

ADDENDUM NO. 1

VILLAGE OF BOTKINS Wastewater Treatment Plant UV Disinfection Upgrades August 21, 2019

To: Planholders

From: Mote & Associates, Inc. Phone: (937) 548-7511
214 West Fourth Street Fax: (937) 548-7484
Greenville, Ohio 45331 E-mail: info@moteassociates.com

Re: Village of Botkins
Wastewater Treatment Plant UV Disinfection Upgrades

This Addendum forms a part of the Contract Documents and modifies the original Contract Documents dated August 2019. Acknowledge receipt of this Addendum in the space provided on the Bid Proposal form. Failure to do so may subject the Bidder to disqualification.

CHANGES/CLARIFICATIONS TO THE BIDDING REQUIREMENTS:

1. Section 00 41 43, Bid Form

The Bid Form has been replaced to reflect the addition of an Alternate Bid Item as follows:

The area light indicated on Plan sheet 2 of 8 and 4 of 8 is an Alternate Bid Item. This item includes all associated wiring, concrete base, and light pole as shown. This item is a nicety and if the project comes in within the Village's budget, they would like to award the area light.

The "Revised Bid Form" is attached hereto and shall be utilized with the proposal forms submitted for a responsive bid to reflect the addition of this Alternate.

CHANGES/CLARIFICATIONS TO THE TECHNICAL SPECIFICATIONS:

2. Section 06 82 70, FRP Grating

This technical specification has been revised and the replacement is attached hereto and shall be utilized for this project in lieu of the version included in the Contract Documents Manual. Changes include the following: 1) Revision to the wording in Section 2.04 Grating Fabrication, A-D (which is now A-C); 2) Revision to Section 3.02 Installation, A – wording has been revised, B has been added to this section.

3. Section 40 05 00, Hydraulic Gates

This technical specification was omitted from the Contract Documents Manual and is attached.

4. Section 46 66 00, UV Disinfection System

This technical specification has been revised and the replacement is attached hereto and shall be utilized for this project in lieu of the version included in the Contract Documents Manual. Changes include the following: 1) Revision to Section 3.01, F – text has been added to say "bases are required".

CHANGES/CLARIFICATIONS TO THE CONSTRUCTION PLANS:

5. Sheet 2, Site Plans

1. This sheet shows two (2) Cranes, however only one (1) Jib Crane is required on the project with two (2) bases as shown on Sheet 4.
2. The gravel ramp shown on this plan includes the area within the dotted line. The gravel in this area shall be ODOT #57 stone and shall be 3” thick.

6. Sheet 4, Proposed UV Disinfection Trough

The air compressor is part of the supplied equipment from the UV Manufacturer. The air compressor needs to be raised off of the floor (Elev. 981.58) above the 2019 floodplain as indicated on the drawings. This is intended to be a simple fabricated stand based off of the dimensions of the air compressor. The platform may be made of steel (galvanized) or aluminum. No wood will be allowed.

7. Sheet 5, Proposed UV Trough Systems

- A. Provide embedded fiber-glass anchored angle or form the concrete to support the FRP grating at the channels.
- B. The flow meter and/or transducer at the existing flow meter manhole will be removed and given to the plant operator.

8. Sheet 6, Electrical Details/Storm Pipe

Per Wireless Communication Note 4, a pre-bid submittal is not required for pre-approval if quoting a system other than Phoenix. The Phoenix Contact unit which was tested at the site during the Pre-Bid Meeting worked without the need for external antennas. There are no spare conduits running to the UV Building and excavating to install conduits through an existing wastewater treatment facility is not preferred. If other systems are to be offered, a preliminary field test should be performed as part of the submittal for an equivalent system.

9. Sheet 7, General Details

The following note shall be added to this sheet:

“SEAL OFF MANHOLE FROM THE PIPE, LEAVING THE PIPE TO CONVEY EFFLUENT WATER. REMOVE NECESSARY MANHOLE BARREL SECTIONS OR CUT OFF NECESSARY PRECAST MANHOLE TO ACCOMMODATE THE NEW CONSTRUCTION. FILL THE REMAINING MANHOLE SECTION WITH ODOT, ITEM 613 LOW STRENGTH MORTAR. THIS MANHOLE WILL HAVE STANDING WATER AS THE OUTFALL PIPE IS HIGHER IN ELEVATION THAN THE TOP OF PIPE IN THE MANHOLE. THIS WORK TO BE TIMED AROUND THE SBR DISCHARGE CYCLES (OPERATOR MAY BE ABLE TO GIVE YOU MORE TIME IF NEEDED BY DELAYING A DISCHARGE CYCLE)”

GENERAL CLARIFICATIONS

10. The flow control gate valves within the ICES effluent chamber do work and are water tight.
11. The representative for the UV system equipment used for basis of design indicated that the equipment can be delivered within the tight time constraints of the project. A purchase order for the UV Equipment would need to be made by 15 October to arrive timely on site. The Village anticipates issuing Notice to Proceed by October 4, 2019.
12. Based on the small size of the project and contractor's ability to submit equipment submittals in a timely manner, the engineer can return submittals expeditiously to allow the contractor to stay on schedule.
13. For bidding purposes, assume the stock-pile of fill dirt at the WWTP is not available for use.

