

**ARLINGTON WASTEWATER TREATMENT PLANT
SECONDARY CLARIFIER BASINS EQUIPMENT REPLACEMENT**

CONTRACT 2014-04

**ADDENDUM NO. 1
September 15, 2014**

THIS ADDENDUM IS ISSUED TO CLARIFY SOME PROJECT DETAILS AND ANSWER QUESTIONS RAISED DURING THE PRE-BID WALK-THROUGH. THE FOLLOWING INFORMATION SUPPLEMENTS, AND AS APPLICABLE SUPERCEDES, THE INFORMATION IN THE BID DOCUMENTS.

1. All bidders shall take note that in some instances the product of one manufacturer was used as the basis of design and the specification was written accordingly. However, any manufacturer who produces an equivalent product and who meets the experience requirements may supply the equipment for this contract. The burden of proof to demonstrate that the alternate product is at least equal to the basis of design product shall be on the alternate product manufacturer. The manufacturer shall demonstrate minimum 12 years of experience for all components.
2. An additional acceptable manufacturer shall be Guardian Environmental Products, West Chester, PA
3. The same supplier shall be used for the longitudinal collector flights and for the screw cross collector.
4. The specification reference to the use of "blue clips" is only applicable to the basis of design product by Polychem. Other suppliers use a snap fit pin that does not require clips. Therefore, the use of "blue clips" does not apply to the other named suppliers (Envirex and Guardian Environmental Products).
5. Revise the description of work Section VIII Longitudinal Flight Type Sludge Collection Equipment and Open Pipe Type Scum Removal Equipment as noted below.
 - ¶ A.2.b. Shaft deflection shall not exceed L/360.
 - ¶ B.1.3. Revise in two places to 3,100 lbs working load minimum.
 - ¶ B.1.4 Revise to 7,500 minimum in two places.
 - ¶ B.2 Manufacturer specific test procedure shall meet the minimum requirements described herein. Manufacturer shall submit testing procedures for approval with their submittal and prior to manufacturing.

¶ B.2.2.b Revise working load 2,600 lbs in two places to 3,100 lbs.

¶ C.1 Drive chain is specified as stainless steel HB78. An acceptable alternate will be NH78 non-metallic chain.

¶ D.1. After the second sentence regarding the headshaft sprockets, add an additional sentence: "Headshafts shall be split construction of same material and design as the rest of the collector sprockets or cast iron body with UHMW polyethylene replaceable tooth segments."

¶ D.2. Based on the 1967 drawings, it appears that the corner shaft sprockets are smaller than the headshaft sprockets. Therefore, the paragraph shall be revised to require 23 tooth headshaft sprockets and a pitch diameter of 22.22" and 17 tooth corner sprockets with a pitch diameter of 16.59".

¶ D.3 The drive hub, specified as cast iron, shall instead be made of stainless steel with a shear pin. The driven hub, specified with "one piece" construction option, shall only be split construction, and the rim teeth segments shall be UHMW polyethylene.

¶ E.1 First sentence, the bearings shall be cast iron and UHMW-PE lined (delete "babbitted type). Remove the sentence, "Where required, bearings shall be equipped with grease fitting for lubrication...." since the bearings shall have UHMW-PE liners that are non-lube bearings and do not require grease fittings or grease lines.

¶ E.2 Delete this paragraph in its entirety. (Not required, see above.)

¶ E.3. Remove this paragraph in its entirety. (Deflector boxes are not required with the specified "peak cap" bearings specifically designed to prevent accumulation of solids.)

¶ F.2.b and c: Deflection of the flight is determined by the product of Moment of Inertia (I) and Modulus of Elasticity (E). The minimum $E \times I$ (Iy index) shall be 5.13^6 (not 4.42^6 or 5.35^6).

¶ F.3 The nominal flight dimension shall be 3 inches x 8 inches.

¶ F.4 Revise second sentence to read, "The wears shoes furnished for the long collectors shall be of UHMW polyethylene or Nylon." In the fifth sentence, revise return shoes to add "with lug" to the end. (The lug on the helps to guide the flight to stay in alignment on the rails and not rub on the tank wall.)

