APPENDIX

TECHNICAL DATA / NON-CONTRACT DOCUMENTS

FOR

WATER RECLAMATION FACILITY
PHOSPHORUS/TOTAL NITROGEN PROJECT
CONTRACT NO. 26

CITY OF CANTON, OHIO

APPENDIX

1. Quotation from Schreiber, Inc., for "*Canton, OH Proposal No.: 10-13-1984"*, prepared by Larry Willingham, dated November 1, 2013, consisting of 11pages.

2. Quotation from Hydro-Dyne Engineering, Inc., for "*Canton WRF Nutrient Removal and Miscellaneous Improvements Fine Screening Facility Scope of Work #11272-13-14 for (Dual Stage) Hydro-Flo Screens and Washing Compactors"*, prepared by Steve D. Frank, Regional Sales Manager, dated August 30, 2013, consisting of 8 pages.

3. Quotation from Hydro-Dyne Engineering, Inc., for "*Canton WRF Nutrient Removal and Miscellaneous Improvements Fine Screening Facility Scope of Work #11272-12 for (Single Stage) Hydro-Flo Screens and Washing Compactors"*, prepared by Steve D. Frank, Regional Sales Manager, dated August 30, 2013, consisting of 7 pages.

4. Quotation from Gardner Denver Nash Hoffman & Lamson Products, entitled *"Proposal No. 23201R3 Canton Ohio WWTP Equipment Repair…Centrifugal Products"*, prepared by Todd Lilly, Product Specialist, dated October 15, 2013, consisting of 8 pages.

5. Quotation from Farrar Scientific, entitled *"Quote: FS080512 Rev 1 for Refrigerator Environmental Chamber/Incubator Environmental Chamber System"*, prepared by Craig A. Wood, Director of Engineering, dated May 10, 2013, consisting of 2 pages.

6. Report of Geotechnical Subsurface Exploration from Professional Services Industries, Inc. for *"Proposed Building Expansion Canton Water Reclamation Facility…PSI File Number 0145-449"*, prepared by Nicholas S. Campanella and A. Veeramani, P.E., dated October 24, 2011, consisting of 32 pages.

7. Soil Resistivity Test Results from Professional Services Industries, Inc. for *"Canton Water Reclamation Facility…PSI File Number 0138-323"*, prepared by Surya Thapa, P.E. and A. Veeramani, P.E., dated June 14, 2012, consisting of 5 pages.

8. Analytical Report from Alloway, for *"Mudwell – Center Well Sample No. L12-10280-01 Canton Tertiary Demolition Project"*, dated January 12, 2012, consisting of 2 pages.

9. Report of Findings of an Asbestos Survey from HzW Environmental Consultants. LLC. Conducted at (6) Structures Located of the City of Canton Water Pollution Control Center, prepared by Matthew P. Fergus and Joan A. Sablar, dated October 10, 2013, consisting of 58 pages.

10. Report of Thickness Inspection from Acuren, for *"Raw Pump Inlet Discharge Piping City of Canton OH (WRF)"*, prepared by Richard Conley, dated December 10, 2010, consisting of 32 pages.

11. Report of Piping Inspection City of Canton OH (WRF) from Acuren, prepared by Richard Conley, dated December 19, 2011, consisting of 28 pages.

12. Report of Piping Inspection City of Canton OH (WRF) from Acuren, prepared by Richard Conley, dated December 3, 2012, consisting of 31 pages.

13. Agreement between Ovivo USA, LLC and the City of Canton for furnishing goods and services associated with the Membrane Bioreactor ("MBR") system, dated August 20, 2013.

14. Shop Drawings submitted by OVIVO, for equipment to be furnished under the Scope of Supply contained in the MBR Procurement Agreement and as shown on the drawings (to be furnished upon availability).

SECTION 01

QUOTATION FROM SCHREIBER, INC.
(GRIT AND GREASE SYSTEM)

SCHREIBER
Pure Ingenuity

November 1, 2013

Craig W. Juday, P.E.
Vice President
CT Consultants, Inc.
8150 Sterling Court
Mentor, OH 44060

Subject: Canton, OH

Dear Mr. Juday,

Thank you for the opportunity to offer the Longitudinal Grit and Grease Removal System for the City of Canton, OH.

We previously submitted comments on the drawings, but have not seen if these modifications have been incorporated. We will review the final drawings as soon as the project Advertises or when they are available. Should the final drawing require any change in our scope or pricing we will provide a statement of clarification and address any cost implications.

An outline of the scope of supply and pricing for the subject project is as follows:

- Two (2) Dual SFB-440 Grit & Grease Removal Units with Grit Channels 95'-6" in length and Grease Channels 89'-6" in length. Each unit will include the following:
    - One (1) 304 stainless steel bridge spanning two (2) grit and grease Channels including one (1) 0.5 HP TEFC brushless drive, eight (8) drive shaft bearings, two (2) flanged crane wheels, two (2) non-flanged crane wheels, carbon steel crane rails with base plates and anchorage, 304 stainless steel 1-1/2" round handrails, access stair treads, and aluminum grating.
    - Two (2) 4" diameter 316 stainless steel air distribution pipe with wall mounted pipe supports, and anchorage.
    - Thirty-Two (32) 1" diameter 316 stainless steel air supply drop pipes with PVC diffusers, 316 stainless steel diffuser supports and anchorage.
    - Two (2) 2.4 HP Flygt grit pumps, two (2) galvanized steel 4" square drop pipes, two (2) 3" diameter galvanized steel grit discharge pipes, and two (2) 3" diameter flexible hose connectors.
    - Two (2) 316 stainless steel mechanical grease skimmer blade, two (2) 0.25 HP TEFC grease scraper hoist, two (2) 304 stainless steel 12" shafted grease removal screw conveyors with 1.5 HP drives, two (2) grease bagger systems, two (2) 316 stainless steel diverter boxes, and two (2) galvanized 24" diameter carrier pipe..

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- Two (2) sets of grit and grease chamber divider baffles, 304 stainless steel angle support brackets, HDP baffle sections, and stainless steel anchorage.

- One (1) Local On-Bridge Control Station / Junction Box including the following:

  - One (1) Enclosure, NEMA 7 cast aluminum, approximately 17"H x 13"W x 9"D.
  - One (1) E-Stop pushbutton.
  - One (1) Cycle Start pushbutton.
  - One (1) Fwd-Off-Rev selector switch (used when system is put in manual at the Off-Bridge Panel).
  - Two (2) On/Off selector switches for the Grit Pump (used when system is put in manual at the Off-Bridge Panel).
  - Two (2) Raise-Off-Lower selector switches for the Grease Skimmer Hoist. (used when system is put in manual at the Off-Bridge Panel).
  - One (1) lot of terminal blocks, and wire ducts.

- Two (2) Thermal-Flex crane rail heating system and panel including two (2) 90' heating length and 24" cold ends. System shall be Constant Wattage Rail Heating Cable 25 watts/ft @ 480 VAC. Conductors: #12 AWG (19/26) Tinned Plated Copper, Primary Insulation: FEP, Jacket or Pairs: FEP. Nichrome 34 gage resistance heating wire, 60" zone length with grounding braid & over-jacket FEP, final O.D. 0.260 x 0.375" nominal. The system shall included the following components:

  - Thirty-one (31) Thermal-Flex High Temperature Fiberglass Channels 0.438" x 1.00" x 0.438" x 72".
  - One hundred twenty-five (125) Crane Rail Channel Brackets, 0.070" x 1.5." with 5/16-18 x 1 ¼" stainless steel bolts, washers, and nuts.
  - Two (2) Hazardous Location Power Connection Kits.
  - Two (2) End Seal Kits for Hazardous Locations.

- Two (2) Off-Bridge Main Grit and Grease Control Panels, each controlling one (1) Bridge, two (2) Grit Pumps, two (2) Grease Skimmers, two (2) Grease Screw Conveyors, and one (1) Grit Classifier. Each panel shall include the following:

  - One (1) Enclosure, NEMA 4X 304 stainless steel floor mounted enclosure, approximately 62"H x 48"W x 12" D, mounted off the bridge.
  - One (1) Main breaker with operator mechanism.
  - One (1) Control power transformer.
  - Three (3) FVR combination starters (Bridge and Skimmer).
  - Two (2) FVNR combination starters (Grit Pumps).
  - One (1) Phase failure monitor.
  - One (1) Condensation heater.
  - One (1) Heat exchanger.
  - One (1) CompactLogix L23E PLC, Ethernet module, I/O as required.
  - One (1) PanelView Plus 700 7" color touch OIT, sun shield.
  - One (1) 24VDC power supply.
  - One (1) Ethernet switch, unmanned.

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- One (1) lot of pilot lights, terminal blocks, wire ducts, timers, relays, branch and supplementary circuit protection.

- One (1) Heat Trace Control Panel 480 Volts 3-PH / NEMA 4X enclosure with lockable handle, door switch and enclosure light, main breaker, contactor, lightning arrestor, control transformer, remote local selector switch on back panel, On and Fault light, GFI protected (50-100MA) with door mounted RTD temperature controller.

