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TRANSMITTAL COVER SHEET

DATE: November 03, 2023

PAGE: 1 of 45 (INCLUDING THIS PAGE)

TO: ALL CONTRACTORS

FROM: DENISE KING

PROJECT: ROBERTSDALE WASTEWATER TREATMENT PLAN UPGRADES
USDA RURAL DEVELOPMENT
FOR CITY OF ROBERTSDALE
GMC PROJECT NO. CMOB210098(A)

RE: ADDENDUM #3

PLEASE COMPLETE BELOW AND RETURN IMMEDIATELY.

Ashley Morris
Email: Ashley.Morris@gmcnetwork.com

I, the undersigned, hereby acknowledge receipt of this Addendum.

Authorized Representative of Contractor

Date

Company Name

Telephone

Fax

Contractor's License Number (if applicable)



ADDENDUM NUMBER 3

WASTEWATER TREATMENT PLANT UPGRADES

USDA RURAL DEVELOPMENT

FOR

THE CITY OF ROBERTSDALE

GMC PROJECT NO. CMOB210098A

1. Revisions to Project Manual

- 1.1 The following revisions are hereby added as Addendum No. 3 to the referenced Project Manual and Plans and shall be considered when preparing bids.

2. Clarifications

- 2.1 Referencing sheet E-003, the work shown in detail 2 and discussed in key note 1 (metal platform) has been completed by the owner, and shall not be performed by the contractor.

3. Revisions to Project Manual

- 3.1 Specification 43 23 40 – Horizontal Self-Priming Centrifugal Pumps has been revised and is included as an attachment to this addendum.
- Referencing Section 2.1.S.3, controls shall be provided as indicated on the drawings and in Section 26 04 44A – RAS/WAS Control Panel.
- 3.2 Specification 46 21 14 – Static Screens
- Referencing Section 2.1.A, Elgin is included as an acceptable manufacturer for static screens.
- 3.3 Specification 46 21 16 – Shaftless Screw Screenings Conveyor
- Referencing Section 2.1.A, Elgin is included as an acceptable manufacturer for shaftless screw screenings conveyors.
- 3.4 Specification 46 43 21 – Circular Clarifier Equipment
- Referencing Section 2.1.A, Envirodyne is included as an acceptable manufacturer for circular clarifier equipment.
- 3.5 The bid form has been revised and is included as an attachment to this addendum.
- Warminster Fiberglass is included as an approved “A” product for FRP Density Current Baffles. Warminster is currently and was previously listed in the associated specification, and this Bid form correction reflects the up-to-date approved manufacturer’s for FRP Density Current Baffles.



4. Questions

- 4.1 **Question: Will the contractor be responsible for Instrumentation/ SCADA work? If they are what is the scope?**
Answer: No SCADA work is included in this project. Instrumentation to be provided by the contractor is indicated in the Instrumentation Schedule on Drawing I-911.
- 4.2 **Question: On sheet E-301 and E-302, it shows a detail 3 & 8 on sheet 901; there is no detail 8 shown on the plans. Please advise.**
Answer: Detail 8 should instead be referencing Detail 5 on sheet E-901 "EQUIPOTENTIAL EQUIPMENT GROUND".
- 4.3 **Question: Does the Allowances Specification (01 21 00), section 1.6.A.2, indicate that contractors will not be paid for labor resulting from the use of allowances?**
Answer: Contractors shall be paid for labor resulting from any new work not included in the project drawings and specifications paid for out of the allowances.

5. Attachments

- 5.1 Specification 43 23 40 – Horizontal Self-Priming Centrifugal Pumps
- 5.2 Specification 46 21 14 – Static Screens
- 5.3 Specification 46 21 16 – Shaftless Screw Screenings Conveyor
- 5.4 Specification 46 43 21 – Circular Clarifier Equipment
- 5.5 Revised Bid Form

6. Acknowledgement of Receipt

- 6.1 Receipt of Addendum No. 3 shall be acknowledged in two ways:
- 6.1.1 Note on (EJCDC C-410) page 3 of Bid Form of the Project Manual – Bidder acknowledges receipt of "Addendum No. 3" and date of "November 3, 2023".

AND

- 6.1.2 EMAIL GMC office immediately at ashley.morris@gmcnetwork.com with the signed transmittal which confirms the addendum has been received and is legible.

7. Conclusion

- 7.1 This is the end of Addendum No. 3, dated Friday, November 3, 2023.

BID FORM FOR CONSTRUCTION CONTRACT – ADDENDUM NO. 3

The terms used in this Bid with initial capital letters have the meanings stated in the Instructions to Bidders, the General Conditions, and the Supplementary Conditions.

ARTICLE 1—OWNER AND BIDDER

1.01 This Bid is submitted to:

City of Robertsdale

Attn: The Honorable Charles Murphy

P.O. Box 429

22647 Racine Street

Robertsdale, AL 36567

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 perform all Work 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—ATTACHMENTS TO THIS BID

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

- A. Required Bid security;
- B. List of Proposed Subcontractors;
- C. Evidence of authority to do business in the state of the Project; or a written covenant to obtain such authority within the time for acceptance of Bids;
- D. Contractor's license number as evidence of Bidder's State Contractor's License or a covenant by Bidder to obtain said license within the time for acceptance of Bids;
- F. Required Bidder Qualification Statement with supporting data; ~~and~~
- ~~G. [List other documents and edit above as pertinent].~~
- G. If Bid amount exceeds \$10,000, signed Compliance Statement (RD 400-6). Refer to specific equal opportunity requirements set forth in the Supplementary Conditions of the Construction Contract (EJCDC C-800);
- H. If Bid amount exceeds \$25,000, signed Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion - Lower Tier Covered Transactions (AD-1048);
- I. If Bid amount exceeds \$100,000, signed RD Instruction 1940-Q Exhibit A-1, Certification for Contracts, Grants, and Loans.
- J. Accounting of Sales Tax Attachment to Proposal Form.

ARTICLE 3—BASIS OF BID—

3.01 Lump Sum Bids

- A. Bidder will complete the Work in accordance with the Contract Documents for the following lump sum (stipulated) price(s), together with any Unit Prices indicated in Paragraph 3.02:

The Bidder hereby proposes to accept as full payment for completion of the Project the amounts computed under the provisions of the Contract Documents and based on the following lump sum amount. The Bidder agrees that the lump sum price represents a true measure of the labor and material required to perform the work, including all allowances, overhead and profit for work called for. The Lump Sum (LS), including cash allowances, shall be shown in both figures and words. If a discrepancy exists between the amount stated in words and the amount stated in figures, the amount stated in words shall govern.

The Bidder acknowledges that the **LUMP SUM AMOUNT includes the amounts for Allowances as listed below.**

The Bidder agrees to perform all the work described in the Base Bid of the Contract Documents for the following lump sum price of

_____ DOLLARS

AND _____ CENTS

\$ _____

subject to the reductions or additions resulting from price items, all in accordance with the following Schedule of Payment Items.

ALLOWANCES

Allowances (Specification Section 01 21 00) may be used, as authorized and directed by the Engineer, to pay for costs of additional work resulting from the need for allowance items identified below. This work is not shown or specified in the drawings and not covered by another line item in the Bid. This work may be required in the event the Engineer or Owner establish the need for additional work deemed to be necessary for the completion of this contract. This cash allowance amount is to be included in the Lump Sum Base Bid, but is to be paid to the Contractor only if authorized as provided in this paragraph.

	<u>DESCRIPTION</u>	<u>UNIT PRICE</u>	<u>TOTAL PRICE</u>
1	Engineering Startup	LS \$	15,000
2	Allowance for Unforeseen Conditions	LS \$	200,000
		\$	215,000

EJCDC® C-410, Bid Form for Construction Contract.

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Modified to include RD edits from RUS Bulletin 1780-26 (6/16/2020).

OWNER SELECTED EQUIPMENT/SUPPLIER

All Owner-Selected Equipment/Supplier items shall be bid according to the following:

The product(s) noted as “A” selection for each item of equipment listed in the following Owner-Selected Equipment/Supplier Schedule has been designated by the Owner for use in the Project. Contractor must bid base bid items. Where more than one product is noted as “A”, Bidder must circle the item on which the bid is based. The Bidder may indicate substitute equipment/supplier by writing in a substitute for “B”, and writing in the amount of deduction for the substitute equipment supplier.

The prior naming of substitute equipment/suppliers is based on a belief that the substitute should be able to furnish “equal” equipment/service as that specified, although it may not be the supplier’s standard. Should the write-in substitute be disallowed by the Owner as “not equal” or “not desired”, then the Bidders shall supply the circled “A” item. If no substitute is indicated, the Bidder must supply the circled “A” item. Should Bidder fail to circle one, or circle more than one, the Bid will be deemed by Owner to be based upon the first-listed equipment/supplier, and Bidder, if awarded the Contract, shall provide same.