¶ G.2. The third sentence, $\frac{3}{8}$ " diameter hardware is preferred, but $\frac{1}{4}$ " diameter hardware may be used. The concrete fasteners shall be stainless steel concrete tapping screws (not expansion anchors). Later in the same paragraph, modify the sentence "Weld washers shall be field welded to Type 316 stainless steel tracks" by adding "or $\frac{1}{4}$ " 316 stainless steel hardware for fiberglass rails."

¶ H.3. Revise this paragraph and subparagraphs to eliminate reference to "flexible coupling and clutch" and require close coupled motor.

¶ H.4.f. Revise this subparagraph to delete reference to removing the word "automatically reduce slack" since adjustment in the drive chain. A sliding idler sprocket shall be used to manually adjust tension.

¶ H.5.d and g and I.1. The secondary clarifier basin area does not require explosion proof equipment. Therefore, limit switches and control panels shall be NEMA 4X (stainless steel or FRP). Motors shall be TEFC; however, the fans shall be bronze for long life.

¶ J.1. The specified minimum wall thickness of 0.25 inches is typical for carbon steel pipes but is inadequate for fiberglass. Therefore, a minimum thickness of 5/16" shall be required to minimize deflection under the condition of a full pipe while a tank is empty down for maintenance. The FRP pipes will be exposed to the sun and shall have a UV inhibitor to provide a longer service life.

¶ J.1. The scum trough was not constructed with the sector plate and operating wheel shown on the 1967 plans. The new trough may use an operating lever with a locking mechanism to operate the trough.

¶ J.2. In the first sentence, add following bearing/collar, "with UHMW polyethylene liner."

¶ K.1. The plant does not currently have a SCADA system, but one will be constructed with other plant upgrades. Therefore, all controls shall be equipped with dry terminals to allow connection to the future plant SCADA system. Automatic operation will not be possible until later plant upgrades have been completed.

6. The drained basins themselves are classified as a non-permitted confined space. The contractor shall provide all safety equipment (such as fall protection gear and retrieval hoist) and all air monitoring equipment for a confined space as required by law and OSHA regulations. The contractor shall also provide scaffolds, safety harnesses, and all other equipment and accessories needed to safely access and work in the tanks (secondary clarifier basins).
7. Headshaft wall bearings between tanks 1 and 2 are through bolt mounted to an existing diaphragm plate. New headshaft wall bearings shall be provided with an adapter plate to match the existing bolt pattern and provide bearing mounting studs to receive the replacement wall bearing. Adapter plate shall be a minimum of 0.5" thick, designed for the loads required and include stainless steel bearing mounting studs. Because two tanks must be taken out of service while the bearings are changed, this addendum allows a minor exception to the project requirement that only tank at a time may be taken out of service. Therefore, for a period not to exceed 12 hours (unless specifically authorized by the Plant Manager Steve Segna), two tanks may be simultaneously taken out of service. The contractor shall coordinate with the United Water plant manager to set the date and time (typically a day when low flow is expected). The bid shall include any overtime and other extra costs for this work.

8. All shafts shall be full width, rotating in UHMW-PE lined peak cap bearings and shall not require grease fittings or grease lines. One shaft in each tank on each flight shall be set in bearings with a sliding adjustment mechanism to properly tension the flight chain.
9. Headshaft sprockets shall be keyed to the shafts. Idler shaft sprockets shall be timed and set screwed to the rotating idler shaft.
10. Drive units. Each collector and screw cross collector shall have independent drive units. The drive units shall be close coupled with motor integrally connected to the gearbox without couplings.
11. Drive units shall be sized for the torque required but not less than 0.5 hp and operate at a corresponding collector speed of 1 ft/min. Drive units shall be single speed.
12. Longitudinal collector drive chains shall have idler sprocket take-up mechanisms. Idler sprocket shall be no less than 7 tooth.
13. Each drive unit shall include a 304 stainless steel chain guard. Chain guards shall be insulated. A silicone heating sheet (BriskHeat SRL series or Omega SSHB, or equal), rated at 480V and 2.5 W/sq in, with pressure sensitive adhesive and with thermostat, shall be mounted to the inside of the stainless steel chain guard to maintain a 40°F temperature under the guard.
14. Flight hold-down deflector angles (not shown on original drawings) shall be replaced with fiberglass 4 x 4 x 3/8" angles and securely anchored to the tank wall and include a wear strip. Flights shall include an additional set of wear shoes in this matching location.
15. Limited sections of the safety rails around the tanks may be temporarily removed to allow access to the tanks. The openings shall be suitably protected. Removed railings shall be securely fastened back in place at the end of each work day.
16. The dewatering valves (bottom valves) shall be replaced, as required in the bid documents. This addendum clarifies that the existing rising stem valves may be replaced with similar gate valves but with a non-rising stem. Each operating key shall be held in place with a stanchion from the building wall to place the tee handle at a convenient height and location to operate the valve from the walkway floor above.

