

SECTION 01201

TEMPORARY SOLIDS DEWATERING

PART 1 GENERAL

1.01 DESCRIPTION OF WORK

- A. The Vendor shall furnish a Centrifuge for temporary dewatering of blended thickened primary sludge and thickened waste activated sludge. The Centrifuge shall include a local control panel and dewatered sludge conveyor. The Work shall include delivery and unloading of the centrifuge. The Vendor shall remove and ship the centrifuge off site at the completion of the project. The Work shall also include startup after installation. Final positioning of the Centrifuge and connection to the plant's piping, electrical, and control systems shall be approved by the owner. The Vendor shall have been in the business of temporary/mobile centrifuge dewatering for no less than four (4) years. Temporary Dewatering shall commence on December 1, 2016 and continue uninterrupted until November 30, 2019 with an option to extend up to two (2) additional years if both parties agree. The rental fee will commence after acceptance testing is complete.
- B. The temporary centrifuge shall be located within the Truck Loading Area along with three trailers for loading and hauling of dewatered sludge in a manner that does not impede the operation of the three (3) sludge loading bays. Modifications necessary to the building, appurtenances, and utilities to accommodate the rigging and placement of the Centrifuge into the Truck Loading Area are the responsibility of the Vendor. Once the temporary dewatering system is no longer necessary, any modifications to the Truck Loading Area shall be restored to the original condition unless otherwise noted. See Drawings M-1 and M-2 for the extent of the available layout area and a summary of horizontal and vertical constraints.
- C. The electrical equipment and controls for the temporary dewatering system shall be located in the Storage Area A. See Drawings M-3 and M-4 for the extent of the available layout area and a summary of horizontal and vertical constraints.
- D. The layout of the temporary centrifuge unit and the electrical and controls shall be approved by the City.
- E. The Vendor will have two weeks from the commencement, December 1, 2016, to get the centrifuge operational before any down days shall be assessed.
- F. The temporary dewatering system shall be furnished with all necessary accessory equipment and auxiliaries, whether specifically mentioned in this Section or not, for the highest standards for the type of service specified.
- G. The Lowell Regional Wastewater Utility, LRWWU, will provide personnel to operate the temporary dewatering equipment.
- H. The Vendor shall be responsible for all repairs and major maintenance to the Centrifuge, including parts and labor. LRWWU shall be responsible for any daily or weekly routine

maintenance, as described in the Operations & Maintenance manual. See subpart 3 section 3.02 for further detail.

1.02 SUBMITTALS

- A. Submit, as part of the Bid, a temporary dewatering plan that provides sufficient detail that the proposed dewatering system will meet the needs of this project. At a minimum, the temporary dewatering plan shall contain:
 - 1. Elevation and plan drawings of the exact make and model of the Centrifuge located in the truck loading area and including all utility connection locations and sizes (power, water, polymer, sludge feed, centrate, etc. Drawings shall also show dewatered sludge conveyance including details of how the conveyor provided with the Centrifuge shall connect with the existing inclined conveyor and any modifications required to be performed by the Vendor. Drawings shall be to scale with all relevant clearances and dimensions called out.
 - 2. List of references demonstrating the required years of experience. Provide contact information for at least three (3) references in the USA that utilized similar dewatering equipment as that being proposed. The contact references must be municipal wastewater treatment plants that dewater a blend of primary and secondary sludge that has not been digested. References shall include name and location of plant, and current contact names and phone numbers. If any of the phone numbers are determined to be invalid, and valid phone numbers cannot be determined based on a quick internet search, the proposal shall be considered incomplete.
 - 3. Operations & Maintenance (O&M) manual including Standard Operating Procedures (SOP). The O&M manual shall be specific to the size and model of the dewatering unit provided, shall list out all daily/weekly routine maintenance responsibilities, and shall be prepared by the dewatering equipment manufacturer.
 - 4. Product data showing compliance with all specified design and performance requirements.
 - 5. A startup and demonstration plan that meets the requirements below.

