal of sludge cake from the belts. The doctor blades shall be held in place against the belts by means of a counter-weighted assembly. The doctor blade assemblies shall be designed to allow the blades to be held away from the belts, without assistance, for maintenance and belt replacement.
2. Dewatered sludge cake shall be scraped from the discharge rollers by means of counter-weighted adjustable doctor blades. Pressure shall be adjustable by positioning of the counterweight. Doctor blades shall be reversible to maximize service life.
3. A 304 SS discharge chute shall be provided to direct cake from the belt press to customer supplied container. Discharge chute shall be approximately 4-ft in length.

F. Rollers

1. All solid rollers shall be of welded carbon steel construction. Solid roller shafts shall have a minimum diameter of 2.50 inches inside the roller and machined to a minimum diameter of 60 mm into and through the support bearing. The stub end shafts and plates must be welded in place. The pressure section begins with one fixed radius grid, which will apply pressure on the sludge between the belts to press out free water. The horizontal wiper bars shall give a wiping action to the belt that will quickly remove water from the belt allowing faster drainage.
2. All roller assemblies shall be designed to have a minimum yield stress safety factor of 10, and a maximum deflection of 0.025 inches when under maximum load. Maximum load shall be based on the summation of forces applied to the roller from roller mass forces and belt tension forces. Tension forces shall include a belt tension of 30 pli and tensions produced by the driving torque of the motor.
3. Rollers materials and coatings shall be as specified herein. Other types of protective coatings shall not be acceptable. Rollers shall be coated up to the point of insertion into the bearing block. The use of rollers constructed entirely of Type 316L stainless steel, in lieu of rollers of carbon steel with protective coatings, shall be considered acceptable under this specification; however, the Buna N rubber coating on the drive rollers shall still be required. The ends of the shafts of each roller shall be equipped with support bearings as specified under "Bearings".

G. Bearings

1. All rollers shall be supported by greaseable type, high-capacity bearings, in pillow block housings. The bearings shall be direct mounted on the shaft with a locking sleeve assembly.
2. All bearings shall have a minimum L10 bearing life of 100,000 hours at 30 pli and 15 fpm as calculated by using the latest ANSI/AFBMA standard.
3. Bearing lubrication shall be performed through stainless steel grease fitting mounted on the bearing housing. All bearings shall be outboard (externally mounted) and shall be greaseable while the unit is in operation. All bearings shall be greased at one-month intervals.
4. The manufacturer of the belt filter press shall warrant the complete bearing assembly, as specified herein, for a period of one year from the date of start up, or acceptance of the equipment, whichever occurs first. The warranty is void if the bearings are not lubricated sufficiently to prevent rusting of the rolling elements.

H. Belt Wash System

1. Each belt filter press shall be equipped with individual belt wash stations for both the upper and lower belts. Each station shall consist of a spray pipe, fitted with spray nozzles, contained within a fabricated housing that encapsulates a section of each belt. The spray tube assembly shall be readily removable.
2. Nozzle spacing and spray pattern shall be such that the sprays from adjacent nozzles overlap one another at the belt surface. Individual spray nozzles shall be replaceable.
3. Each belt wash spray tube shall be furnished with a drain valve having an external handwheel to which is mounted a stainless-steel cleaning brush located inside the spray pipe. One full turn of the handwheel shall cause the brush bristles to enter each spray nozzle, and dislodge any solid particles which have accumulated, open the valve and allow the solids particles to be flushed into the drainage system.
4. Belt wash spray tubes shall be the type manufactured by Appleton Manufacturing, or of similar quality.
5. Each belt wash station shall be positioned so that the washing is performed after the cake has been discharged from the belt. The belt wash station shall extend beyond the full width of the filter belt by a minimum of two (2) inches per side.
6. The belt wash system shall be suitable for use with plant effluent water with a maximum suspended solids content of 50 mg/l. The belt wash system shall be designed to operate at the minimum flow of 27 gallons per minute, and at a minimum pressure of 85 psig.

