AMENDMENT NUMBER 1 TO AGREEMENT FOR PROFESSIONAL SERVICES BETWEEN UTILITIES INSTRUMENTATION SERVICE AND THE CITY OF ANN ARBOR

The City of Ann Arbor, a municipal corporation, 301 E. Huron Street, Ann Arbor, Michigan 48104 ("City") and Utilities Instrumentation Service, a Michigan Corporation, having its offices at 2290 Bishop Circle East, Dexter, MI 48130 ("Consultant") agree to amend the services agreement for the Electrical and Instrumentation Support Services executed by the parties dated October 18, 2019 as follows:

1) Article I, DEFINITIONS is amended to read as follows

A. Administering Service Areas/Units means City of Ann Arbor Water Treatment Services Unit.

B. Contract Administrator means Mike Switzenberg, acting personally or through any assistants authorized by the Administrator/Manager of the Administering Service Area/Unit.

C. Deliverables means all Plans, Specifications, Reports, Recommendations, and other materials developed for or delivered to City by Consultant under this Agreement.

D. Project means Electrical and Instrumentation Support Services.

2) Article III., SERVICES, is amended to read as follows:

A. The Contractor agrees to provide Electrical and Instrumentation Support ("Services") and to furnish all materials, equipment and labor necessary and to abide by all the duties and responsibilities applicable to it for the Project in accordance with the requirements and provisions of the following documents, including all written modifications incorporated into any of the documents, which are incorporates as part of this Agreement:

Contracts and Exhibits
Invitation to Bid No. 19-23 and all Addendum thereto (if any)
Bid Proposal of Contract, dated August 7, 2019, and restate and attached as Exhibit A.
Proposal of Contractor, dated January 3, 2020, and restated and attached as Exhibit A-1

The contract documents are complementary and what is called for by any one shall be binding. The intention of the document is to include all labor and materials, equipment and transportation necessary for the proper

execution of the Project. Materials or work described in word that so applied have a well-known technical or trade meaning have the meaning of those recognized standards.

In case of a conflict among the contract documents listed above in any requirement(s), the requirement(s) of the document listed first shall prevail over t any conflicting requirement(s) of a document listed later.

The City retains the right to makes changes to the quantities of service within the general scope of the Agreement at any time by a written order. If the changes add to or deduct from the extent of the services, the contract sum shall be adjusted accordingly. All such changes shall be executed under the conditions of the original Agreement.

B. Quality of Services under this Agreement shall be of the level of quality performed by persons regularly rendering this type of service. Determination of acceptable quality shall be made solely by the Contract Administrator.

C. The Contractor shall perform its Services of the Project in compliance with all statutory, regulatory and contractual requirements now or hereafter in effect as may be applicable to the rights and obligations set forth in the Agreement.

D. The Contractor may rely upon the accuracy of reports and surveys provided to it by the City (if any) expect when defects should have been apparent to a reasonably competent professional or when it has actual notice of any defects in the reports or surveys.

3) Article V, COMPENSATION OF CONSULTANT is amended to read as follows:

A. The Contractor shall be paid on the basis of the time spent and materials used at the rates and prices as amended by Amendment Number 1 (Exhibit B-1) for acceptable work performed and acceptable deliverables received. The total fee to be paid the Contractor for the Services shall not exceed $1,400,000.00. The original contract amount was $120,000.00. The Amendment No. 1 amount is $1,280,000.00. Payment shall be made monthly following receipt of invoices submitted by the Consultant, and approved by the Contract Administrator.

B. The Contractor will be compensated for the Services performed in addition to the Services described in Article III, only when the scope of and compensation for those additional Services have received prior written approval of the Contract Administrator.

C. The Contractor shall keep complete records of work performed (e.g. tasks performed/hours allocated) so that the City may verify invoices submitted by the Contractor. Such records shall be made available to the City upon request and submitted in summary form with each invoices.

All terms, conditions, and provisions of the original agreement between the parties executed October 18, 2019, unless specifically amended above, are to apply to this amendment and are made a part of this amendment as though expressly rewritten, incorporated, and included herein.

This amendment to the agreement between the parties shall be binding on the heirs, successors and assigns of the parties.

Dated this March 3, 2020.

For Consultant

By _____
Gary Walls, President
Utilities Instrumentation Service

Fo

By _____ 03/11/2020
CHRISTOPHER TAYLOR, MAYOR

By _____ 03/16/2020
JACQUELINE BEAUDRY, CITY CLERK
Jacqueline Beaudry, City Clerk

A

F _____ 03/09/2020
TOM CRAWFORD, INTERIM CITY ADMINISTRATOR

I _____ 03/04/2020
CRAIG HUPY, PUBLIC SERVICES AREA ADMINISTRATOR
Craig Hupy, Public Services Area Administrator

Ap

By _____ 03/06/2020
STEPHEN POSTEMA, CITY ATTORNEY
Stephen K. Postema, City Attorney

EXHIBIT A-1
SCOPE OF SERVICES

fishbeck
Engineers | Architects | Scientists | Constructors

1515 Arboretum Drive, SE
Grand Rapids, Michigan 49546

616.575.3824 | fishbeck.com

Technical Memo 3

SUBJECT: Ann Arbor Water Treatment Plant
Filter Pipe Gallery Flooding Rehab

DATE: January 3, 2020 PROJECT NO.: 191556

Table of Contents

List of Figures

List of Tables

List of Appendices

Introduction

On September 16, 2019, the City of Ann Arbor's Water Treatment Plant experienced a power loss from DTE. During this event, a breaker in the City's Green Substation failed and was not able to be reset. The Green Substation powers the City's transfer pumps that evacuate water from the plant's clear wells. Without power to these pumps, the clear wells overflowed and flooded the lowest level of the Filter Pipe Gallery to a depth of approximately 7 feet. Most of the electrical and instrumentation equipment located in the portion of the gallery that was submerged was damaged during the flooding. Rehabilitation of the flood damage will be completed as part of an insurance claim. The City retained Fishbeck and Utility Instrumentation Service, Inc. (UIS) to assess the damage and to provide recommendations for equipment replacement.

UIS conducted a detailed condition assessment of instruments and equipment in the Filter Pipe Gallery for Filters 1 through 26 after the flooding. Tables were developed that indicated which equipment was damaged as a result of the flooding. Fishbeck reviewed the condition assessment provided by UIS, and evaluated the equipment needed for "in-kind" replacement, using new equipment with functionality and configuration that is similar to the damaged systems. This memo summarizes the recommended approach for in-kind replacement.

Summary of Damaged Equipment

Each filter has an instrumentation panel associated with it that includes lighting, receptacles, switches, remote control stations, and process instruments, see Figure 1. These panels were fully submerged for Filters 11 through 26 and the majority of equipment on these panels needs replacing.

There are 64 valve actuators associated with Filters 11 through 26. Twenty-one of these actuators were damaged during the flooding.

The following types of instruments were damaged for Filters 11 through 26:

1. 10-inch flow meters.
2. 12-inch flow meters.
3. Particle counters.
4. Turbidimeters.
5. Headloss (differential pressure) meters.

Six free-standing dehumidifiers were also damaged. The complete list of the equipment that was inspected by UIS can be found in Appendix 1. The equipment summary notes which items were damaged, and which items were not damaged during the flooding event. Appendix 2 contains a photo log of the damage to equipment. These photos were taken by UIS during the damage assessment. Appendix 3 provides an inventory of the existing equipment with the model number of each device.

Figure 1: Filter Instrumentation Panels

Replacement Equipment

Fishbeck evaluated multiple manufacturers to replace the damaged equipment in-kind. Due to the age of the existing equipment and advancements in technology and code requirements, most of the equipment cannot be replaced with the exact model of the equipment that was damaged. In most cases, manufacturers have come out

with new models that have replaced the equipment that was damaged since the time it was installed. In these cases, the in-kind replacement proposed uses equipment that closely matches the properties and functionality of the damaged equipment.

Miscellaneous Equipment

All light fixtures (1 above each panel), receptacles (4 per panel), and switches (1 per panel) on the instrumentation panels were damaged as a result of the incident and should be replaced. The 4-foot fluorescent lensed fixtures should be replaced with 4-foot LED lensed fixtures, as fluorescent fixtures are considered to be obsolete. LED fixtures will have better energy savings, provide more consistent light output, and require minimal maintenance. Receptacles will be replaced in-kind with new ground fault interrupting (GFI) receptacles. Switches will be replaced in-kind. New conduit and wire will be installed for lighting and receptable circuits for items below the 7-foot elevation, as needed to accommodate replacement of these items.

Reduction of humidity in the Pipe Gallery is accomplished using portable cord and plug dehumidifiers. The existing dehumidifiers were manufactured by Therma-Stor and were model Hi-E Dry 195. Six of the existing dehumidifiers were damaged as a result of the incident and should be replaced. Like-kind replacement dehumidifiers are available from Therma-Stor, which has been re-branded under the Quest line of products since the original units were purchased.

There are three existing small diameter pipelines with pipe insulation that run through the pipe gallery. The insulation was submerged during the flooding and should be replaced. These pipelines include the sodium hydroxide chemical feed, the emergency eyewash water, and one other pipeline, which are insulated. The sodium hydroxide pipeline also has heat trace which needs to be replaced.