- One (1) RTD Type A, 3-wire 36" length for Ambient or Line Sensing.

- Eleven (11) Festooning Mast, each constructed of 4" carbon steel square tubing and hot-dipped galvanized with stainless steel anchorage.

- Two (2) 20" 304 stainless steel grit classifiers including 304 stainless steel replaceable liner, hardened steel screw, 3.0 HP TEFC brushless motor.

- Spare Parts: Two (2) Bridge wheels (flanged), two (2) Bridge wheels (non-flanged), four (4) Shaft bearings, four (4) Shaft couplings, one (1) Grit pumps, four (4) diffusers, two (2) crane rail keepers, one (1) Festooning system tow trolley, two (2) Festooning system standard trolleys, and two (2) sets of grease auger drive belts.

- Field Services:

  - Installation Assistance – two (2) days, one (1) trip.
  - Start-up – three (3), one (1) day trips.
  - Commissioning – one (1), five (5) day trip.
  - Operator Training – six (6), 4-hour training sessions, one (1) trip.
  - Adjustment Trip – one (1), two (2) day trip.

All pricing is in U.S. Dollars.

All above pricing **includes** supervision of installation, field services start-up, and training of personnel.

The above pricing does not include the following:

- Installation of equipment.
- Any Structural and Civil work associated with the modification of the structure.
- Any field wiring, and local junction boxes,
- Motor starters for the Grit Classifiers and Grease Screw Conveyors.
- Local pushbutton stations for the Grit Classifiers and Grease Screw Conveyors.
- The required air for the Aerated Grit Channel to be provided by others. Air required per Grit Channel is 210 scfm (Total 840 scfm) at approximately 6.0 psig.
- Any field painting.
- Any slide gates.

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Delivery is estimated as follows:

- Submittals: 14 – 18 weeks after receipt of order.
- Equipment Delivery: 16 – 18 weeks after receipt of approved submittal data.

Price $905,200.00

If you have any questions or need additional information, please do not hesitate to contact me.

Sincerely,

Larry Willingham
Schreiber LLC
larryw@schreiberwater.com
Phone: (205) 655-7466

cc: Paul Matrka – Smith Environmental

100 Schreiber Drive
Trussville, AL 35173
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DATE: November 1, 2013 **PROPOSAL NO.:** 10-13-1984

TO: All Bidding Contractors **ENGINEER:** CT Consultants

PROJECT: Canton, OH
(Per Draft Documents Dated
September 27, 2013 and as Outlined Below)

SCHREIBER LLC, 100 Schreiber Drive, Trussville, Alabama 35173 (hereinafter referred to as "Seller") hereby agrees to sell to the buyer designated below (hereinafter referred to as "Buyer"), subject to all of the terms and conditions on the face and reverse sides hereof, the following equipment:

I. SECTION 11328 – LONGITUDINAL GRIT AND GREASE REMOVAL SYSTEM

A. Two (2) Grit and Grease Removal Systems, Dual Model SFB 440 X 95'-6" long Grit Channel and 89'-6" long Grease Channel for installation in structure provided by others. The following items are included with each unit:

1. One (1) traveling bridge constructed of 304 stainless steel. The bridge shall span both grit channels and both grease channels. Bridge is equipped with walkway of aluminum grating and 1 ½" diameter round 304 stainless steel hand railing. The bridge is supported by two (2) drive wheels and two (2) idler wheels. The wheels shall be suitable for operating on crane rails.
2. One (1) set of crane rails, base plates, and clips.
3. One (1) access step.
4. One (1) bridge drive is 1/2 HP, TEFC motor. Drive assembly shall include shafts and bearing assemblies.
5. Two (2) 2.4 HP Flygt grit pumps, two (2) galvanized steel 4" square drop pipes, two (2) 3" diameter galvanized steel grit discharge pipes, and two (2) 3" diameter flexible hose connectors. Pump capacity: 120 gpm at 10 ft T.D.H. each.
6. Two (2) 4" diameter 316 stainless steel air distribution pipe with supports, anchorage, and union.
7. Thirty-two (32) diffuser assemblies with 1" diameter 316 stainless steel drop pipe, PVC diffusers, supports, isolation valve, union and anchorage. Dead zone auxiliary diffusers will be furnished as required. Diffuser supports shall be 316 stainless steel.
8. One (1) manual hoist for inspecting and/or maintaining grit pump is furnished on bridge.
9. Two (2) 316 stainless steel mechanical grease skimmer blade, two (2) 0.25 HP TEFC grease scraper hoist, two (2) 304 stainless steel 12" shafted grease removal screw conveyors with 1.5 HP drives, two (2) grease bagger systems, two (2) 316 stainless steel diverter boxes, and two (2) galvanized 24" diameter carrier pipes.
10. Two (2) lot of 2" x 4" HDP baffles with 304 stainless steel angle supports and stainless steel anchorage.
11. One (1) Thermal-Flex crane rail heating system and panel including two (2) 90' heating length and 24" cold ends. System shall be Constant Wattage Rail Heating Cable 25 watts/ft @ 480 VAC. Conductors: #12 AWG (19/26) Tinned Plated Copper, Primary Insulation: FEP, Jacket or Pairs: FEP. Nichrome 34 gage resistance heating wire, 60" zone length with grounding braid & over-jacket FEP, final O.D. 0.260 x 0.375" nominal. The system shall included the following components:
    a. Thirty-one (31) Thermal-Flex High Temperature Fiberglass Channels 0.438" x 1.00" x 0.438" x 72".
    b. One hundred twenty-five (125) Crane Rail Channel Brackets, 0.070" x 1.5." with 5/16-18 x 1 ¼" stainless steel bolts, washers, and nuts.
    c. Two (2) Hazardous Location Power Connection Kits.
    d. Two (2) End Seal Kits for Hazardous Locations.

DATE: November 1, 2013 **PROPOSAL NO.:** 10-13-1984

TO: All Bidding Contractors **ENGINEER:** CT Consultants

PROJECT: Canton, OH
(Per Draft Documents Dated
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12. One (1) Local On-Bridge Control Station / Junction Box including the following:
    a. One (1) Enclosure, NEMA 7 cast aluminum, approximately 17”H x 13”W x 9”D.
    b. One (1) E-Stop pushbutton.
    c. One (1) Cycle Start pushbutton.
    d. One (1) Fwd-Off-Rev selector switch (used when system is put in manual at the Off-Bridge Panel).
    e. Two (2) On/Off selector switches for the Grit Pump (used when system is put in manual at the Off-Bridge Panel).
    f. Two (2) Raise-Off-Lower selector switches for the Grease Skimmer Hoist. (used when system is put in manual at the Off-Bridge Panel).
    g. One (1) lot of terminal blocks, and wiring ducts.
13. One (1) Festooning System shall be provided for electrification. Festooning System shall include the following:
    a. C-Track type trolley carrier.
    b. Tow trolley.
    c. Tow bar.
    d. Cable trolleys.
    e. Flat electrical cable.
    f. Stainless steel wall mounted support brackets.

B. One (1) Heat Trace Control Panel 480 Volts 3-PH / NEMA 4X enclosure with lockable handle, door switch and enclosure light, main breaker, contactor, lightning arrestor, control transformer, remote local selector switch on back panel, On and Fault light, GFI protected (50-100MA) with door mounted RTD temperature controller.

C. One (1) RTD Type A, 3-wire 36” length for Ambient or Line Sensing.

D. Two (2) Off-Bridge Main Grit and Grease Control Panels, each controlling one (1) Bridge, two (2) Grit Pumps, two (2) Grease Skimmers, two (2) Grease Screw Conveyors, and one (1) Grit Classifier. Each panel shall include the following:

1. One (1) Enclosure, NEMA 4X 304 stainless steel floor mounted enclosure, approximately 62”H x 48”W x 12” D, mounted off the bridge.
2. One (1) Main breaker with operator mechanism.
3. One (1) Control power transformer.
4. Three (3) FVR combination starters (Bridge and Skimmer).
5. Two (2) FVNR combination starters (Grit Pumps).
6. One (1) Phase failure monitor.
7. One (1) Condensation heater.
8. One (1) Heat exchanger.

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9. One (1) CompactLogix L23E PLC, Ethernet module, I/O as required.
10. One (1) PanelView Plus 700 7” color touch OIT, sun shield.
11. One (1) 24VDC power supply.
12. One (1) Ethernet switch, unmanned.
13. One (1) lot of pilot lights, terminal blocks, wire ducts, timers, relays, branch and supplementary circuit protection.

E. Eleven (11) Festooning Mast, each constructed of 4” carbon steel square tubing and hot-dipped galvanized with stainless steel anchorage.

F. Two (2) 20” 304 stainless steel grit classifiers, each including the following:
1. One (1) 304 stainless steel decant hopper/housing.
2. One (1) 304 stainless steel pipe trough.
3. One (1) Hardened steel shaftless screw.
4. One (1) 304 stainless steel replaceable liner.
5. One (1) 3.0 HP TEFC brushless motor.