The Bidder must supply a base bid for the Owner-Selected Equipment/Supplier items. The contract will be awarded based on the base bid. The Bidder may supply a deductive cost from the base bid for one of the products in the schedule below by writing in a substitute. This amount will be deducted from the base bid (after award) if the Owner in its sole discretion determines that the acceptance of the substitute product is in its own best interest. The Owner in its sole discretion may determine any substitute “not desired” and reject said substitute.

For comparable alternate named equipment “B”, the furnished items shall fulfill the function and performance of the item specified and shall be of equal quality to base bid equipment “A”; any modifications required by the furnished alternate equipment to the structure, process, associated equipment, electrical or piping shall be include in the Alternate Bid price, and the completed installation of the item by the Contractor shall incur no additional cost to the Owner, including engineering cost to accommodate alternate supplier.

Additional substitutes will not be considered after receipt of the Bidder’s Proposal.

Design of this project is based upon the manufacturer’s equipment or product noted as “A” item in the schedule. Should a Bidder propose furnishing substitute equipment, the Bidder shall comply with the provisions in Specification Section 01 25 00 – Substitution of Major Equipment Items.

INDICATE THE BASE BID MANUFACTURER UNDER “MANUFACTURER” BELOW BY CIRCLING THE MANUFACTURER USED FOR THE LUMP SUM BASE BID TOTAL.

Item	Specification Section	Description	Manufacturer/Supplier		Amount of Alternate (\$+/-)
1	43 23 40	Horizontal Self-Priming Centrifugal Pumps	A	Gorman Rupp	
			A	Vaughan	
			B		\$
2	46 21 14	Static Screens	A	Parkson Corporation	
			A	Elgin	
			B		\$
3	46 21 14.1	Shaftless Screw Conveyor	A	Parkson Corporation	
			A	Elgin	
			B		\$
4	46 23 23	Vortex Grit Removal Equipment	A	Smith & Loveless	
			B		\$
5	46 43 11	Aeration Basin Equipment	A	Parkson Corporation	
6	46 43 12	Aeration Basin Liners	A	ATARFIL USA	
			B		\$
7	46 43 21	Circular Clarifiers	A	ClearStream	
			A	Ovivo	
			A	WesTech	
			A	Envirodyne	
			B		\$
8	46 43 81	FRP Density Current Baffle	A	Enduro	
			A	NEFCO	

			A	Warminster Fiberglass	
			A	EDGENG	
			B		\$

ARTICLE 4—TIME OF COMPLETION

4.01 Bidder agrees that the Work will be substantially complete and will be completed and ready for final payment in accordance with Paragraph 15.06 of the General Conditions on or before the dates or within the number of calendar days indicated in the Agreement.

4.02 ~~Bidder agrees that the Work will be substantially complete on or before [Bidder inserts date], and will be completed and ready for final payment in accordance with Paragraph 15.06 of the General Conditions on or before [Bidder inserts date].~~

Deleted

4.03 ~~Bidder agrees that the Work will be substantially complete within [Bidder inserts number] calendar days after the date when the Contract Times commence to run as provided in Paragraph 4.01 of the General Conditions, and will be completed and ready for final payment in accordance with Paragraph 15.06 of the General Conditions within [Bidder inserts number] calendar days after the date when the Contract Times commence to run.~~

Deleted

4.04 Bidder accepts the provisions of the Agreement as to liquidated damages.

ARTICLE 5—BIDDER'S ACKNOWLEDGEMENTS: ACCEPTANCE PERIOD, INSTRUCTIONS, AND RECEIPT OF ADDENDA

5.01 *Bid Acceptance Period*

A. 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.

5.02 *Instructions to Bidders*

A. Bidder accepts all of the terms and conditions of the Instructions to Bidders, including without limitation those dealing with the disposition of Bid security.

5.03 *Receipt of Addenda*

A. Bidder hereby acknowledges receipt of the following Addenda:

Addendum Number	Addendum Date

ARTICLE 6—BIDDER’S REPRESENTATIONS AND CERTIFICATIONS

6.01 *Bidder’s Representations*

A. In submitting this Bid, Bidder represents the following:

1. Bidder has examined and carefully studied the Bidding Documents, including Addenda.
2. Bidder has visited the Site, conducted a thorough visual examination of the Site and adjacent areas, and become familiar with the general, local, and Site conditions that may affect cost, progress, and performance of the Work.
3. Bidder is familiar with all Laws and Regulations that may affect cost, progress, and performance of the Work, **including all American Iron and Steel requirements.**
4. Bidder has carefully studied the reports of explorations and tests of subsurface conditions at or adjacent to the Site and the drawings of physical conditions relating to existing surface or subsurface structures at the Site that have been identified in the Supplementary Conditions, with respect to the Technical Data in such reports and drawings.
5. Bidder has carefully studied the reports and drawings relating to Hazardous Environmental Conditions, if any, at or adjacent to the Site that have been identified in the Supplementary Conditions, with respect to Technical Data in such reports and drawings.
6. Bidder has considered the information known to Bidder itself; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Bidding Documents; and the Technical Data identified in the Supplementary Conditions or by definition, with respect to the effect of such information, observations, and Technical Data on (a) the cost, progress, and performance of the Work; (b) the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder, if selected as Contractor; and (c) Bidder’s (Contractor’s) safety precautions and programs.
7. Based on the information and observations referred to in the preceding paragraph, Bidder agrees that no further examinations, investigations, explorations, tests, studies, or data are necessary for the performance of the Work at the Contract Price, within the Contract Times, and in accordance with the other terms and conditions of the Contract.
8. Bidder is aware of the general nature of work to be performed by Owner and others at the Site that relates to the Work as indicated in the Bidding Documents.
9. Bidder has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder has discovered in the Bidding Documents, and of discrepancies between Site conditions and the Contract Documents, and the written resolution thereof by Engineer is acceptable to Contractor.
10. The Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.

11. The submission of this Bid constitutes an incontrovertible representation by Bidder that without exception the Bid and all prices in the Bid are premised upon performing and furnishing the Work required by the Bidding Documents.

6.02 *Bidder's Certifications*

A. The Bidder certifies the following:

1. 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.
2. Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid.
3. Bidder has not solicited or induced any individual or entity to refrain from bidding.
4. Bidder has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for the Contract. For the purposes of this Paragraph 8.02.A:
 - a. 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.
 - b. 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.
 - c. 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.
 - d. 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.

SIGNATURE PAGE TO FOLLOW

BIDDER hereby submits this Bid as set forth above:

Bidder:

(typed or printed name of organization)

By:

(individual's signature)

Name:

(typed or printed)

Title:

(typed or printed)

Date:

(typed or printed)

If Bidder is a corporation, a partnership, or a joint venture, attach evidence of authority to sign.

Attest:

(individual's signature)

Name:

(typed or printed)

Title:

(typed or printed)

Date:

(typed or printed)

Address for giving notices:

Bidder's Contact:

Name:

(typed or printed)

Title:

(typed or printed)

Phone:

Email:

Address:

Bidder's Contractor License No.: (if applicable)

SECTION 43 23 40 – HORIZONTAL SELF-PRIMING CENTRIFUGAL PUMPS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes: Horizontal self-priming centrifugal pumps.
- B. Related Requirements:
 - 1. Section 09 96 00 – High Performance Coatings
 - 2. Division 26 – Electrical
 - 3. Division 40 – Process Interconnections
 - 4. Section 43 05 20 – Common Work Results for Liquid Handling Equipment

1.2 REFERENCE STANDARDS

- A. American Bearing Manufacturers Association:
 - 1. ABMA 9 - Load Ratings and Fatigue Life for Ball Bearings.
 - 2. ABMA 11 - Load Ratings and Fatigue Life for Roller Bearings.
- B. ASME International:
 - 1. ASME B16.1 - Gray Iron Pipe Flanges and Flanged Fittings.
- C. ASTM International:
 - 1. ASTM A29 - Standard Specification for General Requirements for Steel Bars, Carbon and Alloy, Hot-Wrought.
 - 2. ASTM A536 - Standard Specification for Ductile Iron Castings.

1.3 COORDINATION

- A. Section 01 31 00 – Project Management and Coordination: Requirements for scheduling.
- B. Coordinate the installation of the pump with field conditions and verify layout with manufacturer's shop drawings.
- C. Coordinate installation and startup of Work of this Section with plant operations.

1.4 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Product Data: Submit manufacturer information for materials of construction and fabrication.