End of Addendum

Attachments: Section 00 41 43, Revised Bid Form
Section 06 82 70, FRP Grating
Section 40 05 00, Hydraulic Gates
Section 46 66 00, UV Disinfection System

REVISED BID FORM

00 41 43

ARTICLE 1 - BID RECIPIENT

- 1.01 This Bid is submitted to: **[Village of Botkins, 210 South Mill Street, P.O. Box 190, Botkins, Ohio, 45306]**
- 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 - BIDDER'S ACKNOWLEDGEMENTS

- 2.01 Bidder accepts all of the terms and conditions of the Instructions to Bidders, including without limitation those dealing with the disposition of Bid security. This Bid will remain subject to acceptance for 60 days after the Bid opening, or for such longer period of time that Bidder may agree to in writing upon request of Owner.

ARTICLE 3 - BIDDER'S REPRESENTATIONS

- 3.01 In submitting this Bid, Bidder represents that:
 - A. Bidder has examined and carefully studied the Bidding Documents, and any data and reference items identified in the Bidding Documents, and hereby acknowledges receipt of the following Addenda:

<u>Addendum No.</u>	<u>Addendum, Date</u>
_____	_____
_____	_____
_____	_____
 - B. Bidder has visited the Site, conducted a thorough, alert visual examination of the Site and adjacent areas, and become familiar with and satisfied itself as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work.
 - C. Bidder is familiar with and has satisfied itself as to all Laws and Regulations that may affect cost, progress, and performance of the Work.
 - D. Bidder has carefully studied all: (1) reports of explorations and tests of subsurface conditions at or adjacent to the Site and all drawings of physical conditions relating to existing surface or subsurface structures at the Site that have been identified in the Supplementary Conditions, especially with respect to Technical Data in such reports and drawings, and (2) reports and drawings relating to Hazardous Environmental Conditions, if any, at or adjacent to the Site that have been identified in the Supplementary Conditions, especially with respect to Technical Data in such reports and drawings.
 - E. 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 any Site-related reports and drawings identified in the Bidding Documents, with respect to the effect of such information, observations, and documents on (1) the cost, progress, and performance of the Work; (2) the means, methods,

techniques, sequences, and procedures of construction to be employed by Bidder; and (3) Bidder's safety precautions and programs.

- F. Bidder agrees, based on the information and observations referred to in the preceding paragraph, that no further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of this Bid for performance of the Work at the price bid and within the times required, and in accordance with the other terms and conditions of the Bidding Documents.
- G. 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.
- H. Bidder has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder has discovered in the Bidding Documents, and confirms that the written resolution thereof by Engineer is acceptable to Bidder.
- I. The Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance and furnishing of the Work.
- J. The submission of this Bid constitutes an incontrovertible representation by Bidder that Bidder has complied with every requirement of this Article, and that without exception the Bid and all prices in the Bid are premised upon performing and furnishing the Work required by the Bidding Documents.
- K. Bidder agrees that the contracting authority reserves the right to reject any or all bids, to waive any informalities or irregularities in the bids received, and to accept that bid which is considered lowest and to the best interest of the Owner.

ARTICLE 4 - BIDDER'S CERTIFICATION

4.01 Bidder certifies that:

- A. This Bid is genuine and not made in the interest of or on behalf of any undisclosed individual or entity and is not submitted in conformity with any collusive agreement or rules of any group, association, organization, or corporation;
- B. Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid;
- C. No person interested in this Proposal is directly or indirectly interested in or connected with any other bid or proposal for the said work and no member of the Village of Botkins, Ohio, is directly or indirectly interested therein, or in any portion thereof, and he will, if required by the Village of Botkins, Ohio, execute and submit from himself as Principal Contractor and from any Subcontractor, the non-collusion affidavits as provided herein.
- D. Bidder has not solicited or induced any individual or entity to refrain from bidding; and
- E. Bidder has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for the Contract. For the purposes of this Paragraph 4.01.D:
 - 1. "corrupt practice" means the offering, giving, receiving, or soliciting of anything of value likely to influence the action of a public official in the bidding process;
 - 2. "fraudulent practice" means an intentional misrepresentation of facts made (a) to influence the bidding process to the detriment of Owner, (b) to establish bid prices at artificial non-competitive levels, or (c) to deprive Owner of the benefits of free and open competition;

3. "collusive practice" means a scheme or arrangement between two or more Bidders, with or without the knowledge of Owner, a purpose of which is to establish bid prices at artificial, non-competitive levels; and
4. "coercive practice" means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process or affect the execution of the Contract.