G. Spare Parts:

1. Two (2) Bridge wheels (flanged).
2. Two (2) Bridge wheels (non-flanged).
3. Four (4) Shaft bearings.
4. Four (4) Shaft couplings.
5. One (1) Grit pumps.
6. Four (4) diffusers.
7. Two (2) crane rail keepers.
8. One (1) Festooning system tow trolley.
9. Two (2) Festooning system standard trolleys.
10. Two (2) sets of grease auger drive belts.

II. CORROSION PROTECTION

A. All motors, gear reducers, bearing housings and valves shall be coated with the respective manufacturer’s standard machinery enamel. All other mild steel parts are to be hot dip galvanized following fabrication. No field painting is required.

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III. INSTALLATION

A. Installation of equipment **is not** included (installation provided by others in accordance with manufacturer's instructions). Installation instruction provided for two (2) days with one (1) trip to assist and direct the purchaser in the proper installation of equipment. General Contractor to unload equipment from delivering trucks. General contractor to provide electrician for actual hook-up of power from junction box.

B. NOT INCLUDED is the following:

1. Equipment installation.
2. Any concrete grouting.
3. Any underground or interconnecting piping or valves.
4. Any electrical wiring, conduit, junction boxes, or controls not expressly included with this quotation.

IV. FIELD SERVICES

A. Start-Up:

1. The services of a factory trained field technician will be provided for a maximum of three (3) days with three (3) trips to calibrate, check alignment, perform functional testing and classroom, field operation, and maintenance instruction. Additional services furnished upon request at the rate of $800.00 per day, plus travel and normal living expenses.

B. Equipment Commissioning:

1. The services of a factory trained field technician will be provided for a maximum of five (5) days with one (1) trip to commission the equipment including the inspection of the equipment, supervise field testing, and start-up. Additional services furnished upon request at the rate of $1,000.00 per day, plus travel and normal living expenses.

C. Operator Training:

1. The services of a factory trained field technician will be provided for a maximum of six (6) 4-hour training sessions, with one (1) trip to provide training on the operation and maintenance and control of the equipment. Additional services furnished upon request at the rate of $1,000.00 per day, plus travel and normal living expenses.

DATE: November 1, 2013 **PROPOSAL NO.:** 10-13-1984

TO: All Bidding Contractors **ENGINEER:** CT Consultants

PROJECT: Canton, OH
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SCHREIBER LLC, 100 Schreiber Drive, Trussville, Alabama 35173 (hereinafter referred to as "Seller") hereby agrees to sell to the buyer designated below (hereinafter referred to as "Buyer"), subject to all of the terms and conditions on the face and reverse sides hereof, the following equipment:

D. Adjustment Trip:

1. The services of a factory trained field technician will be provided for a maximum of two (2) days with one (1) trip to observe the equipment operation and work with plant operators to answer questions regarding the operation and maintenance of the equipment. Additional services furnished upon request at the rate of $1,000.00 per day, plus travel and normal living expenses.

V. WARRANTY

A. The equipment contained in this proposal shall be free of defects in the material and workmanship for a period of two (2) years from the date of beneficial use, but not to exceed 90 days from completion of installation.

VI. OPERATION AND MAINTENANCE MANUALS

A. Included with the proposal are one (1) hardcopy and one (1) electronic copy of the Operation and Maintenance Manuals. Should additional manuals be necessary they will be furnished at a cost of $150.00 per hardcopy and $70.00 per electronic copy.

VII. NOT INCLUDED AND TO BE PROVIDED BY OTHERS

A. Any Structural and Civil work associated with the modification of the structure.
B. Any field wiring, local junction boxes,
C. Motor starters for the Grit Classifiers and Grease Screw Conveyors.
D. Local pushbutton stations for the Grit Classifiers and Grease Screw Conveyors.
E. The required air for the Aerated Grit Channel to be provided by others. Air required per Grit Channel is 210 scfm (Total 840 scfm) at approximately 6.0 psig.
F. Any field painting.
G. Any slide gates.

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TO: All Bidding Contractors **ENGINEER:** CT Consultants

PROJECT: Canton, OH
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SCHREIBER LLC, 100 Schreiber Drive, Trussville, Alabama 35173 (hereinafter referred to as "Seller") hereby agrees to sell to the buyer designated below (hereinafter referred to as "Buyer"), subject to all of the terms and conditions on the face and reverse sides hereof, the following equipment:

Price: **$905,200.00** F.O.B Canton, OH

Price Valid for sixty (60) days from bid date shown on this proposal.

Taxes: Above price does NOT include sales or use tax. Such taxes shall be for Buyer's account.

Payment: 15% Approved submittals.
80% Upon delivery of equipment.
5% Upon acceptance or beneficial use, but not to exceed 90 days from completion of installation.

Submittals to be provided 14 – 18 weeks after mutually executed and accepted Purchase Order.

Shipment is estimated 16 – 18 weeks after receipt in Seller's office of complete approved submittal data.

THE SALE OF THE EQUIPMENT DESCRIBED ABOVE IS MADE SOLELY ON AND EXPRESSLY SUBJECT TO ALL THE TERMS AND CONDITIONS ON THE FACE AND REVERSE SIDES HEREOF.

Agreed to this _____ day of _____, 20__ Agreed to this _____ day of _____, 20__

_____ SCHREIBER LLC
BUYER

By:_____ By:_____
Name & Title Name & Title

Is this purchase tax exempt? Yes__ No __
If yes, sale tax exemption certificate No _____

Prepared by:_____
Larry G. Willingham/Director of Sales Processes

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CONDITIONS OF PROPOSAL

Acceptance of this proposal by the Contractor shall be acceptance of all terms and conditions recited herein, which shall supersede any conflicting term in any other contract document. Any of the Contractor's terms and conditions in addition or different from this proposal are objected to and shall have no effect. Contractor's agreement herewith shall be evidence by Contractor's signature hereon by permitting Seller/Subcontractor to commence work for project. Further this proposal is contingent on a mutually acceptable contract.

1. The Contractor shall provide the Seller a purchase order agreement for the equipment furnished under this proposal.
2. a. If required the Seller will accept a subcontract agreement, from the Contractor, for the installation services furnished under this proposal.
   b. The subcontract form used between the Seller and Buyer will be the AIA Standard Form Subcontract Document A401 (1987 Edition).
3. Seller/Subcontractor shall be paid monthly progress payments within 7 days after receipt of the payment by the General Contractor for value of work completed plus the amount of materials and equipment suitably stored on or off site.
4. The Contractor will withhold no more retention from the Seller/Subcontractor than is being withheld by the Owner from the Contractor with respect to the Sellers/Subcontractor's work.
5. All sums not paid when due shall bear interest at the maximum rate allowed by law at the place of the project, and all cost of collection, including a reasonable attorney's fee, shall be paid by the Contractor.
6. Nothing in the Agreements shall require the Seller/Subcontractor to continue performance if timely payments are not made to Seller/Subcontractor for suitable performed work or stored materials and equipment.
7. No back charges or claim of the Contractor for services shall be valid except by an agreement in writing by the Seller/Subcontractor's failure to meet any requirement of the Agreements. In such event, the Contractor shall notify the Seller/Subcontractor of such default, in writing, and allow Seller/Subcontractor reasonable time to correct any deficiency before incurring any cost chargeable to the Seller/Subcontractor.
8. Contractor is to prepare all work areas so as to be acceptable for Seller/Subcontractor's work under the Agreements. Seller/Subcontractor will not be called upon to start work until sufficient areas are ready to insure continued work.
9. Contractor shall furnish all temporary site facilities including suitable, on site, storage space, hoisting and temporary electrical and water at no cost to Seller/Subcontractor.
10. Contractor is to unload all initial equipment deliveries to the job site and place in the Seller/Subcontractor's designated job site storage area.
11. Seller/Subcontractor shall be responsible for obtaining off-site storage space at no cost to the Contractor. All loading and unloading of equipment at the off-site location shall be the responsibility of Seller/Subcontractor.
12. Seller/Subcontractor shall be given reasonable time in which to make delivery of materials and/or labor to commence and complete the performance of the contract. Supplier/Subcontractor shall not be responsible for delays or defaults where occasioned by any causes of any kind and extent beyond its control, including but not limited to: delays caused by the Owner, General Contractor, Architect and/or Engineers, delays in transportation, shortages of raw materials, civil disorders, labor difficulties, vendor allocations, fires, floods, accidents and acts of God. Seller/Subcontractor shall be entitled to equitable adjustment in the Purchase Order/Subcontract amount for additional costs due to unanticipated project delays or accelerations.
13. All workmanship is guaranteed against defects in workmanship for a period of one year from date of beneficial use. THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING ANY WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. The exclusive remedy shall be that Seller/Subcontractor will replace or repair any part of its work, which is found to be defective. Seller/Subcontractor will not be responsible for special, incidental, or consequential damages. Seller/Subcontractor shall not be responsible for damage to its work by other parties or for improper use of equipment by others.
14. Work called for herein is to be performed during Seller/Subcontractor's regular working hours. All work performed outside such hours shall be charged for at rates or amounts agreed upon by the parties at the time overtime is authorized.
15. Nothing in this Agreement shall serve to void Seller/Subcontractor's right to file a lien or claim on its behalf in the event that any payment to Seller is not timely made.
16. The Contractor shall make no demand for liquidated damages for delays or actual damages for delays in any sum in excess of such amount as may be specifically named in this proposal and no liquidated damages may be assessed against Seller/Subcontractor for more than the amount paid by the Contractor for unexcused delays to the extent actually caused by the Supplier/Subcontractor.