I. Belt Alignment and Tensioning System

1. Each belt shall be provided with an alignment system. The alignment system shall provide continuous guidance via UHMW wear strips in the gravity zone and pressure zone.
2. Each belt shall be provided with a belt tensioning system. The belt tensioning system shall be hydraulically actuated. The design of the tensioning system shall be such that adjustments in tension shall result in immediate changes in dewatering pressure.
3. The belt tensioning system shall be located on the press so that control of belt tension is possible. Actual belt tension shall be maintained automatically despite process changes or belt stretching and not require additional adjustment by the operator to maintain the setpoint.
4. The belt tensioning system shall be designed to accommodate maximum belt stretching during the useful life of the belt. The tensioning system shall have two hydraulic cylinders for each belt, directly connected to a rigid tensioning yoke, to provide absolute parallel tension across the entire width of the belt. The tension force shall be constant over the full range of the cylinder.
5. Manual tensioning systems or pneumatic systems are not acceptable, as they do not automatically maintain a pre-set pressure on the sludge despite process changes.
6. Rollers for the belt tensioning system shall be constructed as specified under "Rollers". The roller shaft bearings shall be as specified under "Bearings".

J. Hydraulic Power Unit

1. Each belt filter press system shall be provided with a dedicated hydraulic power system to provide pressurized oil for the tensioning. The unit shall consist of a one-gallon reservoir, variable-displacement pressure-compensated hydraulic oil pump and drive motor, hydraulic oil filter (reusable), pressure gauge, piping, and cylinders to make a complete operational system.
2. The pump, motor, reservoir, and oil filter shall be mounted directly to the belt press frame to eliminate excess piping runs, extra fittings and hoses. All hydraulic lines shall be

properly sized for the pressure and flow of the unit. Pressurized hydraulic lines shall be 316ss tubing or high-pressure hose, and shall be supported on the structural frame of the press. Flexible lines to cylinders, low-pressure connections to the reservoir, etc. shall be hose of the material and construction appropriate to the application. The hydraulic reservoir shall be made of high-density polyethylene (HDPE) and shall be translucent to allow visual inspection of the oil level.

3. The hydraulic oil filter shall be a washable 10-micron screen that does not require frequent replacement, but can be cleaned by washing.
4. The pump motor shall be 1 hp and shall not exceed a noise level of 70 DbA. The motor shall be a cast iron TEFC 1,200 rpm, NEMA B design with a "C" face mounting for the hydraulic pump adapter.
5. Maximum system pressure shall be set equal to the highest pressure required to obtain the desired operating belt tension. The maximum system operating pressure is 300 psi.
6. Hydraulic pressure control shall be located on the pump for easy access and ease of operation. The fittings and associated parts shall be of non-corroding materials such as nylon, rubber, and stainless steel.

K. Belt Drive

1. Input power to the drive roller shaft shall be supplied through a variable speed drive unit. The drive roller speed reduction is obtained through a helical-bevel mounted gear reducer.
 - a. Drive Motor Data:
 - 1) Quantity per Machine: 1.
 - 2) Maximum Horsepower: 1.5 hp .
 - 3) Power Requirements: 460 v.a.c., 3 phase, 60 cycle.
 - 4) Rated Speed: 1740 r.p.m.
 - 5) NEMA Design: B.
 - 6) Insulation Class: F.
 - 7) Enclosure: TEFC.
 - 8) Service Factor: 1.15.
 - 9) Lubrication: Grease filled.
 - 10) Special Features: Severe duty rating.
2. The variable input power shall be transmitted through a gear reducer mounted on the drive roller shaft. The drive roller shall be constructed as specified under "Rollers" and shall be surfaced with a Buna-N rubber coating to permit slip-free transmission of driving torque to the belt.

L. Dewatering Belts

1. Each belt filter press shall incorporate the use of two dewatering belts. Belts shall be fabricated of monofilament polyester and shall have 316 Stainless Steel seams. The mesh design shall be selected for optimum dewatering of the sludge to be processed and provide for maximum belt life when operated in accordance with the manufacturer's instructions.
2. Belt selection shall be based on the manufacturer's experience obtained from testing the sludge during start up of the belt filter press (es) and at other installations dewatering similar sludges with similar polyelectrolyte conditioning chemicals.