C. Shop Drawings:

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

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

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

F. Source Quality-Control Submittals: Indicate results of factory non-witnessed performance tests and inspections.

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

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

1.5 CLOSEOUT SUBMITTALS

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

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

1.6 QUALITY ASSURANCE

A. Materials, physical and chemical characteristics of the components and tests or test requirements shall conform to current AWWA, ANSI, and ASTM standards.

B. All electrical equipment provided shall be manufactured in complete accordance with the requirements of the National Electric Code.

C. The naming of a manufacturer in this Specification Section is not an indication that the manufacturer's standard equipment will be acceptable in lieu of the specified component features. Naming is only an indication that the manufacturer may have the capability of Engineering and supplying the pumps as specified herein. The manufacturer shall clearly note on his bid proposal and submittal data any and all deviations to this specification.

D. It is the intent of these specifications to accurately describe equipment that is a regular production item of the specified manufacturer, and that has a proven record of performance in identical or similar applications in other treatment facilities. The pump manufacturer shall have a minimum of twenty (20) years of documented experience in the design and production of wastewater pumps of all types, and not less than five (5) years of experience in the production of the exact equipment as specified herein. The pump manufacturer shall have a minimum of twenty (20) successful installations of pumps for similar applications.

1.7 TOOLS AND SPARE PARTS

- A. The pump manufacturer shall provide one (1) set of recommended spare parts.
- B. The pump manufacturer shall provide a list of recommended spare parts.
- C. The manufacturer shall furnish any special tools necessary to disassemble, service, repair, and adjust the equipment.

1.8 WARRANTY

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for warranties.
- B. All equipment, apparatus, and parts furnished shall be warranted for one (1) year from startup or eighteen (18) months from shipment, excepting only those items that are normally consumed in service, such as oils, grease, packing, gaskets, O rings, etc. The pump manufacturer shall be solely responsible for warranty of the pump equipment and all components.

1.9 SHIPPING, HANDLING AND STORAGE

- A. Follow manufacturer's recommendations for handling and storage of equipment.
- B. Contractor shall inspect all delivered equipment for any damage and shall note any damage. Contractor shall receive recommendations from Manufacturer for correcting damaged equipment.
- C. Any damaged equipment shall be repaired or replaced prior to installation.

PART 2 - PRODUCTS

2.1 HORIZONTAL NON-CLOG CENTRIFUGAL PUMPS

- A. Manufacturers:
 - 1. Gorman Rupp (Model T6)
 - 2. Vaughan
 - 3. Approved Equal
- B. Pump Design:
 - 1. Pumps shall be horizontal, self-priming centrifugal type, designed specifically for handling the anticipated service liquid. The pumps shall also be capable of handling heavy concentrations of rags, debris, grit, plastic, hair, and other foreign material that can be expected to be present in a typical RAS pumping application.
 - 2. The rotating assembly, which includes impeller, shaft, mechanical shaft seal, lip seals, bearings, sealplate and bearing housing, must be removable as a single unit without disturbing the pump casing or piping.

C. Schedule:

1. RAS Pumps:
 - a. P5010
 - b. P5020
 - c. P5030

D. Performance and Design Criteria:

1. Capacity: 700 gpm
2. Total Dynamic Head: 20 ft
3. Horsepower (max): 10 hp
4. Service liquid: Return Activated Sludge
5. Minimum Suction Diameter: 6 inch
6. Minimum Discharge Diameter: 6 inch

E. Casing:

1. Material: ASTM A48, Cast iron – Class 30
2. End Connections:
 - a. Flanged.
 - b. Comply with ASME B16.1, Class 125
3. Drain plug: 1-1/4" NPT

F. Coverplate

1. Material: Cast iron – Class 30
2. Coverplate shall incorporate the following maintenance features:
 - a. Retained by hand nuts for complete access to pump interior. Coverplate removal must provide ample clearance for removal of stoppages, and allow service to the impeller, seal, wearplate or check valve without removing suction or discharge piping.
 - b. A replaceable wearplate secured to the coverplate by weld studs and nuts shall be hardened alloy steel.
 - c. In consideration for safety, a pressure relief valve shall be supplied in the coverplate. Relief valve shall open at 75-200 PSI.
 - d. Two O-rings of Buna-N material shall seal coverplate to pump casing.
 - e. Pusher bolt capability to assist in removal of coverplate. Pusher bolt threaded holes shall be sized to accept same retaining capscrews as used in rotating assembly.
 - f. Easy-grip handle shall be mounted to face of coverplate.

G. Impeller:

1. Material: Austempered ductile iron or cast alloy steel
2. Design to pass sand, grit, and solids normally encountered in a wastewater treatment plant without clogging and pass a maximum solid size of 3 inches.
3. Type: two-vane, semi-open, non-clog, with integral pump out vanes on the back shroud.

4. Statically and dynamically balanced after assembly.
 5. Threaded to shaft.
- H. Shaft:
1. Material: AISI 4140, steel
 2. Key couplings to shaft.
- I. Wearing Rings:
1. Replaceable.
 2. Stainless steel in accordance with AISI 410 with a minimum hardness of 300 BHN
- J. Bearings:
1. Type: Anti-friction ball bearings
 2. Minimum B10 Life: 100,000 hours at continuous maximum load and speed, according to AFBMA 9.
 3. Bearings shall be oil lubricated from a dedicated reservoir.
- K. Seals:
1. Mechanical seal.
 2. Lubrication: dedicated oil reservoir.
- L. Sealplate and Bearing Housing:
1. Sealplate and bearing housing shall be cast iron Class 30. Separate oil filled cavities, vented to atmosphere, shall be provided for shaft seal and bearings. Cavities shall be cooled by the liquid pumped. Three lip seals shall prevent leakage of oil.
 2. The bearing cavity shall have an oil level sight gauge and fill plug check valve. The clear sight gauge shall provide easy monitoring of the bearing cavity oil level and condition of oil without removal of the fill plug check valve. The check valve shall vent the cavity but prevent introduction of moist air to the bearings.
 3. The seal cavity shall have an oil level sight gauge and fill/vent plug. The clear sight gauge shall provide easy monitoring of the seal cavity oil level and condition of oil without removal of the fill/vent plug.
 4. Double lip seal shall provide an atmospheric path providing positive protection of bearings, with capability for external drainage monitoring.
- M. Suction check valve:
1. Suction check valve shall be molded Neoprene with integral steel and nylon reinforcement. A blow-out center shall protect pump casing from hydraulic shock or excessive pressure. Removal or installation of the check valve must be accomplished through the coverplate opening, without disturbing the suction piping. Sole function of check valve shall be to save energy by eliminating need to reprime after each pumping cycle. Pumps requiring a suction check valve to assist reprime will not be acceptable.

- N. Spool flanges shall be one-piece cast iron, class 30 fitted to suction and/or discharge ports. Each spool shall have one 1-1/4" NPT and one 1/4" NPT tapped hole with pipe plugs for mounting gauges or other equipment.
- O. Volute Casing Heater:
1. Each pump shall be provided with a thermostat mounted to the exterior of the volute casing, and a 750-watt 115-volt electric heater inserted into the interior of the volute by means of a dedicated port. The heater shall be energized at 43+/-3 °F to provide heat to the casing and eliminate the possibility of freezing. Heater probes that must be installed through a pump drain port shall not be acceptable.
- P. Pump Base
1. Pump shall be mounted on a fabricated steel base consisting of pump, motor, V-belt drive unit, and belt guard.
 2. Bases shall be provided with suitably sized openings to allow the Contractor to firmly anchor and grout each pump base. All necessary grout dams shall be constructed as a part of the steel support base, and anchor bolt holes shall be provided as an integral part of the base design.
- Q. Reprime Performance
1. Consideration shall be given to the sanitary sewage service anticipated, in which debris is expected to lodge between the suction check valve and its seat, resulting in the loss of the pump suction leg, and siphoning of liquid from the pump casing to the approximate center line of the impeller. Such occurrence shall be considered normal, and the pump must be capable of automatic, unattended operation with an air release line installed.
 2. During unattended operation, the pump shall retain adequate liquid in the casing to ensure automatic re-priming while operating at its rated speed in a completely open system. The need for a suction check valve or external priming device shall not be required.
 3. Pump must reprime >7 vertical ft. at the specified speed and impeller diameter. Reprime lift is defined as the static height of the pump suction above the liquid, while operating with only one-half of the liquid remaining in the pump casing. The pump must reprime and deliver full capacity within five minutes after the pump is energized in the reprime condition.
- R. Fabrication:
1. Connect pump shaft to drive motor with universal flexible coupling to compensate for minor misalignment and to permit removal of pump-rotating assembly and motor without removing piping.
 2. Shaft Guard: Enclose shaft and universal joint with enclosed-type metal shaft guard complying with OSHA standards.
 3. Pump and Drive Mating Surfaces: Machine finished.
- S. Operation:
1. Electrical Characteristics: As specified in Division 26 – Electrical
 - a. 460 V / 3ph / 60 Hz