SECTION 02

QUOTATION FROM HYDRO-DYNE ENGINEERING, INC. (FINE SCREENING DUAL STAGE)

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August 30th, 2013

To: CT Consultants Inc.

Ref: Canton WRF Nutrient Removal and Miscellaneous Improvements
Fine Screening Facility
Specification: Section 11325CT – FINE SCREEN EQUIPMENT – (5/1/13)

Scope of Work #11272-13-14 for Hydro-Flo Screens and Washing Compactors

Hydro-Dyne Engineering is pleased to offer the following equipment designed for use at the above referenced installation.

EQUIPMENT DESCRIPTION – DUAL STAGE SCREENING

1. Hydro-Flo Screens – 6mm
   a.) Hydro-Dyne Engineering Inc. will supply three (3) Hydro-Flo Screens, which will each fit in a channel measuring 84" wide by 144" deep in the vicinity of the screen. The approach channel shall be 48" wide and 144" deep. Each screen will be designed to pass the peak flow of 44 MGD with head loss that will not exceed 5 inches when the screen grid is 50% blinded

   b.) The Hydro-Flo Screens will consist of T316 stainless steel vertical elements connected in parallel with 9mm thick UHMWPE panels with 6mm perforations. The elements will be mounted on T316 stainless steel pivot shafts with UHMWPE guide links at each end of the shaft. The screen's assembly will be mounted in a T316 stainless steel frame with T316 stainless steel wear tracks to guide and support the screenings grid. All hardware shall be T316 stainless steel. All wetted parts will be of T316 stainless steel and high-density composites for maximum corrosion resistance. To reduce maintenance, no bearings, seals or other mechanisms are subject to operation in the flow stream. Front and rear covers will completely enclose the Hydro-Flo above the operating floor.

2. Hydro-Flo Screens – 2mm
   a.) Quantity six (6) Hydro-Flo Screens which will fit in a channel measuring 72" wide by 144" deep in the vicinity of the screen. The approach channel shall be 36" wide and 144" deep. Each screen will be designed to pass the peak flow of 21.6 MGD with head loss that will not exceed 12 inches when the screen grid is 60% blinded. See attached hydraulic calculations for channel capacity and headloss through screens given existing conditions.

   b.) The Hydro-Flo Screens will consist of T316 stainless steel vertical elements connected in parallel with T316 stainless steel panels with 2mm perforations. The elements will be mounted on T316 stainless steel pivot shafts with UHMWPE guide links at each end of the shaft. The screen's assembly will be mounted in a T316 stainless steel frame with T316 stainless steel wear tracks to guide and support the screenings grid. All hardware shall be T316 stainless steel. All wetted parts will be of T316 stainless steel and high-density composites for maximum corrosion resistance. To reduce maintenance, no bearings, seals or other mechanisms are

subject to operation in the flow stream. Front and rear covers will completely enclose the Hydro-Flo above the operating floor.

c.) The Hydro-Flo Screens are driven by included appropriate motors and gear reducers. No parts of the drive system are directly in contact with, or exposed to, the screened debris.

3. Launder Sluice
   a) Hydro-Dyne Engineering will supply a screenings launder sluice system that will collect screenings and wash water from the 6mm and 2mm screen. The branches from each screen will enter a common "W" sluice with a diversion plate between. The solids and wash water from the screens will transfer by gravity into a sluice divider system.

   b) The sluice divider system will be designed to include symmetrical wye-branches that provide an even split between any two selected on-line washer compactors. The off-line washer compactor will be isolated with a manual slide gate.

   c) The sluice divider will transfer solids by gravity directly into the Washing Compactor washing trough via vertical PVC hose down chutes that will be flange connected to the sluice and to the cover of the Washing Compactor. A blanking plate with a drain will be supplied to cover the sluice outlet when the Washing Compactor is removed.

   d) The sluice will be manufactured from 316 stainless steel. It shall comprise of U-shaped and W-shaped lengths of trough that will be welded to the desired overall length.

   e) The sluice system will include the support leg structure manufactured from 316 stainless steel. The legs will be suitable for fixing to a concrete floor.

   f) Covers will be a lightweight, no more than 6 feet long and easily removed by a single operator.

   g) Level sensors will be placed throughout the sluice system and divider sluice that signal a high level alarm if a blockage occurs.

   h) Each screen sluice branch will have a maintenance flushing point that consists of a washing nozzle and ¾" manual ball valve.

   i) A solenoid valve will be fitted into the back plate of the sluice. It will be connected to a local plant water supply. The water supply will provide supplementary transport water.

4. Washing Compactors
   a.) Quantity three (3) 12" Washing Compactors complete with covers to be installed at the end of the launder sluice. The Washing Compactors will accept 380 cubic feet/hour of screenings debris and spray wash water discharged from the Hydro-Flo Screens. The Spray headers, in conjunction with a mixing screw conveyor, will return organic matter, in the screenings, to the channel. The remaining washed screenings will be transported to screenings receptacle, supplied by others.

   b.) The Washing Compactors, including covers, flight, and housing will be constructed of heavy gauge T316 stainless steel. Flight shall be 1/4" thick, have a 3.5" OD torque shaft and have a full pitch. The Washing Compactors will be driven by an electric motor and be supported by bearings on both the drive and discharge ends.
   c.) Each electric motor will be wired to a wall mounted control station with a high voltage cable including multi pin receptacle on each end to provide quick disconnect.

d.) The 6” outlet drain pipe will be fitted with a quick connect coupling and flexible hose to the floor drain.

e.) The compactor outlet chute will be tapered at 1 degree along the full length and will elevate the dewatered screenings to discharge into a bagging system.

f.) The tapered outlet chute will terminate in a flange that will connect directly to a stainless steel discharge box that will direct the compacted screenings downward into the cassette bagger. The box will be designed to prevent bridging of solids and will have a bolted down maintenance access hatch.

g.) The outlet of the discharge box will be a stainless steel mounting assembly that will allow a 24” diameter circular cassette of bags to slide horizontally into position.

h.) The plastic cassette will house one 230 feet long continuous bag that will be released under the weight of compacted screenings dropping from the outlet chute.

5. Controls

a.) Hydro-Dyne Engineering shall supply one (1) NEMA 1 508A UL listed main control panel for the 6mm screens and one (1) NEMA 1 508A UL listed main control panel for the 2mm screens. One (1) NEMA 7X local control panel shall be supplied for each 6mm and 2mm screen. One (1) NEMA 1 508A UL listed main control shall be supplied for the washer compactors and three (3) NEMA 4X local control panels shall be supplied for the washer compactors. The electric control system shall automatically control each Hydro-Flo screen and the Washing Compactor.

Main Panel for the 6mm Screens

1 - Enclosure, NEMA 1, Painted Carbon Steel Enclosure, wall mount type
1 - Main Circuit Breaker, w/ door handle
3 - Circuit Breaker Motor Branch circuit protection
3 - Line Reactors
3 - VFDs, Sq.D Altivar 312 [Screens, 1HP]
1 - Control power transformer, 480-120VAC
3 - HydroRanger 200 Differential Level Assembly including: [1-HydroRanger 200, NEMA 4X, 316SS, 2-Tranducers w/ 30M Cable, 1-Handheld programmer]
1 - Surge Protection
1 - PLC, Allen-Bradley MicroLogix w/ Ethernet and required analog and discrete I/O
1 - OIU, Allen-Bradley Panelview Plus 600
1 - Ethernet switch [Unmanaged]
1 - Power supply, 24VDC
1 - Lot, controls for the solenoid valves
3 - Hour Meter
1 - Alarm horn
3 - Push buttons, NEMA 4X [E-Stop, Reset, Silence]
7 - Pilot lights, NEMA 4X, Push-to-Test type [(1) Power, (3) Run, (3) Fault]
1 - Lot, Control relays, socket type
1 - Lot, Terminal blocks
1 - Lot, Remote contacts [As Required]