ARTICLE 5 - BASIS OF BID

- 5.01 Bidder agrees that any item not specifically shown or called out on the plans or within the specifications, but is required to complete the work in place and fully operational, shall be included in the bid item that is most closely associated with that portion of the work.
- 5.02 Bidder will complete the Work in accordance with the Contract Documents for the following price(s) and will contract to do all the work and furnish all the materials called for by said plans and specifications, and in consideration thereof, to accept from the Owner as full payment for the completion of each specified item and any required maintenance thereof as hereinafter provided, for the following prices;

LUMP SUM BID FOR WASTEWATER TREATMENT PLANT - UV DISINFECTION UPGRADE

<i>Description of Work:</i>	<i>Total Lump Sum Bid</i>
Lump sum bid to provide all labor, materials, equipment, and related incidentals to complete the work as shown on the Construction Plans and as included in the Contract Documents Manual to make all improvements fully operational.	\$
TOTAL AMOUNT OF LUMP SUM BID:	\$

Total Base Bid (in words):

ALTERNATE BID – AREA LIGHT

Description	Total Price
Lump sum bid to provide and install area light to include all associated wiring, concrete base, and light pole as shown on Plan Sheet 2 & 4 of 8.	\$
TOTAL ALTERNATE BID :	\$

Total Alternate Bid (in words):

Bidder acknowledges that:

(1) if this proposal shall be accepted, bidder will be prepared to discuss with the Owner in detail any matters relating to special features and the methods proposed to be followed for the general conduct of the work, that within ten (10) days after "Notice of award" the contract Form with the Owner for performance of the work will be completed and bidder will furnish a Contract Bond in an amount not less than one hundred percent (100%) of the total bid amount, and with sureties subject to the approval of the Owner as a guarantee of the faithful performance of this contract; and that bidder will also submit the required insurance certificates.

ARTICLE 6 - TIME OF COMPLETION

- 6.01 Bidder agrees that the Work will be substantially complete and ready for final payment in accordance with Paragraph 15.06 of the General Conditions on or before **June 1, 2020.**
- 6.02 Bidder accepts the provisions of the Agreement as to liquidated damages in the amount of \$1,000.00 for every consecutive day after the stated date in the Notice to Proceed and along with any time extension given per a Change Order and it may be retained from the monies which may be due.

ARTICLE 7 - ATTACHMENTS TO THIS BID

- 7.01 The following documents are submitted with and made a condition of this Bid:
 - A. Required bid security;
 - B. Affidavit for Corporation;
 - C. Required Bidder Qualification Statement with supporting data;
 - D. List of Proposed Subcontractors;
 - E. Non-Collusion Affidavit; and
 - F. Certifications as listed in Section 3—Procurement Forms & Supplements in the Table of Contents.

ARTICLE 8 - DEFINED TERMS

8.01 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 9 - BID SUBMITTAL

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

By: *[Signature]* _____ Date: _____

[Printed name] _____

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

Address for giving notices:

Telephone Number: _____ Fax Number: _____

Bidder's Federal ID No.: _____

Contact Name and e-mail address: _____

GLASS-FIBER-REINFORCED PLASTICS (FRP) FABRICATIONS
MOLDED GRATING
06 82 70

PART ONE – GENERAL

1.01 Requirements Included

- A. The Contractor shall furnish, fabricate (where necessary), and install all fiberglass reinforced plastic (FRP) items, with all appurtenances, accessories and incidentals necessary to produce a complete, operable and serviceable installation as shown on the Contract Drawings and as specified herein, and in accordance with the requirements of the Contract Documents.

1.02 Related Sections

- A. 01 30 00 Submittals & Substitutions
- B. 03 30 00 Cast-in-Place Concrete

1.03 References

- A. The publications listed below (latest revision applicable) form a part of this specification to the extent referenced herein. The publications are referred to within the text by the designation only.
 - 1. AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM) Test Methods:
 - 2. ASTM D 635 Rate of Burning and/or Extent and Time of Burning of Self-Supporting Plastics in a Horizontal Position.
 - 3. ASTM E 84 Surface Burning Characteristics of Building Materials.
 - 4. NSF/ANSI STANDARD 61

1.04 Submittals

- A. The Contractor shall furnish shop drawings of all fabricated gratings and accessories in accordance with the provisions of this Section.
- B. The Contractor shall furnish manufacturer's shop drawings clearly showing material sizes, types, styles, part or catalog numbers, complete details for the fabrication and erection of components including, but not limited to, location, lengths, type and sizes of fasteners, clip angles, member sizes, and connection details.
- C. The Contractor shall submit the manufacturers published literature including structural design data, structural properties data, grating load/deflection tables, corrosion resistance

tables, certificates of compliance, test reports as applicable, concrete anchor systems and their allowable load tables.

- D. The Contractor shall submit sample pieces of each item specified herein for acceptance by the Engineer as to quality and color. Sample pieces shall be manufactured by the method to be used in the work.

1.05 Product Delivery and Storage

- A. Delivery of Materials: Manufactured materials shall be delivered in original, unbroken pallets, packages, containers, or bundles bearing the label of the manufacturer. Adhesives, resins and their catalysts and hardeners shall be crated or boxed separately and noted as such to facilitate their movement to a dry indoor storage facility.
- B. Storage of Products: All materials shall be carefully handled to prevent them from abrasion, cracking, chipping, twisting, other deformations, and other types of damage. Adhesives, resins and their catalysts are to be stored in dry indoor storage facilities between 70- and 85-degrees Fahrenheit (21 to 29 degrees Celsius) until they are required.