2. Motors: As specified in Section 26 05 93 - Common Motor Requirements for Process Equipment.
 - a. Motors shall be provided with three (3) winding thermostats (one per phase) in the windings of each phase to afford protection of the motor against excessive operating temperature. Thermostats shall be suitable for use with 120VAC control power, with leads routed to the conduit box for connection to monitoring circuitry separate from the power wiring.
 - b. Motors shall be provided with 120 VAC silicon space heaters in the windings of each motor to prevent the formation of condensation. The space heaters shall be sized by the motor manufacturer for the frame size provided, and shall be installed prior to shipment. Location of the space heaters shall not interfere with operation of the winding thermostats specified above. Leads from the space heaters shall be routed to the conduit box that is mounted on the side of the motor frame. Wiring of the space heaters to 120VAC power shall be provide by the Contractor, and shall be interlocked with auxiliary contacts from the motor starter sot that they are energized only when the respective pump is off line.
3. Controls: As indicated on the drawings and in Section 26 04 44A – RAS/WAS Control Panel.

T. Miscellaneous

1. Data Plates: Each pump shall be equipped with a data plate securely fastened to the pump that contains the manufacturer's name, pump size and type, serial number, pump speed, impeller data, capacity and head rating, and any other pertinent information.
2. Testing: The pump shall be factory non-witness performance tested in accordance with ANSI/HI 14.6 Acceptance Grade 2B. Test shall include, but not be limited to, checking the unit at its rated speed, capacity, head, efficiency, and brake horsepower at such conditions of head and capacity so as to properly establish the actual performance curve. Certified copies of the test reports shall be submitted for review prior to shipment. The Standards of the Hydraulic Institute shall govern the procedures and calculations for the prescribed testing.
3. Painting: All equipment above pump pad, including motor frame exterior, discharge head exterior and sole plate, shall be painted as specified in Section 09 96 00.
4. Fasteners: All pump fasteners shall be ASTM A276-00a Type 316 stainless steel.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Contractor shall off-load equipment at installation site using equipment of sufficient size and design to prevent injury or damage. Immediately after off-loading, contractor shall inspect complete pump and appurtenances for shipping damage or missing parts. Any damage or discrepancy shall be noted in written claim with shipper prior to accepting delivery. Validate all pump serial numbers and parts lists with shipping documentation. Notify the manufacturer's representative of any unacceptable conditions noted with shipper.

3.2 INSTALLATION

- A. Install pumps where indicated on Drawings and according to manufacturer instructions.
- B. Install, level, align, and lubricate pump(s) as indicated on project drawings. Installation must be in accordance with written instructions supplied by the manufacturer at time of delivery.
- C. Suction pipe connections shall vacuum tight. Fasteners at all pipe connections must be tight. Install pipe with supports to prevent strain and vibration on pump piping. Install and secure all service lines (level control, air release valve or pump drain lines) as required in wet well.
- D. Check motor and control data plates for compatibility to site voltage. Install and test the station ground prior to connecting line voltage to control panel.
- E. Prior to applying electrical power to any motors or control equipment, check all wiring for tight connection. Verify that protective devices (fuses and circuit breakers) conform to project design documents. Manually operate circuit breakers and switches to ensure operation without binding. Open all circuit breakers and disconnects before connecting utility power. Verify line voltage, phase sequence and ground before actual start-up.
- F. After all anchor bolts, piping and control connections are installed, completely fill the grout dam in the pump base with non-shrink grout.

3.3 FIELD QUALITY CONTROL

- A. Section 01 40 00 - Quality Requirements: Requirements for inspecting and testing.
- B. Section 01 70 00 - Execution and Closeout Requirements: Requirements for testing, adjusting, and balancing.
- C. Prior to acceptance by owner, an operational test of all pumps, drives, and control systems shall be conducted to determine if the installed equipment meets the purpose and intent of the specifications. Tests shall demonstrate that all equipment is electrically, mechanically, structurally, and otherwise acceptable; it is safe and in optimum working condition; and conforms to the specified operating characteristics.
- D. After construction debris and foreign material has been removed from the wet well, contractor shall supply clear water volume adequate to operate station through several pumping cycles. Observe and record operation of pumps, suction and discharge gage readings, ampere draw, pump controls, and liquid level controls. Check calibration of all instrumentation equipment, test manual control devices, and automatic control systems. Be alert to any undue noise, vibration or other operational problems.

3.4 MANUFACTURER SERVICES

- A. Furnish services of manufacturer's representative experienced in installation of products furnished under this Section for not less than one (1) 8-hour day(s) on-Site for installation, inspection, field testing, and instructing Owner's personnel in maintenance of equipment.

END OF SECTION 43 23 31

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SECTION 46 21 14 – STATIC SCREENS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Static screens

B. Related Requirements:

1. Section 03 20 00 – Anchorage in Concrete
2. Section 46 21 16 – Shaftless Screw Screenings Conveyor

1.2 COORDINATION

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

B. Coordinate Work of this Station with installation of process piping.

1.3 SUBMITTALS

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

B. Product Data: Submit manufacturer's Product Data for system materials and component equipment.

C. Shop Drawings:

1. Indicate system materials and component equipment.
2. Submit connection requirements, installation and anchoring requirements, fasteners, and other details.

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

1. Certify installation is completed according to manufacturer's instructions.

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

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

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

H. Manufacturer Reports: Indicate that equipment has been installed according to manufacturer's instructions.

I. Qualifications Statement:

1. Submit qualifications for manufacturer.

1.4 CLOSEOUT SUBMITTALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for submittals.
- B. Project Record Documents: Record actual locations of pipe penetrations and installation details.
- C. Operation and Maintenance Data: Submit operation and maintenance manuals in accordance with Section 01 78 23 – Operation and Maintenance Data.

1.5 MAINTENANCE MATERIAL SUBMITTALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for maintenance materials.
- B. Spare Parts:
 1. Furnish one (1) set of manufacturer's recommended spare parts.
- C. Tools: Furnish special wrenches, tools, etc. and other devices required for Owner to maintain equipment reference herein.

1.6 QUALITY ASSURANCE

- A. The materials covered by these specifications are intended to be standard equipment of proven reliability and as manufactured by a reputable manufacturer having experience in the production of static screens. The equipment furnished shall be designed and constructed in accordance with the best practices and methods and shall operate satisfactorily when installed as shown on the Contract Drawings and operated per the manufacturer's recommendations.
- B. The screen manufacturer shall have a minimum of five (10) years of design and manufacturing experience with screening units, with no less than ten (20) similar units installed as screening devices in similar applications. Manufacturer shall include U.S. installation list with the equipment submittal.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.
- B. Deliver materials in manufacturer's packaging, including application instructions.
- C. Inspection: Accept materials on-Site in original packaging. Inspect for damage.
- D. Store materials according to manufacturer's instructions.

- E. Protect materials from water and wet weather.

1.8 WARRANTY

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for warranties.
- B. The Manufacturer shall furnish a warranty extending twelve (12) months after substantial completion date.

PART 2 - PRODUCTS

2.1 STATIC SCREENS

A. Manufacturers

- 1. Parkson Corporation
- 2. Elgin Separation Solutions
- 3. Or Approved Equal
 - a. Specifications and equipment arrangements for the static screens are based on Parkson Corporation. Changes to the arrangement indicated in the specifications and in the plan set shall be at the expense of the installing Contractor. No change orders will be issued to the Contractor for modifications to the laying length, footprint, concrete layout, electrical, mechanical, etc.

B. General

- 1. Description: The static screens shall be suitable for unscreened raw municipal wastewater. Each static screen shall consist of a screen cabinet with two inlet connections and one outlet connection, headbox drain, influent distribution chamber, weir, influent flow baffle, and curved screen panel.
- 2. Location: Headworks
- 3. Schedule:
 - a. SCN1010
 - b. SCN1020
 - c. SCN1030
 - d. SCN1040

C. Design and Performance Requirements

- | | | |
|----|-----------------|----------|
| 1. | Quantity | Four (4) |
| 2. | Capacity (each) | 1.5 MGD |
| 3. | Influent TSS | 351 mg/L |
| 4. | Opening size | 0.060 in |

D. Dimensions (each)

- | | | |
|----|--------|----------------|
| 1. | Length | 54.25 in. |
| 2. | Width | 72 in. |
| 3. | Height | 84 in. |
| 4. | Weight | 4910 lb. (wet) |

E. Screen Construction and Materials

1. Screen Cabinet

- a. Material: 10 ga. 304 stainless steel
- b. Influent connections: 10 in. (provide with stainless steel ANSI backup flange)
- c. Effluent connection: 12 in. (provide with stainless steel ANSI backup flange)
- d. Drain connections: 3 in. (FNPT connection)
- e. Provide stainless steel ANSI backup flanges
- f. Screen cabinet shall have two (2) observation ports, one in each cabinet side wall.