Main Panel for the 2mm Screens

1 - Enclosure, NEMA 1, Painted Carbon Steel Enclosure, Floor mounted

1 - Main Circuit Breaker, w/ door handle
6 - Circuit Breaker Motor Branch circuit protection
6 - Line Reactors
6 - VFDs, Sq.D Altivar 312 [Screens, 1HP]
1 - Control power transformer, 480-120VAC
1 - Surge Protection
1 - PLC, Allen-Bradley MicroLogix w/ Ethernet and required analog and discrete I/O
1 - OIU, Allen-Bradley Panelview Plus 600
1 - Ethernet switch [Unmanaged]
1 - Power supply, 24VDC
1 - Lot, controls for the solenoid valves
6 - HydroRanger 200 Differential Level Assembly including: [1-HydroRanger 200, NEMA 4X, 316SS, 2-Tranducers w/ 30M Cable, 1-Handheld programmer]
6 - Hour Meter
1 - Alarm horn
3 - Push buttons, NEMA 4X [E-Stop, Reset, Silence]
13 - Pilot lights, NEMA 4X, Push-to-Test type [(1) Power, (6) Run, (6) Fault]
1 - Lot, Control relays, socket type
1 - Lot, Terminal blocks
1 - Lot, Remote contacts [As Required]

Local Controls for 6mm and 2mm Screens
Nine (9) Local Control Panels for Screens
Enclosure, NEMA 7, 2-Hole [HOA & E-stop]

Main Panel for Washer Compactors
1 - Enclosure, NEMA 1, Painted Carbon Steel Enclosure, wall mount type
1 - Main Circuit Breaker, w/ door handle
3 - Motor Circuit Protectors, HMCPE
3 - Motor starter, Non-Reversing, NEMA Size 1 type, w/ overload [Compactor 2HP]
3 - Current monitor
1 - Control power transformer, 480-120VAC
1 - PLC, Allen-Bradley MicroLogix w/ Ethernet
1 - OIU, Allen-Bradley Panelview Plus 600
1 - Ethernet switch [Unmanaged]
1 - Lot, controls for the solenoid valves
3 - Hour Meter
1 - Alarm horn
3 - Push buttons, NEMA 4X [E-Stop, Reset, Silence]
7 - Pilot lights, NEMA 4X, Push-to-Test type [(1) Power, (3) Run, (3) Fault]
1 - Lot, Control relays, socket type
1 - Lot, Terminal blocks
1 - Lot, Remote contacts [As Required]

Local Controls for Washing Compactors
Three (3) Local Control Panels for Washer Compactors
Enclosure, NEMA 4X, 316, 2-Hole [HOA & E-stop]

6. Electric motors, and speed reducers
   a.) Electric motors for screens are 1 hp, explosion proof, NEMA 56C face, 3 phase, 480V, 60 Hz.
   b.) Electric motors for Washing Compactors are 3 hp, NEMA 56C face, 3 phase, 480V, 60Hz.
   c.) Speed reducers for screens are a SEW Eurodrive.

d.) Speed reducers for Washing Compactors are a SEW Eurodrive.

7. Spare Parts
   a.) The following spare parts shall be furnished with each Filter Screen: 2 screen panels, 2 grid axles, 2 guide links, 2 center supports, 20 hook links, and 20 spacers. Two (2) sets of brushes with fixing clamps shall be supplied with the washing compactors. Also, a total of six (6) solenoid valves, six (6) strainers, and two (2) spray bars with fifty (50) nozzles shall be included.

8. Accessories
   a.) Necessary anchor bolts for mounting
   b.) Nine (9) 2.5" PVC female slip wash water strainers [1 per screen]
   c.) Three (3) 1.5" PVC female slip wash water strainers [1 per washing compactor]
   d.) Nine (9) 2.5" Manual ball valves [1 per screen]
   e.) Eighteen (18) 1.5" Manual union style ball valves [2 per screen]
   f.) Six (6) 1" Manual ball valves [2 per washing compactor]
   g.) Nineteen (19) ¾" Manual ball valves [1 per screen, 10 at sluice system]
   h.) Nine (9) 1.5" Explosion proof solenoid valves [1 per screen]
   i.) Three (3) 1" Non explosion proof solenoid valves [1 per washing compactor]
   j.) One (1) ¾" Explosion proof solenoid valve [1 at sluice system]
   k.) Thirteen (13) Flow switches [1 per screen, 1 per washing compactor, 1 at sluice system]
   l.) Twelve (12) Pressure switches [1 per screen, 1 per washing compactor]
   m.) Six (6) Sluice high level sensors
   n.) Two (2) wash water pressure gauges per Screen
   o.) Three (3) Compactor Disconnect Power Cables, NEMA 4 [Non-Hazardous]
   p.) Three (3) Bagging Assemblies for Washing Compactor
   q.) One (1) Screen Test Kit
   r.) One (1) Leg Kit for the 6mm screen control panel enclosure
   s.) One (1) Leg Kit for the compactor control panel enclosure

COMMENTS AND CLARIFICATIONS

1. See Section 11325 1.1 B – Update with "Hydro-Dyne's base bid proposal is entitled Scope of Work 11272-13-14 dated August 30th, 2013".

2. See Section 2.7 G 2. b. 1 – This requirement is from a competitor's specification. The Hydro-Dyne washing compactor does not have a washing tank and therefore there is no low level to detect. The washing compactor has a stainless steel wedge wire trough to let all the water drain, therefore a low level washing tank alarm sensor is not required for this piece of equipment and has not been included.

3. We have supplied NEMA 1, Painted Carbon Steel enclosures. If 316SS is required, adder is $2,535 for the 6mm screen enclosure, $6,425 for the 2mm screen enclosure, and $1,840 for the compactor enclosure.

4. Connectors have been provided for each 3-Phase Compactor motor. Please note that these items are Non-Hazardous and do NOT include quick connectors and cables for the solenoid valves or local control stations. Per specification section 11325 2.8 E the wash water supply pipe work shall be disconnected by means of a union fitting located downstream of the solenoid leaving it (and the strainer and manual ball valves) in place when the Washing Compactor is removed. An adder for power quick connects power cables for the solenoid valves and local control stations on the (3) Compactors is $18,600. Conduit will be provided by others from the Compactor main control panel to the 3-Ph receptacles located in the vicinity of the Compactor equipment. A cable has been provided

for each motor so that the motor can plug into the 3-Ph receptacle. These cables and connectors have been provided as NON-HAZARDOUS.

5. 2.4 C Note: - This performance guarantee is leftover from discussion about using screenings washing machine rather than a washing compactor. A washing compactor cannot guarantee 5% free organic content and a maximum BOD of 10 mg/g. This will need to be removed.

6. The Local control enclosures will be supplied with Hydro-Dyne fabricated stands. Contractor is responsible for installation.

The Test Kit

Included in this scope is a test kit consisting of a pump, suction and discharge piping and screen disc to be inserted into the discharge piping system. This will allow the city to be able to periodically test the influent and effluent flows at the screens to determine the effectiveness of the installed screens. Hydro-Dyne will demonstrate the use of the test kit during commissioning and will assist the City in establishing baseline data for comparison with future tests.

The testing kit consists of intake piping, a flow meter, electric motor pump, two pressure sensors, the Screen Sample Assembly (SSA), discharge piping and a PLC. The flow is pumped up through adjustable level intake piping, the flow meter and SSA before being piped back to the channel. The SSA will include perforated panels matching all Hydro-Dyne screens on site. Prior to each simulation, the parameters pertaining to each test (grid type, opening size, test duration, etc.) are programmed into the PLC via the touch screen panel. Data collected by the SSA and flow meter is then stored by the onboard PLC for interpretation by the testing party.

Testing will be conducted when flows are typically highest during the day and consist of a series of 10 individual tests upstream and 10 individual tests downstream of each screen to measure how quickly the screen grid completely blinds. Trials were run at the top, the middle and the bottom of the channel to account for variations in solids quantities at different channel elevations. Findings were recorded via the onboard PLC.

Each test provides the testing party with an accurate time taken to blind each perforated panel in the SSA. There shall be 10 results upstream and 10 results downstream of the tested screen. They can quickly be compared and averaged to provide a ratio between the efficiency upstream and downstream of the screen.

Test Kit Factory Service Option

The Hydro-Dyne Test kit includes sophisticated components which enable the collection of a multitude of data that helps Hydro-Dyne size and select screen model and grid types for equipment. Hydro-Dyne employs an engineer with hydraulic expertise to apply the kit. We are concerned that the City will purchase equipment that will prove to be of little practical use. In lieu of the City purchasing a Test Kit to perform these tests, Hydro-Dyne strongly recommends the City considers employing the services of a Hydro-Dyne Test Kit specialist to come to site and perform the necessary testing in conjunction with the plant operators to test the effectiveness of the screening equipment. If considered, this service would replace the included cost for the Test Kit and would include six (6) trips from our Test Kit specialist.

Factory Testing

All components of the screening system shall be factory assembled and tested for a minimum of 24 hours prior to shipment. The equipment shall be shipped in the largest assemblies possible permitted for transporting to minimize field assembly by the Contractor. During the factory testing the screening system shall be adjusted as required assuring proper operation on completion of the field installation.

