ADDENDUM NO. 2

VILLAGE OF ARCANUM Mechanical Wastewater Treatment Facility – Re-Bid March 17, 2017

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 Arcanum													
	Mechanical Wastewater Treatment Facility – Re-Bid													

This Addendum forms a part of the Contract Documents and modifies the original Contract Documents dated February 2017 and Addendum #1 dated March 10, 2017. 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. <u>Section 00 11 13, ADVERTISEMENT FOR BIDS</u>

The fourth paragraph, second sentence in the Advertisement for Bids shall be changed to read: ".....The Owner intends and requires that Contract 'A' be completed by March 15, 2019; Contract 'B' by March 15, 2020; and/or Contract C by November 15, 2019"

The changes to the completion dates of Contracts A, B, and C shall also be revised in the following locations as appropriate:

Section 00 21 13, Instructions to Bidders, Article 9

Section 00 52 43, Agreement Contract 'A', Article 4.02 along with a change to the date for final payment included in this Article to become June 15, 2019.

Section 00 52 44, Agreement Contract 'B', Article 4.02 along with a change to the date for final payment included in this Article to become June 15, 2020.

Section 00 52 45, Agreement Contract 'C', Article 4.02 along with a change to the date for final payment included in this Article to become February 15, 2020.

2. Section 00 41 43.10 through Section 00 41 45.10, BID ATTACHMENT

Attached to this Addendum are revised documents to be included with the Bid Packets in order to submit a responsive Bid. The "Bid Attachment – Equipment Manufacturer Declaration" has been removed and will be replaced with the attached document entitled "Unit Price Bid Attachment" for all Contracts A, B, and C. This Form must be completed and submitted as part of the proposal documents for the associated Bid Form(s) (Section 00 41 43, 00 41 44, and 00 41 45). These values shall be part of the lump sum bid provided in the Base Bid on the Bid Form associated with each Contract.

3. <u>Section 00 55 00, NOTICE TO PROCEED</u>

The second paragraph, last sentence in the Notice to Proceed shall be changed to read: ".....The Owner intends and requires that Contract 'A' be completed by December 31, 2018; Contract 'B' by December 31, 2019; and/or Contract C by August 31, 2019......"

CHANGES/CLARIFICATIONS TO THE TECHNICAL SPECIFICATIONS:

4. <u>Section 09 67 23 – HIGH SOLIDS EPOXY FLOORING</u>

Remove Section 2.01, D pertaining to glass beads for slip resistance to flooring.

5. <u>Section 09 97 00 – SPECIAL COATINGS</u>

Treatment plant equipment, piping, and appurtenances to receive special coatings as stated in this Specification shall include cleaning and repainting of all existing metal surfaces within the High Flow Pump Station (pumps, motor supports, etc.).

6. <u>Section 33 47 23.20 – EQUALIZATION BASIN</u>

Item 3.01, B., 5 shall be revised to state: "The installation of underdrain/leak detection system (per drawings). The "system" includes underdrain pump station and associated piping as shown on the drawings. Please note that this underdrain system is not required for Contract C.

The underdrain pump station shall include the requirements detailed on Lagoon – Contract B, Drawing Sheet #3 of 4 as shown in the numbered list located in the upper right corner in the underdrain pump station detail.

The underdrain pump station in Contract B will be powered from the aeration control panel as shown on Drawing #5 of 20 - Electrical, items #44 and #86.

7. Section 40 23 36, SANITARY WATER PROCESS PIPING

Due to questions received regarding the required coatings for water and/or sewer piping, Specification Section 40 23 36, Sanitary Water Process Piping has been revised to further identify the coatings required for the project. The revised specification is attached hereto.

All ductile iron sewer piping shall have interior protective coating in compliance with Specification Section 09 96 56 (Protecto 401). Any ductile iron air piping (blowers) shall not receive protective interior lining.

8. <u>Section 41 22 13.23 – DAVIT CRANES</u>

As stated in Part 1.1, Item B. one davit crane and three pedestal bases shall be supplied and installed per the manufacturer's installation instructions. The bases are to be located as stated there in with one at the UV Disinfection, the second at the Platform for Digester Tanks 1 & 2, and the third at the Digester Storage Tank. Should Alternate #1 in Contract A be chosen, the base at the Digester Storage tank shall be non-performed.

9. <u>Section 40 66 00, UV DISINFECTION</u>

This specification has been revised to alter brand specific requirements so all manufacturers listed as equals conform to the equipment stipulations.

CHANGES/CLARIFICATIONS TO THE CONSTRUCTION PLANS:

10. LAB/MAINTENANCE BUILDING - Sheet #4 of 17

Please disregard the concrete stairs connecting the driveway and the lab building in this Drawing along with the detail for the concrete stairs and handrail.

11. LAB/MAINTENANCE BUILDING - Sheet #5 of 17

The stairs in the UV Disinfection Area shown on this sheet shall be Fiberglas Reinforced Plastic (FRP) material and <u>not</u> galvanized as indicated thereon.

12. LAB/MAINTENANCE BUILDING - Sheet #8 of 17

A North Lab/Control Room elevation has been added to this sheet and attached hereto for an additional Lab Building Casework Section View.

A description for Keynote #16 is also included on this Lab Building Casework Section View, as it was inadvertently missing from the original drawing to specify the Swinging Glazed Doors.

All Hardware for the Laboratory Casework shall adhere to Specification Section 12 35 53.13, Steel Laboratory Casework. Any other referenced specifications within the Laboratory Casework Schedule for Hardware on this Sheet shall be disregarded.

13. LAB/MAINTENANCE BUILDING - Sheet #11 of 17

The Room Finish Schedule shown on Sheet #11 of 17 shall be changed to the Schedule attached hereto. This revised schedule deletes reference to Specification 09 67 00.

The Door Schedule shown on Sheet #11 of 17 shall be revised to indicate that all walk-in doors and frames are to be Fiberglass material. No doors or frames shall be wood materials. Door #2, the Overhead Roll-up Door, shall conform to Specification 08 11 00, Roll Up Garage Doors.