1.03 COORDINATION

- A. The treatment plant operates on a continuous basis 24 hour per day, 7 days per week. The Vendor cannot interfere with plant operations including sludge dewatering and sludge hauling.
- B. The City will provide a full time operator for the temporary dewatering system.
- C. The Centrifuge and electrical equipment shall fit into the areas shown on the drawings (M-3 & M-4) with sufficient clearance for all operations and maintenance activities. The Centrifuge shall not impede the use of any of the three (3) sludge loading bays.
- D. The Centrifuge shall discharge sludge onto the existing sludge conveyance system. The Centrifuge shall not impede the use of the existing conveyors to convey sludge from the existing belt filter presses. The existing conveyors shall remain available for use to convey sludge from the existing belt filter presses at all times.
- E. The Vendor must coordinate with LRWWU to ensure that the Centrifuge is properly connected to the existing sludge process.

PART 2 PRODUCTS

2.01 TEMPORARY DEWATERING EQUIPMENT

- A. The Centrifuge shall be designed to accept and blend separate streams of sludge and polymer and condition and dewater the sludge in accordance with the specified range listed in the design criteria. The temporary dewatering equipment shall produce a dewatered sludge cake that can be conveyed by the existing conveying system.

2.02 FEED SLUDGE CHARACTERISTICS

- A. Sludge Feed: Combination of Thickened Primary Sludge and Thickened Waste Activated Sludge, that has been blended in-line. Polymer is currently injected into the blended sludge feed line at an injection point 100 to 150 feet upstream of the sludge feed pumps. The sludge feed characteristics are as follows: 45-60 percent Thickened Primary Sludge and 40 – 55 percent Thickened Waste Activated Sludge. The historic average Total Volatile Solids of the blended sludge is 79 percent. Occasionally LRWWU will need to dewater 100 percent Thickened Waste Activated Sludge that has a concentration of 3-5 percent solids. Sludge samples can be made available upon request.
- B. The City's sewers are combined sanitary and stormwater systems. The sludge characteristics vary seasonally and during wet weather events. Grit is present in the sludge feed.
- C. The City's existing sludge processing system consists of:
 - 1. Thickened Primary Sludge – Primary sludge is pumped continuously to two gravity thickeners to thicken the primary sludge to a concentration between 2 to 4 percent.
 - 2. Thickened Waste Activated Sludge – Waste Activated Sludge (WAS) is continuously pumped from the secondary clarifiers to a Rotary Drum Thickener (RDT). The WAS is conditioned with polymer and thickened to 4 to 6 percent.
 - 3. Each sludge stream has its own pumps and the sludge is blended inline with the use of a pair of mixing valves. Each pump has a VFD that can adjust the pump speed and change the ratio of sludge. Currently polymer is injected between the mixing valves, about 100 ~ 150 feet upstream of the sludge discharge point, at the temporary Centrifuge.

2.03 DESIGN REQUIREMENTS

- A. Design Requirements: The temporary dewatering system shall meet the following requirements:

Dewatering Centrifuge Bowl Diameter	(Minimum)	26 inches
Approximate Length: Bowl Diameter		4:1
Max Feed Pump Hydraulic Capacity		250 gpm
Available Pressure in Sludge Feed Line at Centrifuge Sludge Inlet		atmospheric
Wash Water Capacity		80 gpm (Maximum)
Flush Water Pressure		60 psi (Maximum)
Power Source		480 volt, 3 phase, 60 hertz
Current Draw (Maximum)		250 amps

Sound Pressure Level (Maximum)
unit)

85 dBa (3 feet from
unit)