If a new valve does not match the existing flanges bolt circle or spacing, the pipe may be cut and MegaLug or equal flanges shall be constructed on the plain cut pipe ends.

17. There is no cathodic protection in the tanks, and none needs to be constructed.

18. **Section IX. Sludge Collection Screw Conveyors and Related Equipment** is deleted in its entirety, and the following specification is substituted.

SECONDARY CLARIFIER BASINS SCREW CONVEYORS FOR THE SLUDGE CROSS COLLECTORS

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. Furnish all labor, materials, equipment and incidentals required and install, complete and ready for operation, screw conveyors for the sludge cross collection equipment in the secondary clarifier basins as specified herein and to fit the existing troughs.

- B. Electric motors shall conform to the same requirements as stated in Section VIII, paragraph H.5.

1.02 REFERENCE STANDARDS

- A. American Society for Testing and Materials (ASTM)
 1. ASTM A36- Standard Specification for Carbon Structural Steel.
 2. ASTM A48- Standard Specification for Gray Iron Castings.
 3. ASTM A242- Standard Specification for High-Strength Low-Alloy Structural Steel

- B. American National Standards Institute (ANSI)
 1. ANSI B15- Ball Bearing, Load Ratings and Fatigue Life.

- C. Society for Protective Coating (SSPC)

1. SSPC SP-6- Surface Preparation Specification No. 6 Commercial Blast Cleaning.
2. SSPC SP-10- Surface Preparation Specification No. 10 Near White Blast Cleaning.

D. National Electrical Manufacturers Association (NEMA)

1. NEMA MG-1- Motors and Generators.
2. NEMA 4X- Control Panel Enclosures.

E. Conveyor Equipment Manufacturers Association (CEMA)

1. CEMA 350- Screw Conveyors.

F. American Welding Society (AWS)

G. American Gear Manufacturers Association (AGMA)

H. American Society of Mechanical Engineers (ASME)

I. American Bearing Manufacturers Association (ABMA)

1.03 DESCRIPTION OF SYSTEM REQUIREMENTS

- A. All of the equipment specified herein is intended to be standard equipment for use of sludge collection with wastewater. All equipment specified herein must be suitable for operation under the specified conditions.
- B. Each settling basin shall have one screw conveyor installed at the bottom of the basin to convey collected sludge to a sludge sump for removal.
- C. The Contractor shall field verify all field dimensions and elevations including side tolerances and tank squareness. Dimensions of the tanks and equipment per the original design are shown on the Drawings. It appears the existing cross collector screw conveyors are about 12" diameter.
- D. The cross collectors shall operate at a constant speed of 10 rpm.

- F. All miscellaneous fastening hardware such as screws, nuts, bolts, washers, etc. shall be Type 304 stainless steel unless otherwise noted.
- G. All expansion bolt anchors used in the work shall be Type 304 stainless steel.

1.04 QUALITY ASSURANCE

- A. All screw conveyor collection equipment shall be furnished by the same manufacturer as the manufacturer of the longitudinal flight-type collection equipment and the open pipe scum removal equipment to be furnished for this contract. All components of the equipment to be furnished shall be fully compatible with each other and be designed for extended service.
- B. Submit certification of 12 years of experience in manufacturing and satisfactory evidence of experience of submerged screw conveyor collection systems.
- C. The equipment shall be designed, constructed and installed in accordance with the best practices and methods.
- D. This Section calls attention to certain features, but does not purport to cover all details entering into the design and construction of the equipment.