14. CIVIL PLANS - Sheet #8-1 of 49

The contours on the Plant Grading Plan have been darkened for better visibility. No changes to the contours have been made. A copy of this revised Plan Sheet is attached hereto.

In order to have positive drainage on the east side of the primary treatment tank and digester at the completion of construction, these areas should be regraded to similar elevations that exist prior to construction. This area presently slopes away from the plant toward the empty field and this drainage pattern shall be restored at the completion of the work.

15. <u>SLUDGE PRESS & STORAGE BUILDING – Sheet #3 of 7</u>

Door and Door Hardware Schedules are included on this Sheet with other finish notes shown throughout the Sludge Press & Storage Building Sheets #1 through #7. Specification Section 08 36 13, Sectional Doors, has been attached to this Addendum to further clarify Doors #2 and #4.

Additional clarification of building finishes shall include: 1) The concrete slab in this building shall be treated with Chemprobe CT Densifier Series 629; and 2) The metal liner panels on the interior walls from the top of the concrete wall to the ceiling along with the metal liner panel on the ceiling all contained in Room 101 shall be 26 gauge ribbed metal.

16. <u>SLUDGE PRESS & STORAGE BUILDING – Sheet #5 of 7</u>

Section View 3 shown herein indicates "Simpson CB68 Post Base, Typical". This shall be changed to read "Simpson CB66 Post Base, Typical" to reflect a 6" x 6" treated post.

The 6"x6" columns for the sludge press building shall be changed to three (3) treated 2"x 6" posts laminated together to create the column.

Section Views shown on this Sheet indicate "Treated 2x6 T&G on all interior walls to +/- 11' AFF in Room 101" and shall be changed to read "Treated 2x6 T&G on all interior walls to 14'6" in Room 101". The 2x6 T&G shall extend 11' above the top of the 3'6" concrete wall for a total height of 14'6".

17. ELECTRICAL PLANS – Sheet #3 of 20

Specification Section 33 32 19 – Facility Lift Pump Stations, Item 1.01, D, 5, b shows equipment to be provided by the Contractor, Lift Station Manufacturer, or Control Panel Builder for the float switch style control panel. This includes transducers and controllers that are shown on Electrical Drawing #3 of 20 depicting three (3) level transducers and two (2) ultrasonic transducers.

GENERAL INFORMATON:

- 18. As clarification, the outdoor covered area of the grit removal building does not require a finish coating.
- 19. The epoxy flooring for the grit removal building, RAS building, and the existing high flow pump station area of the lab building shall all be changed to receive a coating of Chemprobe CT Densifier Series 629.
- 20. The influent lift station is to be precast and designed by the precast manufacturer, which will determine the concrete foundation dimensions.
- 21. The 460 volt power service will be available upon request as it will be provided by the Village since they own and operate the electric utility. The Village will need approximately 30 days' notice of your need for the power transfer. Depending on when the contractor is ready for power, both 460 and 230 can be supplied. The Village will be changing out the transformer and the transformer base which will require a power outage. The new generator might be a source of backup power for the outage. The logistics will need to be worked out during the construction phase.

22. The following manufacturer has requested an equipment review and Kuster shall be added to the list of approved manufacturers for the influent fine screen.

End of Addendum

Attachments: Section 00 41 43.10 – Contract A - Unit Price Bid Attachment Section 00 41 44.10 – Contract B - Unit Price Bid Attachment Section 00 41 45.10 – Contract C - Unit Price Bid Attachment Section 08 36 13 – Sectional Doors Section 40 23 36 – Sanitary Water Process Piping Section 46 66 00 – UV Disinfection Lab Building Casework Section View Lab Building - Revised Room Finish Schedule Plant Grading Plan – Sheet 8-1 of 49

<u>CONTRACT A – UNIT PRICE BID ATTACHMENT</u> 00 41 43.10

As an Attachment to Contract A - Base Bid Form (Section 00 41 43), the Bidder MUST insert the declared value of the items listed in the spaces below for their bid to be considered responsive. These values shall be part of the lump sum bid provided in the Base Bid Form. **Failure to submit this form will disqualify the Bidder**.

Equipment Item / Specification Section #	Declared Value					
FRP Stamford Density Current Baffle 2.0 / Spec # 06 82 60	\$					
Laboratory Fume Hood / Spec # 11 53 13	\$					
Steel Laboratory Casework / Spec # 12 35 53.13	\$					
Submersible Pumps Digester / Spec # 22 13 29.10	\$					
Wet Pit, Vertical Turbine Pump - Non-Potable Pump / Spec # 22 13 29.13	\$					
Submersible Pumps Emergency Effluent / Spec # 22 13 29.20	\$					
Submersible Pumps Process / Spec # 22 13 29.30	\$					
Panelboards / Spec # 26 24 16; Instrumentation & Controls for Water Utilities Process Control Devices / Spec # 33 09 10.10	\$					
Low Voltage Industrial MCC / Spec # 26 24 19	\$					
Variable Frequency Drive / Spec # 26 29 23.10	\$					
Electric Generator / Spec # 26 32 13	\$					
Stainless Steel Gates & Weirs / Spec # 35 20 16	\$					
Process Monitoring System Universal Controllers including all Probes / Spec # 40 94 13.27	\$					

Equipment Item / Specification Section #	Declared Value				
Automatic Refrigerated Sampling Equipment / Spec # 40 97 40	\$				
In-Channel Bar-Filter Screen / Spec # 46 21 19	\$				
Grit Removal System / Spec # 46 23 23	\$				
Chemical Feed Systems / Spec # 46 33 41	\$				
Chemical Flash Mixer / Spec # 46 41 11.01	\$				
Rapid Mixers / Spec # 46 41 11.02	\$				
Rotary Lobe Positive Displacement Blowers / Spec # 46 51 10.01	\$				
Fine Bubble Diffusers / Spec # 46 51 36	\$				
UV Disinfection Equipment / Spec # 46 66 00	\$				
Sludge Dewatering Equipment / Spec # 46 76 27	\$				

<u>CONTRACT B – UNIT PRICE BID ATTACHMENT</u> 00 41 44.10

As an Attachment to Contract B - Base Bid Form (Section 00 41 44), the Bidder MUST insert the declared value of the items listed in the spaces below for their bid to be considered responsive. These values shall be part of the lump sum bid provided in the Base Bid Form. **Failure to submit this form will disqualify the Bidder**.