2.04 COMMUNICATION WITH SCADA

- A. Provide an industrial-quality local control panel including PLC and any hand switches, OIT, and/or other controls required for all manual and automatic operation modes.
- B. The Centrifuge shall be networked to the plant SCADA system. The Centrifuge control system shall interface directly with the main plant's Allen Bradley-based SCADA system via Ethernet/IP protocol communication network conforming to IEEE Std 802.3 standards. The interface shall be capable of allowing monitoring functions by the SCADA system when remote operation is selected. Monitoring functions shall be available in either local or remote control modes.
- C. The plant SCADA system shall remotely monitor all alarm outputs from the Centrifuge. Alarm inputs from the Centrifuge will be interlocked with the existing sludge pumping equipment and will automatically shut down the existing equipment if necessary.
- D. All process variables, status and alarm points to be monitored by the plant SCADA system shall be stored in contiguous memory registers designated for this purpose. A spreadsheet of these locations, including addresses, signal descriptions and units shall be provided during equipment submittals.
- E. Centrifuge control equipment requiring IP addresses (PLCs, OITs, etc.) shall have IP addresses assigned by the City or the System Integrator. IP addresses shall be available upon request during equipment submittals.
- F. The temporary SCADA interface shall be used to control the speed of the sludge feed pumps to enable an automatic torque control of the temporary dewatering centrifuge. Sludge pump control inputs from the Centrifuge will be interlocked with the existing sludge pumping equipment and will be used to control the sludge pumps while the Centrifuge runs in automatic torque control.
- G. The Vendor shall connect the Centrifuge Control Panel to SCADA via an OIT in the truck loading area.
- H. SCADA integration and startup shall be provided by others (LRWWU SCADA Integrator). The Vendor shall coordinate with the LRWWU SCADA Integrator.

2.05 ELECTRICAL CONNECTIONS

- A. The temporary dewatering equipment shall connect to a 480V, 3 phase, stainless steel, heavy-duty safety switch located in the Storage Area A. See Drawings M-3 and M-4 for the extent of the available layout area and a summary of horizontal and vertical constraints.
- B. The entire Centrifuge, including any conveyor drives, shall be fed from a single power source specified above. Provide power distribution, breakers, transformers, etc, in an industrial-quality power panel as required.
- C. All work shall meet the Electrical Code requirements, including grounding of the machine.

2.06 CONNECTIONS TO EXISTING SYSTEMS

- A. The Vendor is responsible for connecting the Centrifuge to the plant's blended sludge, polymer, drain, and plant water systems. Those connections are available in the garage (see locations in Dwg M-1)
- B. The Centrifuge shall provide access for sampling of the Blended Sludge Feed. The Centrifuge shall also provide access for visual inspection and sampling of the Centrate and Dewatered Sludge. The access must be available during operation of the centrifuge.
- C. The Vendor shall convey the Dewatered Sludge to the existing inclined conveyor or horizontal conveyor. The Vendor shall be responsible for modifying the existing conveyance system to accept sludge in a different location than currently. The conveyor must remain usable for conveying dewatered sludge from the existing belt filter presses.
- D. Conveyors shall be fully enclosed. Enclosures shall be fabricated from 304L SS with 316 SS hardware. Provide removable, gasketed covers with 316 SS quick-release latches.

PART 3 EXECUTION

3.01 HOURS OF OPERATION

- A. The hours of operation for the temporary dewatering units will vary based on the City's needs and may be continuous 24 hours per day, seven days per week. The Vendor shall use their discretion to schedule equipment maintenance and cleanup as needed.

3.02 MECHANICAL SUPPORT

- A. The Vendor shall be responsible for all repairs and major maintenance to the Centrifuge, including parts and labor. Major maintenance items include, but are not limited to, gearbox lubrication, correction of structural issues, and any maintenance checks that do not qualify as daily or weekly routine maintenance.
- B. LRWWU shall be responsible for any daily or weekly routine maintenance, as described in the Operations & Maintenance manual. The Vendor will provide a list, for review and approval by LRWWU, of all daily and weekly maintenance tasks.
- C. In the event that the temporary/mobile dewatering system becomes inoperable, the Vendor must respond within 24 hours via phone or in person. The Vendor must repair or replace the temporary dewatering equipment within seven (7) consecutive days.
- D. LRWWU will assess liquidated damages of \$2,000/day if the temporary dewatering equipment is unavailable for more than four (4) consecutive days, once this threshold is met the Vendor will be assessed all prior unavailable days additionally, or an aggregate of twenty (24) days over a rolling twelve (12) month period. An unavailable day is defined as any calendar day in which the centrifuge cannot be operated for at least twelve (12) hours.
- E. All temporary dewatering maintenance and mechanical support shall be coordinated with LRWWU and shall not disrupt normal plant operations including truck loading, and Belt Filter

Press dewatering.