2. Influent Distribution Chamber

- a. Screens shall be equipped with an internal influent distribution chamber to receive the incoming flow and evenly distribute it to the weir.

3. Weir

- a. A weir shall be located at the top of the influent chamber. The weir shall be the full width of the screen cabinet.

4. Screen Panel

- a. Material: 304 stainless steel
- b. The screen panel shall consist of the screen element, panel pivot, and drip lip.
- c. Screen Element
 - 1) Single concave curved panel
 - 2) Transverse screen segments shall be formed to have a triangular cross section (wedgewire) and to have 360-degree attachment loops securing each segment to longitudinal support rods.
 - 3) Screen panel shall be oriented such that the arcs lie in the direction of flow.
 - 4) No rivets, bolts, or other mechanical fastening shall be used to attach the transverse screen segments to the longitudinal support rods

d. Panel Pivot

- 1) The wedgewire screen panel shall be pivot mounted to allow it to be rotated about the horizontal axis, facilitating inspection of the tapered side of the wedgewire screen.
- e. Drip Lip
 - 1) A contoured drip lip shall be furnished along the bottom edge of the screen panel to control excess water from running off the screen panel. The drip lip shall be contoured so as to direct free water into the screen cabinet for discharge.
 - 2) Material: 304 stainless steel, ga. 12
- f. Chutes
 - 1) The manufacturer shall provide 304 stainless steel chutes from each static screen to the conveyor to allow for clean and proper distribution of the screenings into the conveyor. The fabricated chutes shall be attached to the unit as determined by the manufacturer.
- g. Fasteners
 - 1) All fasteners and anchor bolts shall be 304 stainless steel.

PART 3 - EXECUTION

3.1 TESTING

- A. The static screens shall be factory assembled and factory tested prior to shipment. The test results shall be certified in writing and a copy shall be provided to the Owner to certify compliance.

3.2 INSTALLATION

- A. Install according to manufacturer's instructions.

3.3 START UP AND TRAINING

- A. Manufacturer Services: Furnish services of a factory-employed service technician who shall adequately inspect the installation, test the equipment furnished under this specification and instruct the Owner's operating personnel in its maintenance and operation. The services of the technician shall be provided for a minimum of one (1) trip for two (2) days on site to inspect and certify the installation and provide Owner's personnel in the proper operation and maintenance of the equipment.

END OF SECTION 46 21 14

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SECTION 46 21 16 – SHAFTLESS SCREW SCREENINGS CONVEYOR

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes:
 - 1. Shaftless screw conveyor
- B. Related Requirements:
 - 1. Section 03 20 00 - Anchorage in Concrete.
 - 2. Division 26 - Electrical.
 - 3. Section 46 21 14 - Static Screens

1.2 COORDINATION

- A. Section 01 31 00 – Project Management and Coordination: Requirements for scheduling.
- B. The Contractor shall review design and layout drawings to ensure that installation arrangements are suitable for the specified equipment. Any potential conflicts or recommended modifications shall be coordinated with the Engineer and noted on the shop drawings or by a pre-submittal request for information, if appropriate.
- C. Coordinate installation and startup of Work of this Section with Plant Operations and installation of static screens.

1.3 SCHEDULING

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

1.4 DELIVERY, STORAGE AND HANDLING

- A. All equipment shall be suitably packaged to facilitate handling and protect against damage during transit and storage. All equipment shall be protected from exposure to the elements and shall be kept thoroughly dry at all times.
- B. Painted surfaces shall be protected against impact, abrasion, discoloration, and other damage. All painted surfaces, which are damaged prior to acceptance of equipment, shall be repaired to the satisfaction of the engineer.
- C. Grease and lubrication oil shall be applied to all bearings and similar items.

- D. Each item of equipment shall be tagged or marked as identified on the Shop Drawings. Complete packing lists and bills of material shall be included with each shipment.
- E. Motors, electrical equipment, and other equipment with bearings shall be stored and maintained. Electrical equipment, controls, and insulation shall be protected against moisture and water damage. All space heaters furnished in electrical equipment shall be connected and operated continuously.
- F. Conveyor accessories shall be delivered, stored and protected in accordance with the manufacturer's recommendations and the requirements of Section 01 60 00 – Product Requirements.

1.5 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Product Data: Submit manufacturer's Product Data for system materials and component equipment.
- C. Shop Drawings:
 - 1. Indicate system materials and component equipment.
 - 2. Submit connection requirements, installation and anchoring requirements, fasteners, and other details.
- D. Submit electrical information including wiring diagrams, panel drawings, and cut sheets for all electrical components.
- E. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- F. Certify installation is completed according to manufacturer's instructions.
- G. Manufacturer's Instructions: Submit detailed instructions on installation requirements, including storage and handling procedures.
- H. Source Quality-Control Submittals: Indicate results of shop/factory tests and inspections.
- I. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.
- J. Manufacturer Reports: Indicate that equipment has been installed according to manufacturer's instructions.
- K. Qualifications Statement:
 - 1. Submit qualifications for manufacturer.

1.6 CLOSEOUT SUBMITTALS

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

- B. Project Record Documents: Record actual locations and final orientation of equipment and accessories.
- C. Operation and Maintenance Data: Submit operation and maintenance manuals in accordance with Section 01 78 23 – Operation and Maintenance Data

1.7 QUALITY ASSURANCE

- A. The manufacturer shall provide the Engineer with written certification that all equipment furnished complies with all applicable requirements of these Specifications.
- B. The manufacturer shall have at least 10 years of experience in the design and construction of the screening, conveyor and compactor equipment described herein, with at least 25 similar equipment installations.

1.8 TOOLS AND SPARE PARTS

- A. Spare parts shall be prepared for long term storage, sufficiently labeled, and shipped in separate containers.
- B. Manufacturer's recommended spare parts shall be provided for the screenings conveyor.

1.9 WARRANTY

- A. The Manufacturer shall furnish a warranty extending twelve (12) months after substantial completion date of the project in its entirety.

PART 2 - PRODUCTS

2.1 SHAFTLESS SCREW CONVEYOR

- A. Manufacturers
 - 1. Parkson Corporation
 - 2. Elgin Separation Solutions
 - 3. Or Approved Equal
 - a. Specifications and equipment arrangements for the shaftless screw conveyor are based on Parkson Corporation. Changes to the arrangement indicated in the specifications and in the plan set shall be at the expense of the installing Contractor. No change orders will be issued to the Contractor for modifications to the laying length, footprint, concrete layout, electrical, mechanical, etc.
- B. General

1. Description: Shaftless screw conveyor to collect and convey screenings from the two (2) static screens to the dumpster.
2. Location: Headworks
3. Schedule
 - a. CONV1050
 - b. CONV1060

C. Description

1. The conveyor shall be designed to receive screened solids materials and deliver them to a dumpster.

D. Design Information (Per Conveyor)

1. Capacity 50 ft³/hr
2. Angle of inclination: 5° from horizontal
3. Horsepower: 1.5 hp

E. Construction and Materials

1. Spiral
 - a. Material: high strength stainless carbon steel
 - b. Type: shaftless
 - c. Concentric flights shall be formed from bar stock and welded together if required.
 - d. The spiral shall be fitted with a water-resistant nylon brush with stainless steel holder to clean the drain area. The brush shall be welded to the spiral in the trough drainage area only.
2. Trough
 - a. Material: 304 stainless steel
 - b. Two inlet areas shall receive incoming materials. Type 304L stainless steel transition feed hopper designed to mate with the static screens shall be supplied by the manufacturer.
 - c. The trough shall be lined with a 3/8-inch thick UHMW polyethylene sheet.
 - d. Free liquid from feed materials shall drain through a screen located at the drive end of the unit. Screen shall conform to the press trough radius and be perforated. A 3-inch type 304L stainless steel pipe connection shall be provided to remove liquid accumulated in the drainage area.
3. Covers
 - a. The trough shall be covered with 14 gauge type 304L stainless steel covers. Covers shall be removeable
4. Support Legs
 - a. Support legs shall be designed to support the required loads of the conveyor.