3. Each belt and connecting seam shall be designed for a minimum tensile strength equal to five times the normal maximum dynamic tension to which the belt shall be subjected. The seam shall be designed to fail before the belt.
4. Belts shall be designed for ease of replacement with a minimum of belt filter down time. Belt replacement shall be such that disassembly of the equipment is not required.

M. Discharge Blades

1. Discharge blades shall be provided to scrape dewatered sludge from the belt at the final discharge rollers. The blades shall be of ultra-high molecular weight polyethylene (UHMW) construction and shall be readily removable.

N. Drainage Pans

1. Drainage pans shall be provided as necessary to contain filtrate from all dewatering areas within the belt filter press without splashing and to prevent rewetting of downstream cake. All drainage piping shall be furnished, adequately sized for the upper gravity section and washboxes to direct water to the sump. The main filtration collection pan under the wedge and pressure zone shall direct discharge into the sump. Drainage pans shall be located so that the moving belts do not come into contact with the pans, nor does the filtrate come back into contact with the belt, under any condition.

O. Control

1. Electrical Work

- a. All electrical work shall meet the current NEC standard for code and practice and shall comply with all applicable state and local codes concerning wiring and service equipment. Where conflicts of the code exist, the national code shall prevail.
- b. All components used for this control and all associated equipment shall be UL approved and bear the underwriters stamp and registration number. The entire assembly shall meet minimum requirements for safety as determined by this agency and be built according to its guidelines within the framework of the NEC as listed above.1.3. Electrical assemblies shall meet UL-508 standards and be suitable for wet environments. The controls and equipment located on or near the BFP shall meet UL-4X or IP66 standards for wash down service. Controls and equipment located away from the BFP shall meet UL-4 standards for wet environments.
- c. Electric motors shall meet all specifications as outlined in associated sections.
- d. All press mounted conduit and wiring shall meet all necessary code requirements as stated in the NEC for wet and/or corrosive environments. All wiring shall be fully enclosed in conduit or sealed flexible armor. No exposed cords or "mine cable" such as SO or SJO cables will be allowed.

2. Variable Frequency Drive Units

- a. The manufacturer shall supply drive units installed in the master control that meet the functional requirements associated with each motor involved with process control. Motor and drive unit selection shall be based upon the operating profile of the machine, with particular attention given to the limits of motor performance when operated at less than full speed with a VFD.

- b. The drive unit shall operate with an output up to 120% continuous capacity without exceeding the motor specification for:
 - 1) Temperature rise
 - 2) Full load current draw
 - 3) Vibration
 - 4) Noise
 - 5) Phase slip
 - c. The drive unit shall consist of the following major components:
 - 1) Motor load protection as required by the NEC and in accordance with UL 991
 - 2) Under and over voltage protection that shall shut down the drive and enunciate a buss fault
 - 3) Phase protection shall guard against a phase to phase fault and enunciate the error
 - 4) Ground fault protection shall enunciate a phase to ground short
 - 5) Acceleration and deceleration protection with adjustable pre-selected speed set points
 - 6) Operating panel for monitoring and controlling the VFD
 - 7) Remote control capability that will accept 0-10VDC, 4-20mA DC or pulsed DC speed reference signals
 - d. The drive unit shall be assembled and tested to the latest applicable standards of ANSI, NEC, IEEE, NEMA, be UL listed, registered and be capable of CE certification with no modifications to the drive.
 - 1) The drive shall be industrial grade. Commercial grade or "OEM" grade drives will not be accepted.
3. Electrical Control Panel
- a. An electro-pneumatic master control panel shall be provided that will allow operation of the Belt Filter Press dewatering system from a central point near the press. This control shall be constructed such that it shall have a UL-4 rating. All equipment contained on the panel shall be rated NEMA 4/4X and construction shall be such that this rating is maintained in the finished control.
 - 1) A separate press mounted NEMA 4X remote operator panel with 304 SS enclosure shall allow for manual operation of the belt press only.
 - b. The enclosure shall be configured to allow local connection of the electrical wiring and pneumatic lines to the BFP. The control shall be constructed to conform with UL-4X and/or IP66 ratings. The enclosure shall be 304 stainless steel.
 - c. Starting Devices (Starters, VFD's) located in the master panel.
 - 1) Press VFD
 - 2) Sludge Pump VFD
 - 3) Air Compressor Starter
 - 4) Booster Pump Starter
 - 5) Polymer Pump Drive
 - d. Power to the master panel shall be 480VAC/60Hz/60A. Single point wiring shall be used, with all control voltages supplied internally by a copper wound, split bobbin, step down transformer that provide full regulation at duty cycles between 85 to 120% of load. The transformer shall be fully fused on both the primary and