3.03 STARTUP PERFORMANCE DEMONSTRATION

- A. The Vendor shall provide a minimum of three (3), consecutive ten (10) hour days on site for startup testing and performance demonstration. The Vendor shall finalize dates with all parties one week in advance. The Vendor shall coordinate startup and demonstration with the Owner to insure sufficient quantities of sludge are available for the required tests. The Vendor shall coordinate the startup testing with the SCADA Integrator.
- B. Submit details of the startup and demonstration procedures to the Engineer prior to shipment of the Centrifuge. At a minimum the submittal of the testing procedures shall include:
 - 1. Step-by-step procedure, sampling methods & locations, data collection forms.
 - 2. All analyses required.
 - 3. Clearly delineate any responsibilities of the Vendor, Engineer, and Owner.
 - 4. Contact information and qualifications for the independent testing lab.
- C. Startup testing shall demonstrate that the system operates correctly both mechanically and electronically. All alarms and interlocks shall be checked. Startup, shutdown, and any other manual or automatic operational modes shall be tested. Plant water, drain, polymer, and sludge feed shall be checked.
- D. LRWWU shall provide the Vendor with the optimum polymer as selected by the Owner's Polymer Supplier (Polydyne Chemical). This will most likely be Clarifloc NE-1997, which was previously determined by jar testing to be the optimal polymer for centrifuge dewatering of the LRWWU sludge. The Vendor may use a different Polymer than the one provided by the LRWWU for performance testing purposes, this will not be supplied by the LRWWU and would be the responsibility of the Vendor.
- E. System optimization after startup and prior to demonstration testing shall be the responsibility of the Vendor.
- F. Upon successful completion of the startup testing and optimization, the Vendor shall provide a minimum of one (1), eight (8) hour day for the performance demonstration of each of the operating conditions outlined below. The performance demonstration shall occur on consecutive days. The Vendor shall demonstrate the successful start-up and shutdown of the centrifuge each day. The performance demonstration shall occur at the following operating conditions:
 - 1. Combination of Thickened Waste Activated Sludge and Thickened Primary Sludge.
 - a. The sludge feed characteristics are as follows:

Thickened Primary Sludge	90 gpm
Thickened Waste Activated Sludge	60 gpm
 - b. The Centrifuge shall meet the following requirements during performance demonstration testing:

Performance Demonstration Throughput (Combined Sludge Total)	160 gpm
Cake Solids Concentration (Minimum)	25%
Solids Capture (Minimum)	95%

2. 100 percent Thickened Waste Activated Sludge.

a. The temporary dewatering system shall meet the following requirements during performance demonstration testing:

Performance Demonstration Throughput (Thickened Waste Activated Sludge)	80 gpm
Cake Solids Concentration (Minimum)	18%
Solids Capture (Minimum)	95%

- G. During the duration of each demonstration, the Vendor shall collect for analysis a minimum of one (1) sample per two hours to measure solids concentrations in the feed sludge, cake, and centrate. The Owner may collect and analyze duplicate samples for validation. The Vendor shall measure and record the corresponding sludge and polymer feed rates with each sample. The performance demonstration shall be considered acceptable if the average of each day's samples meet or exceed the performance requirements previously specified.
- H. The polymer usage rate, measured in lbs/dry ton, shall be computed by the Vendor using the measured dilute polymer flow rate and the polymer concentration provided by the City as well as the measured sludge feed rate and measured sludge concentration.
- I. Vendor shall submit a concise performance testing report to the Owner showing all data and results relative to the above criteria.

END OF SECTION

This page left blank intentionally.