1.06 Quality Assurance

- A. All items to be provided under this Section shall be furnished only by manufacturers having a minimum of ten (10) years' experience in the design and manufacture of similar products and systems. Additionally, if requested, a record of at least five (5) previous, separate, similar successful installations in the last five (5) years shall be provided.
- B. Manufacturer shall offer a 3 year limited warranty on all FRP products against defects in materials and workmanship.
- C. Manufacturer shall be certified to the ISO 9001-2008 standard.
- D. Manufacturer shall provide proof of certification from at least two other quality assurance programs for its facilities or products (DNV, ABS, USCG, AARR).
- E. Manufacturer shall provide proof, via independent testing, that materials proposed as a solution do not contain heavy metals in amounts greater than that allowed by current EPA requirements.

PART TWO – PRODUCTS

2.01 Products and Manufacturer

- A. Molded gratings shall be Fibergrate® as manufactured by:
Fibergrate Composite Structures Inc. 5151
Belt Line Road, Suite 1212
Dallas, Texas 75254-7028 USA
(800) 527-4043 Phone ; (972) 250-1530 Fax
Website: www.fibergrate.com; E-mail: info@fibergrate.com

- B. Or equal.

2.02 General

- A. All FRP items furnished under this Section shall be composed of fiberglass reinforcement and resin in qualities, quantities, properties, arrangements and dimensions as necessary to meet the design requirements and dimensions as specified in the Contract Documents.
- B. Fiberglass reinforcement shall be continuous roving in sufficient quantities as needed by the application and/or physical properties required.
- C. Resin shall be Isophthalic Polyester, with chemical formulations as necessary to provide the corrosion resistance, strength and other physical properties as required.
- D. All finished surfaces of FRP items and fabrications shall be smooth, resin rich, free of voids and without dry spots, cracks, crazes or unreinforced areas. All glass fibers shall be well covered with resin to protect against their exposure due to wear or weathering.
- E. All fire-retardant molded grating products shall have a tested flame spread rating of 25 or less per ASTM E 84 Tunnel Test. Gratings shall not burn past the 25 mm reference mark and will be classified HB per ASTM D635.
- F. All grating products shall be certified to NSF/ANSI Standard 61 (use only if choosing a resin system that can be used to produce gratings to the NSF Standard 61 in sections 2.2 C & 2.3 E).
- G. All mechanical grating clips shall be manufactured of Type 316SS (stainless steel).

2.03 Molded FRP Grating

- A. **Manufacture:** Grating shall be of a one-piece molded construction with tops and bottoms of bearing bars and cross bars in the same plane. Grating shall have (a square mesh pattern providing bidirectional strength or a rectangular mesh pattern providing unidirectional strength - choose one). Grating shall be reinforced with continuous rovings of equal number of layers in each direction. The top layer of reinforcement shall be no more than 1/8" below the top surface of the grating so as to provide maximum stiffness and prevent resin chipping of unreinforced surfaces. Percentage of glass (by weight) shall not exceed 35% so as to achieve maximum corrosion resistance, and as required to maintain the structural requirements of the contract.

After molding, no dry glass fibers shall be visible on any surface of bearing bars or cross bars. All bars shall be smooth and uniform with no evidence of fiber orientation irregularities, interlaminar voids, porosity, resin rich or resin starved areas.

- B. **Non-slip surface:** Grating shall be manufactured with a concave, meniscus profile on the top of each bar providing maximum slip resistance.

- C. Grating bar intersections are to be filleted to a minimum radius of 1/16" to eliminate local stress concentrations and the possibility of resin cracking at these locations.
- D. Fire rating: Grating shall be fire retardant with a tested flame spread rating of 25 or less when tested in accordance with ASTM E 84. Data performed only on the resin shall not be acceptable.
- E. Resin system: The resin system used in the manufacture of the grating shall be {Vi-Corr®, FGI-AM®, Corvex®, ELS, XFR or Super Vi-Corr® (or equal) - choose one, use NSF specialty formula for NSF Standard 61 certified products}.
- F. Manufacturer may be required to submit corrosion data from tests performed on actual grating products in standard chemical environments. Corrosion resistance data of the base resin from the manufacturer is not a true indicator of grating product corrosion resistance and shall not be accepted.
- G. Color: All deck grating to be Yellow.
- H. Depth: 1.5" (unless shown differently on drawings) with a tolerance of plus or minus 1/16".
- I. Mesh Configuration: Tolerance of plus or minus 1/16" mesh centerline to centerline.
- J. Load/Deflection: Grating design loads shall be less than manufacturers published maximum recommended loads. Maximum recommended loads shall be determined by acoustic emission testing. Grating shall be designed for a uniform load of 100 psf or concentrated load of 300 lb. Deflection is not to exceed 0.375" or L/D = 120, whichever is less.
- K. The manufacturer shall certify that the stiffness of all panels manufactured are never more than 2.5% below the published load-deflection values.
- L. Substitutions: Other products of equal strength, stiffness, corrosion resistance and overall quality may be submitted with the proper supporting data to the engineer for approval.