Valve Actuators

There are two models of existing EIM valve actuators within the Pipe Gallery for Filter Nos. 11 through 26. The modulating duty actuators on the filter effluent valves are model Q4G2-3. The open/close duty actuators on the wash water valves are model R5L6. The existing actuators carry a NEMA 4 rating, which indicates no protection against temporary submergence. In total 16 filter effluent valve actuators and 5 wash water valve actuators were damaged as a result of the incident and should be replaced. The actuators communicate to the SCADA system via Modbus protocol. There are three RS485 network loops that serve the filter actuators with the actuators for each bank of filters split between the three loops. The Modbus communication to the SCADA system is accomplished via a proprietary EIM controller. In addition to Modbus communications, the filter effluent actuators accept a 4-20mA input signal from a differential pressure sensor for monitoring headloss. This pressure signal is then communicated to the SCADA system via Modbus.

The existing valve actuators that are not readily operated from the Pipe Gallery floor are equipped with hard-wired remote control stations which are mounted to the instrument panel for their respective filter. The remote-control stations provide indication of valve position and allow for an operator to open and close the valve locally in the event the communication network or SCADA system is not functional. There are 16 Drain valve actuators, 16 Influent valve actuators, and 16 Wash Water valve actuators that are equipped with these remote-control stations. The remote-control stations were damaged as a result of the incident and should be replaced.

The existing EIM valve actuators which were damaged as a result of the incident will be replaced with Rotork's equivalent offering, the Model IQ3 valve actuator, around which the City has standardized. One reason for using the Rotork actuators is that they provide greater submergence protection than the EIM actuators. The Rotork actuators have a standard environmental sealing rating of IP66/68, which allows them to be temporarily submerged to a depth of up to 20 meters (65.6 feet) for 10 days.

An analog monitoring card will be included in each of the replacement filter effluent valve actuators to facilitate powering and communication of the replacement differential pressure transmitters. Rotork's version of the

remote-control station, which carries the same IP66/68 rating as the actuator itself, will be provided for the five wash water valve actuators which will be replaced.

To facilitate communicating to the SCADA system, a new RS485 network loop dedicated to the Rotork actuators will be provided. A PLC5 Modbus communications module will be installed in a spare space in the City's existing PLC5 rack. The PLC5 has been discontinued by Rockwell. The Modbus communications module will need to be an aftermarket/refurbished purchase. SCADA PLC programming and iFIX screens will be updated to incorporate the replacement Rotork valve actuators.

The EIM remote-control stations which were damaged on the 16 Drain valve actuators, 16 Influent valve actuators and remaining 11 Wash Water valve actuators will be replaced with like kind EIM control stations.

Flow Meters

The existing electromagnetic flow meters are ABB model 10DX3111 with associated 50XM1000 flow indicating transmitters. In total, 16 flow meters and associated flow indicating transmitters were damaged as a result of the incident and should be replaced.

The existing flow meters and transmitters will be replaced with Rosemount model 8750W units, which are equivalent to the damaged ABB units and the City's current standard. Both the Rosemount and new ABB flow meters were evaluated for replacement of the damaged meters. The existing ABB meters have functionality that allows them to be field-calibrated to confirm their accuracy. However, the new, similar model flow meters from ABB do not have this functionality. The provided Rosemount meters can be field-calibrated.

The City needs the ability to have the meters calibrated so that they can trust that they are reading accurately. Therefore, the Rosemount units will be used for replacement. The Rosemount units are slightly more expensive than the current ABB model (approximately $200 more per meter). We would consider the Rosemount unit to be a closer equivalent, in-kind replacement than the new ABB flow meters, and suggest that the additional cost be covered by the insurance claim.

Turbidimeters

The existing turbidimeters were Hach model 1720E sensors which were housed within a 1720C well. Each turbidimeter had a Hach SC200 controller that facilitated communication with SCADA. The 16 turbidimeters and associated controllers were damaged as a result of the incident and should be replaced.

The 1720E turbidimeters have been phased out by Hach and are no longer available for purchase. The current equivalent offering from Hach is the TU5300 turbidimeter. Hach SC200 controllers are still available.

Plant staff are currently conducting a 3-month side-by-side pilot between the Lovibond PTV1000 turbidimeter and the Hach TU5300 turbidimeter. The results of the pilot will determine which manufacturers instruments are ultimate installed. The pricing received from Hach have been included in the cost estimates presented within this memo as the Hach analyzers costs slightly more than the Lovibond analyzers.

Portable Turbidimeter

A portable benchtop turbidimeter was damaged in the flooding. The Plant needed this meter to maintain plant operations and has already purchased a replacement turbidimeter, a Hach TU5200 Laboratory Turbidimeter.

Particle Counters

The existing particle counters are Hach 2200 PCX units. The particle counters were plumbed so that a single instrument could provide readings for two separate filters. A pair of normally closed ASCO solenoid valves periodically cycle between two filters, altering the source water to the instrument. The 18 solenoid valves and 9 particle counters were damaged as a result of the incident and should be replaced.

Particle counter communication to SCADA occurs over dedicated network loops, with a loop for each bank of filters. Signals for the Filter Nos. 1 through 8 particle counters are routed to a Prosoft network card on PLC F1. Signals for the Filter Nos. 9 through 20 particle counters are routed to a Prosoft network card on PLC F2. Signals for the Filter Nos. 21-26 particle counters are routed to a Prosoft network card on PLC F3. The conduit, wire, and network cards were not damaged and will be reused.

The City is considering the possibility of replacing the existing particle counters with ChemTrac Model PC3400 particle counters, which is currently being piloted at the plant. The ChemTrac units are considered to be equivalent to the damaged Hach 2200 PCX units, but are less expensive. The project cost estimate has been based on the more expensive HACH replacement units.

Differential Pressure (Headloss) Meters

The existing pressure transmitters, which provide indication of filter headloss, were ABB Model 621ED. These instruments were powered by and signals were communicated over the filter valve actuator Modbus communication network. The 16 pressure sensors were damaged as a result of the incident and should be replaced.

The existing pressure transmitters will be replaced with Rosemount Model 2051C pressure transmitters and associated 3-valve manifolds, which are equivalent to the damaged ABB pressure transmitters. Re-use of the existing 3-valve manifolds was considered; however, UIS estimated that the labor cost to remove the old manifolds and reinstall new would exceed the cost of the new manifolds. There were also questions about compatibility of the old manifolds with new differential pressure meters.

Installation Considerations

The like-kind replacement for the instruments, transmitters, and valve actuator remote control stations occupies more space than the existing devices. The new turbidimeters in particular are larger than the existing units. As a result, we anticipate that the existing instrument panels will not be large enough to accommodate all of the new devices. Two options were evaluated for adding space to the instrument panels. The first option was to add an extension to the existing panels, with approximately 8 square feet of additional surface area. The second option was to remove the existing plate and replace with a new, larger plate with approximately 8 square feet of additional surface area. The cost of the second option was higher than the first but may be more aesthetically pleasing than the first option. A cost comparison for the two options is included in the table in a following section. New panels would be ¼-inch thick aluminum plate, similar to the existing panel. The support stands for the panel would be reused under either scenario.

New equipment that is not rated for submergence (transmitters, analyzers, lighting, receptacles, switches, etc.) will be installed as high as possible on the panel.

All conduit entries into instrumentation and equipment should be through the bottom where possible, and all conduit terminations should include o-rings and/or conduit plugs to further prevent water ingress during a flooding event.

Project Construction Sequencing

Well-coordinated construction sequencing for replacement of the damaged equipment will be critical in order to maintain plant operations. The City can only turn over 2 out of the 16 affected filters at a time for Contractor work. This means that the work will be completed in 8 separate windows that must be approved and coordinated with water treatment plant operations. During each of these windows, all work associated with the 2 filters (actuators, flow meters, instrumentation, etc.) will be completed. Due to space limitations in the pipe gallery,

equipment for the remaining filters will need to be staged off-site until subsequent sets of filters are ready for installation. There will be 8 separate efforts to transport, rig and lower equipment into the pipe gallery, impacting Contractor mobilization costs.

Engineer's Estimated Cost

The following is the Engineer's total estimate construction cost, including materials and installation.

The first column in Table 1 is the Base Project Cost. This is the portion of the project cost that is considered to be the lowest cost direct, in-kind replacement. The Upgraded Equipment Cost column is the cost of any equipment upgrades that the City would like to make, to add functionality or to meet their standards. The Cost Differential column is the difference between the first two columns.

A contingency of 15% has been included in the estimate. Engineering Costs have been estimated at 8% of the project cost (plus a 5% markup from UIS). Engineering for the project will include the following items:

- Review meetings with the City and representatives from the City's insurance company and their Engineer.
- Respond to questions on this evaluation.
- Write specifications for new equipment and materials.
- Develop drawings as needed to build the project, likely including: detailed layout of instrumentation panels, network configuration diagram, installation details.
- Workshops with City to review preferences.
- Review equipment submittals.
- Provide limited construction inspection. We anticipate that Emily Schlanderer will complete brief visits daily during active construction periods. Other Fishbeck Engineers will visit the sight and review the work at key times, as needed.
- Attend progress meetings during construction.
- Assist UIS with developing a project schedule.
- Provide updates on progress to the City and the insurance company.