- secondary windings. One leg of the secondary winding shall be bonded to the panel frame to provide a true neutral buss.
- e. A master disconnect, rated for 125% of the possible full load current draw expected in normal service shall be installed in the cabinet. The operating handle is to be interlocked to the door so that the power must be off to gain entry to the cabinet interior. A defeater is to be installed in this mechanism so that qualified technicians can open the door under power with the use of a proper tool.
 - 1) This disconnect shall be front mounted, be lockable, with provisions for three locks. The disconnect must be NEMA rated, suitable for 600 volt service, and be UL approved.
 - 2) The disconnect shall be by Allen Bradley, Square D or approved equal.
 - f. A mushroom head Emergency Stop palm switch shall be provided in a prominent place on the cabinet face. This switch shall be the maintained position type and require manual reset. Actuation of the switch shall result in a full crash stop of the equipment controlled from this panel. This is accomplished by opening the control voltage line which will shut off power to all equipment.
 - g. All push buttons and pilot lights shall be Allen Bradley bulletin 800H devices, or approved equals, and be UL-4 rated devices with NEMA A600 self cleaning contact blocks rated at 10 amps continuous service with a one million cycle design life.
 - h. All major machine functions shall be enunciated with pilot lights. These pilots shall be Allen Bradley bulletin 800H devices (or approved equal) with integral step down transformers to provide a low voltage filament supply to incandescent bulbs for extended lamp life in severe service
 - i. Other secondary functions shall have labeled push buttons or switches with accompanying banks of pilot lights that will describe the general operation surrounding that function.
 - j. The control shall have pneumatic equipment as necessary to individually control belt tensions with gauge indication of the actual pressure placed on the tensioning devices.
 - k. There shall be a primary oil coalescing air filter mounted on the control to pre-clean the air for use in belt tracking and tensioning.
 - l. Alarm tie points shall be provided for the cable safety, belt over travel, and low air pressure. Each of these conditions shall immediately stop the system by breaking the control circuit to the start/run contact for the press drive. This alarm shall start a programmed shut down of the system.
 - m. All wiring shall be done in a neat and professional manner. Internal wire connections between devices shall be contained in PVC wire duct. Where space limitations prohibit this, all wires shall be laced into neat bundles tied to the enclosure with panel cleats to prevent movement of the harness in service. All wires shall have computer generated self-laminating Tyvek numbers on each end of the conductor. These numbers shall coincide with the diagram supplied with the control. All wiring shall use AWG #16 or heavier stranded copper conductors with 600-volt type MTW insulation. All wires shall terminate at screw and pressure plate connectors. All terminal points shall have indelible marking showing the wire number and corresponding tie point. Twenty percent spare terminals shall be provided for use by the owner.

