IOWA DEPARTMENT OF NATURAL RESOURCES **ADDENDUM No. 1**
LAND & WATERS BUREAU
WALLACE STATE OFFICE BUILDING

SPIRIT LAKE FISH HATCHERY
UPGRADE TO RAS SYSTEM
DICKINSON COUNTY, IOWA
PROJECT NUMBER: 21-01-30-01

Date September 8, 2020

This Addendum is issued to modify, explain or correct the original Drawings and Specifications, and is hereby made a part of the Contract Documents. Please attach this Addendum to the Project Manual in your possession. Insert the number and issue date of this Addendum in the blank space provided on the Proposal Form.

Project: N/A

Specifications:

1. Add attached Section 22 32 23 – Carbon Filters.
2. Replace all of Section 43 25 13 – Submersible Pumps With attached Section 43 25 13 – Submersible pumps and Static Mixers.
3. Section 40 66 16 – Closed-Vessel Low-Pressure High-Intensity Ultraviolet Equipment:

   Replace 2.1, D. With:

   Given 60 deg. F water with 81% UVT, dose shall be 40 mJ/sq cm validated (pre-validated per US EPA UVDGM or DVGW or Onorm or NWRI) or 60 mJ/sq cm (non-validated; but, calculated per US EPA UVDGM or DVGW or Onorm or NWRI). The associated flow rate for packages tagged UV-1 thru 3 shall be 115 us gpm and 1,000 watts max. and for UV-4 shall be 30 gpm and 500 watts max. UV vessels shall be suitable for installation with lamps vertical and vessels and manufacturer recommended maintenance space and inlet field piping shall not be more than 10'-6" altogether. Input voltage will be 208 volt single phase.

   Replace 2.4, A., 1 and 2 and 3 With:

   1. UltraAqua UV (represented by Innovasea, Baton Rouge) models MR3-220SS and MR1-220SS
   2. Trojan/Aquafine models Logic 04AS20 and SwiftSC B03

4. Section 43 32 13 – Inline Centrifugal Pumps

   Part 2.2, A. Replace "Close coupled" With "Split coupled."

   Replace Parts 2.2, G and H With:

   Pumps tagged in the Drawings TP-1 thru 3 shall be for 60 gpm @ 13' TDH, ¾ hp max., 2 inch connections such as Taco KS 2006 and Grundfos TP-50 Series and pump tagged TP-4 shall be for 35 gpm @ 6' TDH, ½ hp max., 1-1/2 inch connections such as Taco 1506 and Grundfos TP-40 Series. All are 1800 rpm, 208 volt 1 phase.

   Delete Part 2.3.

Plans:

1. Replace Sheet G-4 with attached Sheet G-4R.
2. Replace Sheet D-4 with attached Sheet D-4R.
3. Sheet S-3: Add "Note: Subdivide grating into pieces no larger than 40 x 30.5 inches nominal."

4. Sheet S-8, Sections A & B: Change "SOCID" to "ESOCID" and Add "Note: Provide piping connections per D-5 and any addenda thereto."

5. Sheet D-3

West of the 12 ft inside length tanks (Walleye Fry Tanks 3' rather than 2.5' H) is shown another tank (Fry Transfer Tank) who's outside length measures 42 inches which is a maximum. There shall be a 2nd Fry Transfer Tank centered 6.25' north of the 1st. Each Fry Transfer Tank shall be 2'x3' inside at the rim and 2' inside depth with 2.5 inch flush PVC coupling out the bottom center with removable standpipe for drainage. Each Fry Transfer tank shall have four lockable stainless steel casters with rubber wheels that place the tank rim 2.5' above floor. Contactor add pipe stub to each outlet to direct effluent through a hole in the fiberglass floor of the room into 3 inch pipes shown on D-2.

Shorten the 1 inch PR supply shown from the north so that it fills the north Fry Transfer Tank. Provide similar valved supply to the south Fry Transfer Tank from the 3 inch riser south of it.

Three places 3 inch risers, from the three pairs of Walleye Reuse Pumps (WRP-1 thru 6) on Sheet D-2, are depicted west of the 12 ft inside length tanks. These risers shall have water flow meters WM-5, 6 & 7 eye level, followed by V-port ball valves.

Dimensions given for Musky Fry Tank in southeast corner of room are inside dimensions and rim shall be 3 inch max. Legs shall be thread adjustable to allow overall tank height to be adjusted between 35 & 36 inches above floor. Tank shall have screen slots (recessed or surface mounted) at side walls 0.5' from both tank ends. Inward pointed PVC elbows shall be factory bonded flush in the bottom of the tank centered 3 inches from both ends and removable standpipes shall be provided in these elbows for drainage. Provide rubber coupling atop the standpipes for height adjustment.

Similar to 4/D-6, provide 3 inch piping from the upper and lower drain troughs of the Esocid Jar Rack to the Musky Fry Tank, expect the pipes will go over the top of the tank, rather than to sidewall couplings, to near the Musky Fry Tank center using horizontal 45 deg els.

The two circles at the ends of the PR pipes over the three walleye Jar Racks represent Aeration Columns per B/D-4R.

Esocid Jar Rack Aeration Columns shall be similar to B/D-4R except skinnier.