Table 1 - Engineer's Estimated Construction Cost

Item No.	Item	Quantity	Base Project Cost	Upgraded Equipment Cost	Cost Differential
1	Filter Effluent Valve Actuators Equipment Only (Base is EIM, Upgrade is Rotork)	16	$95,700	$133,800	$38,100
2	Filter Valve Installation, Wire, Conduit, Etc	16	$54,300		
3	Wash Water Valve Actuators Equipment Only (Base is EIM, Upgrade is Rotork)	5	$37,200	$51,900	$14,700
4	Wash Water Valve Installation, Wire, Conduit, Etc	5	$17,000		
5	Drain Valve Remote Control Stations	16	$13,300		
6	Wash Water Remote Control Stations	16	$13,300		
7	Influent Valve Remote Control Stations	16	$13,300		
8	Filter Effluent Flow Meters Equipment Only	16	$95,700		
9	Filter Effluent Flow Meters Install	16	$67,100		
10	Settled Water Valve Remote Control Stations	2	$1,700		
11	Differential Pressure Transmitters	16	$51,700		
12	Turbidimeters	17	$121,800		
13	Particle Counters	9	$91,700		
14	Install new devices at Instrument Panel, wire and conduit	16	$75,300		
15	New aluminum plate (Base = Add Extension, Upgrade = Replace Entire Panel)	9	$7,700	$20,600	$12,900
16	New Lighting, Receptacles, and Switches at Instrument Panels	9	$27,800		
17	Heat Trace and Insulation	16	$9,300		
18	Dehumidifiers	6	$34,500		
19	Modbus Network Card	1		$7,500	$7,500
20	Valve Network	1		$10,000	$10,000
21	Conduit and Wire for valves	1	$16,800		
22	Programming - General SCADA	1	$18,300		
23	Programming - Associated with New Network Loop	1		$10,000	$10,000
24	Meetings and Workshops (UIS)	1	$19,500		
25	Offsite Materials Storage & Deliveries	1	$20,800		
	Sub Total		$903,800		$93,200
	Contingency	15%	$135,600		$14,000
	Engineering		$87,300		$9,000
	Total Project Estimate		$1,126,700		$116,200

Other Cost Items

In addition to the items that were evaluated for this project and listed in the engineer's cost estimate above, there are other items that were damaged during the flooding incident and which may require replacement as part of the insurance claim. This includes items such as:

1. Sump Pump Control Panel.
2. Portable Benchtop Turbidimeter.
3. Green Switch/Breaker.
4. Manlift.
5. Cleaning and Drying out of the gallery and conduit.

The list above summarizes the items that were not part of Fishbeck's scope of work to evaluate or estimate the cost to replace. This list is not necessarily all-inclusive, as there may be other miscellaneous items damaged by the flooding incident that require replacement. The City will identify these cost items separately.

Appendix 1

	Turbidimeter Hach 1720E	Hach Turb Controller	ABB Head loss Meter	ABB Effluent Flow Meter	EIM Effluent Valve Actuator	EIM Backwash Valve Actuator	Hach Particle Counter	EIM 60" Interconnect Valve Remote Operators	EIM Backwash VLV Remote Operator	EIM Drain Valve Remote Operator	Filter lights, plugs, & switches	Influent Valve Remote Operator	Genie Lift	Therma-Stor Air Dryer	Rhombus Sump Pump Control Panel	ABB Flow Surface Wash Flow Meter	Pilot Filter Influent Supply Pump/VFD	Pilot Filter Non Chlorinated Supply Pump	NaOH Supply Line Insulation	Hach Bench Top Turb	ASCO Valves on Particle Counters
Filter #11	Device FAILED .Water in device, Corrosion on electronics	Device FAILED.Water in device, Corrosion on electronics	Device FAILED.Water in device, Corrosion on electronics	Device FAILED.Water in device, Corrosion on electronics	Device FAILED .Water in device, Corrosion on electronics	Excellent condition. No water in this unit.	Device FAILED .Water in device, Corrosion on electronics		Device FAILED .Water in device, Corrosion on electronics	Device FAILED .Water in device, Corrosion on electronics	submerged, need replaced	Device FAILED .Water in device, Corrosion on electronics									
Filter #12	Device FAILED .Water in device, Corrosion on electronics	Device FAILED.Water in device, Corrosion on electronics	Device FAILED.Water in device, Corrosion on electronics	Device FAILED.Water in device, Corrosion on electronics	Device FAILED .Water in device, Corrosion on electronics	Excellent condition. No water in this unit.	Device FAILED .Water in device, Corrosion on electronics		Device FAILED .Water in device, Corrosion on electronics	Device FAILED .Water in device, Corrosion on electronics	submerged, need replaced	Device FAILED .Water in device, Corrosion on electronics									
Filter #13	Device FAILED .Water in device, Corrosion on electronics	Device FAILED.Water in device, Corrosion on electronics	Device FAILED.Water in device, Corrosion on electronics	Device FAILED.Water in device, Corrosion on electronics	Device FAILED .Water in device, Corrosion on electronics	Excellent condition. No water in this unit.			Device FAILED .Water in device, Corrosion on electronics	Device FAILED .Water in device, Corrosion on electronics	submerged, need replaced	Device FAILED .Water in device, Corrosion on electronics									
Filter #14	Device FAILED .Water in device, Corrosion on electronics	Device FAILED.Water in device, Corrosion on electronics	Device FAILED.Water in device, Corrosion on electronics	Device FAILED.Water in device, Corrosion on electronics	Device FAILED .Water in device, Corrosion on electronics	Excellent condition. No water in this unit.	Device FAILED .Water in device, Corrosion on electronics		Device FAILED .Water in device, Corrosion on electronics	Device FAILED .Water in device, Corrosion on electronics	submerged, need replaced	Device FAILED .Water in device, Corrosion on electronics									
Filter #15	Device FAILED .Water in device, Corrosion on electronics	Device FAILED.Water in device, Corrosion on electronics	Device FAILED.Water in device, Corrosion on electronics	Device FAILED.Water in device, Corrosion on electronics	Device FAILED .Water in device, Corrosion on electronics	Excellent condition. No water in this unit.	Device FAILED .Water in device, Corrosion on electronics		Device FAILED .Water in device, Corrosion on electronics	Device FAILED .Water in device, Corrosion on electronics	submerged, need replaced	Device FAILED .Water in device, Corrosion on electronics									
Filter #16	Device FAILED .Water in device, Corrosion on electronics	Device FAILED.Water in device, Corrosion on electronics	Device FAILED.Water in device, Corrosion on electronics	Device FAILED.Water in device, Corrosion on electronics	Device FAILED .Water in device, Corrosion on electronics	Excellent condition. No water in this unit.			Device FAILED .Water in device, Corrosion on electronics	Device FAILED .Water in device, Corrosion on electronics	submerged, need replaced	Device FAILED .Water in device, Corrosion on electronics									
Filter #17	Device FAILED .Water in device, Corrosion on electronics	Device FAILED.Water in device, Corrosion on electronics	Device FAILED.Water in device, Corrosion on electronics	Device FAILED.Water in device, Corrosion on electronics	Device FAILED .Water in device, Corrosion on electronics	Excellent condition. No water in this unit.			Device FAILED .Water in device, Corrosion on electronics	Device FAILED .Water in device, Corrosion on electronics	submerged, need replaced	Device FAILED .Water in device, Corrosion on electronics									
Filter #18	Device FAILED .Water in device, Corrosion on electronics	Device FAILED.Water in device, Corrosion on electronics	Device FAILED.Water in device, Corrosion on electronics	Device FAILED.Water in device, Corrosion on electronics	Device FAILED .Water in device, Corrosion on electronics	Excellent condition. No water in this unit.	Device FAILED .Water in device, Corrosion on electronics		Device FAILED .Water in device, Corrosion on electronics	Device FAILED .Water in device, Corrosion on electronics	submerged, need replaced	Device FAILED .Water in device, Corrosion on electronics									
Filter #19	Device FAILED .Water in device, Corrosion on electronics	Device FAILED.Water in device, Corrosion on electronics	Device FAILED.Water in device, Corrosion on electronics	Device FAILED.Water in device, Corrosion on electronics	Device FAILED .Water in device, Corrosion on electronics	Excellent condition. No water in this unit.	Device FAILED .Water in device, Corrosion on electronics		Device FAILED .Water in device, Corrosion on electronics	Device FAILED .Water in device, Corrosion on electronics	submerged, need replaced	Device FAILED .Water in device, Corrosion on electronics									
Filter #20	Device FAILED .Water in device, Corrosion on electronics	Device FAILED.Water in device, Corrosion on electronics	Device FAILED.Water in device, Corrosion on electronics	Device FAILED.Water in device, Corrosion on electronics	Device FAILED .Water in device, Corrosion on electronics	Excellent condition. No water in this unit.			Device FAILED .Water in device, Corrosion on electronics	Device FAILED .Water in device, Corrosion on electronics	submerged, need replaced	Device FAILED .Water in device, Corrosion on electronics									
Filter #21	Device FAILED .Water in device, Corrosion on electronics	Device FAILED.Water in device, Corrosion on electronics	Device FAILED.Water in device, Corrosion on electronics	Device FAILED.Water in device, Corrosion on electronics	Device FAILED .Water in device, Corrosion on electronics	Excellent condition. No water in this unit.	Device FAILED .Water in device, Corrosion on electronics		Device FAILED .Water in device, Corrosion on electronics	Device FAILED .Water in device, Corrosion on electronics	submerged, need replaced	Device FAILED .Water in device, Corrosion on electronics									