Equipment Item / Specification Section #	Declared Value
Floating Mechanical Aerators – Contract B / Spec # 46 51 13	\$

<u>CONTRACT C – UNIT PRICE BID ATTACHMENT</u> 00 41 45.10

As an Attachment to Contract A - Base Bid Form (Section 00 41 43), the Bidder MUST insert the declared value of the items listed in the spaces below for their bid to be considered responsive. These values shall be part of the lump sum bid provided in the Base Bid Form. **Failure to submit this form will disqualify the Bidder**.

Equipment Item / Specification Section #	Declared Value			
Floating Mechanical Aerators – Contract C / Spec # 46 51 13.10	\$			

SECTIONAL DOORS 08 36 13

PART ONE - GENERAL

1.01 Requirements Included

- A. The Contractor shall provide all labor, materials, and equipment to install a 2" insulated thermally broken sectional overhead door and related work.
- B. Work shall include, but not necessarily be limited to, installation of the overhead door, tracks, counterbalance mechanisms, hardware, weather seals, anchors, door assembly, locks, and electrical operator.
- C. Manufacturers shall be regularly engaged in manufacturing items of type specified. Installers shall be under direct supervision of manufacturers' representative or trained personnel.

1.02 References

- A. All materials shall meet ASTM G60 per ASTM A525 and A526 (steel skins).
- B. All doors shall be designed to meet wind load as specified by American National Standard Institute (ANSI).
- C. ANSI 216.1 Application Type Commercial
- D. NFPA 70-02 for fire rated doors where indicated on drawings.

1.03 Submittals

- A. The following items shall be furnished by the Contractor for submission to the Engineer to verify conformance with these specifications.
 - 1. Shop Drawings: documents illustrating materials, shop coatings, steel thickness, details of attachment to the structure, accessories, and then installation. Drawings shall include dimensions, sections, and details, supporting brackets for motors, location and rating of motors and safety devices.
 - 2. Certifications: Certifications shall be statements from the manufacturer verifying that the materials conform to the appropriate requirements as outlined in the Contract Documents.
 - 3. Descriptive Literature: manufacturer's literature containing product and installation specifications and details.
 - 4. Maintenance and installation instructions.
 - 5. Wiring diagrams for motors and controls, including wiring diagram for door showing electrical interlock for motor with manually operated dead lock.

1.04 Warranty

- A. Manufacturer's minimum 10-year warranty must be provided.
- B. Warranty shall include all maintenance, parts and service for one (1) year after project completion at no additional cost to the owner.

PART TWO - PRODUCTS

2.01 Products and Manufacture

- A. Products of the following manufacturers are acceptable providing their products meet or exceed the quality specificity and they can provide products of the size and function arrangement for the intended use.
 - 1. Clopay Corporation
 - 2. Raynor Garage Doors
 - 3. Overhead Door Corporation
 - 4. Holmes Garage Door Company
 - 5. Or, an approved equal
- B. Like or equal to Clopay Model 3200.

2.02 Materials

- A. Sections shall be minimum 2" thick sandwich construction consisting of exterior and interior steel skins with polyurethane core. Both steel skins to be separated by a continuous silicone filling forming a thermal break. Steel skins shall be roll formed commercial quality hotdipped galvanized G60 per ASTM A525, A526, phosphate coated, prepainted with an epoxy primer and baked-on polyester top coat. Door sections constructed of minimum 24 gauge skins and minimum 16 gauge steel end and center stiles. Glazed panels where shown using rubber thermal break gaskets standard with door manufacturer.
- B. Energy Values/Infiltration
 - 1. Minimum R-value of 9.00.
 - 2. Water Infiltration: No infiltration when tested in accordance with ASTM E331.
- C. Finish
 - 1. Exterior and interior steel skins prefinished with the manufacturer's standard process of hotdipped G60 galvanizing, prepainted inside and out with an epoxy primer and finished with a baked-on polyester topcoat. FINISH GUARANTEED AGAINST RUST THROUGH FOR A FULL FIVE YEARS AND SECTIONS AGAINST DELAMINATION FOR A FULL FIVE YEARS.

- D. Hardware
 - 1. All hinges and brackets to be manufactured of hot-dipped galvanized steel, 14 gauge minimum. Ten-ball steel rollers to be full floating ball bearing in case-hardened steel races, mounted to fit the taper of the track. Include all hinges, brackets, collars, locking devices and other hardware for a complete installation.
- E. Tracks
 - 1. 2" or larger vertical tracks to be minimum 14 gauge galvanized steel tapered and mounted for wedge type closing sized per the manufacturer's installation instructions. Horizontal tracks to be minimum 14 gauge galvanized steel, reinforced with minimum 13 gauge galvanized steel angles as required. Brackets to be adjustable for mounting and incline to continuous steel angle wall brackets.
- F. Spring Counterbalance
 - 1. Door assembly to be operated by a torsion spring counterbalance mechanism, with a helically wound oil tempered torsion spring mounted on a steel shaft. Cable drums are die cast aluminum with high strength galvanized aircraft cable with minimum 5 to 1 safety factor.
- G. Locking
 - 1. Inside spring loaded slide bolt lock on end stile shall engage slot in track.
- H. Weatherstripping
 - 1. Bottom of door shall have U-type vinyl bulb seal and an extended aluminum retainer to seal the door to bottom of floor. Jamb and header seals to be EPDM rubber blades.
- I. Electric Operator
 - 1. Like Liftmaster T-5O or approved equal.
 - 2. Motor: Provide ¹/₂ H.P., 115V, single-phase permanent split capacitor motor with built-in automatic reset overload protection.
 - 3. Limit Switches: Provide positive chain drive screw type limit switch, enclosed in electrical control box, easily accessible for setting.
 - 4. Control Wiring: Control voltage shall be 24 volt solid-state circuitry with provision for connection of a safety edge to reverse.
 - 5. Electrical Enclosure: All electrical components shall be in NEMA 1 enclosure.
 - 6. Emergency Operation: A disconnect shall be provided so door can be manually operated. Supply a chain hoist which may be engaged from the floor for manual operation.
 - 7. Operators: Wall mounted three button momentary contact on open-close-stop switches. Provide one per door. Provision for a safety edge to reverse door. Also provide pull cord to open or close door. Provide remote units for vehicles, one per door.