Move Key Note 8 item to northeast corner of jar rack; locate tee in nearest overhead 3 inch PR pipe. Similarly provide a ¾ inch valve at the northeast corner of the Esocid Jar Rack fed from the piping split to the 6 inch aeration columns shown and noted over the Esocid Jar Rack.

6. Sheet D-5, Detail B:

Delete 3 inch PR piping. Instead provide piping between upper and lower supply troughs except in 2 inch size located 3 inches from the trough corners.

7. Sheet D-6, Plan 2: Add a pair of screen slots to the walls at 10" from the drain end and Change dimension "5 inches" To "6 inches."

8. Sheet D-6, Section 4: Removable vertical solid plate(s), screen(s) and covers shall be by DNR.

SECTION 22 32 23

CARBON FILTERS

PART 1 GENERAL

1.0 SCOPE OF WORK

A. Provide carbon filters as shown in the Drawings.
B. Filters shall be capable of treating potable water from a municipal supply that contains residual chlorine used for disinfection and shall achieve the following treatment goals based on the influent loading:

Raw Water Design Data:

Chlorine	2.0	ppm max

Filter Effluent Design Quality:

Chlorine	less than	0.01	ppm

C. Package shall include pressure filtration system with granular activated carbon, Sch80 PVC piping, hoses, inlet distributor, underdrain system.

1.1 SUBMITTALS

A. Provide submittals in accordance with DIV 01.

B. Submittals shall be provided for items listed below:

1. Manufacturers Product Data:

   a. Pressure Filters
   b. External piping to and including hoses.
   c. Internal piping.
   d. Filter media including material, gradation and depths.

2. Shop Drawings:

   a. Each pressure filter assembly, materials, port sizes and locations, media, etc.
   b. Filter overall dimensions, filter arrangement, plan view elevation, side view.
   c. Equipment Layout.

3. Operation and Maintenance Manuals shall be provided on:

   a. Each filter system.
   b. All mechanical equipment including valves, meters, pumps, etc. as supplied by filter manufacturer.

1.4 OPERATOR INSTRUCTIONS

A. Provide three copies of bound step-by-step operator start-up and operating instructions for the filter plant. Instructions for each of these units shall be typewritten on 8-1/2" x 11" paper.

1.5 PRODUCT DELIVERY AND STORAGE

A. Contractor shall not bring filtration equipment onto site until building is sufficiently complete to set the equipment in its designated space. Storage of un-protected equipment outdoors at the site for more than five (5) days will not be permitted. All equipment temporarily stored outside shall be protected with tarps tightly secured.

1.6 JOB CONDITIONS

A. Existing Conditions

1. If existing conditions prohibit proper installation or as shown on the Drawings or specifications herein, the Contractor shall notify the Engineer in writing requesting instruction.
2. The Contractor is responsible for the verification of new and existing dimensions, locations, elevations, and materials on site before that particular phase of installation begins.

1.2 REFERENCES

A. Industry standard references shall be noted, as applicable, in this specification and shall be considered a part of this specification.
   a. All Filter Media must be NSF approved and meet AWWA B100 standards

1.3 QUALITY ASSURANCE

A. A single supplier whose experience includes design, fabrication, and operation of water plants of a size and complexity similar to that specified herein shall furnish all major equipment and materials. Filter Supplier shall take complete responsibility for the operation of the new filtration equipment and the integration with the existing city water supply system.

PART 2 PRODUCTS

2.1 ACCEPTABLE PRODUCTS

A. Filter Tech Systems, Inc. of Grand Junction, CO model AquaTech GAC24/3-3

B. Westech

2.2 GENERAL

A. The units shall be of the size and shape as shown in the plans and meeting the specified design criteria. The pressure filters shall be 24" diameter x 72" side shell. Filter media shall consist of 0.55 – 0.75 mm coal-based granular activated carbon (Calgon FiltraSorb 400 or equal) and support gravel.

2.3 DESIGN AND PERFORMANCE REQUIREMENTS

A. Type of System Granular Activated Carbon for Chlorine Removal
B. Design Flow 60 GPM
C. No. of Filters Three
D. Type of Filter Granular Activated Carbon
E. Surface Area 3.14Square Feet per filter
F. Filtration Rate 6.37 gpm/ft^2 per filter
G. Backwash Rate 10 gpm/ft^2 per filter
H. Backwash Flow 31.4gpm maximum

2.4 FILTER TANKS

A. The filters shall be fiberglass/composite vessels with a diameter of 24" and an overall height (inclusive of stand) of 80.4" constructed of non-corrosive material according to the features and dimensions as shown on the drawings. The total vessel capacity shall be 119 gallons.
B. The pressure vessels shall have an operating pressure of 150 psi and designed with a 4:1 minimum for burst pressure.
C. The pressure vessel shall be designed to pass a 0 to rated operating pressure cycle test of 250,000 cycles without failure.
D. The pressure vessel shall be capable of withstanding negative pressure up to 5" Hg.
E. The pressure vessel inner shell shall be constructed of virgin PE material and shall be constructed in such a way as to isolate the fluid contents of the pressure vessel to eliminate corrosion, intrusion or reaction. The pressure vessel inner shell material will be the only material in contact with the contents.
F. The outer pressure vessel shall be constructed of continuous fiberglass roving.
G. Threaded pressure vessel openings shall be an UN thread specification with a positive O-ring seal.
H. The pressure vessel shall have a 4" opening in the center of the top dome and a 4" opening at the center of the bottom dome.
I. Connections to the pressure vessel and controller shall accommodate vertical expansion between top and bottom openings and between openings and hard piping.
J. The pressure vessel support base shall be a tripod design. Accessibility to the bottom of the pressure vessel is required for servicing and maintenance.
K. Clearance at the bottom of the pressure vessel shall be sufficient to service remove and replace the drain valve without moving the tank.