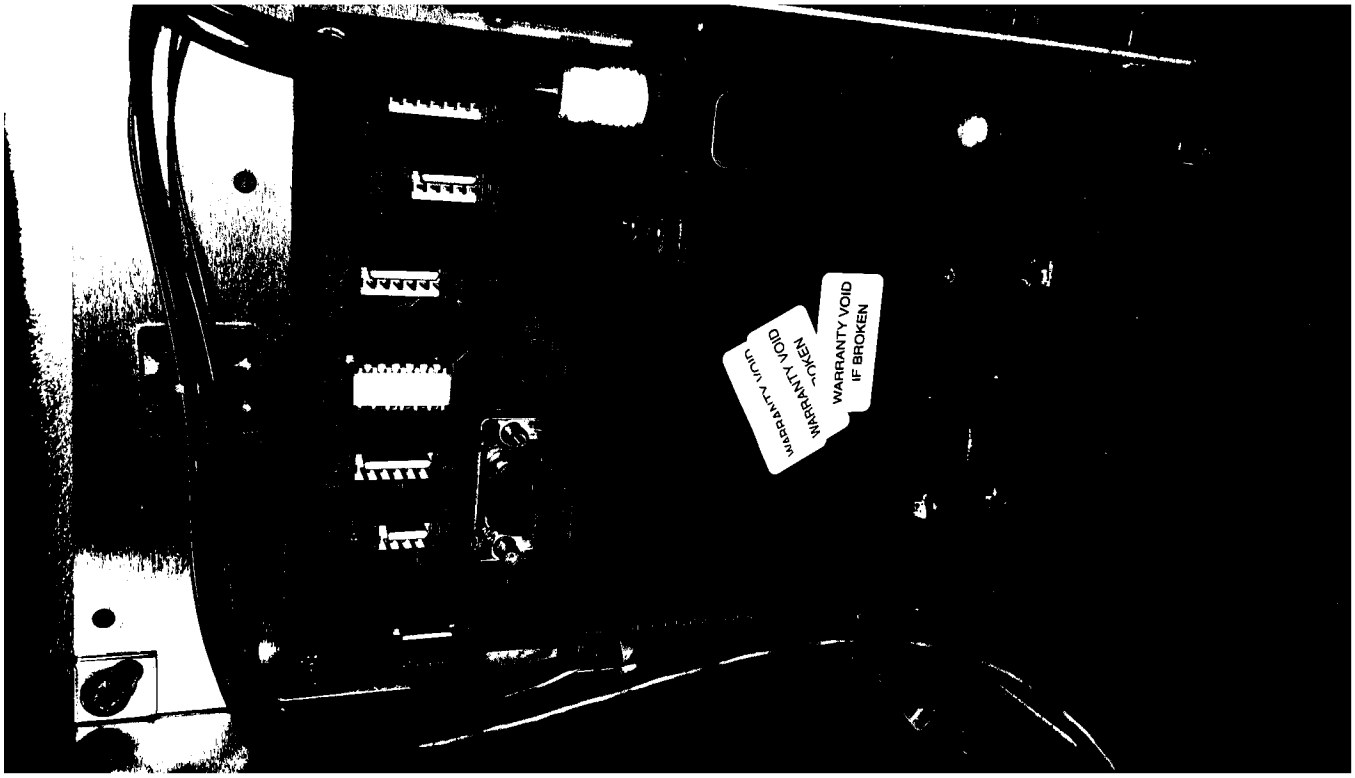
	Turbidimeter Hach 1720E	Hach Turb Controller	ABB Head loss Meter	ABB Effluent Flow Meter	EIM Effluent Valve Actuator	EIM Backwash Valve Actuator	Hach Particle Counter	EIM 60" Interconnect Valve Remote Operators	EIM Backwash VLV Remote Operator	EIM Drain Valve Remote Operator	Filter lights, plugs, & switches	Influent Valve Remote Operator	Genie Lift	Therma-Stor Air Dryer	Rhombus Sump Pump Control Panel	ABB Flow Surface Wash Flow Meter	Pilot Filter Influent Supply Pump/VFD	Pilot Filter Non Chlorinated Supply Pump	NaOH Supply Line Insulation	Hach Bench Top Turb	ASCO Valves on Particle Counters
Filter #22	Device FAILED .Water in device, Corrosion on electronics	Device FAILED.Water in device, Corrosion on electronics	Device FAILED.Water in device, Corrosion on electronics	Device FAILED.Water in device, Corrosion on electronics	Device FAILED .Water in device, Corrosion on electronics	Device FAILED .Water in device, Corrosion on electronics			Device FAILED .Water in device, Corrosion on electronics	Device FAILED .Water in device, Corrosion on electronics	submerged, need replaced	Device FAILED .Water in device, Corrosion on electronics									
Filter #23	Device FAILED .Water in device, Corrosion on electronics	Device FAILED.Water in device, Corrosion on electronics	Device FAILED.Water in device, Corrosion on electronics	Device FAILED.Water in device, Corrosion on electronics	Device FAILED .Water in device, Corrosion on electronics	Device FAILED .Water in device, Corrosion on electronics	Device FAILED .Water in device, Corrosion on electronics		Device FAILED .Water in device, Corrosion on electronics	Device FAILED .Water in device, Corrosion on electronics	submerged, need replaced	Device FAILED .Water in device, Corrosion on electronics									
Filter #24	Device FAILED .Water in device, Corrosion on electronics	Device FAILED.Water in device, Corrosion on electronics	Device FAILED.Water in device, Corrosion on electronics	Device FAILED.Water in device, Corrosion on electronics	Device FAILED .Water in device, Corrosion on electronics	Device FAILED .Water in device, Corrosion on electronics			Device FAILED .Water in device, Corrosion on electronics	Device FAILED .Water in device, Corrosion on electronics	submerged, need replaced	Device FAILED .Water in device, Corrosion on electronics									
Filter #25	Device FAILED .Water in device, Corrosion on electronics	Device FAILED.Water in device, Corrosion on electronics	Device FAILED.Water in device, Corrosion on electronics	Device FAILED.Water in device, Corrosion on electronics	Device FAILED .Water in device, Corrosion on electronics	Device FAILED .Water in device, Corrosion on electronics	Device FAILED .Water in device, Corrosion on electronics		Device FAILED .Water in device, Corrosion on electronics	Device FAILED .Water in device, Corrosion on electronics	submerged, need replaced	Device FAILED .Water in device, Corrosion on electronics									
60" EIM Remote Operators QTY 2								Device FAILED .Water in device, Corrosion on electronics													
Genie Lift													Lift Failed								
Dehumidifier #4														Device FAILED .Water in device, Corrosion on electronics							
Dehumidifier #5														Device FAILED .Water in device, Corrosion on electronics							
Dehumidifier #6														Device FAILED .Water in device, Corrosion on electronics							
Sump Pump Controller															Device FAILED.Water in device, Corrosion on electronics						
Surface Wash Mag Meter																Small amount of water in terminal box. Dried out. Recommend Calibration					

	Turbidimeter Hach 1720E	Hach Turb Controller	ABB Head loss Meter	ABB Effluent Flow Meter	EIM Effluent Valve Actuator	EIM Backwash Valve Actuator	Hach Particle Counter	EIM 60" Interconnect Valve Remote Operators	EIM Backwash VLV Remote Operator	EIM Drain Valve Remote Operator	Filter lights, plugs, & switches	Influent Valve Remote Operator	Genie Lift	Therma-Stor Air Dryer	Rhombus Sump Pump Control Panel	ABB Flow Surface Wash Flow Meter	Pilot Filter Influent Supply Pump/VFD	Pilot Filter Non Chlorinated Supply Pump	NaOH Supply Line Insulation	Hach Bench Top Turb	ASCO Valves on Particle Counters
Pilot Filter Influent Supply Pump/VFD																	Device FAILED .Water in device, Corrosion on electronics				
Pilot Filter Non Chlorinated Supply Pump																		Device FAILED .Water in device, Corrosion on electronics			
NaOH Supply Line																			Heat Traced line. Insulation is soaked and damaged		
Bench top Turb																				City evaluated this unit	
ASCO Valves Qty 18																					Recommend Replacement