PART THREE - EXECUTION

3.01 Installation

- A. Install door including sections, brackets, guides, tracks, etc. in accordance with the final shop drawings and the manufacturer's written installation instructions. Make all final door adjustments for proper operation.
- B. Securely attach tracks to adjoining construction with not less than 3/8" diameter bolts spaced near each end and not over 24" apart.
- C. Provide all items and accessories necessary for a complete installation.
- D. Locate control switches at least 5' above floor line so operator will have complete visibility of the door.
- E. Upon completion, door openings shall be weathertight and doors shall be free of warp, twists or distortion.
- F. Replace all damaged units at no additional cost to the Owner.

End of Section

SANITARY WATER PROCESS PIPING 40 23 36

PART ONE – GENERAL

1.01 Requirements Included

A. Contractor to furnish all labor, materials, equipment, and incidentals required and all pipe and appurtenances as shown on the Drawings and specified herein.

1.02 Related Specifications Sections

- A. 01 45 00 Quality Control
- B. 09 97 00 Special Coatings
- C. 31 20 00 Earth Moving
- D. 33 12 19 Yard Hydrants
- E. 33 21 00 Water Well Service
- F. 33 31 00 Sanitary Utility Service Piping with OEPA Notes
- G. 33 32 19 Facility Lift Stations
- H. 33 05 27 Utility Pipe Tracer Wire

1.03 References

- A. ASME B16.1 Cast Iron Pipe Flanges and Flanged Fittings; The American Society of Mechanical Engineers.
- B. ASME B31.9 Building Services Piping; The American Society of Mechanical Engineers; (ANSI/ASME B31,9).
- C. ASTM A 53/A 53M Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
- D. ASTM A 74 Standard Specification for Cast Iron Soil Pipe and Fittings.
- E. ASTM A 105 Standard Specification for Steel Pipe Flanges.
- F. ASTM A 126 Standard Specification for Gray Iron Castings for Valves, Flanges and Pipe Fittings.
- G. ASTM C 564 Standard Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings.
- H. ASTM D 1785 Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120.

- I. ASTM D 2241 Standard Specification for Poly (Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series).
- J. ASTM D 2665 Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings.
- K. ASTM D 2846/D 2846M Standard Specification for Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Hot- and Cold-Water Distribution Systems.
- L. ASTM D 2855 Standard Practice for Making Solvent-Cemented Joints with Poly(Vinyl Chloride) (PVC) Pipe and Fittings.
- M. ASTM F 493 Standard Specification for Solvent Cements for Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe and Fittings.
- N. AWWA C104/A21.4 ANSI Standard for Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water.
- O. AWWA C110 American National Standard for Ductile-Iron and Gray-Iron Fittings, 3 In, Through 48 In. (75 mm Through 1200 mm), for Water and Other Liquids; American Water Works Association.
- P. AWWA C111/A21.11 Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings; American Water Works Association (ANSI/AWWA C111/A21.11).
- Q. AWWA C151/A21.51 Ductile-Iron Pipe, Centrifugally Cast, for Water; American Water Works Association (ANSI/AWWA C151/A21.51).
- R. AWWA C153 American National Standard for Ductile-Iron and Gray-Iron Compact Fittings for Water and Other Liquids; American Water Works Association.
- S. AWWA C200 Steel Water Pipe 6 inches and Larger.
- T. AWWA C206 Field Welding of Steel Water Pipe.
- U. AWWA C207 Steel Pipe Flanges for Waterworks Service Sizes 4 inches Through 144 inches.
- V. AWWA C208 Dimensions for Fabricated Steel Water Pipe Fittings.
- W. AWWA C600 Installation of Ductile-Iron Water Mains and Their Appurtenances.
- X. AWWA C604 Installation of Steel Water Pipe 4 In. and Larger.
- Y. AWWA C605 Underground Installation of Polyvinyl Chloride (PVC) Pressure Pipe and Fittings for Water.

- Z. AWWA C651 Disinfecting Water Mains; American Water Works Association (ANSI/AWWA C651).
- AA. AWWA C900 Polyvinyl Chloride (PVC) Pressure Pipe, 4 In. Through 12 In. (100 mm Through 300 mm), for Water Distribution; American Water Works Association (ANSI/AWWA C900).
- BB. AWWA C905 Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 14 In. Through 48 In. for Water Transmission and Distribution.
- CC. CISPI 301 Standard Specification for Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste and Vent Piping Applications; Cast Iron Soil Pipe Institute.
- DD. CISPI 310 Specification for Coupling for Use in Connection with Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications; Cast Iron Soil Pipe Institute.
- EE. MSS SP-58 Pipe Hangers and Supports Materials, Design and Manufacture; Manufacturers Standardization Society of the Valve and Fittings Industry, Inc.
- FF. MSS SP-69 Pipe Hangers and Supports Selection and Application; Manufacturers Standardization Society of the Valve and Fittings Industry, Inc.
- GG. MSS SP-89 Pipe Hangers and Supports Fabrication and Installation Practices; Manufacturers Standardization Society of the Valve and Fittings Industry, Inc.

1.04 Submittals

- A. Section 01 33 00 Submittals and Substitutions
- B. Product Data: Provide data on pipe materials, pipe fittings, valves, and accessories. Provide manufacturers catalog information. Indicate valve data and ratings.
- C. Project Record Documents: Record actual locations of valves.

1.05 Quality Assurance

- A. All non-metallic below grade piping shall be installed with a 12 gauge coated copper wire attached to the crown of the pipe with duct tape in not less than 2 places per length of pipe to provide detectors a means of locating buried lines.
- B. Upon completion of backfilling for trenches, the Contractor shall be responsible for matching the existing surface conditions.
- C. Identify and label all visible pipe with markings indicating the direction of flow.