Hydro-Dyne will provide a certificate of completion of the factory testing to certify that the equipment was successfully assembled and satisfactorily operated prior to shipment. The Contractor shall notify the Owner/Engineer at least 45 days in advance of the factory testing so the Owner/Engineer can arrange to be at the factory testing if chosen. The Owner/Engineer is responsible for travel and lodging expenses. The manufacturer is responsible for local travel and meals

COMMISSIONING SERVICE & CUSTOMER TRAINING

Installation inspection, commissioning of equipment, and training will be furnished with factory-trained servicemen. This service will be rendered in three (3) visits from our factory; One (1) trip to the project site for equipment commissioning assistance for the Contractor, one (1) trip for operator training for Owner personnel and One (1) trip after 3 months of operation to make any necessary field adjustments and/or follow up training. The equipment commissioning trip shall include a minimum of five (5) days. Each day shall not exceed an 8-hour day. The Operator Training trip shall consist of two (2) 12 hour days, and the Adjustment trip shall consist of two (2) days on site observing the equipment operation and working with plant operators to answer questions and expand the plant personnel's knowledge regarding the operation and maintenance of the equipment. Each additional trip will be figured at $2,000 and each additional day onsite will be figured at $1,200. It is agreed and understood that all necessary utilities such as water, electric, air, etc. be connected and functional prior to the arrival of our servicemen. A complete job of checking, adjusting, etc. of the equipment and installation cannot be accomplished unless the plant is ready to operate at the time this service is to be performed. Our servicemen are non-union technicians and any extra cost for other assisting personnel as required by local union regulations is not included in this proposal. Advance notification of at least ten (10) working days prior to the date start-up service is required.

FREIGHT

F.O.B. shipment point with freight costs included.

WARRANTY

The screens and all appurtenances including, but not limited to: frame, supports, covers, and mechanisms manufactured by Hydro-Dyne Engineering are warranted for a period of 2 years against defects in materials and workmanship. Warranty period shall commence after commissioning and operational demonstration. Items supplied to Hydro-Dyne Engineering shall be covered under original manufacturer's warranty. Hydro-Dyne Engineering reserves the right to repair or replace warranted equipment at installation or factory, F.O.B. Hydro-Dyne.

NOT INCLUDED

Concrete work, installation, plumbing, wiring connections, transducer mounting brackets, bonds, liquidated damages, and anything else not specifically mentioned above as included will be construed as NOT INCLUDED, whether or not inclusion is specifically acknowledged.

PRICE SCHEDULE

Three (3) HF-50-67-206-6-P Screens
Six (6) HF-38-72-207-2-P Screens
One (1) Sluice System
Three (3) Washing Compactors WCP-12 **$3,145,000.00**

TAXES

Applicable sales or use taxes, fees, permits, and licenses are not included.

TERMS

90% net due 30 calendar days upon delivery, 100% net due upon completion of startup and approval of O&M manuals NOT to exceed 60 calendar days from date of delivery . Past due balances will be subject to a service charge of 1-1/2% per month on the unpaid balance and services, including shipping and startup, will not be scheduled until account is current.

VALIDITY

Price quoted is firm provided:

1. Written acceptance is received at the factory before February 15th, 2014. If other terms are desired they must be submitted before bid date and revised pricing shall be considered.
2. Purchaser agrees to accept shipment 20 to 28 weeks from date of receipt of approved drawings and authorization to proceed with manufacture. Purchaser is allowed not more than 45 calendar days for review and return of submittals for approval.
3. Shipments delayed by the purchaser or his agents will be escalated at a rate of 1-1/2% per calendar month, compounded, of the value of the unshipped portion.

For additional information, please contact our local representative listed above or me personally.

Sincerely,

Steve D. Frank
Regional Sales Manager
Hydro-Dyne Engineering, Inc.

SECTION 03

QUOTATION FROM HYDRO-DYNE ENGINEERING, INC. (FINE SCREENING SINGLE STAGE)

HYDRO-DYNE® Engineering, Inc.
Tel: 813-818-0777 Fax: 813-818-0770

Locally Represented By:
Hydrodynamics
Mike Voshefski
Number-(513)-899-9992

August 30th, 2013

To: CT Consultants Inc.

Ref: Canton WRF Nutrient Removal and Miscellaneous Improvements
Fine Screening Facility
Specification: Section 11325CT – FINE SCREEN EQUIPMENT - (5/1/13)

Scope of Work 11272-12 for Hydro-Flo Screens and Washing Compactors

Hydro-Dyne Engineering is pleased to offer the following equipment designed for use at the above referenced installation.

EQUIPMENT DESCRIPTION – SINGLE STAGE SCREENING

1. Hydro-Flo Screens – 2mm
   a.) Quantity six (6) Hydro-Flo Screens which will fit in a channel measuring 72" wide by 144" deep in the vicinity of the screen. The approach channel shall be 36" wide and 144" deep. Each screen will be designed to pass the peak flow of 21.6 MGD with head loss that will not exceed 12 inches when the screen grid is 70% blinded.

   b.) The Hydro-Flo Screens will consist of T316 stainless steel elements connected in parallel with T316 stainless steel panels with 2mm perforations. The elements will be mounted on T316 stainless steel pivot shafts with UHMWPE guide links at each end of the shaft. The screen's assembly will be mounted in a T316 stainless steel frame with T316 stainless steel wear tracks to guide and support the screenings grid. All hardware shall be T316 stainless steel. All wetted parts will be of T316 stainless steel and high-density composites for maximum corrosion resistance. To reduce maintenance, no bearings, seals or other mechanisms are subject to operation in the flow stream. Front and rear covers will completely enclose the Hydro-Flo above the operating floor.

   c.) The Hydro-Flo Screens are driven by included appropriate motors and gear reducers. No parts of the drive system are directly in contact with, or exposed to, the screened debris.

2. Launder Sluice
   a) Hydro-Dyne Engineering will supply a screenings launder sluice system that will collect screenings and wash water from the 2mm screens. The branches from each screen will enter a common "W" sluice with a diversion plate between. The solids and wash water from the screens will transfer by gravity into a sluice divider system.

   b) The sluice will include three transition pieces with blanking plates that will connect to three 6mm screens if added in the future.

   c) The sluice divider system will be designed to include symmetrical wye-branches that provide an even split between any two selected on-line washer compactors. The off-line washer compactor will be isolated with a manual slide gate.

d) The sluice divider will transfer solids by gravity directly into the Washing Compactor washing trough via vertical PVC hose down chutes that will be flange connected to the sluice and to the cover of the Washing Compactor. A blanking plate with a drain will be supplied to cover the sluice outlet when the Washing Compactor is removed.

e) The sluice will be manufactured from 316 stainless steel. It shall comprise of U-shaped and W-shaped lengths of trough that will be welded to the desired overall length.

f) The sluice system will include the support leg structure manufactured from 316 stainless steel. The legs will be suitable for fixing to a concrete floor.

g) Covers will be a lightweight, no more than 6 feet long and easily removed by a single operator.

h) Level sensors will be placed throughout the sluice system and divider sluice that signal a high level alarm if a blockage occurs.

i) Each screen sluice branch will have a maintenance flushing point that consists of a washing nozzle and ¾" manual ball valve.

j) A solenoid valve will be fitted into the back plate of the sluice. It will be connected to a local plant water supply. The water supply will provide supplementary transport water.

3. Washing Compactors

a.) Quantity three (3) 12" Washing Compactors complete with covers to fit at the end of the Launder Sluice. Each washing compactor is designed to handle 380 cubic feet per hour. The Washing Compactors will accept the debris and spray wash water discharged from the Hydro-Flo Screens and transferred by the Launder Sluice. In the event a washing compactor is off line a block plate is provided to fit at the discharge end of the divider sluice and a flexible drainage pipe will channel bypass water into the floor drain below. The Spray headers, in conjunction with a mixing screw conveyor, will return organic matter, in the screenings, to the channel. The remaining washed screenings will be transported to screenings receptacle, supplied by others.

b.) The Washing Compactors, including covers, flight, and housing will be constructed of heavy gauge T316 stainless steel. Flight shall be 1/4" thick, have a 3.5" OD torque shaft and have a full pitch. The Washing Compactors will be driven by an electric motor and be supported by bearings on both the drive and discharge ends.

c.) Each electric motor will be wired to a wall mounted control station with a high voltage cable including multi pin receptacle on each end to provide quick disconnect.

d.) The 6" outlet drain pipe will be fitted with a quick connect coupling and flexible hose to the floor drain.

e.) The compactor outlet chute will be tapered at 1 degree along the full length and will elevate the dewatered screenings to discharge into a bagging system.

f.) The tapered outlet chute will terminate in a flange that will connect directly to a stainless steel discharge box that will direct the compacted screenings downward into the cassette bagger. The box will be designed to prevent bridging of solids and will have a bolted down maintenance access hatch.

g.) The outlet of the discharge box will be a stainless steel mounting assembly that will allow a 24" diameter circular cassette of bags to slide horizontally into position.

h.) The plastic cassette will house one 230 feet long continuous bag that will be released under the weight of compacted screenings dropping from the outlet chute.