1.05 SPARE PARTS, OPERATIONS AND SUPPLIER SERVICES

A. Spare Parts

1. A full inventory of spare parts, as identified below, shall be furnished for all equipment.
2. All spare parts shall be labeled, for identification.
3. All spare parts are to be wrapped or boxed as required for storage. Each individual package is to be labeled with the description and part number.
4. Screw Conveyor spare parts shall include the following:
 - a. Two coupling hangers, hanger hearings and coupling bolts for each screw conveyor.

- b. One complete set of bearing sand seals for each gear reducer and drive motor.
- c. One flexible coupling for the gear box output shaft (If Applicable)
- d. Twelve shear pins. (If Applicable)

B. Services of a Manufacturers Service Representative

1. Provide the services of a factory-trained service representative trained on the type and the size of the equipment specified and in the methods to be used in the installation of all spare parts. The man-days listed are exclusive of travel time and shall not limit or relieve the Contractor of the obligation to provide sufficient service necessary to place the equipment into fully satisfactory and functioning condition.

2. Provide the services of the factory representative for the following, on-site periods of time:

a. During installation: assist in location of supports, hanger bearings, etc. leveling and alignment, coordination of utility connections (electrical):

Screw Conveyor Cross Collector One 8-Hour Day

b. Start-up: Complete review of installation, provide written certification that the installation is complete and operable in all respects, and that no conditions exist which may affect the warranty. Provide written report, summarizing test procedures, tested and measured variable (alignment check, etc.):

Screw Conveyor Cross Collector One 8-hour Day

c. Field and classroom instruction on operation and maintenance of the equipment, including start-up, shut-down, troubleshooting, lubrication maintenance and safety:

Screw Conveyor Cross Collector One 8-Hour Day

PART 2 PRODUCTS

2.01 GENERAL

- A. The manufacturer shall be responsible for the design, fabrication and provision of adequate installation instructions to assure a fully operational sludge cross collection system in all respect. The equipment design of this Section is based upon equipment furnished by Guardian Environmental Products, Inc., West Chester, PA. Equivalent products manufactured by, for example, Polychem Systems or Envirex, shall be acceptable.
- A. Grease fitting extensions where required, 3/8 inch, shall be provided for all bearings equipped with grease fittings.
- B. Each cross collector screw conveyor shall consist of a screw mounted in a concrete trough. Material settled into the trough shall be moved laterally by the rotation of the screw as shown on the Drawings.
- C. Each cross collector shall be arranged so that conveyor drive shaft is at the location shown on the Drawings.
- D. All bolts, fasteners, anchor bolts and related hardware shall be Type 304 stainless steel.

2.02 MATERIALS

- A. Structural steel shall conform to ASTM A36.
- B. Shapes and plates shall have a minimum thickness of ¼ inch and bolts a minimum diameter if ½ inch unless otherwise specified.
- C. Stainless steel connectors shall be Type 304 stainless steel and shall be bolted using locking washers.
 - 1. All shop and all field connections shall be made with an approved anti-seize lubricant furnished by Loctite or equal, designed to reduce the possibility of galling.
- D. Iron casting shall conform to ASTM A48 Class 30.
- E. All submerged hardware, including fasteners, embedded and expansion anchors shall be Type 304 stainless steel. All stainless steel hardware

shall be fastened using an approved non-galling compound furnished by Loctite or equal.

- F. Unless otherwise specified, other submerged metals shall be hot dip galvanized.

2.03 EQUIPMENT

- A. All parts of the equipment shall be proportioned for all stresses that may occur during fabrication, erection and operation. The equipment shall be designed for continuous operation.