1.06 Regulatory Requirements

- A. Perform Work in accordance with State & Local plumbing code.
- B. Conform to applicable code for installation of backflow prevention devices.

1.07 Delivery, Storage, and Protection

- A. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.
- B. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system. During laying operations, no debris, tools, clothing or other materials shall be placed in the pipe.

PART TWO – PRODUCTS

2.01 Sanitary Sewer Piping, Buried

- A. Ductile Iron Pipe: AWWA C151/A21.51, minimum pressure class 250 psi.
 - 1. Fittings:
 - a. 90 Bends: Ductile or gray iron, standard thickness, conforming to AWWA C110 (ANSI 21.10).
 - b. All other Bends/Fittings: Ductile or gray iron, conforming to AWWA C153 (ANSI 21.53).
 - 2. Joints: AWWA C111/A21.11, rubber gasket with 3/4 inch diameter rods and concrete thrust blocks as indicated on the Drawings.
 - 3. Flanges: ASME B16.1 125 pound template.
 - 4. Interior Coating: See specification section 09 96 56 Ductile Iron Pipe Protective Coating
 - 5. Exterior Coating: See Specification Section 09 97 00 Special Coatings
- B. PVC Pipe: AWWA C900 and AWWA C905, minimum pressure class 150 psi.
 - 1. Provisions must be made for expansion and contraction at each joint with an elastomeric gasket.
 - 2. Fittings:

- a. 90 Bends: Ductile or gray iron, standard thickness, conforming to AWWA C110 (ANSI 21.10).
- b. All other Bends/Fittings: Ductile or gray iron, conforming to AWWA C153 (ANSI 21.53).
- 3. Joints: Under slabs and foundations, restrained joint fittings shall be provided.
- 4. Random lengths shall not be less than 10 feet long.
- 5. Interior Coating: PVC Pipe No Interior Lining, Ductile Iron Fittings See specification section 09 96 56 Ductile Iron Pipe Protective Coating
- 6. Exterior Coating: PVC Pipe No Exterior Coating, Ductile Iron Fittings See Specification Section 09 97 00 Special Coatings

2.03 Process and Water Piping, Above Grade

- A. Ductile Iron Pipe: AWWA C151/A21.51, minimum pressure class 350 psi
 - 1. Fittings: Ductile or gray iron, standard thickness, conforming to AWWA C110 (ANSI 21.10).
 - 2. Joints: AWWA C111/A21.11, rubber gasket with 3/4 inch diameter rods and concrete thrust blocks as indicated on the Drawings.
 - 3. Flanges: ASME B16.1 125 pound template.
 - 4. Interior Coating: See specification section 09 96 56 Ductile Iron Pipe Protective Coating
 - 5. Exterior Coating See Specification Section 09 97 00 Special Coatings

2.04 Flanges, Unions, and Couplings

- A. Unions for Pipe Sizes 3 Inches and Under:
 - 1. Ferrous pipe: Class 150 malleable iron threaded unions.
- B. Flanges for Pipe Size Over 1 Inch:
 - 1. Ferrous pipe: Class 150 malleable iron threaded or forged steel slip-on flanges; preformed neoprene gaskets.
- C. Grooved and Shouldered Pipe End Couplings:

- 1. Housing: Malleable iron clamps to engage and lock, designed to permit some angular deflection, contraction, and expansion; steel bolts, nuts, and washers; galvanized for galvanized pipe.
- 2. Sealing gasket: "C" shape composition sealing gasket.
- D. Dielectric Connections: Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier.

2.05 Pipe Hangers and Supports

- A. Process Piping:
 - 1. Conform to ASME B31.9.
 - 2. Hangers for Pipe Sizes 1/2 Inch to 1-1/2 Inches: Malleable iron, adjustable swivel, split ring.
 - 3. Hangers for Pipe Sizes 2 Inches and Over: Carbon steel, adjustable, clevis.
 - 4. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
 - 5. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.
 - 6. Wall Support for Pipe Sizes 4 Inches and Over: Welded steel bracket and wrought steel clamp.
 - 7. Vertical Support: Steel riser clamp.
 - 8. Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
 - 9. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.
- B. Plumbing Piping Water:
 - 1. Conform to ASME 831.9.
 - 2. Hangers for Pipe Sizes 1/2 Inch to 1-1/2 Inches: Malleable iron, adjustable swivel, split ring.
 - 3. Hangers for Cold Pipe Sizes 2 Inches and Over: Carbon steel, adjustable, clevis.
 - 4. Hangers for Hot Pipe Sizes 2 Inches to 4 Inches: Carbon steel, adjustable, clevis.
 - 5. Hangers for Hot Pipe Sizes 6 Inches and Over: Adjustable steel yoke, cast iron pipe roll, double hanger.

- 6. Multiple or Trapeze Hangers: Steel channels with welded supports or spacers and hanger rods.
- 7. Multiple or Trapeze Hangers for Hot Pipe Sizes 6 Inches and Over: Steel channels with welded supports or spacers and hanger rods, cast iron roll.
- 8. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.
- 9. Wall Support for Pipe Sizes 4 Inches and Over: Welded steel bracket and wrought steel clamp.
- 10. Wall Support for Hot Pipe Sizes 6 Inches and Over: Welded steel bracket and wrought steel clamp with adjustable steel yoke and cast iron pipe roll.
- 11. Vertical Support: Steel riser clamp.
- 12. Floor Support for Cold Pipe: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
- 13. Floor Support for Hot Pipe Sizes to 4 Inches: Cast iron adjustable pipe saddle, locknut, nipple, floor flange, and concrete pier or steel support.
- 14. Floor Support for Hot Pipe Sizes 6 Inches and Over: Adjustable cast iron pipe roll and stand, steel screws, and concrete pier or steel support.
- 15. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.