L. The pressure vessel shall be equipped with an adequate vacuum breaker installed between the pressure vessel inlet and any valve.
M. Tank bottom opening shall be fitted with an elbow and PVC True Union Ball Valve to be used as a filter drain and easily removed to be used for media removal
N. Tank top opening shall be used for filter influent and effluent piping.
O. Filtered water outlet shall be fitted with a bajonet-type high-flow underdrain.
P. The distributor tube to be held in place by an O-Ring seal.

Q. Filter influent and effluent piping shall be factory installed prior to shipping. Filter media will be installed in the field by the Contractor under direct supervision of the supplier's factory–direct field representative.

2.6 FILTER PIPING

A. All filter piping under pressure shall be solvent-welded Schedule 80 PVC. Flanges shall be provided at appropriate intervals to facilitate servicing.
B. All mounting hardware to be zinc-coated, stainless steel or aluminum.
C. All nuts, bolts, flat washers to be zinc-coated or stainless steel.
D. For the three filters, furnish one educator and hose as shown in the project Drawings for removal of media after multiple seasons of operation.

2.7 FILTER MEDIA

The filter manufacturer shall furnish dual media filter beds consisting of the following:

1. 36 inches of 0.55 – 0.75 mm Granular Activated Carbon.
   Uniformity coefficient shall not exceed 1.9

2. Bottom head to be filled with high-density support gravel in a sufficient amount to cover the upper-most portion of the underdrain with 3" of support gravel.

All Filter Media shall meet or exceed AWWA Standard B100 for filter Media.

The filter-plant manufacturer shall provide at least 5% additional media material, as compared to theoretical, to allow for unforeseen losses. The filter media shall be delivered to the jobsite in one cubic foot bags, palletized and stretch-wrapped with each individual bag tagged and marked with the size of its contents.

PART 3 EXECUTION

3.1 GENERAL

A. Installation, start-up and testing shall be conducted in accordance with DIVISION 01.

3.2 FILTER MEDIA INSTALLATION

A. The Installation Contractor shall install the media carefully, only under the technical direction of the factory-direct technical representative who shall be present during the installation and startup.
B. Starting with the support gravel, the contractor shall place the material in the filter to the depths indicated. The gravel shall be dumped from the top of the filter.

C. Contractor to install the underdrain in the lowest level of gravel taking care to pack the gravel under the header and laterals and to ensure that no gravel gets into the headers or laterals.
D. Following the above, the Contractor shall install the Granular Activated Carbon media per the manufacturer's specifications:

1. Fully submerge GAC bed in clean, contaminant free water for at least 16 hours (overnight)
2. Open backwash inlet and begin up-flow at 3 gpm/ft2 for 2 minutes
3. Increase flow to 5 gpm/ft2 and maintain for 2 minutes
4. Increase flow to 7 gpm/ft2 and maintain for 2 minutes
5. Increase flow to 8.5 gpm/ft2 and maintain for 30 minutes
6. Decrease flow to 7 gpm/ft2 and maintain for 2 minutes
7. Decrease flow to 5 gpm/ft2 and maintain for 2 minutes
8. Decrease flow to 3 gpm/ft2 and maintain for 2 minutes
9. Close backwash inlet and stop flow

3.3 TRAINING

A. Training shall be conducted in accordance with Division 01. The Contractor shall provide the factory-direct engineer from the treatment plant manufacturer for plant startup assistance and operator training to include placement directions of the filter media, plant equipment & control checkout, and operator instruction. The factory-direct engineer shall have had experience in training operators on at least five plants of the size and complexity similar to this project.
B. The factory-direct engineer shall include, as part of the operator training, discussions relating to chemical feed, filtration, effect of major variables on plant operation, use of various chemicals, factors influencing chlorine removal and filtration and the various components of system and their interrelationship.
C. Also to be presented during the training shall be the calculations relating to chemical feed, the use of constants to facilitate the calculations, and sample calculations to illustrate how the calculations are accomplished.
D. The operator training shall include discussions concerning the effect of pH on the process operation.
E. After going through the training sessions described above the plant operators will be expected to take over the new filter train operation with "over-the-shoulder" coaching from the factory direct engineer.

END OF SECTION

SECTION 43 25 13
SUBMERSIBLE PUMPS AND STATIC MIXERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Submersible pumps, lift out check valves, rail systems and controls.
   2. Static Mixers

B. Related Specification Sections include but are not necessarily limited to:
   1. Division 01 - General Requirements.
   2. Section 26 05 00 - Electrical: Basic Requirements.
   3. Section 43 21 00 - Pumping Equipment: Basic Requirements.