2.04 CROSS COLLECTORS (SCREW CONVEYORS)

- A. Three-quarter pitch conveyor flights shall be constructed of steel conforming to medium hard 235 Brinell abrasion resistant plate and hard faced along its entire periphery and 1 inch carrying surface. Flight minimum thickness shall be 3/8 inch before hard surfacing.
- B. Each end wall bearing shall be of cast iron construction, hard iron or bronze sleeved and of the water lubricated, ball and socket, self-aligning type especially designed to prevent the accumulation of settled solids on their surfaces. The bearing shall be bolted directly to the tank wall.
- C. Screw center tubes shall be of A36 steel tube with sufficient wall thickness to give a maximum deflection not exceeding 5/32 inch between any two bearing support points, based upon formulas for a simply-supported tube with a uniform loading equal to the mass of the tube and flight material. Minimum wall thickness shall not be less than the nominal wall thickness for schedule 40 steel pipe. Center tubes for the nominal 12 inch screw conveyors (actual size shall be field verified by the contractor) shall be a minimum 4 inch outside diameter. Center tubes shall be sized and selected to handle the rated motor horsepower and shall be greater than the specified minimum diameter and thickness if required to safely transmit motor torque.
- D. The design of the center tube shall include a removable key or other means to disconnect and remove the screw conveyor without disassembling the right angle miter gear box. (i.e. section can be completely removed without disturbing other conveyor components). Provide pipe bushings in all pipe ends. Bushings shall be keyed where required for conveyor section removal.

- E. The center tube pipe at the drive shaft shall be reinforced with an external sleeve welded to the outside of the center tube if required to safely transmit the rated motor horsepower through the center tube-rive shaft connection. Succeeding coupling connections shall also be reinforced if required to safely transmitted rated motor horsepower trough succeeding conveyor sections.
- F. Flights shall be of full-faced sectional construction made from precut steel plate, of uniform thickness, formed accurately to the pitch of the screw flights. Pitch tolerance shall be within plus $7/8$ inch or minus $1/2$ inch. Radial welds of the sectional flight segments shall be bevel-welded on both sides. All welds shall be full and continuous both sides of the flight junction to center tube.
- G. Each section of the screws shall have the outside diameter of the flights over the entire length of the screw conveyor is within a tolerance of plus $3/16$ inch or minus $3/8$ inch.
- H. The pitch measured between flights, measured at the outside diameter of the screw flights, along four straight lines parallel to the axial centerline through the bearings at 0, 90, 180 and 270 degrees, shall not vary more than pitch tolerances specified above.
- I. Each screw shall be inspected at the factory by the manufacturer, prior to shipment to the site, to certify conformance to the specified dimensional tolerances.
- J. Hangers: Hanger bearings shall be hard iron type mounted in heavy steel self adjusting welded frames. Mounting hole in the frame shall be slotted parallel to screw to facilitate assembly and alignment. Hangers shall be self-adjusting expansion type equal to CEMA hanger No. 326.
- K. End Drive and Coupling Shafts: Shafts shall be made of surface hardened low carbon steel securely fastened to conveyor pipe with at least two bolts arranged 90 degrees apart. Drive shaft shall be integral part of bearing block.
 - 1. All shafts shall be a minimum 3 inch diameter. All couplings, end and drive shafts and shaft bolts shall be sized and selected to handle the rated motor horsepower. High strength bolts and shafts shall be provided if required.

L. Conveyor Drive

1. The screw conveyor shall be driven by a motor, helical bevel gear speed reducer, drive sprocket, chain and driven sprocket.
2. Each motor shall be ample size to start conveyor when fully loaded and to operate equipment without exceeding motor nameplate rating. Minimum horsepower shall be 3 horsepower. Motor shall be 480 volt, 3 phase and suitable for a Class I, Division 2, Group D area. See also the additional motor specification requirements in Section VIII, paragraph H.5
3. Each gear reducer shall have a cast-iron housing with integral oil sump. Housing shall be dust-tight and oil-tight. Gear reducer shall conform to AGMA standard Class II, for 24-hour continuous full-load operation with a 1.50 service factor. Gears shall be helical bevel type, hardened and ground and shall be manufactured to AMGA 12 or better. Shafts shall have anti-friction bearings.