2.06 Pipe Penetration Seals

- A. Wall/floor penetration seals shall be used to continuously fill the annular space between pipe and wall/floor. Wall/floor penetration seals, once expanded, shall provide a seal between the pipe and wall/floor opening.
- B. Where walls or floors have pipe penetrations that are continuously wet on one or both sides, the use of wall sleeves with water stops shall be employed along with the wall/floor penetration seal to achieve a watertight seal between pipe and wall/floor opening.
- C. The wall/floor opening size and/or type shall be selected according to recommendations found in seal penetration manufacturer's representative catalog. The wall/floor opening refers to a steel or plastic sleeve, core drilled hole or cast-formed hole.
- D. Penetration Seal Rubber Links;
 - 1. The wall/floor penetration seal shall be made of mechanically interlocked, solid synthetic rubber links. There shall be a sufficient quantity of links about the pipe that once expanded, shall achieve a 20-PSI hydrostatic seal between pipe and wall/floor opening.

- 2. The elastomer element shall be EPDM elastomer.
- 3. Penetration seal pressure plates shall be molded of glass reinforced nylon.
- 4. Hardware Fasteners shall consist of stainless steel bolts and hex nuts.
- E. Wall Sleeves
 - 1. Cast in place concrete wall sleeves are to be fabricated from galvanized heavy wall welded or seamless carbon steel pipe. All sleeves are to have a 2" wide, full perimeter water stop, welded on both sides.

2.07 Tracer Wire and Access Boxes

- A. See specification section 33 05 27 Utility Pipe Tracer Wire
- B. All new buried piping shall be installed with tracer wire. The tracer wire shall be installed continuously along the new pipe route with access points at 300 feet maximum. The tracer wire shall be brought to the ground surface at the access points. Access points may include valve boxes, handholes, manholes, vaults, or other covered access devices. Access point covers shall be clearly marked with a pipe description. Splices in the tracer wire shall be connected by means of a split bolt or compression type connector to ensure continuity. Wire nuts shall not be used. A waterproof or corrosion-proof connector for direct bury applications shall be used. After installation, the tracer wire shall be tested to verify continuity of the tracer wire system.
- C. For locations where valve boxes are not present, the tracer wire access point shall be composed of one SnakePit Tracer Wire Access Box, or approved equal, installed at each proposed access point.
- D. At each valve location, a loop of wire is to be brought up the outside of the valve box and looped Inside the box through a hole drilled two (2) inches below the bottom of the lid.

PART THREE – EXECUTION

3.01 Examination

A. Verify that excavations are to required grade, dry, and not over-excavated.

3.02 Preparation

- A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
- B. Remove scale and dirt, on inside and outside, before assembly.
- C. Prepare piping connections to equipment with flanges or unions.

3.03 Installation

- A. Install in accordance with manufacturer's instructions.
- B. Install to the required lines and grades with fittings, valves, and accessories at the required locations; spigots centered in the bells; and all valves and appurtences properly aligned. The laying of pipe shall conform to the applicable portions of AWWA C600, AWWA C604, or AWWA C605.
- C. Pressure test all piping in accordance with AWWA C600, AWWA 0604, or AWWA C605 to a minimum test pressure of 150 psi, unless otherwise indicated.
- D. All piping and fittings shall be rigidly supported.
- E. Provide non-conducting dielectric connections wherever jointing dissimilar metals.
- F. Route piping in orderly manner and maintain gradient. Route parallel and perpendicular to walls, except as indicated otherwise on the Drawings.
- G. Install piping to maintain headroom, conserve space, and not interfere with use of space.
- H. Group piping whenever practical at common elevations.
- I. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- J. Deflections from a straight line or grade made necessary by vertical or horizontal curves or offsets shall not exceed the manufacturer's recommendations. If the required alignment requires deflections in excess of those recommended, the Contractor shall either provide special bends, as approved by the Engineer, of a sufficient number of shorter lengths of pipe to provide angular deflections within the required limit.
- K. Laying of pipe shall be commenced immediately after the excavation is started, and every means must be used to keep pipe laying closely behind the trenching. The Engineer may stop the trenching when, in the opinion of the Engineer, the trench is open too far in advance of the pipe laying operation. Pipe may be laid in the best manner adapted to securing speed and good results.
- L. Inspect pipe and fittings for defects and all lumps, blisters, excess coal-tar coating and other foreign material shall be removed from the bell and spigot end of each cast iron or PVC pipe, or inside of PVC couplings and fittings. All pipe, couplings, adapters, and other pipe connections shall be wiped clean and dry before the pipe is laid.
- M. After placing a length of pipe in the trench, center the spigot end in the bell and force the spigot end into the bell end.
- N. Secure the pipe in place with approved backfill material tamped under It except at the bells. Pipe and fittings which do not allow a sufficient and uniform space for joints shall be

removed and replaced with pipe and fittings of proper dimensions to insure each uniform space.

- O. Prevent dirt from entering the joint space.
- P. The cutting of cast iron pipe for inserting valves, fittings, or closure pieces shall be done in a neat and workmanlike manner without damage to the pipe or cement lining and so as to leave a smooth end at right angles to the axis of the pipe.
- Q. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings.
- R. Establish elevations of buried piping outside the building to ensure not less than 4 ft of cover.
- S. Install vent piping penetrating roofed areas to maintain integrity of roof assembly.
- T. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welding.
- U. Provide restrained joint fittings under all slabs.
- V. Provide support for utility meters in accordance with requirements of utility companies.
- W. Prepare exposed, unfinished pipe, fittings, supports, and accessories ready for finish painting. Refer to Section 09 97 00 Special Coatings.
- X. Excavate in accordance with Section 31 20 00 for work of this Section.
- Y. Backfill in accordance with Section 31 20 00 for work of this Section.
- Z. Install bell and spigot pipe with bell end upstream.
- AA. Install valves with stems upright or horizontal, not inverted; unless indicated otherwise on the Drawings.
- BB. PVC Pipe: Make solvent-welded joints in accordance with ASTM D 2855. AC. Sleeve pipes passing through partitions, walls and floors.
- CC. Inserts:
 - 1. Provide inserts for placement in concrete formwork.
 - 2. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
 - 3. Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inches.

- 4. Where inserts are omitted, drill through concrete slab from below and provide through-bolt with recessed square steel plate and nut above slab.
- DD. Pipe Hangers and Supports:
 - 1. Install in accordance with ASME B31.9.
 - 2. Support horizontal piping as scheduled.
 - 3. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.
 - 4. Place hangers within 12 inches of each horizontal elbow.
 - 5. Use hangers with 1-1/2 inch minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
 - 6. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
 - 7. Prime coat exposed steel hangers and supports. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.
 - 8. Support cast iron drainage piping at every joint.