1.2 QUALITY ASSURANCE

A. Referenced Standards:
   1. American National Standards Institute (ANSI).
   2. National Electrical Manufacturers Association (NEMA):
      a. 250, Enclosures for Electrical Equipment (1000 Volts Maximum).
   3. National Fire Protection Agency (NFPA):
      a. 70, National Electrical Code (NEC):
         1) Article 500, Hazardous (Classified) Locations, Classes I, II, and III, Divisions 1 and 2.
   4. Underwriters Laboratories, Inc. (UL).
      a. 62, Flexible Cord and Fixture Wire

1.3 SUBMITTALS

A. Shop Drawings:
   1. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
   2. Requirements in Specification Section 43 21 00.

B. Operation and Maintenance Manuals:
   1. See Specification 01 33 00 for requirements for:
      a. The mechanics and administration of the submittal process.
      b. The content of Operation and Maintenance Manuals.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
   1. Submersible Pumps tagged in the Drawings WRP-1 thru 6 for Walleye Reuse Pumps:
      a. Ebara
      b. Mody
      c. Tsurumi
   2. Submersible Pumps tagged in the Drawings ERP-1 & 2 for Esocid Reuse Pumps.
      a. Zoeller
      b. Liberty
   3. Rail and Lift Out Check Valve System:
      a. Jackel Engineered Products
      b. Topps

4. Static Mixers
    a. Komax
    b. Koflo
    c. Filter Tech Systems, Grand junction, CO

2.2 ESOCID RESUE PUMPS

A. CONSTRUCTION: Stainless body or epoxy or powder coated body of class 25 cast iron. All mating parts shall be machined and sealed with a Buna-N O-ring. All fasteners exposed to the liquid shall be stainless steel. The motor shall be protected on the top side with sealed cord entry plate with molded pins to conduct electricity eliminating the ability of water to enter internally through the cord. The motor shall be protected on the lower side with a unitized ceramic/carbon seal with stainless steel housings and spring. The pump shall be furnished with stainless steel handle.

B. ELECTRICAL POWER CORD: The submersible pump shall be supplied with multiple conductor power cord capable of continued exposure to the pumped liquid. The power cord shall be sized for the rated full load amps of the pump in accordance with the National Electric Code.

C. MOTORS: Three phase motors, overload protection incorporated into control panel, Class B or better insulation, rated for continuous duty at not less than 104 F.

D. BEARINGS AND SHAFT: Upper and lower ball bearings, permanently lubricated. The motor shaft shall be made of stainless steel.

E. SEALS: The pump shall have a unitized carbon/ceramic seal, with stainless steel housing. The motor plate/housing interface shall be sealed with a neoprene or Buna-N ring.

F. IMPELLER: Bronze or cast iron.

G. CONTROLS: See Float Switches and see Control Panel under PUMP ACCESSORIES later.

H. PERFORMANCE AND MAKES AND MODELS: 30 gpm to at least 41' TDH, 208 volt 3 phase motor of 6/10 horsepower max., 1-1/2" female threaded vertical outlet, 80 lbs weight max., Zoeller J161 or Liberty FL63M Series.

2.3 WALLEYE REUSE PUMPS

A. General:
1. Ebara 80DWP63 or Mody M204T or Tsurumi KTZ 32.2
2. Maximum 3 HP motor, 208VAC, 3PH, 60Hz.
3. The design point is 115 gpm at 45 ft TDH.
4. Discharge 3 inch vertical out top of motor. Max. weight 77 lbs.
5. Provide pumps capable of handling solid sizes schedule one the Drawings.
6. Where watertight sealing is required, machine and fit mating surfaces with O-rings.
7. Provide with heavy duty lift lugs or hoisting bail designed for lifting the entire pump and motor assembly.
8. Round hole cylindrical intake strainer.

B. Impeller:
1. Provide non-clog type dynamically balanced impeller of stainless steel or hi chrome iron.

C. Shaft:
1. Design pump shaft of sufficient size to transmit full driver output.
2. Use shaft which is accurately machined and constructed with sufficient materials.
3. Shaft shall be 400 series stainless steel.

D. Shaft Seal:
1. Seal shaft with two seals running in an oil filled chamber. At least one seal face shall be silicon carbide or tungsten carbide.
2. Provide seals requiring neither routine maintenance nor adjustment, but capable of being easily inspected and replaced.

E. Motors:

1. Suitable for operating with a variable frequency drive.
2. Motors shall have internal thermal overload protection.
3. Provide motor of totally submersible design, constructed with epoxy or poly-seal encapsulated windings, with Class F or better insulation and rated for continuous duty operation.
4. Assure motor is capable of running dry for extended periods without damage to motor or seal.
5. The motor horsepower provided shall be adequate for all points on the pump curve.

F. Power and Control Cables:
1. Provide power and control cables which are listed and labeled per NEC requirements and approved for the installation types indicated on the drawings. As a minimum the cable shall be suitable for installation in conduit, submersible applications, and cable tray. The cable and markings shall conform to NEC requirements and indicate AWG size, listing agency, and suitability for installation types listed above.
2. Provide length of power cable and control cable as needed for the project base on study of the Drawings.