M. Drive Chain & Sprockets

1. Drive chains shall be NH-78 Type 403 stainless steel with chain tension rating of 3,300 lbf minimum.
2. The drive sprocket shall consist of a machined cast iron sprocket hub with UHMW-PE sprocket teeth machined to accurately engage drive chain.
3. Driven sprockets shall consist of a split machined cast iron sprocket hub with segmental UHMW-PE teeth machined to accurately engage drive chain.
4. All sprocket hardware shall be Type 316 stainless steel.
5. Sprocket arrangement shall be designed so the maximum chain tension does not exceed the working load of the chain. Maximum ratio obtained through the drive and driven sprocket is 3:1.
6. Sprockets shall be equipped with a shear pin, designed to provide torque overload protection for the drive. Upon shear pin failure a trip lug shall pop out of the sprocket. This trip lug shall engage the lever arm of a limit switch. The limit switch shall send a signal to shut off the drive.

7. Limit switch shall be the model 3SE03 as manufactured by Siemens or equal.
8. Provide a Type 304 stainless steel chain guard for the portion of the chain that extends above the operating level.

2.05 SURFACE PREPARATION AND SHOP COATINGS

- A. All iron and steel surfaces shall be blast-cleaned in accordance with SSPC SP-6 and SP-10 and shall be shop primed and finish coated unless specified otherwise herein.
- B. The cross collector screw shall be hot-dipped galvanized after fabrication.
- C. All pre-painted purchase equipment such as electric motors shall be the manufacturer's standard finish as specified.
- D. Machined or polished ferrous surfaces such as pipe flanges and machined steel shafts, shall be provided with a temporary protective coating of a nondrying oily-type rust preventative compound.
- E. Fiberglass, plastic, galvanized, and stainless steel surfaces shall not be coated.
- F. Areas to be field welded shall not be shop painted.

PART 3 EXECUTION

3.01 PREPARATION

- A. Prior to start-up of the cross collector screw conveyor drives, the Contractor shall take all measurements necessary to assure proper clearances for the cross collector flights.

3.02 INSTALLATION

- A. Installation shall be in strict accordance with the respective manufacturer's instructions and recommendations in the locations shown on the Drawings and in coordination with all related equipment systems. Installation shall include flushing of oil and grease chambers and furnishing the required oil and grease for initial operation. Proper disposal of the flushed oil and grease shall be the responsibility of the

Contractor. The grades of oil and grease shall be as recommended by the equipment manufacturer.

3.03 FIELD ACCEPTANCE TESTING

- A. Furnish the services of a factory representative who has complete knowledge of proper installation, operation and maintenance to inspect the final installation and supervise a test run of the equipment. These services are provided under Paragraph 1.07 above.
- B. Initial inspection of the completed facilities includes examining, inspecting, measuring and performing a dry running test to assess the overall readiness of the installation for the field performance testing. Provide a complete report certifying the results of the initial inspection.
- C. Working under the direction of the factory representative and in the presence of the Engineer, perform field performance tests for the settling basin, as follows:
 - 1. The equipment shall be operated in a dry tank, only to extent necessary to observe proper alignment of the torque tube and cross collector shaft and flights, and bearings. All underwater water-lubricated bearings shall be lubricated with grease for the test.
 - 2. After the settling tanks are filled with wastewater, the equipment shall be tested to demonstrate proper alignment and level and smooth operation of all components
 - 3. In the event the mechanisms fail to meet the test requirements, the necessary changes and adjustments shall be made and the equipment retested.
 - 4. The Contractor shall be responsible for arrangements and pay for all labor, water and power required for the above testing.

END OF SECTION

The Town sent a bid advertisement directly to the website of each manufacturer listed in the original specifications. The following manufactures and manufacturer's reps were also sent a bid advertisement.

- **To:** 'kdissinger@myersequipment.com'
Subject:

Your company is listed in the bid documents as a potential vendor for the sludge collection screw conveyors for the project.

Please forward the bid advertisement to the appropriate person if you are interested in bidding, or if you wish to contact one of your contractors.

- **To:** 'WStradling@siewertequipment.com'
Subject: bid advertisement

Hi Will,

Not sure if the project is in your territory, or maybe its PCSpump. Anyway, outlook won't send them a message, so if needed, perhaps you can forward this to your counterpart at PCSpump.

You may wish to contact your contractors regarding a bid on the project in the Town of Poughkeepsie. The bid documents can be viewed on the Town website.

Peter Hobday
Assistant Town Engineer

End of Addendum No. 1