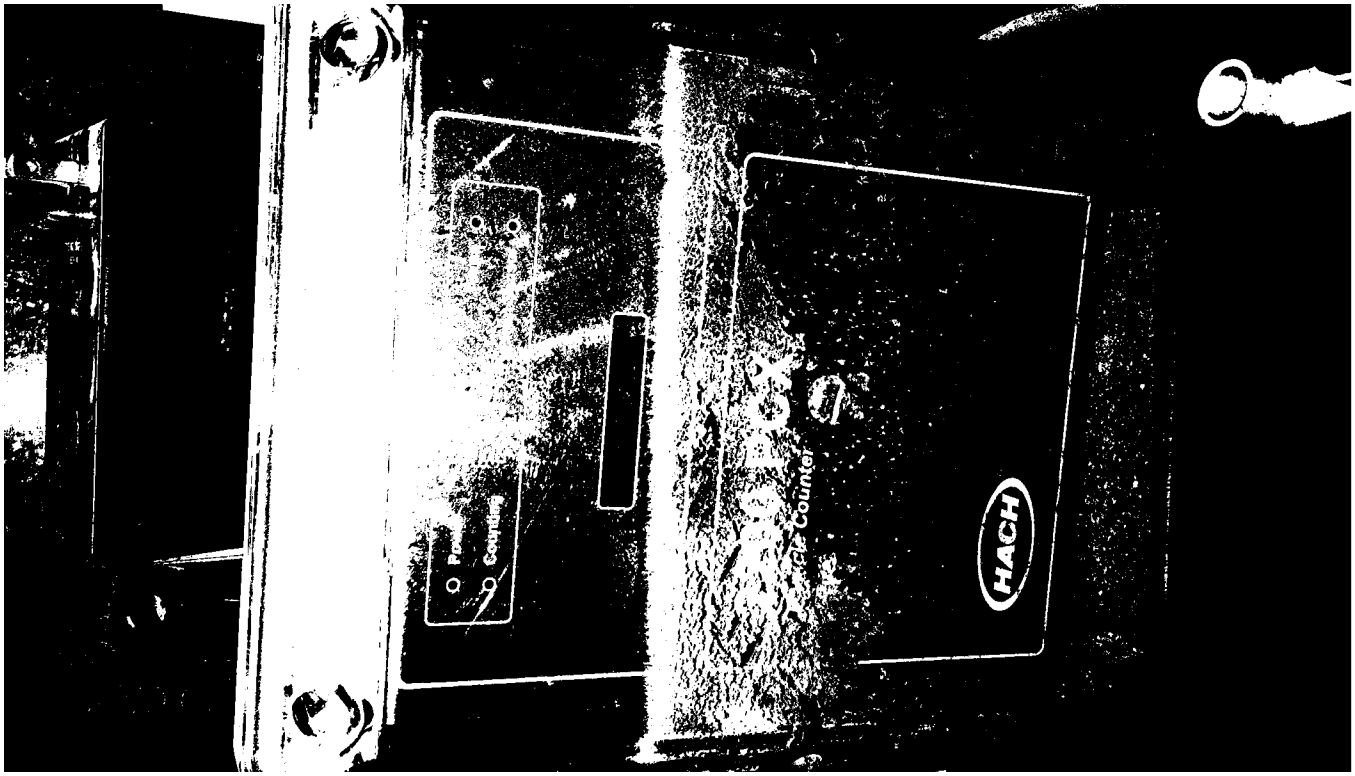
Appendix 2

fishbeck **Photolog**

Ann Arbor Water Treatment Plant Filter Pipe Gallery Flooding Rehab
Project No. 191556
Date of Site Visit: December 5, 2019



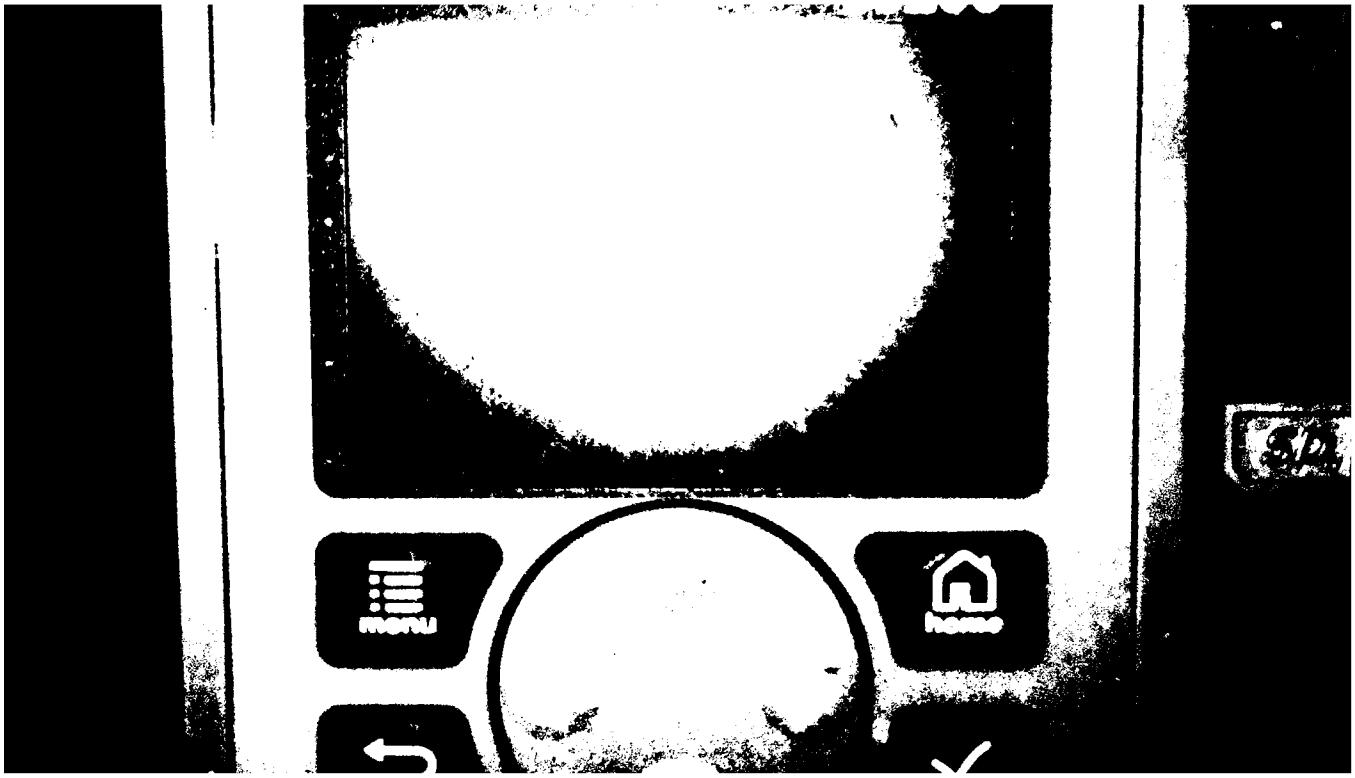
Inside of Hach Particle Counter Enclosure. Typical of 9. Contents of enclosure were immersed. Wire terminations are corroding.



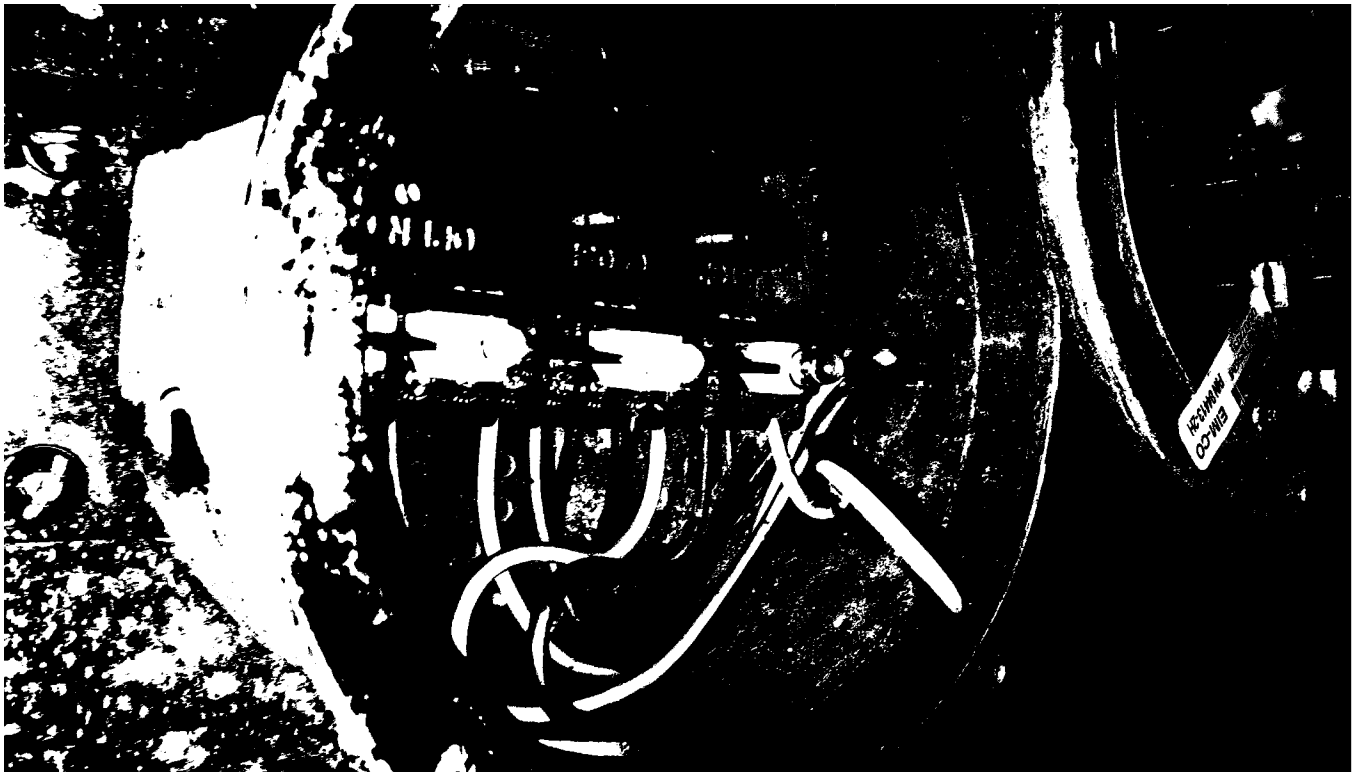
Hach Particle Counter. Water entered the gasketed enclosure and filled the devise approximately 2/3 of the way. Devise not functioning. Typical of 9.