G. Controls: See Electrical Drawings and Electrical Specifications.

2.4 PUMP ACCESSORIES

A. See Specification Section 43 21 00.

B. Float switches:
1. Provide sealed, float-type switches to control pumps and provide alarm signal.
2. Suspend floats on a dedicated stainless steel cable stainless steel cable clamps to set level.
3. Provide floats to operate at elevations shown on Drawings.
4. Design floats to be field-adjustable.
5. At least three (3) floats:
   a. One (1) for lead pump start.
   b. One (1) for lag pump start and alarm.
   c. One (1) for pumps to stop.

C. Control Panel
1. Control panel shall automatically restart after power interruptions.
2. Provide combination magnetic motor starter(s).
3. Provide motor protective switches with overload protection.
4. Include a terminal board for connection of level sensors.
5. NEMA 4X enclosure.
6. Hand-Off-Automatic selector switches.
7. Automatic alternator.
8. High level alarm with alarm horn, silence pushbutton, and alarm light.
9. Pump running lights.
10. Pump sequence selector switch which overrides automatic alternator.
11. Float switch test pushbuttons.
12. Auxiliary contacts wired to terminal blocks.
13. Power ON control relay.
14. Inner door in cabinet-mounted on a continuous vertical steel hinge; size to completely cover wiring and components mounted on the back panel; provide for mounting of controls and instruments on inner door.
15. At least three level float switch operation.

D. Rail and Lift Out Check Valve System for Esocid Reuse Pumps with 1-1/2” vertical discharges:
1. Provide package including stainless rails, lifting cables or chains, pump discharge brass sliding disconnect and a stainless steel threaded drop pipe with an epoxy coated iron wye pattern ball check valve that comes out of the pit with the pump when the pump is lifted straight up and away from the sliding quick disconnect. Also provide galvanized steel or SCH 80 PVC header with brass gate valves with extended handles.

2.5 STATIC MIXERS

A. PVC or stainless steel mixing elements in a flanged PVC body no thinner than Schedule 40.

B. Three stage. Project Drawings are based on not using a factory side port.

C. For units tagged SM-1 thru 3 in the Drawings, diameter shall be 8" and pressure drop at 175 gpm shall be 0.5 ft water max. and for unit tagged SM-4, diameter shall be 4" and pressure drop at 65 gpm shall be 0.9 ft water max.

PART 3 - EXECUTION

3.1 INSTALLATION

A. See Specification Section 43 21 00.

B. Seal pump cable end with a high quality protective covering, to make it impervious to moisture or water seepage prior to electrical installation.

3.2 FIELD QUALITY CONTROL

A. See Specification Section 43 21 00.

END OF SECTION

PIPING SYMBOLOGY

VALVES

SINGLE LINE	DOUBLE LINE	ISOLATION
		BALL VALVE
		BUTTERFLY VALVE
		DIAPHRAGM VALVE
		GATE VALVE
		GLOBE VALVE
		KNIFE GATE VALVE
		NEEDLE VALVE
		PINCH VALVE
		PLUG VALVE
		THREE-WAY BALL VALVE
		THREE-WAY PLUG VALVE
BBFV	BBFV	BURIED BUTTERFLY VALVE
		CONTROL
		BALL CHECK VALVE
		CHECK VALVE
		DOUBLE-DISK CHECK VALVE
		CONE VALVE
OR	OR	PRESSURE RELIEF VALVE
		PRESSURE-REDUCING VALVE
X	X	AIR RELEASE VACUUM VALVE A = AIR RELEASE VAC = VACUUM
		PRESSURE-REGULATING VALVE
		3-WAY CONTROL VALVE

MISCELLANEOUS

- BACKFLOW PREVENTER
- M — WATER METER
- VARIABLE AREA METER
- UNION
- WYE-STRAINER
- PENETRATION THROUGH STRUCTURE
- FLEXIBLE HOSE OR TUBING
- FLEXIBLE PIPING CONNECTION
- LINE SIZE CHANGE (CONCENTRIC REDUCER)
- LINE SIZE CHANGE (ECCENTRIC REDUCER)
- LINE TURNING DOWN
- LINE TURNING UP
- BLIND FLANGE
- PIPE BREAK

NOTE:
MISCELLANEOUS SYMBOLOGY SHOWN IS FOR SINGLE-LINE PIPING. DOUBLE-LINE PIPING SYMBOLS ARE SIMILAR.

MISCELLANEOUS

- PIPE JOINT (SEE SPECS FOR REQUIREMENTS)
- COMPRESSION SLEEVE TYPE COUPLING
- FLANGED COUPLING ADAPTER (FCA)
- FLEXIBLE CONNECTION
- HARNESSED MECHANICAL COUPLING
- PRESSURE GAGE (W/COCK)
- TRAP
- QUICK DISCONNECT CAM & GROOVE COUPLING
- CAP OR PLUG
- CO — INTERIOR CLEANOUT
- HB-X — HOSE VALVE, HOSE BIBB, OR FLUSHING CONNECTION
- HR-X — HOSE RACK
- FD-X — FLOOR DRAIN
- X = TYPE DESIGNATED IN SPECIFICATIONS
- PIPE IN SECTION
- BU — BELL UP (PLAN)
- BU — BELL UP (SECTION OR SCHEMATIC)
- D — DRAIN (SECTION OR SCHEMATIC)
- ATA — AIR TOOL ASSEMBLY
- AVS — AUTOMATIC VALVE STATION
- PRS — PRESSURE-REDUCING STATION
- FREEZE RESISTANT WALL HYDRANT