3.04 Application

- A. Use grooved mechanical couplings and fasteners only in accessible locations.
- B. Install unions downstream of valves and at equipment or apparatus connections.
- C. Install gate valves for shut-off and to isolate equipment, part of systems, or vertical risers.
- D. Provide lug end butterfly valves adjacent to equipment when provided to isolate equipment.
- E. Provide spring loaded check valves or as otherwise Indicated on the drawings on the discharge of all water and wastewater pumps.

3.05 Erection Tolerances

- A. Drainage Piping: Establish invert elevations within 1/2 inch vertically of location indicated and slope to drain at minimum of 1/4 inch per foot slope.
- B. Water Piping: Slope at minimum of 1/32 inch per foot and arrange to drain at low points.

3.06 Schedules

- A. Pipe Hanger Spacing:
 - 1. Metal Piping:
 - a. Pipe size: 1/2 inches to 1-1/4 inches:
 - i. Maximum hanger spacing: 6.5 ft.
 - ii. Hanger rod diameter: 3/8 inches.
 - b. Pipe size: 1-1/2 inches to 2 inches:
 - i. Maximum hanger spacing: 10 ft.
 - ii. Hanger rod diameter: 3/8 inch.
 - c. Pipe size: 2-1/2 inches to 3 inches:
 - i. Maximum hanger spacing: 10 ft.
 - ii. Hanger rod diameter: 1/2 inch.
 - d. Pipe size: 4 inches to 6 inches:
 - i. Maximum hanger spacing: 10 ft.
 - ii. Hanger rod diameter: 5/8 inch.
 - e. Pipe size: 8 inches to 12 inches:
 - i. Maximum hanger spacing: 14 ft.
 - ii. Hanger rod diameter: 7/8 inch.

f. Pipe size: 14 inches and Over:

- i. Maximum hanger spacing: 20 ft.
- ii. Hanger rod diameter: 1 inch.
- 2. Plastic Piping:
 - a. All Sizes:
 - i. Maximum hanger spacing: 5 ft.
 - ii. Hanger rod diameter: 3/8 inch.

End of Section

UV DISINFECTION EQUIPMENT 46 66 00

PART ONE – GENERAL

1.01 Requirements Included

- A. Scope
 - 1. Furnish all labor, materials, equipment and appurtenances required to provide an ultraviolet (UV) disinfection system and install it based on manufactures recommendations.
 - 2. This is a gravity flow system and the system shall be based the 10 States Standard, Chapter 100, Section 104.00 Requirements.
 - 3. This is to be a complete and operational system with all controls, equipment and accessories as shown and specified.
 - 4. The Contractor, at his/her expense shall to make any deviations to the cast-inplace concrete, area configuration, piping and electrical requirements based on the UV system that the Contractor selects.
- B. Related Work (Specified Elsewhere):
 - 1. Section 03 30 00 Cast-in-Place Concrete.
 - 2. Section 26 00 00 Electrical.
 - 3. Section 01 33 00 Submittals

1.02 Quality Assurance

- A. Design Criteria
 - 1. UV system shall meet the requirements of the 10 States Standard, Chapter 100, Section 104.00.
 - 2. Provide equipment which will disinfect an effluent with the following characteristics:

a.	Peak Flow:	1.0 MGD
b.	Average Flow:	0.40 MGD
c.	Total Suspended Solids:	< 30 mg/L
d.	Ultraviolet Transmittance @ 254 nm:	65 %
e.	Maximum Allowable Headloss	< 8" @ Max Flow Rate
f.	Annual Effluent Temperature Range:	33 to 85 °F or 0 to 29 °C

- 3. Microbiological Requirements
 - a. Effluent standard to be guaranteed: 126 E. Coli / 100 ml based 30 day Geometric Mean.

- 4. Performance Validation:
 - a. Bioassay validation methodology to follow protocols described in US EPA Design Manual - Municipal Wastewater Disinfection (EPA/625/186/021), without exception.

1.03 Submittals

- A. Shop Drawings:
 - 1. Submit for review shop drawings showing the following:
 - a. Complete description in sufficient detail to permit an item comparison with the specification.
 - b. Dimensions and installation requirements.
 - c. Descriptive information including catalogue cuts and manufacturers specifications for components.
 - d. Electrical schematics and layouts.
 - e. Experience documentation.

1.04 Guarantee

- A. Equipment:
 - 1. The equipment furnished under this section will be free of defects in material and workmanship, including damages that may be incurred during shipping for a period of 12 months from date of equipment stat-up and placed into service.
- B. UV Lamps:
 - 1. The UV lamps to be warranted for a minimum of 14,000 hours (non-prorated) or thirty-six (36) calendar months from shipment, whichever comes first. Prorated lamp warranties will not be accepted. On / off cycles are limited to an average of four (4) per day without exception.
- C. 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.

PART TWO – PRODUCTS

2.01 Manufacturer

- A. The UV Disinfection equipment shall be manufactured by: (Pre-Qualified Listing)
 - 1. Wedeco (Xylem)
 - 2. Trojan Technologies
 - 3. ETS-UV (Evoqua)
 - 4. Glasco UV
 - 5. Or Approved Equal

2.02 Design, Construction and Materials

- A. System Construction
 - 1. UV system will be designed for complete outdoor installation, without shelter or supplemental cooling or heating required.
 - 2. Chambers to be constructed of 316L Stainless Steel.
 - 3. All wetted parts shall be Stainless Steel, High Purity Quartz or other UV resistance materials.
- B. Monitoring/Control System:
 - 1. 10 States Standards Section 104.6
 - a. An alarm shall be provided to separately indicate lamp failure, UV intensity and any other cause of UV disinfection unit failure.
 - 2. A sensor shall continuously sense the UV intensity produced in each bank of UV lamp modules.
 - 3. Elapsed time in hours (lamp age) shall be provided in the system.
 - 4. Monitoring System will be enclosed in a 316 SS NEMA 4X panel and is to be located less than twelve (12) feet from the UV System.
 - 5. Alarms shall be provided to detect possible water quality problems or fouling of the system. Any alarms shall have set points that are field adjustable.