- n. All work shall be in full compliance with the latest version of the National Electric Code and LSC. Additionally, all work will be UL/CUL approved using only listed components.
 - o. A set of schematic diagrams shall be provided with the panel describing both the wiring and pneumatic layout. All components associated with the press shall be shown on the drawing and all connections shall be addressed. Standard JIC drafting symbols are to be used to show component wiring and function.
 - p. All equipment shall be completely checked out and hot tested prior to shipment. This shall include a test of all switches, lights, relays, and other components. All safety devices shall be rechecked completely for operation, function and control prior to final clean up and packaging for shipment.
4. Control Function
- a. Control Function shall include as a minimum, automatic one-button start and stop with fully interlocked preprogrammed machine sequencing from a fully cold start up through steady state dewatering of process sludge. The shutdown shall also be fully automatic with all necessary timed steps to insure an orderly stop of all equipment. Logic shall be via Allen Bradley MicroLogix PLC.
 - b. The alternate form of operation is manual mode. This mode is for maintenance use and certain operations which may call for manually operating parts of the system. Interlocking of the system is optional in this mode. Full annunciation and safety protection shall be maintained.
5. Order of Operation
- a. The Order of operation in the automatic mode is as follows:
 - 1) Start the air compressor and allow the day tank to build to operating pressure. Pre-tension the filter belts.
 - 2) Select AUTO mode on the master control panel for each device to start automatically.
 - 3) Press the AUTO START push button. The press starts and the PRESS RUNNING pilot illuminates.
 - 4) The wash water pump starts and the press begins a pre-wet cycle. The boost pump pilot shall illuminate when the pump is running.
 - 5) A PREWASH pilot light indicates that the press is performing a preconditioning cycle.
 - 6) At the end of the PREWASH cycle, the sludge pump starts. The operator can adjust the belt speed of the press to get a good cake flow in the dewatering zone.
 - 7) When the sludge pump starts, the polymer system also starts.
 - 8) The press is now in a full run mode and the operator can adjust flows and speeds as necessary to achieve the cake consistency desired.
 - b. The order of operation for shut down is as follows:
 - 1) The operator presses the AUTO STOP push button on the master control panel.
 - 2) The sludge pump and polymer system will stop.
 - 3) The POST WASH pilot light illuminates and the press will begin a timed step to wash off the belts.
 - 4) The boost pump and press stop at the end of the timed cycle.
 - 5) The machine automatically resets for the next cycle.

P. Alarms

1. Alarms shall be provided for Belt Break, Belt Track, Low Air, Emergency Stop (including cable Safety). Faults shall immediately initiate an orderly shut down of the system. In as much as practical, the remaining parts of the system that can still run shall continue to do so and the automatic shut down will allow operating portions of the equipment to clear themselves out and wash off. Down stream interlocked equipment will of course, not be allowed to run. All alarms shall latch on until manually cleared and reset. Individual pilot lights shall be provide for each alarm. Alarms shall remain on until manually reset. The alarm horn shall sound on a fault and remain on until manually silenced. The alarm horn shall reset with the system.

Q. Spare Parts

1. Press manufacturer shall supply the following spare parts, as well as any additional parts recommended for one year's operation:
 - a. Furnish [**one**] (1) set of belts.
 - b. Furnish [**one**] (1) of each size and type of roller bearings.
 - c. Furnish [**two**] (2) sets of doctor blades.
 - d. Furnish [**two**] (2) complete sets of rubber seals for gravity and wedge zones.
 - e. Furnish [**two**] (2)complete sets of belt wash box seals.
 - f. Furnish [**one**] (1) limit switch.
 - g. Furnish [**one**] (1) tracking.
2. Parts shall be packaged in protective enclosure suitable for storage, and shipped separately to minimize possibility of loss or damage.

R. Air Compressor

1. System air shall be provided by a single stage air compressor. Compressor shall be industrial type with cast iron sleeves within finned aluminum casting. Pump shall be splash-lubricated. Compressor to be driven by industrial duty AC induction motor sized for intended duty with a service factor of at least 1.15. Compressor shall be mounted on a 30-gallon ASME rated receiver with pressure gauge and pressure regulator switch. Compressor shall be sized to supply all air for press operation at peak demand.
2. Acceptable Manufacturers:
 - a. Industrial Air.
 - b. Campbell-Hausfield.
 - c. Gardner-Denver.
 - d. Emglo Aurora.
 - e. Or Equal.
3. Compressor shall be or equal.

S. Booster Pump

1. Plant water pressure shall be increased to 100 psi for proper operation of press belt washing. Booster pump shall be centrifugal design, close coupled, bronze fitted construction, with bronze impeller. Pump shall be driven by an industrial duty, AC induction motor sized for the intended duty with a service factor of at least 1.15. Pump and motor shall be close-coupled or mounted on a common base plate.
2. Acceptable Manufacturers:
 - a. Aurora.