PROCESS PIPING LEGEND

X"-OW	OVERFLOW WATER (DRAIN)
OW	OVERFLOW WATER (DRAIN)
X"-GR	GRAVITY REUSE
GR	GRAVITY REUSE
X"-CW	COLD WATER
CW	COLD WATER
X"-PR	PUMPED REUSE WATER
PR	PUMPED REUSE WATER

HVAC SYMBOLOGY

- 24x18 — SUPPLY AIR OR OUTSIDE AIR DUCT UP (SECTION CUT, FIRST DIMENSION DUCT WIDTH)
- SUPPLY AIR OR OUTSIDE AIR DUCT DOWN (NO SECTION CUT)
- RETURN AIR DUCT UP (SECTION CUT)
- RETURN AIR DUCT DOWN (NO SECTION CUT)
- EXHAUST AIR DUCT UP (NO SECTION CUT)
- EXHAUST AIR DUCT DOWN (NO SECTION CUT)
- ROUND ELBOW UP
- ROUND ELBOW DOWN
- TRANSITION - DOUBLE SIDED
- TRANSITION - ONE SIDED
- TRANSITION - RECTANGULAR TO ROUND DUCT
- STANDARD BRANCH - FOR SUPPLY AIR W/ EXTRACTOR AND RETURN AIR W/O EXTRACTOR
- ELBOW - W/TURNING VANE (RECTANGULAR)
- ELBOW - W/TURNING VANES (RECTANGULAR), SMOOTH RADIUS
- GOOSENECK HOOD (COWL)
- 18x24 — RECTANGULAR DUCT OR OPENING SIZE FIRST NUMBER INDICATES SIZE OF SIDE SHOWN
- 18"φ — ROUND DUCT SIZE
- R OR D — RECTANGULAR DUCT INCLINE - RISE OR DROP IN RESPECT TO THE AIR FLOW
- (R) OR (D) — ROUND DUCT INCLINE - RISE OR DROP IN RESPECT TO THE AIR FLOW
- 18x24 — HIDDEN DUCT
- T 9'-10" B 9'-0" / 18x10 — DUCT ELEVATION TAG ABOVE FINISH FLOOR
- PRESSURE/TEMPERATURE TEST PLUG (PETE PLUG OR EQUAL)
- SA — SOUND ATTENUATOR
- SD — SPLITTER DAMPER
- VD, BDD — VD = VOLUME DAMPER, BDD = BACKDRAFT DAMPER
- M — MOD = MOTOR OPERATED DAMPER
- FIRE DAMPER
- SMOKE DAMPER
- SMOKE AND FIRE DAMPER — ZD = ZONE DAMPER

- FLEXIBLE CONNECTION
- FLEXIBLE DUCT - TWO LINE
- FLEXIBLE DUCT - ONE LINE
- ACOUSTICAL LINING - DUCT DIMENSIONS FOR NET FREE AREA
- SIZE / CFM — SUPPLY AIR REGISTER OR GRILLE - W/ DUCT-MOUNTED EXTRACTOR
- SIZE / CFM — EXHAUST AIR OR RETURN AIR REGISTER OR GRILLE
- SIZE / CFM — EXHAUST AIR OR RETURN AIR REGISTER OR GRILLE
- SIZE / CFM — SUPPLY AIR ASSEMBLY SQUARE DIFFUSER
- SIZE / CFM — SUPPLY AIR ASSEMBLY ROUND DIFFUSER
- WALL LOUVER
- AD PLAN / AD SECTION — ACCESS DOOR
- UC 3/4" — UNDERCUT DOOR 3/4"
- AD — ACCESS DOOR OR ACCESS PANEL IN DUCTWORK
- INTAKE OR RELIEF HOOD
- DOOR GRILLE
- AIR FLOW — BACKDRAFT DAMPER
- EXHAUST ROOF VENTILATOR PROPELLER OR CENTRIFUGAL TYPE
- PROPELLER WALL FAN
- ROOM AIR CONDITIONING UNIT
- INTAKE/EXHAUST LOUVER
- SUPPLY, RETURN OR EXHAUST FAN
- AIR FILTER