- b. Material: 304 stainless steel
- 5. Drive System
 - a. Drive system shall consist of a motor, gear reducer, and drive shaft.
 - b. Electrical requirements: 480 V, 3 phase, 60 Hz
 - c. Motor shall be 1.5 HP, 1800 RPM, 460 volt, 3 Phase, 60 Hz, 1.15 S.F., TEFC, NEMA B, Class F insulation, have 1.15 SF, and rated for severe duty.
 - d. Gear reducer shall be a shaft-mounted parallel helical type gear reducer driven by a direct coupled motor. The reducer shall have a cast iron housing and have an output speed of 26 RPM. The service factor rating shall be 1.8.
 - e. The drive shaft shall be direct coupled to the spiral and be constructed of prime coated AISI 1045 carbon steel.
- 6. Fasteners
 - a. All fasteners shall be 316 stainless steel.
- F. Electrical
 - 1. Control Panels (FCP1050 & FCP1060)
 - a. One control panel shall be provided per conveyor. Control panels shall be 480 V in NEMA 4X stainless steel enclosures shall be provided suitable for mounting on an aluminum grating platform or the handrail on the platform.
 - b. Each control panel shall contain the following for proper operation of the equipment:
 - 1) Programmable relay to monitor equipment mounted electrical devices to perform necessary logic functions.
 - 2) E-Stop Push Button
 - 3) Hand-Off-Auto Selector Switch
 - 4) Fault Reset Push Button
 - 5) Forward-Off-Reverse Selector Switch
 - 6) Elapsed Time Meter
 - 7) Running Light
 - 8) Motor Overload/Overcurrent Alarm Light
 - 9) Control Power Indicating Light
 - 10) Auxiliary Contacts for customer use
 - c. A fused main disconnect switch, motor starter, and a step-down transformer shall be provided.
 - 2. Sequence of Operation
 - a. HAND OPERATION – When HAND mode is selected, the spiral shall run continuously.
 - 1) FORWARD OPERATION – When FORWARD mode is selected, the spiral shall run in the forward direction.

- 2) REVERSE OPERATION - When REVERSE mode is selected, the spiral shall run in the reverse direction.
- b. AUTOMATIC OPERATION – The drive motor shall be controlled automatically when the selector switch is placed in the AUTO position.
 - 1) Conveyor shall run on operator-adjustable time intervals.
 - 2) Drive Motor – The spiral drive shall start on demand and run for a set elapsed time, to be controlled by the operator.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install according to manufacturer's instructions.

3.2 START UP AND TRAINING

- A. Manufacturer Services: Furnish services of a factory-employed service technician who shall adequately inspect the installation, test the equipment furnished under this specification and instruct the Owner's operating personnel in its maintenance and operation. The services of the technician shall be provided for a minimum of one (1) trip for two (2) days on site to inspect and certify the installation and provide Owner's personnel in the proper operation and maintenance of the equipment.

END OF SECTION 46 21 16

SECTION 46 43 21 - CIRCULAR CLARIFIER EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes the following for two (2) clarifiers (CLR4010 & CLR4020):
 - 1. Access bridge and walkway.
 - 2. Clarifier drive mechanism.
 - 3. Rake arms and solids collectors.
 - 4. Effluent trough and weir assembly.
 - 5. Weirs and baffles.
 - 6. FRP Density Current Baffles.
 - 7. Influent feedwell.
- B. Related Requirements:
 - 1. Division 1 – General Requirements
 - 2. Section 05 50 00 - Metal Fabrications specified by this Section.
 - 3. Section 09 96 00 – High Performance Coatings
 - 4. Division 26 - Electrical
 - 5. Section 46 43 81 – Fiberglass Reinforced Plastic Density Current Baffles: for density baffles furnished under this section of the specifications.

1.2 DEFINITIONS

- A. FRP: Fiberglass-reinforced plastic.

1.3 REFERENCE STANDARDS

- A. American Bearing Manufacturers Association:
 - 1. ABMA 9 - Load Ratings and Fatigue Life for Ball Bearings.
 - 2. ABMA 11 - Load Ratings and Fatigue Life for Roller Bearings.
- B. American Gear Manufacturers Association:
 - 1. AGMA 6001 - Design and Selection of Components for Enclosed Gear Drives.
 - 2. AGMA 6013 - Standard for Industrial Enclosed Gear Drives.
 - 3. AGMA 6034 - Practice for Enclosed Cylindrical Wormgear Speed Reducers and Gearmotors.
 - 4. AGMA 6113 - Standard for Industrial Enclosed Gear Drives (Metric Edition).
- C. American Society of Mechanical Engineers:
 - 1. ASME B17.1 - Keys and Keyseats.

2. ASME B17.2 - Woodruff Keys and Keyseats.
3. ASME B29.100 - Double-Pitch Roller Chains, Attachments, and Sprockets.

D. ASTM International:

1. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.

1.4 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Product Data: Submit manufacturer's Product Data for system materials and component equipment, including electrical characteristics.
- C. Shop Drawings:
 1. Indicate system materials and component equipment.
 2. Submit wiring and control diagrams, installation and anchoring requirements, fasteners, and other details.
- D. Manufacturer's Instructions: Submit detailed instructions on installation requirements, including storage and handling procedures.
- E. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.
- F. Manufacturer Reports: Indicate that equipment has been installed according to manufacturer's instructions.

1.5 CLOSEOUT SUBMITTALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for closeout procedures.
- B. Operation and Maintenance Data: Submit maintenance instructions for equipment and accessories.

1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for maintenance materials.
- B. Spare Parts:
 1. Furnish one set of manufacturer's recommended spare parts.
- C. Tools: Furnish special tools and other devices required for Owner to maintain and calibrate equipment.

1.7 QUALITY ASSURANCE

- A. The clarifier equipment manufacturer shall modify his standard equipment to meet the minimum values specified for dimensions, design, and the intent of this specification.
- B. Manufacturers shall show evidence of quality assurance in manufacturing and supplying equipment essential in details to the equipment herein specified. This assurance shall be met by certification to the quality system requirement of ISO 9001 or equivalent standard as accepted by the engineer.

1.8 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum five years' documented experience.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.
- B. Inspection: Accept materials on-Site and inspect for damage.
- C. Store materials according to manufacturer's instructions.

1.10 EXISTING CONDITIONS

- A. Field Measurements:
 - 1. Verify field measurements prior to fabrication.
 - 2. Indicate field measurements on Shop Drawings.

1.11 WARRANTY

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for warranties.
- B. Furnish five-year manufacturer's warranty for circular clarifier equipment and accessories.

PART 2 - PRODUCTS

2.1 CIRCULAR CLARIFIER EQUIPMENT

- A. Manufacturers:
 - 1. Ovivo
 - 2. Westech
 - 3. ClearStream Environmental

4. Envirodyne
5. Or Approved Equal
 - a. Specifications and equipment arrangements for the circular clarifier equipment are based on Ovivo. Changes to the arrangement indicated in the specifications and in the plan set shall be at the expense of the installing contractor. No change orders will be issued to the contractor for modifications to the laying length, footprint, concrete layout, electrical, mechanical, etc.

B. General

1. Each clarifier mechanism shall be of the center-drive type, supported on a stationary influent column, with the flow entering at the bottom of the influent column and flowing upward to the inlet openings and dispersed into the tank through the energy dissipating inlet and flocculating feedwell. The clarifier shall be designed to remove sludge evenly from the bottom of the tank.
2. The equipment shall be designed to effectively settle mixed liquor suspended solids and scrape the settled solids from the basin floor to the sludge withdrawal hopper as shown on the drawings. The clarified effluent shall be collected uniformly by the peripheral launder. Surface scum shall be collected by the scum skimming equipment and discharged through the scum withdrawal pipe.
3. The equipment furnished for each clarifier mechanism shall include but not be limited to: walkway with handrails, center drive assembly, center drive platform, center influent column with inlet openings, center cage, sludge collection arms with rake blades, surface scum skimming and collection equipment, density current baffles, effluent weir plates and scum baffle, anchor bolts and assembly fasteners.

C. Performance and Design Criteria:

1. Plant Design Flows:
 - a. Average: 1.1 MGD
 - b. Maximum Month: 2.0 MGD
 - c. Peak Hour: 4.4 MGD
 - d. Return Activated Sludge Average: 1.1 MGD
 - e. Return Activated Sludge Maximum: 2.0 MGD
2. Basin diameter: 55 ft (inside effluent weir)
3. Launder Arrangement: 2 ft wide external concrete launder
4. Side water depth: 14 ft
5. Floor slope: 1:12
6. Center column minimum diameter: 18 inches
7. Cage minimum size: 2'-10" square
8. Rake arm minimum size: 2'-10" square
9. Clarifier Mechanism:
 - a. Continuous use under design load.
 - b. No operating mechanisms below or in contact with liquid surface.
10. Scraper Arms Rotational Speed: Constant, 8 – 12 fpm.
11. Access Bridge Dead Load: 50 psf, with deflection limited to 1/360 of span.