- b. Grundfos.
- c. Or Equal.

T. Polymer Unit

1. The polymer dilution and feed systems shall be capable of effectively activating and fully blending with water a homogenous polymer solution ranging from 0.1% to 1% concentration of emulsion polymers with active contents up to 75%.
2. Multi-zone Hydro-Dynamic Mixing Chamber:
 - a. A hydro-dynamic blending device with staged mixing energy shall be provided. The first stage mixing energy shall be in the form of a high energy water jet impinging on the polymer as the polymer is injected into the mixing chamber. Polymer injection shall be through a quill to optimize polymer / water interface. The water jet shall be produced by a pressure drop across a variable orifice. The system shall effectively blend & activate polymers in this non-mechanical stage with differential pressures as low as 30 psid. The second stage shall produce a back-mixing through a hydraulic, cyclonic action. The design of the mixing chamber shall provide plug flow to prevent polymer build up and plugging in the event polymer is introduced without to the mixing chamber without water. Systems shall allow for low velocity areas in the mixing chamber shall not be considered.
 - b. The mixing chamber body shall be constructed of PVC. The mixing zone shall be clear for viewing purposes. Clear solution piping alone shall not be considered to meet this requirement. A drain connect with a pressure relief valve shall be provided. The chamber shall be rated for up to 150 psi.
 - c. Provide a neat polymer check valve specifically designed to isolate neat polymer from dilution water. The valve shall be designed with an open and unobstructed path to the valve seat. The valve body shall be constructed of Teflon with Viton seals. The poppet and spring shall be stainless steel and designed to prevent polymer from flowing through the spring, causing build-up and plugging. The valve shall be readily accessible for cleaning and shall not require tools for removal, cleaning or replacement. Conventional check valves, ball checks, and or check valves that are installed inside the mixing chamber, or which require mixing chamber disassembly for servicing will not be accepted.
3. Dilution Water Assembly
 - a. The dilution water flow rate shall be monitored by a Rotameter type flow meter having a range of 1-10 GPM. A union shall be provided on the Rotameter to allow easy removal for cleaning.
 - b. Unit shall have an electric solenoid valve for on/off control of total dilution water flow.
 - c. Provide a 2-1/2" stainless steel liquid filled pressure gauge to monitor dilution water inlet pressure.
 - d. Provide a 3/4" FNPT dilution water inlet assembly.
4. Progressive Cavity Neat Polymer Metering Pump.
 - a. Each unit shall have one (1) neat polymer metering pump integrally mounted on the systems skid. The metering pump shall have a range of 0 – 3 GPH. The pump shall be a positive displacement, progressive cavity type constructed of stainless steel and Viton. The pump seal shall be packing type. Mechanical seals shall not be used. The pump shall have a minimum of three stages to minimize slip. A

- TENV 90 VDC motor shall drive the pump. The motor shall be controlled by an SCR motor controller located in the main control panel.
- b. Provide a calibration column with two full port PVC ball valves having Viton o-rings. The column shall be calibrated for a one minute draw-down and read in GPH and milliliters.
 - c. Provide a pressure gauge with diaphragm isolator to monitor polymer line pressure.
 - d. Provide a pressure switch with diaphragm isolator to alarm on high polymer line pressure.
 - e. Provide a metering pump priming assembly including vacuum device and valve.
 - f. Provide a thermal type loss of polymer flow sensor. Loss of flow shall cause polymer pump and sludge pump to stop and initialize an alarm.
5. Solution Discharge Assembly.
- a. Provide a 2-1/2" stainless steel liquid filled pressure gauge to monitor system discharge pressure.
 - b. Provide a 3/4" FNPT solution discharge assembly.
6. Controls for the polymer system shall be located in the belt filter press control panel.
- a. Power:
 - 1) 120 VAC, 1Ph, 60 Hz.
 - b. Polymer System Skid
7. The system's frame shall be of rugged 304 stainless steel construction. No mild steel shall be used. All piping shall be rigidly supported.
8. The overall system dimensions shall not exceed 36"W x 24"D X 42"H.
9. NOTE: Above system is a standalone make down system. However, two (2) 250-gallon 304 SS tanks will be installed on the trailer and piped to act as make down tanks if required.