HVAC CONTROL SYMBOLOGY

- TC — TEMPERATURE CONTROLLER
- TT — TEMPERATURE TRANSMITTER
- TS — TEMPERATURE SWITCH
- T — THERMOSTAT
- TS — TEMPERATURE SENSOR
- TI — TEMPERATURE INDICATOR
- % — PERCENTAGE TIMER
- RC — RECEIVER CONTROLLER
- HOA — HAND-OFF-AUTO
- MS — MOTOR STARTER
- M — DAMPER ACTUATOR
- PI — PRESSURE INDICATOR
- FRZ — FREEZE STAT
- FS — FIRE STAT
- DPS — DIFFERENTIAL PRESSURE SWITCH
- S — SMOKE DETECTOR
- FS — FLOW SWITCH
- PS — PRESSURE SWITCH
- ---- D ---- — TIME DELAY
- M — MINIMUM POSITION RELAY
- S — SIGNAL
- AO — ANALOG OUTPUT
- AI — ANALOG INPUT
- DO — DIGITAL OUTPUT
- DI — DIGITAL INPUT
- C — COMMON PORT
- S — SIGNAL PORT
- NO — NORMALLY OPEN
- NC — NORMALLY CLOSED
- BALANCING VALVE
- RHC — RESISTANCE HEATING CONTACTOR
- TA — TEST-AUTO
- TOA — TEST-OFF-AUTO
- ELECTRIC SIGNAL
- PIPING
- BULB-TYPE THERMOSTAT
- D — DIESEL EXHAUST SENSOR
- CO2 — CARBON DIOXIDE SENSOR
- VD — VOLUME DAMPER - MANUAL
- M — VOLUME DAMPER - MOTORIZED

AIR FLOW SCHEMATIC AND TEMPERATURE CONTROL DIAGRAM SYMBOLOGY

- C / C — CHILLED WATER COOLING COIL
- H / C — HOT WATER HEATING COIL
- EP / R — DIRECT EVAPORATIVE COOLER
- D / X — DIRECT EXPANSION COOLING COIL
- EH / C — ELECTRIC HEATING COIL
- VFD — VFD (VARIABLE FREQUENCY DRIVE)
- H / C CAV — CONSTANT AIR VOLUME BOX WITH REHEAT COIL
- H / C VAV — VARIABLE AIR VOLUME BOX WITH REHEAT COIL

PROCESS EQUIPMENT

- WM-X — WATER FLOW METER
- SM-X — STATIC MIXER
- TP-X — TEMPERED WATER PUMP
- WRP-X — WALLEYE REUSE PUMP
- HX-X — HEAT EXCHANGER OF SPLIT SYSTEM INCUBATION HEATING & COOLING SYSTEM
- HP-X — HEAT PUMP OF SPLIT SYSTEM INCUBATION HEATING & COOLING SYSTEM
- UV-X — ULTRAVIOLET EQUIPMENT
- DCF-X — STACKED DISC FILTER SYSTEM

GENERAL NOTES:

1. THIS IS A STANDARD PROCESS, MECHANICAL AND PLUMBING SYMBOLOGY SHEET. ALL SYMBOLS ARE NOT NECESSARILY USED ON THIS PROJECT.
2. SCREENING OR SHADING OF WORK IS USED TO INDICATE EXISTING COMPONENTS OR TO DE-EMPHASIZE PROPOSED IMPROVEMENTS TO HIGHLIGHT SELECTED TRADE WORK. REFER TO CONTEXT OF EACH SHEET FOR USAGE.
3. SEE INSTRUMENTATION LEGEND AND GENERAL SHEETS FOR PROJECT-SPECIFIC EQUIPMENT SYMBOLS, EQUIPMENT ABBREVIATIONS, AND PIPING SYSTEM ABBREVIATIONS.

ISSUE	DATE	DESCRIPTION
B	09/04/2020	ADDENDUM 1
A	08/21/2020	ISSUED FOR BID

PROJECT MANAGER	M. COCHRAN
ARCHITECTURAL	M. STOFFEL
STRUCTURAL	B. BRADLEY
PROCESS	T. TALSMA
ELECTRICAL	A. KANER
PROJECT NUMBER	10232924

LICENSED PROFESSIONAL ENGINEER — TROY A. TALSMA — P26101 — IOWA — 09/04/2020

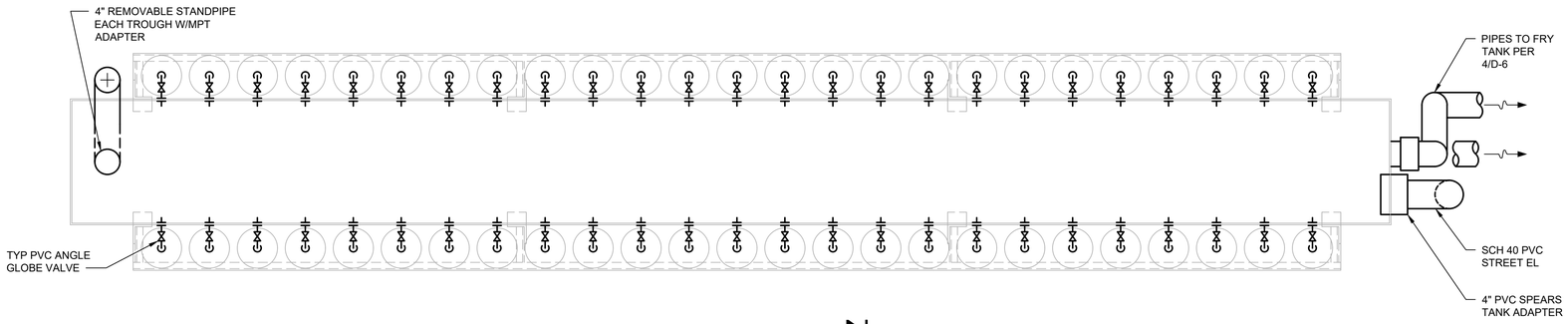
Spirit Lake Fish Hatchery Upgrade for RAS