12. Turntable Bearing Assembly: Arrange components for easy replacement of balls and raceways.

D. Sludge Collector Assembly:

1. Scraper Arms: Structural steel.
2. Scraper Blades:
 - a. Material: Steel plate.
 - b. Minimum Thickness: 1/4 inch.
 - c. Provide squeegees, bolted to underside of scraper arms with 2 inches vertical adjustment.
3. Squeegees:
 - a. Material: Stainless steel
4. Center Drive Drum:
 - a. Material: Structural steel.
5. Center Column:
 - a. Material: 1/4 inch thick welded steel plate

E. Center Drive Assembly:

1. The center drive assembly shall consist of an integral motor and primary speed reducer coupled through roller chain and sprockets to a secondary worm/worm gear reducer driving the main gear through a pinion and shall have an integral overload protection system.
2. All gears and bearings shall be oil bath lubricated with the main bearing totally submerged in oil and the teeth of the main spur gear submerged at least 70 percent in the oil bath. Oil pumps for lubrication or grease lubricated bearings are not considered appropriate for this application and will not be allowed. The oil reservoir for the main bearing and gear shall have a section of minimum depth 5 inches below the main bearing to positively prevent contamination of the main bearing and gears with condensate or other contaminants. Gear and bearing housings must also be fitted with oil level sight glasses and condensate drains. Condensate must be allowed to drain from a low point of the housing. Condensate and contaminants will not be allowed to drain through the lower pinion bearing.
3. Drive components shall be located via a machined, registered fit to preserve the alignment of key drive components under all load conditions. Inspection of the completed drive unit shall be accomplished at the clarifier manufacturer's shop, with reports of all tests and certifications of material hardness being made available for review at the Engineer's request prior to shipment to the job site.
4. The complete center drive assembly, including the overload protection device, shall be a regularly manufactured in-house product of the clarifier manufacturer. Drive assemblies purchased from third party vendors will not be accepted.

F. Primary Gear Reducer

1. The primary gear reducer shall be of either worm/worm gear, helical or cycloidal design and shall be C-face or integrally mounted to the electric motor. The motor shall be minimum 0.75 horsepower and shall be totally enclosed, fan cooled, with a 1.15 service factor, and have bearings with a minimum B10 rating of 50,000 hours. Operating electric current will be 460 volt, 3 phase, and 60 hertz. Each motor shall be NEMA Design B employing Class F insulation designed for an ambient temperature of 40 °C.
2. The gearmotor and primary speed reducer shall drive a secondary worm gear reducer through a #60 roller chain and steel sprockets enclosed in a galvanized 18 gauge steel guard. Sprockets and chain shall be designed for the connected horsepower of the drive with a minimum service factor of 4.0. Provision shall be made for adjustment of chain tension.
3. The main drive unit shall consist of a worm gear secondary reduction unit, pinion and main spur gear assembly. The secondary reducer shall be a worm gear reducer specifically designed for this application. The worm gear shall be centrifugally cast high strength manganese bronze. The worm shall be hardened alloy steel. A single piece pinion and shaft shall be keyed to the worm gear to transmit power from the worm gear to the spur gear. In order to maintain proper alignment between the pinion and the spur gear, the pinion shall be supported by bearings both above and below the spur gear. The bearings shall be fitted into precision machined bearing pilots to positively ensure bearing and gear alignment.
4. The main spur gear material shall be high strength ductile iron per ASTM A536 grade 100-70-04 or equal. The gear shall have a minimum pitch diameter of 30 inches with a 4.75 inch face height or the equivalent spur gear surface area of 754 square inches. Spur gear surface area is defined as the spur gear pitch diameter multiplied by the spur gear face height multiplied by 3.14.
5. The main gear shall rotate and be supported on a ball bearing assembly provided with four replaceable liner strips fitted into the main gear and turntable base. Liner strips shall be special vacuum degassed, carbon corrected, alloy steel hardened to a Rockwell hardness of at least 43 to 46 Rc. The turntable base shall be a minimum 1 inch thick to insure adequate structural rigidity to properly support the drive bearing and gear.
6. The main gear and bearing shall be completely enclosed in an ASTM A-48 Class 40A cast iron housing provided with neoprene dust seals. To ensure the maximum possible base rigidity and vibration dampening the gear housing shall be of full sidewall construction, integral with the base. Prior to assembly, the base shall be thoroughly inspected for seep holes or inclusions and given a hydrostatic test to ensure no leaks are in the oil containment area. If requested, shop inspection reports shall be made available for review.
7. The drive unit shall be equipped with an electro-mechanical overload control device actuated by thrust from the worm shaft. The pointer shall provide a visual reading of the relative main gear output torque on a 0 to 100 percent graduated scale. The 100 percent reading shall equal the 100 percent drive rating. The control device shall also activate an alarm switch for warning of impending overload, a motor cutout switch for overload protection and a back-up safety motor cutout switch for back up overload protection. In lieu of a back-up safety motor cutout switch, a slip clutch assembly will be acceptable upon review by the Engineer. The respective switches in the overload control device shall be factory calibrated and set to the following settings:
 - a. Alarm - 40% of scale.
 - b. Motor cutout - 85% of scale.
 - c. Back-up motor cutout or slip clutch - 100% of scale.

8. All drive control components shall be mounted in a stainless steel weatherproof enclosure with a gasket sealed, removable cover. The pointer shall be covered with a clear plexi-glass enclosure and shall be above the platform surface for visibility from the platform. Amperage sensing devices, devices with exposed linkage connections, or devices which react to rotational movement to an intermediate reduction unit are not acceptable.
9. The center drive unit shall be designed for the continuous torque rating. The continuous torque shall be defined as the minimum torque at which the drive mechanism may operate continuously 24 hours per day, 365 days per year, for 20 years, at the specified sludge collector arm speed. Main gear and pinion calculations shall be based upon ANSI/AGMA 2001 C-95 (1995) standard for rating the pitting resistance and bending strength of involute spur and helical gear teeth. Calculations shall clearly present the values used for the design parameters. Specifically, the load distribution factor shall be determined by the empirical method.
10. Worm gearing shall be designed and rated to equal or exceed the specified continuous torque and life. The basis for rating shall be ANSI/AGMA 6034-B92 standards for durability rating and design of wormgear reducers.
11. The continuous torque rating for the drive unit shall be the lowest value determined for the gearing.

G. Center Cage and Rake Arms:

1. The center cage shall be of steel box truss construction. It shall be provided with connection for sludge removal arms and feedwell supports. The top of the cage shall be bolted to the main gear which shall rotate the cage with the attached arms. The minimum angle size used for the construction of the cage and rake arms shall be 2 inch x 2 inch x 1/4 inch members.
2. The clarifier mechanism shall include two (2) full length sludge removal arms of steel truss construction, with steel spiral rake blades and adjustable 20 gauge 304 stainless steel squeegees. The rake blades shall provide complete raking of the basin floor twice per revolution.
3. The rake blades shall consist of a minimum 3/16 inch thick steel plate. Each rake truss support arm shall be provided with the necessary outrigger bracing and other blade support structures, to ensure that the complete blade can be properly located and adjusted in the field.
4. The cage and rake arms shall be designed such that calculated stresses do not exceed the AISC allowable stress at twice the drive rated AGMA continuous torque rating.

H. Center Pipe:

1. A 1/4 inch wall thickness (minimum), 18 in. diameter stationary center pipe shall be provided which shall serve as the influent pipe. One end shall have a 1-1/4 inch support flange for bolting to the foundation with a minimum of eight (8) 1-1/4 inch diameter anchor bolts as shown on the plans. A similar flange shall be provided at the top of the column for supporting and securing the center drive assembly. Minimum center column thickness shall be 1/4".
2. Influent openings shall be provided in the upper portion of the pipe to allow unrestricted passage of the flow into the energy dissipating feedwell. Influent velocity shall be reduced by providing a total inlet port area a minimum of 135 percent of the center column cross sectional area.