2.04 Grating Fabrication

- A. Measurements: Grating supplied shall meet the dimensional requirements and tolerances as shown or specified.
- B. Layout: Each grating section shall be readily removable, except where indicated on drawings. Contractor to provide openings and holes where located on the contract drawings to accommodate the removal of other treatment facility components. Grating openings which fit around protrusions (pipes, cables, machinery, etc.) shall be discontinuous at approximately the centerline of opening so each section of grating is readily removable.

- C. Hardware: This grating shall be secured unless noted in the drawings as a removable section. This grating needs to be sectionalized for easy removal.

PART THREE – EXECUTION

3.01 Inspection

- A. The grating shall be as free, as commercially possible, from visual defects such as foreign inclusions, delamination, blisters, resin burns, air bubbles and pits. The surface shall have a smooth finish (except for grit top surfaces).

3.02 Installation

- A. Contractor shall install gratings in accordance with manufacturer's assembly drawings. Field cut and drill fiberglass reinforced plastic products with carbide or diamond tipped bits and blades.
- B. If alterations are needed, follow manufacturer's instructions when cutting or drilling fiberglass products or using resin products; provide adequate ventilation.

End of Section

HYDRAULIC GATES

40 05 59

PART ONE – GENERAL

1.01 Scope

- A. This section covers slide, weir and stop gates and operators for the project. The equipment provided under this section shall be fabricated, assembled, erected, and placed in proper operating condition in full conformity with the drawings, specifications, engineering data, instructions and recommendations of the equipment manufacturer.
- B. Gates and operators shall be supplied with all the necessary parts and accessories indicated on the drawings, specified, or otherwise required for a complete, properly operating installation, and shall be the latest standard product of a manufacturer regularly engaged in the production of fabricated gates.
- C. This specification lists that 316 Stainless Steel, Aluminum, and FRP are acceptable construction materials for the stop and slide gates for this project.

1.02 Work Referenced Elsewhere

- A. 03 30 00 – Cast-in-Place Concrete

1.03 Submittals

- A. Submittals shall be as specified in Section 01 33 00.

PART TWO – STAINLESS STEEL GATES

2.01 Approved Manufacturers – Stainless Steel & Aluminum Gates

- A. Slide/weir gates supplied under this section shall be manufactured by:
 - 1. WACO
 - 2. Golden Harvest, Inc.
 - 3. Mechanical Associates Inc.
 - 4. Halliday Products
 - 5. Rodney Hunt
 - 6. Or approved Equal

2.02 Governing Standards

- A. Except as modified or supplemented herein, all gates and operators shall conform to the applicable requirements of AWWA-C561 standards.

2.03 Quality Assurance

- A. The manufacturer shall have 5 years' experience in the production of substantially similar equipment, and shall show evidence of satisfactory operation in at least 10 installations. The manufacturer's shop welds, welding procedures and welders shall be qualified and certified in accordance with the requirement of the latest edition of AWS Sections D1.1, 1.2 and 1.6.
- B. The fully assembled gates shall be shop inspected, tested for operation and leakage, and adjusted before shipping. There shall be no assembling or adjusting on the job sites other than for the lifting mechanism.

2.04 Submittals

- A. The manufacturer shall submit for approval by the purchaser, drawings showing the principal dimensions, general construction and materials used in the gate and lift mechanism.
- B. The manufacturer shall submit for approval by the purchaser, complete engineering design calculations in compliance with AWWA standards latest edition.

2.05 Frame

- A. Stainless Steel Gates: The gate frame shall be constructed of 316 stainless steel.
- B. Aluminum Gates: The gate frame shall be constructed of Aluminum Alloy 6061-T6. All material making contact with concrete shall have protective coating.

2.06 Stop Gates

- A. Stop gates to be constructed of 6061-T6 Extruded Aluminum or 316 Stainless Steel.
- B. Stop gates to have either have handhole removal or an attached gate handle.

PART THREE – FRP GATES

3.01 Acceptable Manufacturers – FRP GATES

- A. Slide/weir & Stop gates supplied under this section shall be manufactured by:
 - 1. Plasti-Fab Inc.
 - 2. Or approved Equal

3.02 Governing Standards

- A. All gates and operators shall conform to the applicable requirements of AWWA-C561 standards.

3.03 Quality Assurance

- A. The manufacturer shall have 5 years’ experience in the production of substantially similar equipment, and shall show evidence of satisfactory operation in at least 10 installations. The manufacturer’s shop welds, welding procedures and welders shall be qualified and certified in accordance with the requirement of the latest edition of AWS Sections D1.1, 1.2 and 1.6.
- B. The fully assembled gates shall be shop inspected, tested for operation and leakage, and adjusted before shipping. There shall be no assembling or adjusting on the job sites other than for the lifting mechanism.