4. Controls

a.) Hydro-Dyne Engineering shall supply one (1) NEMA 1 508A UL listed main control panel and Six (6) NEMA 7X local control panels for the fine screens, and One (1) NEMA 1 508A UL listed main control for the washer compactors and three (3) NEMA 4X local control panels for the washer compactors. The electric control system shall automatically control each Hydro-Flo screen and the Washing Compactor.

Main Panel for the 2mm Screens

1 - Enclosure, NEMA 1, Painted Carbon Steel Enclosure, Floor mounted
1 - Main Circuit Breaker, w/ door handle
6 - Circuit Breaker Motor Branch circuit protection
6 - Line Reactors
6 - VFDs, Sq.D Altivar 312 [Screens, 1HP]
1 - Control power transformer, 480-120VAC
1 - Surge Protection
1 - PLC, Allen-Bradley MicroLogix w/ Ethernet and required analog and discrete I/O
1 - OIU, Allen-Bradley Panelview Plus 600
1 - Ethernet switch [Unmanaged]
1 - Power supply, 24VDC
1 - Lot, controls for the solenoid valves
6 - HydroRanger 200 Differential Level Assembly including: [1-HydroRanger 200, NEMA 4X, 316SS, 2-Tranducers w/ 30M Cable, 1-Handheld programmer]
6 - Hour Meter
1 - Alarm horn
3 - Push buttons, NEMA 4X [E-Stop, Reset, Silence]
13 - Pilot lights, NEMA 4X, Push-to-Test type [(1) Power, (6) Run, (6) Fault]
1 - Lot, Control relays, socket type
1 - Lot, Terminal blocks
1 - Lot, Remote contacts [As Required]

Local Controls for 2mm Screens

Six (6) Local Control Panels for Screens
Enclosure, NEMA 7, 2-Hole [HOA & E-stop]

Main Panel for Washer Compactors

1 - Enclosure, NEMA 1, Painted Carbon Steel Enclosure, wall mount type
1 - Main Circuit Breaker, w/ door handle
3 - Motor Circuit Protectors, HMCPE
3 - Motor starter, Non-Reversing, NEMA Size 1 type, w/ overload [Compactor 2HP]
3 - Current monitor
1 - Control power transformer, 480-120VAC
1 - PLC, Allen-Bradley MicroLogix w/ Ethernet
1 - OIU, Allen-Bradley Panelview Plus 600
1 - Ethernet switch [Unmanaged]
1 - Lot, controls for the solenoid valves
3 - Hour Meter

1 - Alarm horn
3 - Push buttons, NEMA 4X [E-Stop, Reset, Silence]
7 - Pilot lights, NEMA 4X, Push-to-Test type [(1) Power, (3) Run, (3) Fault]
1 - Lot, Control relays, socket type
1 - Lot, Terminal blocks
1 - Lot, Remote contacts [As Required]

Local Controls for Washing Compactors
Three (3) Local Control Panels for Washer Compactors
Enclosure, NEMA 4X, 316, 2-Hole [HOA & E-stop]

5. Electric motors, and speed reducers
   a.) Electric motors for screens are 1 hp, explosion proof, NEMA 56C face, 3 phase, 480V, 60 Hz.
   b.) Electric motors for Washing Compactors are 3 hp, NEMA 56C face, 3 phase, 480V, 60Hz.
   c.) Speed reducers for screens are a SEW Eurodrive.
   d.) Speed reducers for Washing Compactors are a SEW Eurodrive.

6. Spare Parts
   a.) The following spare parts shall be furnished with each Filter Screen: 2 screen panels, 2 grid axles, 2 guide links, 2 center supports, 20 hook links, 20 spacers. 2 sets of brushes with fixing clamps shall be supplied with the washing compactors. Also, a total of six (6) solenoid valves, six (6) strainers, and two (2) spray bars with fifty (50) nozzles shall be included.

7. Accessories
   a.) Necessary anchor bolts for mounting
   b.) Six (6) 2.5” PVC female slip wash water strainers [1 per screen]
   c.) Three (3) 1.5” PVC female slip wash water strainers [1 per washing compactor]
   d.) Six (6) 2.5” Manual ball valves [1 per screen]
   e.) Twelve (12) 1.5” Manual ball valves [2 per screen]
   f.) Six (6) 1” Manual ball valves [2 per washing compactor]
   g.) Thirteen (13) ¾” Manual ball valves [1 per screen, 10 at sluice system]
   h.) Six (6) 1.5” Explosion proof solenoid valves [1 per screen]
   i.) Three (3) 1” Non explosion proof solenoid valves [1 per washing compactor]
   j.) One (1) ¾” Explosion proof solenoid valve [1 at sluice system]
   k.) Ten (10) Flow switches [1 per screen, 1 per washing compactor, 1 at sluice system]
   l.) Nine (9) Pressure switches [1 per screen, 1 per washing compactor]
   m.) Five (5) Sluice High level sensors
   n.) Two (2) wash water pressure gauges per Screen
   o.) Three (3) Compactor Disconnect Power Cables, NEMA 4 [Non-Hazardous]
   p.) Three (3) Bagging Assemblies for Washing Compactors
   q.) One (1) Screen Test Kit
   r.) One (1) Leg Kit for the compactor control panel enclosure

COMMENTS AND CLARIFICATIONS

1. See Section 11325 1.1 B – Update with “Hydro-Dyne’s alternate bid proposal is entitled Scope of Work 11272-12 dated August 30th, 2013”.

2. See Section 2.7 G 2. b. 1 – This requirement is from a competitor’s specification. The Hydro-Dyne washing compactor does not have a washing tank and therefore there is no low level to detect. The washing compactor has a stainless steel wedge wire trough to let all the water drain, therefore a low level washing tank alarm sensor is not required for this piece of equipment and has not been included.

3. We have supplied NEMA 1, Painted Carbon Steel enclosures. If 316SS is required, adder is $2,535 for the screen enclosure and $1,840 for the compactor enclosure.

4. Connectors have been provided for each 3-Phase Compactor motor. Please note that these items are Non-Hazardous and do NOT include quick connectors and cables for the solenoid valves or local control stations. Per specification section 11325 2.8 E the wash water supply pipe work shall be disconnected by means of a union fitting located downstream of the solenoid leaving it (and the strainer and manual ball valves) in place when the Washing Compactor is removed. Adders for power quick connect power cables for the solenoid valves and local control stations on the (3) Compactors is $18,600. Conduit will be provided by others from the Compactor main control panel to the 3-Ph receptacles located in the vicinity of the Compactor equipment. A cable has been provided for each motor so that the motor can plug into the 3-Ph receptacle. These cables and connectors have been provided as NON-HAZARDOUS.

5. 2.4 C Note: - This performance guarantee is leftover from discussion about using screenings washing machine rather than a washing compactor. A washing compactor cannot guarantee 5% free organic content and a maximum BOD of 10 mg/g. This will need to be removed.

6. The Local control enclosures will be supplied with Hydro-Dyne fabricated stands. Contractor is responsible for installation.

<u>The Test Kit</u>
Included in this scope is a test kit consisting of a pump, suction and discharge piping and screen disc to be inserted into the discharge piping system. This will allow the city to be able to periodically test the influent and effluent flows at the screens to determine the effectiveness of the installed screens. Hydro-Dyne will demonstrate the use of the test kit during commissioning and will assist the City in establishing baseline data for comparison with future tests.

The testing kit consists of intake piping, a flow meter, electric motor pump, two pressure sensors, the Screen Sample Assembly (SSA), discharge piping and a PLC. The flow is pumped up through adjustable level intake piping, the flow meter and SSA before being piped back to the channel. The SSA will include perforated panels matching all Hydro-Dyne screens on site. Prior to each simulation, the parameters pertaining to each test (grid type, opening size, test duration, etc.) are programmed into the PLC via the touch screen panel. Data collected by the SSA and flow meter is then stored by the onboard PLC for interpretation by the testing party.

Testing will be conducted when flows are typically highest during the day and consist of a series of 10 individual tests upstream and 10 individual tests downstream of each screen to measure how quickly the screen grid completely blinds. Trials were run at the top, the middle and the bottom of the channel to account for variations in solids quantities at different channel elevations. Findings were recorded via the onboard PLC.

Each test provides the testing party with an accurate time taken to blind each perforated panel in the SSA. There shall be 10 results upstream and 10 results downstream of the tested screen. They can quickly be compared and averaged to provide a ratio between the efficiency upstream and downstream of the screen.

<u>Test Kit Factory Service Option</u>
The Hydro-Dyne Test kit includes sophisticated components which enable the collection of a multitude of data that helps Hydro-Dyne size and select screen model and grid types for equipment. Hydro-Dyne employs an engineer with hydraulic expertise to apply the kit. We are concerned that the City will

purchase equipment that will prove to be of little practical use. In lieu of the City purchasing a Test Kit to perform these tests, Hydro-Dyne strongly recommends the City considers employing the services of a Hydro-Dyne Test Kit specialist to come to site and perform the necessary testing in conjunction with the plant operators to test the effectiveness of the screening equipment. If considered, this service would replace the included cost for the Test Kit and would include six (6) trips from our Test Kit specialist.