I. Energy Dissipating Inlet (EDI)

1. The clarifier shall be equipped with an energy dispersion well located inside the rotating flocculation feedwell. The dispersion well shall be designed to dissipate the energy of the incoming flow by way of multiple baffled inlet ports equally spaced around the dispersion well.
2. The center dispersion well shall include a bottom plate to fit within one inch of the center column. The well shall be constructed of 3/16 inch plate. EDI outlet ports equally spaced around the periphery shall be provided for energy dissipation. The outlet ports shall impart a tangential flow into the outer flocculating feedwell and shall have bottom plates to prevent short circuiting.
3. The bottom plate of the EDI shall be provided with properly sized drain holes.

J. Flocculating Feedwell

1. The flocculating feedwell shall be supported by structural members attached to the rotating center cage. The feedwell shall be fabricated out of 3/16 inch steel plate with upper and lower reinforcing rim angles and stiffeners as required. Properly sized scum ports shall be equally spaced around the feedwell periphery to allow scum to exit from the feedwell at water level.

K. Surface Scum Skimming Equipment:

1. Surface scum skimming equipment shall be furnished with the clarifier mechanism. It shall be arranged to have the surface scum swept along an angled skimmer blade to the skimmer assembly, attached at the end of the blade, for discharge to the scum box as shown on the plans. The surface of the clarifier shall be swept once per revolution.
2. The skimmer blade shall be tangential to the rotating feedwell and be supported by vertical supports from the rake arm. The skimmer assembly shall be a pivoting aluminum skimmer device equipped with manual out of service lock out. The skimmer shall have replaceable neoprene rubber wipers on all three sides to form a pocket to trap the scum and discharge the scum into the scum box.
3. The scum box shall be supported from the tank wall and connected to a 6-inch scum line, as shown on the contract drawings.
4. The clarifier equipment manufacturer shall furnish a flush valve assembly for automatic flushing of the scum box and scum pipe. The flush valve assembly shall be adjustable to allow 0 – 20 gallons of clarified effluent to enter the box as the skimmer assembly passes over the scum box. The assembly shall consist of a stainless steel lever, UHMW seal plate and neoprene diaphragm mounted to the scum box. The diaphragm shall be opened and closed by an easily adjustable, submerged actuation arm mounted to the rotating skimmer blade. The flush volume adjustment mechanism shall be above the water level and shall include at least three settings.

L. Walkway and Operating Platform:

1. The clarifier shall be provided with a 36-inch clear, open width walkway extending from the tank wall to the center drive platform. The walkway shall be supported at the center by the drive unit and supported on the opposite end by the tank wall. As a minimum the walkway shall be designed to safely withstand all dead loads plus a live load of 50 pounds per square foot with a maximum deflection of 1/360, over the entire span. The walkway shall consist of beams or a structural steel truss, with either sufficiently braced to resist the specified design loads. The walkway decking shall be 1-1/4 inch aluminum I-Bar grating.

2. A center drive operations platform shall be provided. It shall be a minimum of 8' by 8' to provide clearance around the center assembly and drive control for maintenance and service. The drive platform shall be decked with 1/4" aluminum checkered floor plate and have sufficient structural supports to meet the specified design load conditions.
3. Handrails with toe plate shall be provided along both sides of the walkway and around the center drive platform.

M. Effluent Weir Plates and Scum Baffles:

1. Effluent weir plates shall consist of 9-inch deep x 1/4 inch thick FRP sections with 2.5-inch deep 90 degree V-notches at 6 inch intervals. The weir sections shall be fastened to the tank wall using 316 stainless steel cinch anchor bolts, hex nuts and 5-inch diameter FRP washers, allowing for 3 in. minimum vertical adjustment. To prevent leakage all surfaces between the launder walls and weir plates shall be given a seal coat of suitable mastic by the erection contractor.
2. The scum baffle plates shall consist of 12-inch deep x 1/4 inch thick FRP sections supported from the tank wall by FRP angle brackets secured with 304 stainless steel cinch anchor bolts and hex nuts, allowing for vertical and radial adjustment. In the area of the scum box the baffle shall extend 24 inches deep starting approximately 6 feet preceding and ending 6 feet following the scum box.

N. Density Current Baffles

1. FRP density current baffles shall be installed in the clarifier as shown on the drawings. The curtain baffles shall conform to the requirements of Section 46 43 81 – Fiberglass Reinforced Plastic Density Current Baffles.

O. Anchorage and Fasteners:

- a. All bolts, nuts, and washers shall be minimum 316 stainless steel and size as required for the equipment assembly.
- b. All bolts, nuts, and washers required for the equipment assembly shall be furnished by the equipment manufacturer.

P. Operation:

1. Electrical Characteristics:
 - a. 1.0 hp.
 - b. Voltage: 460 V, three phase, 60 Hz.
2. Control Panel (FCP4010 & FCP4020):
 - a. One (1) control panel shall be provided per clarifier to operate the center drive units, torque alarms, and provide alarm contacts for plant monitoring system.
 - b. The enclosure shall be NEMA 4X, 316 stainless steel panel properly sized to dissipate heat generated by the internal components under the specified site environmental conditions.
 - c. Electrical characteristics: 480 volt, 3 phase, 60 hz.
 - d. The panel shall have at a minimum:

- 1) Enclosure circuit breaker engage/disengage handle.
- 2) Motor starter
 - a) Motor starter shall be in accordance with Section 26 29 13.03 – Manual and Magnetic Motor Controllers.
- 3) Hand-Off-Auto switch.
- 4) Push to start button.
- 5) Push to stop button.
- 6) Run light.
- 7) Alarm horn.
- 8) Alarm beacon.
- 9) Alarm silence button.
- 10) Alarm/Overload reset button.
- 11) Hi torque alarm light.
- 12) Hi-Hi torque alarm light.
- 13) 480/120 VAC transformer for control power.
- 14) Surge protection device according to Section 26 43 13 – Surge Protection for Low Voltage Electrical Power Circuits

2.2 SOURCE QUALITY CONTROL

- A. Section 01 40 00 - Quality Requirements: Requirements for testing, inspection, and analysis.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for installation examination.
- B. Verify that clarifier basin is installed and ready to receive circular clarifier equipment.

3.2 INSTALLATION

- A. Install circular clarifier equipment according to manufacturer's instructions.
- B. Weir Plates: Mount weir plates against double bead of the sealant.

3.3 PAINTING

- A. Primary Coating system shall be as follows:
 1. All submerged and non-submerged steel shall be sandblasted to SSPC-SP-10 specifications and given one coat of Tnemec Series N69 epoxy primer 4-6 MDFT. Primer shall be applied by manufacturer prior to shipment.

2. Prior to assembly of the drive unit, the castings shall have been sandblasted and thoroughly cleaned to remove any foreign particles in the drive base. After assembly, the drive mechanism shall be solvent cleaned and power wire brushed as needed prior to application of manufacturer's standard primer.
 3. The drive unit shall receive a surface preparation of SSPC-SP-06 and shall be finish coated with two (2) coats of Tnemec N69 and one (1) coat of Tnemec Endura-shield series 73.
 4. Gear motors shall be furnished with manufacturer's standard enamel.
- B. The Contractor shall apply a finish coat to the clarifier equipment. The coating system shall be according to Specification 09 96 00 – High Performance Coatings “Ferrous metals intermittently submerged in wastewater”

3.4 FIELD QUALITY CONTROL

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for testing, adjusting, and balancing.
- B. Torque Test
1. The clarifier mechanisms shall be field torque tested to verify the structural integrity of the mechanism structural steel design and center drive unit. The testing shall be carried out under the supervision of the equipment manufacturer's representative and as approved by the Engineer before the mechanism is accepted and placed into operation. The manufacturer's service representative shall verify that the alarm, motor cut-out, and backup safety motor cut-out switches are properly set and are in proper operation to protect the clarifier mechanism as specified.
- C. Dry Startup: Run equipment without liquid in basins and inspect for:
1. Alignment of sprockets, chain, flights, and wearing surfaces.
 2. Binding and excessive heat buildup in drive units.
- D. Wet Startup: Run equipment with wastewater in basins and verify proper operation.
- E. Manufacturer Services: Furnish services of manufacturer's representative experienced in installation of products furnished under this Section for not less than two (2) days on-site for installation, inspection, field testing, and instructing Owner's personnel in maintenance of equipment.
- F. Equipment Acceptance:
1. Adjust, repair, modify, or replace components failing to perform as specified, and rerun tests.
 2. Make final adjustments to equipment under direction of manufacturer's representative.
- G. Furnish installation certificate from equipment manufacturer's representative attesting equipment has been properly installed and is ready for startup and testing.

3.5 ADJUSTING

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for starting and adjusting.
- B. Check control module functions and adjust as necessary.

3.6 DEMONSTRATION

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for demonstration and training.
- B. Demonstrate equipment startup, shutdown, routine maintenance, and emergency repair procedures to Owner's personnel.

END OF SECTION 46 43 21