PROCESS, MECHANICAL AND PLUMBING LEGEND

0 1" 2"

FILENAME: HDRE_ALL_DISCIPLINES.rte
SCALE: NONE
SHEET: G-4R

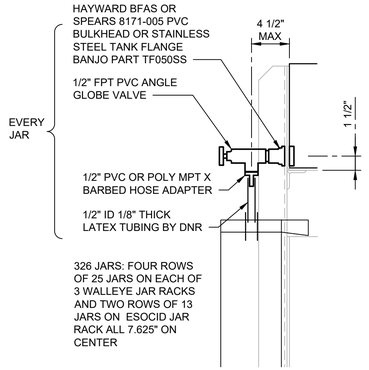
\\SPF-SRV02\ActiveProjects\3854\10232924\6.0_CAD_BIM\6.2_WIP\Revit Models\10232924_00_D.rvt
9/4/2020 12:36:18 PM



1 - JAR RACK PIPING PLAN (AERATION COLUMNS NOT SHOWN)

APPROX SCALE: 1" = 1'-0"

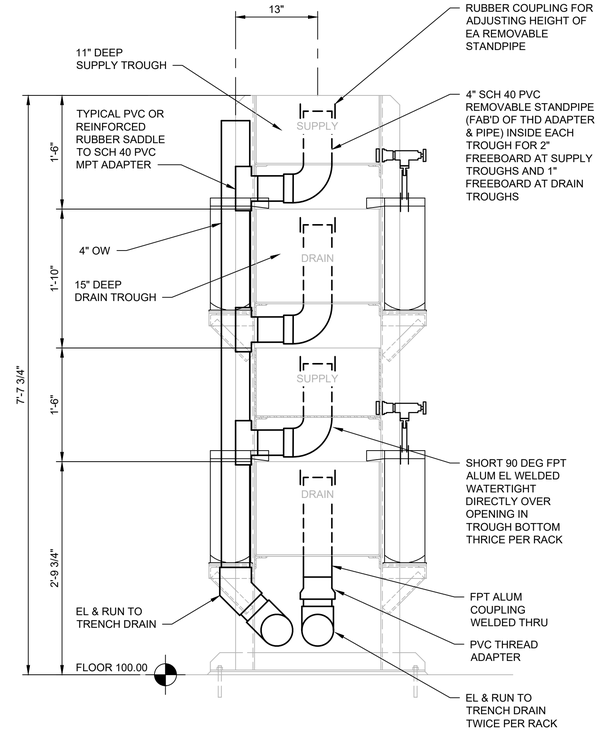
6" 0 6" 12"



2 - JAR PIPING

SCALE: 1 1/2" = 1'-0"

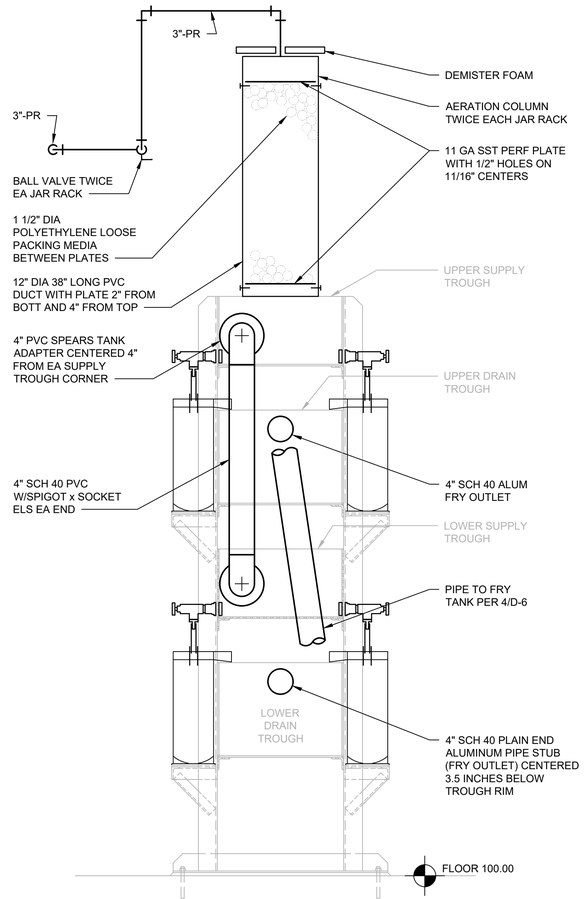
4" 0 4" 8"



A - JAR RACK PIPING EAST END

SCALE: 1" = 1'-0"

6" 0 6" 12"



B - JAR RACK PIPING WEST END

SCALE: 1" = 1'-0"

6" 0 6" 12"

ISSUE	DATE	DESCRIPTION
B	09/04/2020	ADDENDUM 1
A	08/21/2020	ISSUED FOR BID

PROJECT MANAGER	M. COCHRAN
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PROJECT NUMBER	10232924

LICENSED PROFESSIONAL ENGINEER
TROY A. TALSMA
P26101
IOWA
09/04/2020

Spirit Lake Fish Hatchery
Upgrade for RAS

WALLEYE JAR RACK PIPING

0 1" 2"

FILENAME D-4R.DWG
SCALE AS NOTED

SHEET
D-4R