ABB Filter Headloss Sensor. Sensor was immersed and water entered inside of device. Devise has failed. Wire terminations are corroding. Typical of 16.

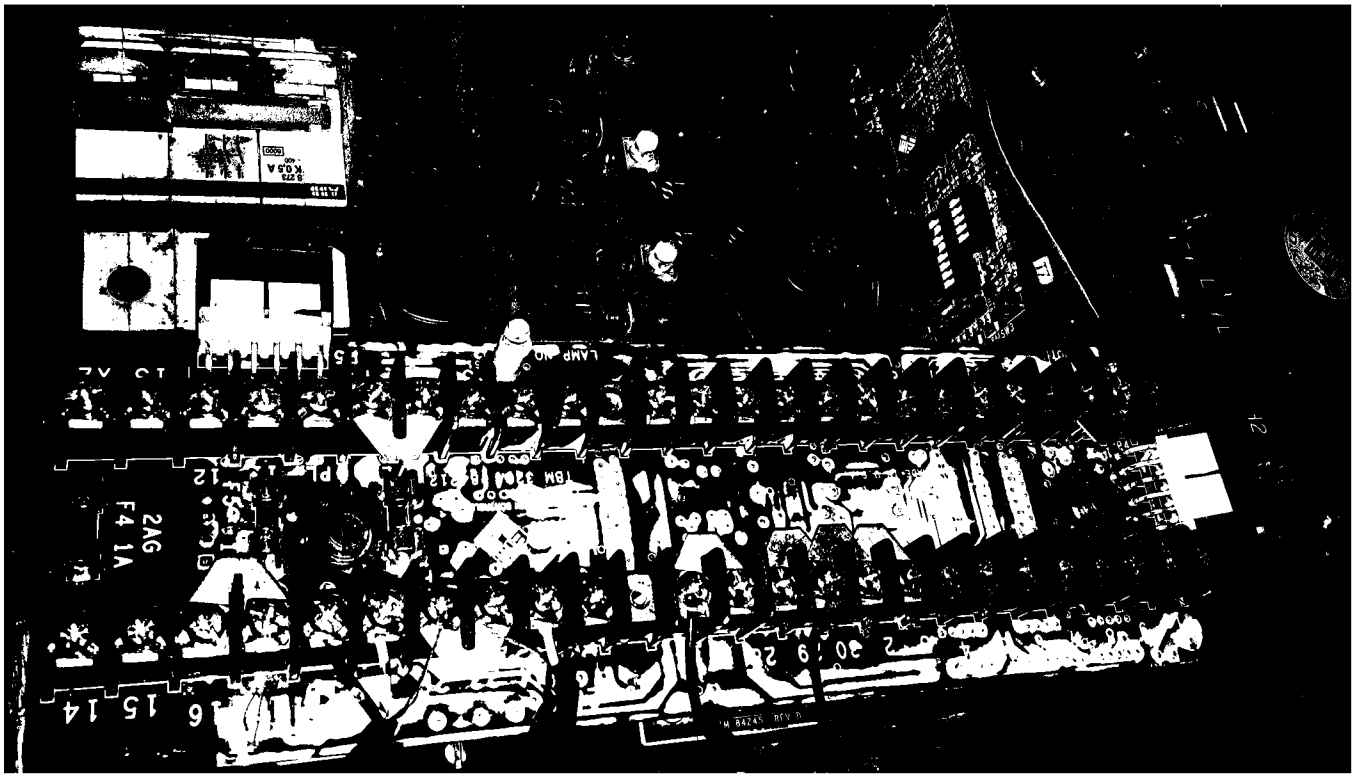
ABB Filter Headloss Sensor Display. Display was immersed and is not functioning. Typical of 16.



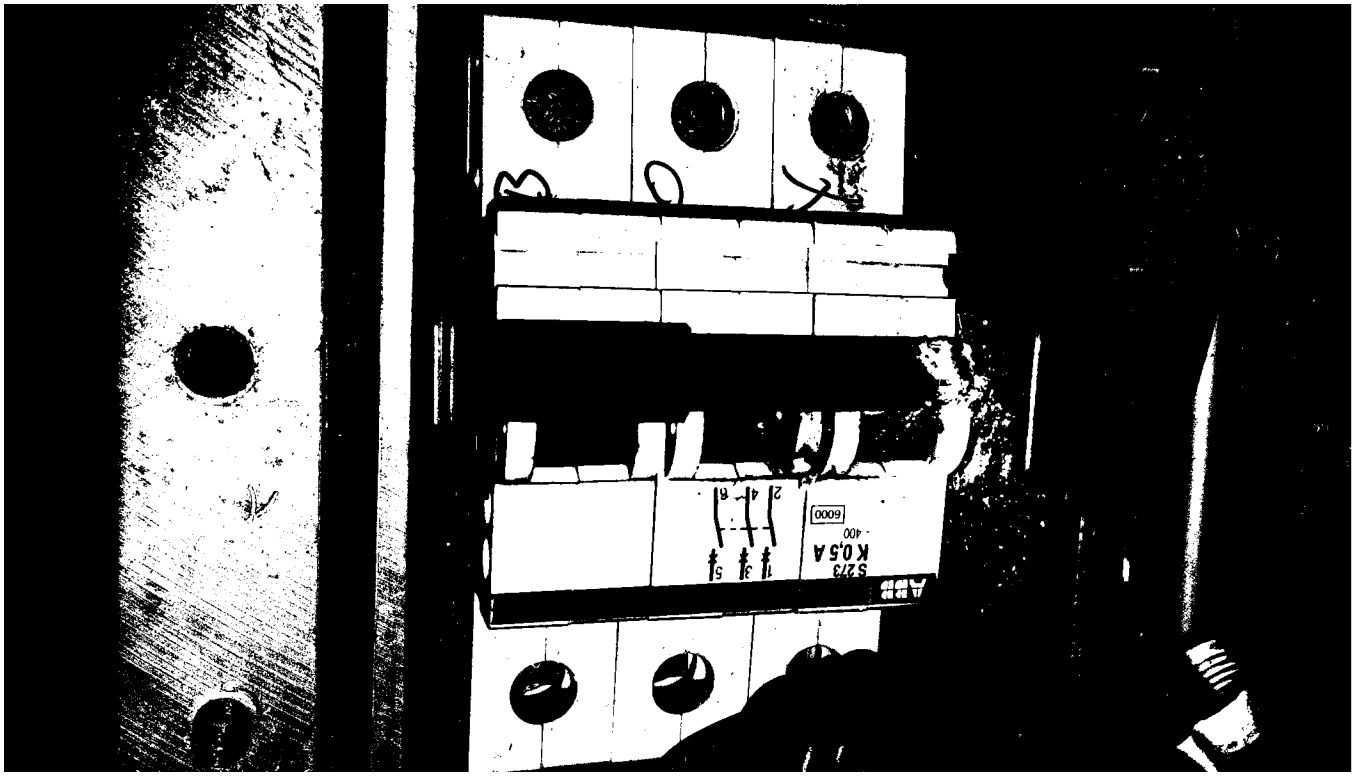
Hach Turbidimeter Controller. Devise was immersed and is not functioning. Typical of 16.