3.04 Submittals

- A. The manufacturer shall submit for approval by the purchaser, drawings showing the principal dimensions, general construction and materials used in the gate and lift mechanism.

3.05 Frame

- A. FRP Slide Gates: The gate frame shall be constructed of FRP.

3.06 Stop Gates

- A. Stop gates to be constructed of FRP.
- B. Stop gates to have either have handhole removal or an attached gate handle.

PART FOUR – GATE & WEIR SCHEDULES

4.01 Stop Gate Schedules

Location	Dimensions (inches)	Construction Material (contractors option)		Meets AWWA Standards	Operators (contractors option)		Mounting Options (contractor option)	
		316 Stainless Steel	Aluminum or FRP		Side Rotation Hand Actuator	Gate Handle	Frame Surface Mount	Frame Cast into Concrete
Bypass Gate	16” W x 24”H	✓	✓		✓		✓	

End of Section

UV DISINFECTION SYSTEM
46 66 00

PART ONE – GENERAL

1.01 Requirements Included

- A. The work under this section shall cover furnishing a complete and operational open channel, gravity flow, ultraviolet (UV) disinfection system. The system shall be complete with UV modules, an electrical cabinet housing the electronic ballasts, power distribution, and system control, UV intensity sensor, automatic mechanical wiping system.
- B. The UV disinfection system shall be the TAK Smart System by Wedeco (a Xylem Brand) or approved equal.
- C. All components that do not meet the technical requirements as specified herein shall be itemized on an appropriate deviation list. Deviations of critical items shall cause disqualification of bid.

1.02 Related Specifications:

- 1. 01 12 16 Operations During Construction
- 2. 01 33 00 Submittals and Substitutions
- 3. 03 30 00 Cast-in-Place Concrete.
- 4. 26 00 00 Basic Electrical Requirements
- 5. 40 95 63 Process Control Wireless Equipment

PART TWO – Design Criteria

2.01 Wastewater Treatment

- A. Prior to the UV system the effluent has undergone secondary treatment.

B. Design Conditions

- | | | |
|--|-----|------|
| 1. Peak Design Flow | 4.0 | MGD |
| 2. Average Flow | 2.2 | MGD |
| 3. Total Suspended Solids | 30 | mg/l |
| 4. Design UV Transmittance at 253.7 nm | 65 | % |
| 5. Maximum Headloss (incl. Level Control System & 4" Free-fall) Peak | | |
| 6. Disinfection Flow | 8.0 | in |

C. Microbiological requirements

1. Maximum inlet concentration: E.Coli < 100,000 /100ml
2. Maximum outlet concentration: E.Coli < 161 /100ml 30 day geometric mean.

2.02 Special Operating Criteria

- B. The UV system is triggered to turn on/off by a flow signal.
1. A “call to run” signal shall be sent to the TAK Smart which triggers the system to turn on. The signal is sent when the decant cycle begins and flow is on its way to the UV system. The UV manufacturer shall make all required PLC/SCADA modifications to existing Sanitaire ICEAS SBR controls to ensure proper functionality between the SBR and UV system.
 2. This signal is to be sent through a wireless, 900 MHz wire bridge. See Specifications Section 40 95 63 – Process Control Wireless Equipment

2.03 Performance Requirements

- A. The UV dose produced by the system shall be at a minimum of 50 mJ/cm² calculated using the Point Source Summation method with one (1) bank offline at the end of lamp life, design UV transmittance and peak design flow rate.
- B. Dose calculation shall be in accordance with the point source summation method as described in the US EPA Design Manual (EPA/625/1-86-021), without exceptions.
- C. Certification from the Lamp Manufacturer to substantiate initial lamp UV-C output after 100 hours burn in shall be submitted. Bidders who fail to provide such certification with the bid shall be considered non responsive and be disqualified. A letter confirming compliance will suffice.
- D. The dose calculation shall be based on the UV-C output at a wavelength of 253.7 nm, under consideration of a maximum quartz sleeve transmittance of 92% at the end of lamp life.
- E. The UV dose will be adjusted using an end of lamp life factor of 0.87 of initial UV lamp output. The use of a higher aging factor will be considered only upon review and approval of independent 3rd party certificate submitted with the bid.
- Aging factors exceeding 0.87 are considered unrealistic and shall not be accepted to prevent under design of the system.
- F. The UV dose will be adjusted using a quartz sleeve fouling factor of 0.958 when sizing the system in order to compensate for attenuation of the minimum dose due to sleeve fouling during operation. The use of a higher fouling factor will be considered only upon review and approval of independent 3rd party certificate submitted with the bid.

- G. Fouling factors exceeding 0.96 of clean, clear quartz sleeves are considered unrealistic and shall not be accepted.