2.03 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. Useful lamp life shall be guaranteed at 14,000 operating hours for each lamp under normal operation conditions. Normal operation conditions include a maximum of four on/off cycles per 24 operating hours.
- D. 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.
- E. 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.

- F. Energy input to the lamp shall be variable from 50 -100% of electrical power.
- G. Lamps with no capability to automatically vary the UV power output in operation shall not be permitted.

2.04 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. 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.
- C. Lamps shall be removable with the quartz sleeve and wiper system remaining in place.
- D. 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.

2.05 Wiping / Self Cleaning 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 wiping system shall be controlled by the UV system control unit and provide a fully automatic, unattended operation.
- D. The number of wiping strokes per interval may be factory pre-set for optimum effect and shall be easily reset by the owner from 1 to 5 strokes per interval without voidance of the warranty.
- E. 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.

2.06 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.

2.07 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.
- D. A drain plug shall be provided for draining upstream of the weir for cleaning purposes.

PART THREE – ELECTRICAL and CONTROLS

3.01 Basic Requirements

- A. Plant voltage is 460VAC. Contractor to accommodate lower voltages if selected equipment warrants.
- B. The electrical system shall provide segregation of plant services and supplies into sensible groups to allow for safe and simple maintenance or servicing.
- C. Sensitive electronic components e.g. electronic ballast cards shall not be exposed to the risk of being flooded.
- D. 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.

E. Systems or designs that expose sensitive electrical or electronic components to excess humidity or poor air quality for cooling are not acceptable.

3.02 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. No single control component shall be permitted. The control system is to be subcomponent based where-as sub-components can be replaced easily by the plant operator. The need for the manufactures repair personnel shall not be required for simple repairs and/or upgrades.
- C. 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.
- D. The ballast shall detect lamp failure and initiate a re-strike sequence, independently from any external influence. The ballast shall attempt re-starting multiple times before shutting down.
- E. 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.
- F. The ballast shall incorporate a temperature controlled pre-heat circuit to minimize lamp failure on start up.
- G. The operating power factor for the ballasts shall be min. 0.99.
- H. 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.
- I. In order to avoid net harmonics and radiated interferences, the electronic ballasts shall be equipped with an active harmonic filter.
- J. Ballasts requiring liquid closed loop re-circulating heat exchanger systems, e.g. propylene glycol, for cooling shall not be permitted.
- K. Ballasts, for which replacement a watertight seal needs to be broken, shall not be permitted.
- L. Ballasts, for which replacement the removal of the module is required, shall not be permitted.

3.03 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. Systems which used a calculated lamp replacement are not acceptable. Only actual measured UV intensity shall be the indication for replacement.

PART FOUR – EXECUTION

- A. A field service technician or start-up engineer of the UV System Supplier shall commission the UV equipment.
 - 1. Local manufacturer's representatives are not acceptable to perform these tasks unless authorized by the UV System Supplier.
- B. 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
- C. The minimum time for installation inspection, start-up, system commissioning, and operator training shall be a total of three (3) days within one (1) trip.
- D. The plant operator shall furnish the first (full 30 days) Monthly Operating Report (MOR) to the manufacture to insure product compliance.

End of Section

MISSING KEYNOTE FROM SHEET 8/17 LAB BUILDING:

KEYNOTE	MANUFACTURER	MODEL NUMBER	DESCRIPTION	HARDWARE:
16	KEWAUNEE	W20M301348-	SWINGING GLAZED DOORS	PER SPEC SHEET - 12 35 53.13



NORTH LAB / CONTROL ROOM ELEVATION

SCALE: 1/4" = 1'

ROOM FINISH SCHEDULE			01000000000000000000000000000000000000															
NAME		FLOOR			BASE			WALL			CEILING		;	HEIGHT	NOTES			
LAB	101	٠				•			•	••	-		•				8'-0"	
MECHANICAL ROOM	102	٠					•		•	•				•			9'-5"	
CORRIDOR	103	٠				•			•				•				8'-0"	
RESTROOM	104	•				•			•	•			•				8'-0"	
MAINTENANCE ROOM	105	•					•		•	•				•			9'-5"	
POWER AND CONTROL ROOM	106	•					•		••	• •				•			9'-5"	
EXISTING HIGH FLOW PUMP STATION	107		•				•			•	•			•			FLOOR ELEVATION VARIES	EXISTING CONCRETE WALLS AND FLOOR TO BE PRESSURE WASHED AND REPAIRED AS NEEDED.
STORAGE	108		•				٠			٠				•			12'-1"	

NOTE:

- 1. CONCRETE TREATMENT A: TNEMEC SERIES 201 EPOXOPRIME (PRIMER), SERIES 237 COLOR POWER-TREAD (INTERMEDIATE), SERIES 247/248 CLEAR EVERTHANE (TOPCOAT). SEE SPECIFICATION SECTION 09 67 23 FOR MORE DETAILS. OR APPROVED EQUAL.
- 2. CONCRETE TREATMENT B: CONCRETE DENSIFYER CHEMPROBE CT DENSIFYER SERIES 629. SEE SPECIFICATION SECTION 03 35 10 FOR MORE DETAILS. OR APPROVED EQUAL.
- 3. CONCRETE TREATMENT C: TNEMEC SERIES 151-1051 ELASTO-GRIP FC APPLIED AT 200 TO 250 SQUARE FEET PER GALLON (PRIMER), TNEMEC SERIES 113 HB TNEME-TUFCOAT APPLIED AT 4.0 TO 6.0 MILS DFT (INTERMEDIATE COAT), TNEMEC SERIES 113 HB TNEME-TUFCOAT APPLIED AT 4.0 TO 6.0 MILS DFT (FINISH COAT). OR APPROVED EQUAL. SURFACE PREPARATION : PRESSURE WASH USING 2,500 PSI EQUIPMENT FITTED WITH 0 DEGREE OSCILLATING TIP. PREPARED SURFACE MUST BE CLEAN, DRY, AND FREE OF CONTAMINANTS.