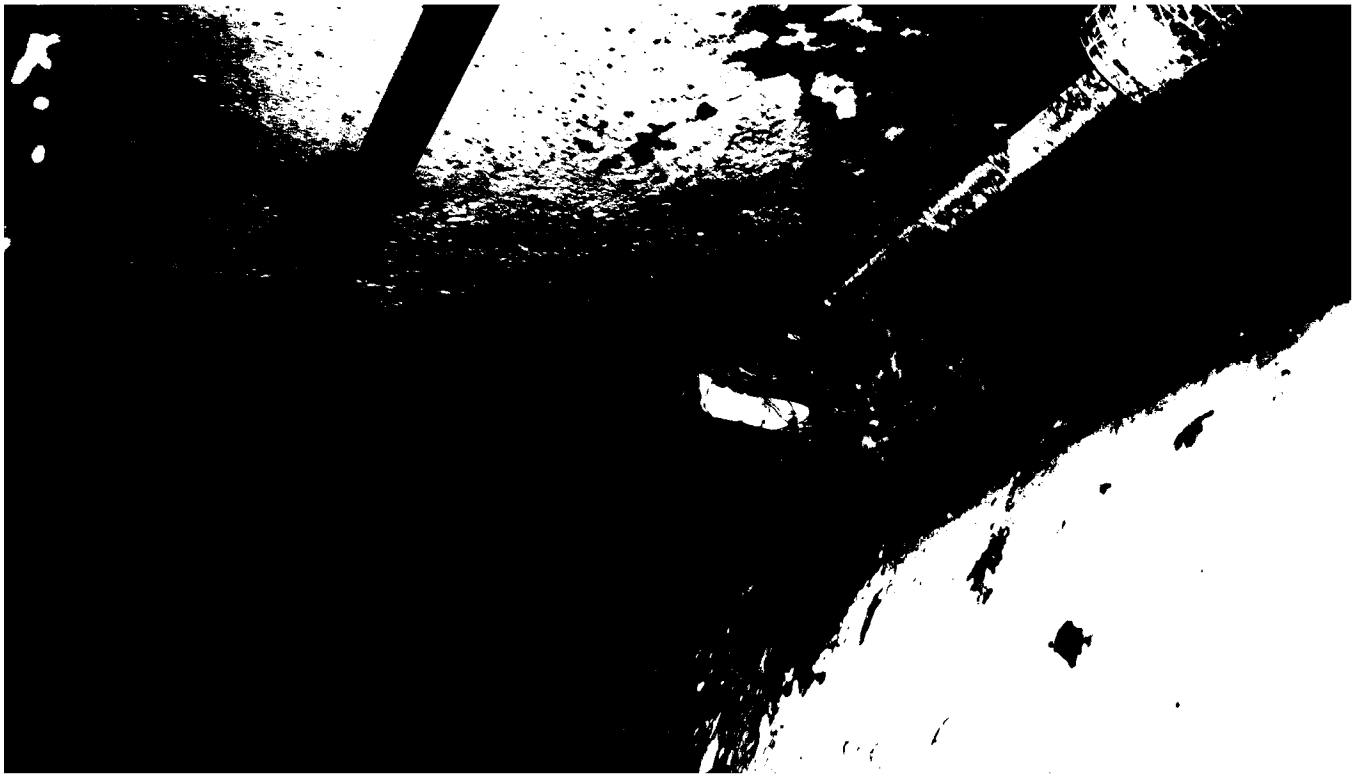
EIM valve actuator remote control station. Device was immersed and is not functioning. Housing and wire terminations are corroding. Typical of 50



EIM valve actuator. Actuator was immersed. Water entered the enclosure and submerged wire terminals and network cards. Actuator not functioning. Typical of 21.



EIM Valve actuator 480V power supply breaker. Breaker was submerged when water entered the enclosure. Wires corroding. Actuator not functioning. Typical of 21.



Sodium Hydroxide heat trace and insulation. Line was submerged. New heat trace cable and insulation is needed.

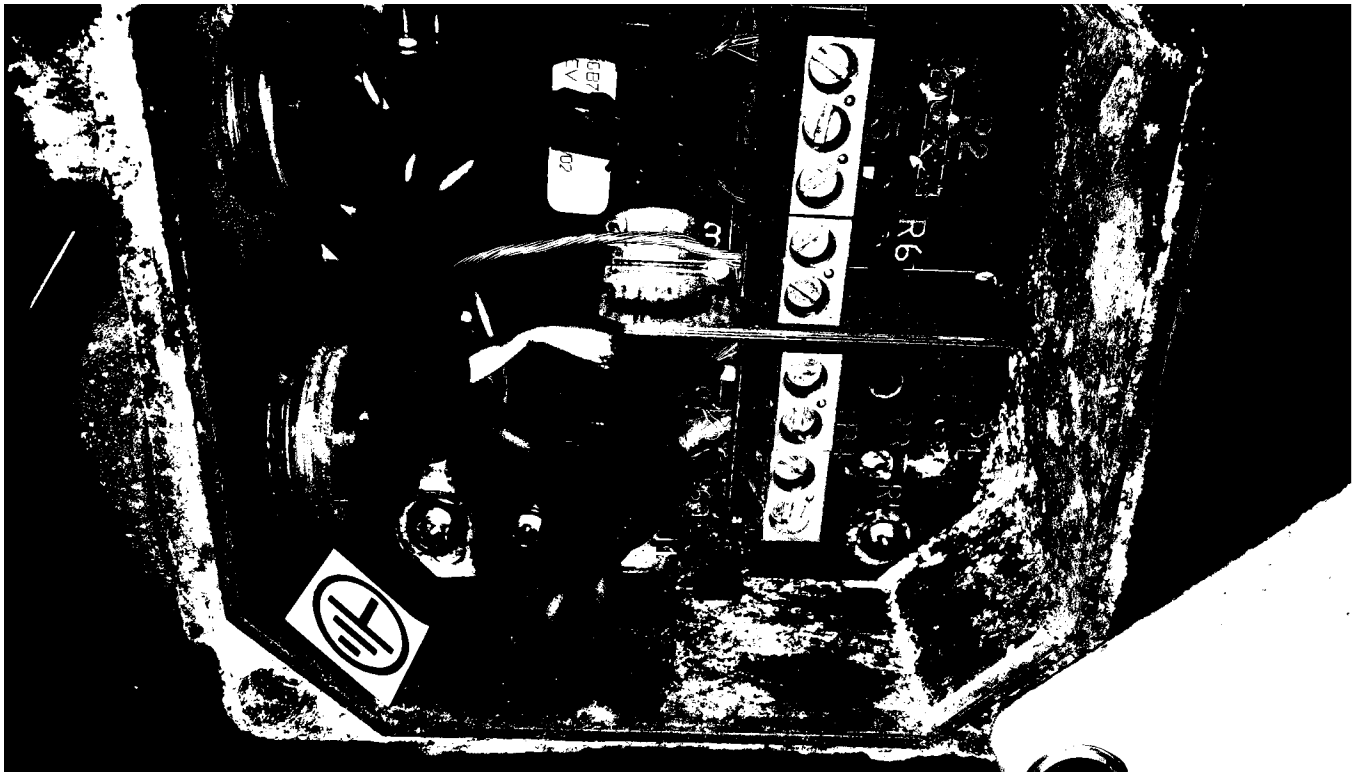
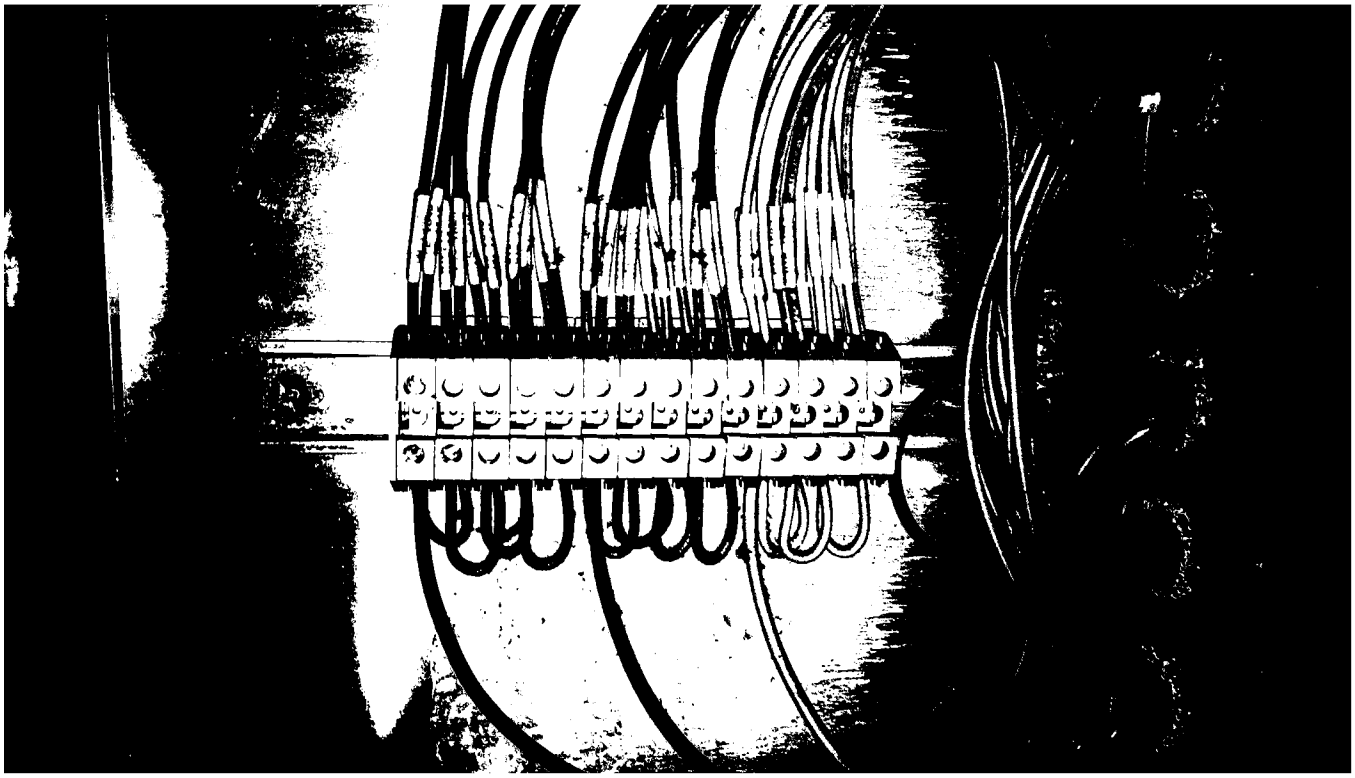


ABB Filter Effluent flow meter. Devise not functioning. Typical of 16.