U. Sludge Pump

1. The sludge feed pump shall be capable of pumping 100 gpm of sludge. The maximum drive horsepower shall be 7.5 HP.
2. Pump shall be of the heavy duty, positive displacement, single stage, progressing cavity type. The pump shall be cradle mounted to allow the normally vertical suction port to be rotated to any angle perpendicular to the centerline to facilitate piping connections.
3. The bearing and suction housings of the pump shall be thick-walled cast iron. All cast parts will be free of sand holes, blow holes, and other defects. The suction housing shall incorporate two rectangular inspection ports, 180° apart, to permit access to the suction housing interior without disconnecting piping.
4. The suction and discharge connections shall be flat face flanges with bolt hole dimensions and spacing to ANSI Standards.
5. The rotor shall be a machined and polished single helix with a nominal chrome plate thickness of .010 inches for maximum abrasion resistance.
6. The stator shall be of double helix configuration with the molded elastomer chemically bonded to a steel tube. The stator shall be fastened to the suction housing and discharge flange with removable clamp rings to facilitate stator removal. The stator seals shall be designed to prevent the material being pumped from contacting the stator bonding and tube.

7. A rigid, splined connecting rod shall connect the drive shaft and eccentrically moving rotor. The connecting rod shall pass through the shaft seal area inside the hollow drive shaft quill so that no eccentric loads are imparted on the shaft seal area.
8. The drive shaft shall be of one piece construction through the bearings and shaft seal area. This design shall permit disassembly without affecting the alignments of the shaft in the shaft sealing area. The quill portion of the shaft shall be replaceable.
9. The bearings will be of the grease lubricated, tapered roller bearing type with diverging pressure angles for maximum shaft stability. Bearings are to be designed for a minimum B-10 life of 30,000 hours under maximum operating conditions and will not require periodic re-lubrication. The bearings shall be protected from contaminants by means of a bearing cover plate bolted to the bearing housing. The stuffing box shall be equipped with an adjustable packing type seal, with fittings provided for lubrication.
10. Acceptable Manufacturers:
 - a. Moyno.
 - b. Seepex.
 - c. Or Equal.
11. Pump shall be or equal.

V. Equipment Trailer

1. All equipment for sludge dewatering system shall be mounted, piped and wired in a nominal 48-ft curtain sided trailer. Walkways shall be preinstalled and be able to be lowered into operating position. There shall be a separately enclosed, air conditioned & heated space at the front of the trailer for use for office / lab / storage. All piping shall be rigidly supported. Trailer shall be new, used trailers will not be considered in original proposal evaluation.
2. Power supply to Trailer shall be via a minimum 50-foot cable fitted with a Shore Power plug, allowing a single plug-type connection for power to service all equipment on the Trailer.
3. Ample LED lighting shall be included suitable for operating the equipment at night in the environment associated with processing wastewater sludge.

W. Manufacturer's Services

1. The manufacturer shall furnish a trained technician to provide start-up assistance and train owner's personnel in the operation, maintenance and adjustments of the press. Assistance shall be provided in a minimum of one (1) trip to owner's location and a total of three (3) days on-site.

X. Miscellaneous

1. The press shall be equipped with a safety trip cord along the accessible areas of the press. Trip cord shall actuate a NEMA 4 safety switch that shall immediately de-energize the press. The safety switch must be reset for the press to be re-started. All wiring shall be contained in press mounted PVC conduit. All belt wash water piping shall be schedule 80 PVC. All air lines shall be nylon tubing with brass connections. Drain connections shall be PVC or stainless steel.
2. The press frame shall be coated as described in Section 2.3B. All other surfaces in contact with sludge or filtrate shall be stainless steel. Components and appurtenances not in contact with sludge or filtrate or not otherwise described herein, shall be coated with a two-part epoxy.