PART THREE – DETAILS OF CONSTRUCTION

3.01 General

- A. The system shall be designed for immersion of the UV lamps in the effluent within their protective quartz sleeve. Both electrodes and the full arc length of the lamp shall be below the water surface.
- B. Systems which prevent uniform cooling of the lamp electrodes (e.g., vertical lamp systems) by the effluent shall not be permitted.
- C. The UV lamps shall be arranged horizontally, parallel to the flow to minimise headloss.
- D. All wetted channel metal parts shall be fabricated of stainless steel 304. Aluminium wetted materials shall not be used.
- E. All module materials exposed to UV light shall be 316 stainless steel, quartz glass, Teflon, Viton, or other suitable long-term UV resistant materials.
- F. One (1) Davit Crane (Thern 5110) and two (2) bases are required.

3.02 UV Lamps

- A. Lamps shall be low-pressure mercury amalgam “doped”, high intensity type. No liquid mercury shall be inside the lamp.
- B. Medium pressure or other lamp types with a polychromatic UV output and a lower UV efficiency compared to low pressure lamps shall not be acceptable.
- C. Each lamp shall be tested in UV-output, lamp current and lamp voltage from supplier. All results shall be stored in a database referencing to the individual lamp number. The lamp number shall be printed on the lamp surface.
- D. Useful lamp life shall be guaranteed at 12,000 operating hours for each lamp under normal operation conditions. Normal operation conditions include a minimum of four on/off cycles per 24 operating hours.
- E. UV lamps shall not require a long cool down period (>10 minutes) prior to re-start should the power to the UV system fail or be interrupted for a short period of time.
- F. Each lamp base shall incorporate a dielectric barrier or pin isolator. The pin isolator shall consist of a non-conductive divider placed between the lamp pins to prevent direct arcing across the pins in moist conditions. The barrier shall be dielectrically tested for 2500 volts.

G. The UV manufacturer shall ensure disposal of returned lamps (old/used) at no costs to the owner upon receipt of the returned lamps at the manufacturing headquarters.

H. Energy input to the lamp shall be variable from 50 -100% of electrical power.

Lamps with no capability to automatically vary the UV power output in operation shall not be permitted.

3.03 UV Modules

A. The UV modules shall be designed for periodic submergence without causing failures or damage to the system or components. They shall not contain any components, such as electronic cards, that cannot withstand submergence.

B. Each UV module shall be equipped with an interlock switch, which will automatically disconnect power to its associated UV bank if the module is raised from the UV channel or the quick disconnect plug is removed.

C. The UV module design and mounting shall provide plug and socket quick disconnect facilities enabling non-technical personnel to carry out lamp replacement, wiper insert replacement, etc. without the need for any tools or specialist isolation procedures.

D. Lamps shall be removable with the quartz sleeve and wiper system remaining in place.

E. The UV lamp sleeve shall be a single piece of clear fused quartz circular tubing, which shall not be subject to degradation over the life of the system.

F. The lamp socket shall be centered against the inside of the quartz sleeve and shall be retained by a cap nut with a ribbed exterior surface providing a positive handgrip for tightening / loosening without the need for any tools. This connection includes a self-contained O-ring, sealing the lamp and socket module (independently from the quartz sleeve).

3.04 Wiping System

A. Each UV module shall be equipped with an automatic wiping system with selectable wiping frequency and an adjustable number of wiping strokes.

B. Systems without automatic mechanical wiping or systems requiring chemicals or removal of the module from the channel as the only means of cleaning will not be acceptable.

C. The automatic wiping system shall be pneumatically powered and shall use Teflon/Viton sandwich wipers to clean the quartz sleeves.

D. The actuator for the wiping system shall be a pneumatic cylinder mounted to the underside of the module top plate. It shall not come in contact with the effluent to prevent damage, sealing challenges, replacement difficulties etc.

- E. The wiping system shall be controlled by the UV system control unit and provide a fully automatic, unattended operation.
- F. The number of wiping strokes per interval shall be factory pre-set for optimum effect and shall be easily reset by the owner from 1 to 5 strokes per interval.
- G. The wiper blade brush or other cleaning device in contact with the quartz sleeve shall be non-metallic and shall not damage or scratch the quartz sleeve or sensor in any way.

3.05 UV Monitoring System

- A. A submersible UV sensor shall continuously sense the UV intensity produced in each bank of UV lamp modules.
- B. The sensor shall be according to ÖNORM M 5873-1 and shall measure only the germicidal portion of the light emitted by the UV lamps as measured at 254 nm. Its sensitivity at 254 nm shall be higher than 95%. Sensors whose sensitivity to other wavelengths amounts to more than 5% of the total sensitivity shall not be allowed.
- C. The UV intensity monitoring system shall be field calibrated. To ensure regular UV sensor field calibration a reference UV sensor device shall be supplied with the UV system.
- D. The measured intensity shall be fed into the UV systems control unit and used for continuous UV output modulations. The UV intensity sensor shall provide this control of the lamp by monitoring real-time wastewater quality, lamp aging, and quartz sleeve fouling changes. This signal shall be sent to the control unit for inclusion in the UV dose calculation. Additionally, it shall be displayed on the operator interface as an absolute value in mW/cm². UV Manufacturers who do not provide lamp modulations based upon the UV intensity sensor signal are not acceptable.
- E. The sensor shall be automatically cleaned at the same frequency as the lamp sleeves to prevent fouling of the sensor and hence false alarms for low intensity.
- F. The UV sensor design shall be such that sensor removal can be easily conducted without removal of the module from the channel.