480V power distribution junction box. Water entered gasketed enclosure and filled approximately 2/3 of the enclosure. Wires terminations are corroding.

Appendix 3

Inventory List

Filter	Device	Manufacture	Model	Serial #	Attachment	Range	Column1	Column2
#11	Effluent Valve Actuator	EIM	Q4G2-3	071856F01	Pratt 12" Butterfly			
#12	Effluent Valve Actuator	EIM	Q4G2-3	071856F02	Pratt 12" Butterfly			
#13	Effluent Valve Actuator	EIM	Q4G2-3	071856F03	Pratt 12" Butterfly			
#14	Effluent Valve Actuator	EIM	Q4G2-3	071856F04	Pratt 12" Butterfly			
#15	Effluent Valve Actuator	EIM	Q4G2-3	071856F05	Pratt 12" Butterfly			
#16	Effluent Valve Actuator	EIM	Q4G2-3	071856F06	Pratt 12" Butterfly			
#17	Effluent Valve Actuator	EIM	Q4G2-3	071856F07	Pratt 12" Butterfly			
#18	Effluent Valve Actuator	EIM	Q4G2-3	071856F08	Pratt 12" Butterfly			
#19	Effluent Valve Actuator	EIM	Q4G2-3	071856F09	Pratt 12" Butterfly			
#20	Effluent Valve Actuator	EIM	Q4G2-3	071856F10	Pratt 10" Butterfly			
#21	Effluent Valve Actuator	EIM	Q4G2-3	071856K01	Pratt 10" Butterfly			
#22	Effluent Valve Actuator	EIM	Q4G2-3	071856K02	Pratt 10" Butterfly			
#23	Effluent Valve Actuator	EIM	Q4G2-3	071856F03	Pratt 10" Butterfly			
#24	Effluent Valve Actuator	EIM	Q4G2-3	071856F04	Pratt 10" Butterfly			
#25	Effluent Valve Actuator	EIM	Q4G2-3	071856F05	Pratt 10" Butterfly			
#26	Effluent Valve Actuator	EIM	Q4G2-3	071856F06	Pratt 10" Butterfly			
#22	Backwash Valve Actuator	EIM	R5L6-3	071856L02	Pratt 20" Butterfly			
#23	Backwash Valve Actuator	EIM	R5L6-3	071856L03	Pratt 20" Butterfly			
#24	Backwash Valve Actuator	EIM	R5L6-3	071856L04	Pratt 20" Butterfly			
#25	Backwash Valve Actuator	EIM	R5L6-3	071856L05	Pratt 20" Butterfly			
#26	Backwash Valve Actuator	EIM	R5L6-3	071856L06	Pratt 20" Butterfly			
#11	Mag Flow Meter	ABB	50XM	03W008174	12"	0-2100 GPM		
#12	Mag Flow Meter	ABB	50XM	03W008175	12"	0-2100 GPM		
#13	Mag Flow Meter	ABB	50XM	03W008176	12"	0-2100 GPM		
#14	Mag Flow Meter	ABB	50XM	03W008177	12"	0-2100 GPM		
#15	Mag Flow Meter	ABB	50XM	03W008178	12"	0-2100 GPM		

Filter	Device	Manufacture	Model	Serial #	Attachment	Range	Column1	Column2
#16	Mag Flow Meter	ABB	50XM	03W008179	12"	0-2100 GPM		
#17	Mag Flow Meter	ABB	50XM	03W008186	12"	0-2100 GPM		
#18	Mag Flow Meter	ABB	50XM	03W008187	12"	0-2100 GPM		
#19	Mag Flow Meter	ABB	50XM	03W008188	12"	0-2100 GPM		
#20	Mag Flow Meter	ABB	50XM	03W008189	12"	0-2100 GPM		
#21	Mag Flow Meter	ABB	50XM	03W025468	10"			
#22	Mag Flow Meter	ABB	50XM	03W025475	10"			
#23	Mag Flow Meter	ABB	50XM	03W025470	10"			
#24	Mag Flow Meter	ABB	50XM	03W025471	10"			
#25	Mag Flow Meter	ABB	50XM	03W025478	10"			
#26	Mag Flow Meter	ABB	50XM	03W025479	10"			
#11	Head Loss Meter	ABB	600T series	03W012393		0-120" H2O Diff		
#12	Head Loss Meter	ABB	600T series	03W012396		0-120" H2O Diff		
#13	Head Loss Meter	ABB	600T series	03W012392		0-120" H2O Diff		
#14	Head Loss Meter	ABB	600T series	03W012398		0-120" H2O Diff		
#15	Head Loss Meter	ABB	600T series	03W012394		0-120" H2O Diff		
#16	Head Loss Meter	ABB	600T series	03W012391		0-120" H2O Diff		
#17	Head Loss Meter	ABB	600T series	03W012399		0-120" H2O Diff		
#18	Head Loss Meter	ABB	600T series	03W012397		0-120" H2O Diff		
#19	Head Loss Meter	ABB	600T series	03W012395		0-120" H2O Diff		
#20	Head Loss Meter	ABB	600T series	03W012400		0-120" H2O Diff		
#21	Head Loss Meter	ABB	600T series			0-120" H2O Diff		
#22	Head Loss Meter	ABB	600T series			0-120" H2O Diff		
#23	Head Loss Meter	ABB	600T series			0-120" H2O Diff		
#24	Head Loss Meter	ABB	600T series			0-120" H2O Diff		
#25	Head Loss Meter	ABB	600T series			0-120" H2O Diff		
#26	Head Loss Meter	ABB	600T series			0-120" H2O Diff		

Filter	Device	Manufacture	Model	Serial #	Attachment	Range	Column1	Column2
#11	Particle Counter	Hach	PCX/WW					
#12	Particle Counter	Hach	PCX/WW					
#13,15	Particle Counter	Hach	PCX/WW					
#14,16	Particle Counter	Hach	PCX/WW					
#17,19	Particle Counter	Hach	PCX/WW					
#18, 20	Particle Counter	Hach	PCX/WW					
#21 ,22	Particle Counter	Hach	PCX/WW					
#23, 24	Particle Counter	Hach	PCX/WW					
#25, 26	Particle Counter	Hach	PCX/WW					
#11	Effluent Turbidimeter	Hach	!720E/ SC200			0-100 NTU		
#12	Effluent Turbidimeter	Hach	!720E/ SC200			0-100 NTU		
#13	Effluent Turbidimeter	Hach	!720E/ SC200			0-100 NTU		
#14	Effluent Turbidimeter	Hach	!720E/ SC200			0-100 NTU		
#15	Effluent Turbidimeter	Hach	!720E/ SC200			0-100 NTU		
#16	Effluent Turbidimeter	Hach	!720E/ SC200			0-100 NTU		
#17	Effluent Turbidimeter	Hach	!720E/ SC200			0-100 NTU		
#18	Effluent Turbidimeter	Hach	!720E/ SC200			0-100 NTU		
#19	Effluent Turbidimeter	Hach	!720E/ SC200			0-100 NTU		
#20	Effluent Turbidimeter	Hach	!720E/ SC200			0-100 NTU		
#21	Effluent Turbidimeter	Hach	!720E/ SC200			0-100 NTU		
#22	Effluent Turbidimeter	Hach	!720E/ SC200			0-100 NTU		
#23	Effluent Turbidimeter	Hach	!720E/ SC200			0-100 NTU		
#24	Effluent Turbidimeter	Hach	!720E/ SC200			0-100 NTU		
#25	Effluent Turbidimeter	Hach	!720E/ SC200			0-100 NTU		
#26	Effluent Turbidimeter	Hach	!720E/ SC200			0-100 NTU		
Applied	Applied Turbidimeter	Hach	1720C			0-100 NTU		

EXHIBIT B-1
FEE SCHEDULE

Contractor shall be paid for those Services performed pursuant to this Agreement inclusive of all reimbursable expenses (if applicable), in accordance with the terms and conditions as set in the original Contract. The Compensation Schedule included in the Exhibit B of the original Contract states natures and amount of compensation the Contractor may charge the City.

The not-to-exceed amount is $1,280,000.00 is broken down in Table 1 – Engineer's Estimated Construction Cost of Technical Memo 3 (included in Exhibit A-1).