3.06 Water Level Control

- A. A fixed finger weir located at the channel outlet shall provide control of water level in the UV channel. The weir design shall be such that a maximum plume of 2.0 in over the weir will not be exceeded to guarantee safe disinfection.
- B. Each channel shall have one fixed over fall weir.
- C. Water level control with moving parts shall not be acceptable.

PART FOUR - ELECTRICAL AND CONTROLS

4.01 The Electrical Cabinet

- A. The electrical system shall provide segregation of plant services and supplies into sensible groups to allow for safe and simple maintenance or servicing.
- B. Sensitive electronic components e.g. electronic ballast cards shall not be exposed to the risk of being flooded.
- C. All heat sensitive components shall be adequately cooled with dry air utilizing forced or natural ventilation. Systems that lack positive mechanical heat transfer such as fans or heat exchanger for the sensitive electronic components are not acceptable.
- D. Systems or designs that expose sensitive electrical or electronic components to excess humidity or poor air quality for cooling are not acceptable.
- E. The enclosures for the UV system shall be IP56/ Type 4X Stainless Steel for exterior application.
- F. The Electrical cabinet shall be a separate enclosure to house the control unit, operator interface, ballast cards and plant interface termination points associated with each individual UV bank.
- G. Electrical power supply to each individual cabinet shall be.
- H. 480/277 volts (+/- 10%), 60 Hz, WYE plus ground (L1, L2, L3, N, GND) (cUL).
- I. The UV system controller shall monitor hardwired protection circuits, e.g. Module Lifted, Module Connected, Cabinet High Temperature, Bank Isolation, etc. which will shut the appropriate area of plant down directly, to aid rapid fault finding when personnel attend site.
- J. Each electrical cabinet shall be equipped with a temperature control device, which will shut off this part of the UV system in case of surpassing the critical limit of 50°C = 122°F.

4.02 The Electronic Ballast

- A. The ballasts shall be electronic microprocessor controlled, designed as slot cards fitting into a rack system with a plug connector for ease of maintenance.
- B. Each ballast shall drive a pair of lamps with independent control and monitoring circuits, and providing individual lamp status information to the UV system controller.
- C. The ballast shall detect lamp failure and initiate a re-strike sequence, independently from any external influence. The ballast shall attempt three re-starts before shutting off.
- D. The ballast shall incorporate a galvanic separation of the two circuits. In case of the secondary circuit operating in abnormal conditions regarding voltage and/or

amperage, the ballast shall shut off the lamp concerned. Ballasts without this feature shall be equipped with one GFC per ballast.

- E. The ballast shall incorporate a temperature controlled pre-heat circuit to minimize lamp failure on start up.
- F. The operating power factor for the ballasts shall be min. 0.99.
- G. The ballast shall be capable of varying the power output between 50 – 100%. UV systems unable to vary the power to the lamps shall not be accepted.
- H. The lamps shall be square wave driven by the ballasts.
- I. In order to avoid net harmonics and radiated interferences, the electronic ballasts shall be equipped with an active harmonic filter.
- J. The ballasts shall be tested on line disturbances up to 4000 V.
- K. Ballasts requiring liquid closed loop re-circulating heat exchanger systems, e.g. propylene glycol, for cooling shall not be permitted.
- L. Ballasts, for which replacement a watertight seal needs to be broken, shall not be permitted.
- M. Ballasts, for which replacement the removal of the module is required, shall not be permitted.

4.03 Control and Instrumentation

- A. The UV Disinfection Management System shall control and display the ON/Off cycling of the UV bank, individual lamp status, alarm messages, UV dose and intensity, bank wiping system status, and lamp power of the UV banks.
- B. Low UV dose alarms shall be provided to detect possible water quality problems, flow rate too high (flow rate signal required by others) or fouling of the system. Alarm set point shall be field adjustable.
- C. The Management System shall utilize a UV sensor located within the UV bank(s) to accurately sense any change in UV intensity (i.e. wastewater quality, lamp aging, and quartz sleeve fouling). The sensor signal together with the flow rate signal shall be fed into the WEDECO Smart Controller as input parameters to accurately control and adjust UV lamp output to the required level under all operation conditions.
- D. Systems that rely on calculated lamp intensity reduction due to aging instead of measured UV intensity for UV dose calculations and UV system control are not acceptable.

PART FIVE – EXECUTION

5.01 START-UP & FIELD SERVICES

- A. A field service technician or start-up engineer of the UV System Supplier shall commission the UV equipment.
- B. Local manufacturer's representatives are not acceptable to perform these tasks unless authorized by the UV System Supplier.
- C. The field service technician shall certify that all equipment is properly installed and that the plant operators have been trained on proper operation and maintenance procedures
- D. The minimum recommended man-days / trips for installation inspection, start-up, system commissioning, and operator training shall be a total of three (3) days and one (1) trip.

End of Section