Factory Testing

All components of the screening system shall be factory assembled and tested for a minimum of 24 hours prior to shipment. The equipment shall be shipped in the largest assemblies possible permitted for transporting to minimize field assembly by the Contractor. During the factory testing the screening system shall be adjusted as required assuring proper operation on completion of the field installation. Hydro-Dyne will provide a certificate of completion of the factory testing to certify that the equipment was successfully assembled and satisfactorily operated prior to shipment. The Contractor shall notify the Owner/Engineer at least 45 days in advance of the factory testing so the Owner/Engineer can arrange to be at the factory testing if chosen. The Owner/Engineer is responsible for travel and lodging expenses. The manufacturer is responsible for local travel and meals

COMMISSIONING SERVICE & CUSTOMER TRAINING

Installation inspection, commissioning of equipment, and training will be furnished with factory-trained servicemen. This service will be rendered in three (3) visits from our factory; One (1) trip to the project site for equipment commissioning assistance for the Contractor, One (1) trip for operator training for Owner personnel and One (1) trip after 3 months of operation to make any necessary field adjustments and/or follow up training. The equipment commissioning trip shall include a minimum of five (5) days. Each day shall not exceed an 8-hour day. The Operator Training trip shall consist of two (2) 12 hour days, and the Adjustment trip shall consist of two (2) days on site observing the equipment operation and working with plant operators to answer questions and expand the plant personnel's knowledge regarding the operation and maintenance of the equipment. Each additional trip will be figured at $2,000 and each additional day onsite will be figured at $1,200. It is agreed and understood that all necessary utilities such as water, electric, air, etc. be connected and functional prior to the arrival of our servicemen. A complete job of checking, adjusting, etc. of the equipment and installation cannot be accomplished unless the plant is ready to operate at the time this service is to be performed. Our servicemen are non-union technicians and any extra cost for other assisting personnel as required by local union regulations is not included in this proposal. Advance notification of at least ten (10) working days prior to the date start-up service is required.

FREIGHT

F.O.B. shipment point with freight costs included.

WARRANTY

The screens and all appurtenances including, but not limited to: frame, supports, covers, and mechanisms manufactured by Hydro-Dyne Engineering are warranted for a period of 2 years against defects in materials and workmanship. Warranty period shall commence after commissioning and operational demonstration Items supplied to Hydro-Dyne Engineering shall be covered under original manufacturer's warranty. Hydro-Dyne Engineering reserves the right to repair or replace warranted equipment at installation or factory, F.O.B. Hydro-Dyne.

NOT INCLUDED

Concrete work, installation, plumbing, wiring connections, transducer mounting brackets, bonds, liquidated damages, and anything else not specifically mentioned above as included will be construed as NOT INCLUDED, whether or not inclusion is specifically acknowledged.

TOTAL PRICE

Six (6) HF-38-90-207-2-P Screens
One (1) Sluice System
Three (3) Washing Compactors WCP-12 **$2,530,000.00**

Freight and start-up included for screens and compactor sold together.

TAXES

Applicable sales or use taxes, fees, permits, and licenses are not included.

TERMS

90% net due 30 calendar days upon delivery, 100% net due upon completion of startup and approval of O&M manuals NOT to exceed 60 calendar days from date of delivery . Past due balances will be subject to a service charge of 1-1/2% per month on the unpaid balance and services, including shipping and startup, will not be scheduled until account is current.

VALIDITY

Price quoted is firm provided:

1. Written acceptance is received at the factory before February 15th, 2014. If other terms are desired they must be submitted before bid date and revised pricing shall be considered.
2. Purchaser agrees to accept shipment 14 to 20 weeks from date of receipt of approved drawings and authorization to proceed with manufacture. Purchaser is allowed not more than 45 calendar days for review and return of submittals for approval.
3. Shipments delayed by the purchaser or his agents will be escalated at a rate of 1-1/2% per calendar month, compounded, of the value of the unshipped portion.

For additional information, please contact our local representative listed above or me personally.

Sincerely,

Steve D. Frank
Regional Sales Manager
Hydro-Dyne Engineering, Inc.

SECTION 04

QUOTATION FROM GARDNER DENVER (SCOUR AIR BLOWERS)

DATE: October 15, 2013 **PROPOSAL NO.: 23201R3**

REFERENCE: Canton Ohio WWTP; Equipment Repair
Aftermarket Service & Repair Group - Centrifugal Products
SECTION 11124CT - FACTORY MODIFICATIONS TO CENTRIFUGAL BLOWERS
10182 REV. 4/17/13

BissNuss, INC on behalf Gardner Denver is pleased to offer our following repair quotation.

***SCOPE OF SUPPLY**

Scope; *onsite service of the existing four (4) Multistage Centrifugal Blowers Model 79104B-ADOI; and one (1) Multistage Centrifugal Blower, Model 67105A-ADOI. The existing blowers are Gardner Denver standard heavy-duty construction with cast iron inlet and outlet heads, cast iron intermediate sections, and aluminum-alloy impellers. Service shall be performed on site, and will include new bearing housings, seals, bearings, hardware and gaskets.

The following are included in each package price:

- Bearing housings, bearings, gaskets, seals, and miscellaneous hardware for onsite repairs
- Discharge check Valve
- Inlet Butterfly valve, with modulating electric actuator, and 4-20 ma signal
- Blow-off valve actuator(s)
- Premium Efficiency, Weather Protected Type II (WPII) Siemens Electric motor 4160V/60Hz/3 ph
    - Model 791 shall be 800 HP
    - Model 671 shall be 500 HP
- Local Control panel with the following features:

  Blower surge and motor overload protection.
  Blower bearing vibration protection.
  Inlet valve control.
  Outlet valve control.
  Blower start / stop control.
  Display of all monitored parameters.
  Warning & alarm adjustable set points on all protection circuits.
  Time & date stamped alarm history screen.
  NEMA 12 enclosure suitable for wall mounting.
  Allen Bradley MicroLogix PLC.
  Allen Bradley PanelviewPlus 600 operator interface.
  N-TRON 1003GX2 fiber Ethernet switch.
  (2) vibration transmitters furnished loose.
  0-5A to 4-20mA transducer.
  Mushroom style E-STOP button.
  NOTE: (All operators (except E-STOP) are currently virtual in the HMI. We may wish to change this to facilitate manual operation of the blowers in the event of PLC / HMI failure. This is an issue that merits further discussion.

ADDITIONAL EQUIPMENT INCLUDED

- One, (1) ea Master Control Panel with the following features:
  NEMA 12 enclosure suitable for wall mounting.
  Allen Bradley Redundant ControlLogix PLCs.
  Allen Bradley PanelviewPlus 1000 operator interface.
  (2) N-TRON 1003GX2 fiber Ethernet switch.
  The MCP will operate the blower train as called for in the specifications.
  The MCP as currently offered has no I/O modules; all input data is anticipated via the SCADA Ethernet link. All output data is via Ethernet links with the LCPs and SCADA.

(OPTIONAL; COST ADDER FOR FACTORY COMPLETE REFIRBISHMENT: $202,263.69)

Scope of equipment refurbishment of four (4) Multistage Centrifugal Blowers Model 79104B-ADOI; and one (1) Multistage Centrifugal Blower, Model 67105A-ADOI. The reconditioned blowers will be Gardner Denver standard heavy-duty construction with cast iron inlet and outlet heads, cast iron intermediate sections, and aluminum-alloy impellers. New impellers will be assembled onto a new solid carbon steel shaft and supported by two outboard-mounted oil-lubricated ball bearings. The existing blower inlet & outlet flanges are drilled to 125# ANSI standards. Other components replaced as new are bearings, bearing housings, seals, gaskets and related shims and hardware.

Existing parts to be reused are:

- Inlet head
- Outlet head
- Structural steel base
- Customer's coupling guard
- Intermediate Sections

FACTORY TESTING:

The blowers are given a standard factory mechanical test consisting of operating the unit for a minimum of one hour after stabilization. Speed, vibration, and temperature levels are recorded and verified to be within Gardner Denver engineering and ISO quality PTC9016 standards during this test. The customer shall consider successful performance of this equipment, as measured by the above mechanical test, as the basis for acceptance unless otherwise noted.

- Dynamic Balancing - Centrifugal Rotor-Assemblies with report per MP902
- Gardner Denver reserves the right to conduct all tests with its shop test driver in the event that the actual driver's requirements are incompatible with Gardner Denver's test facilities or a bare blower is purchased.

(INCLUDED) ON-SITE STARTUP SUPPORT:

Gardner Denver field services is included one technician, five trips, and two days; for startup during blower re-instillation.

Services included during these trips, are as follows:

- Laser Shaft Alignment
- Certified Vibration Analysis
- Training
- Coupling Inspection and Evaluation
- Blower Operational Check: vibration readings, bearing temperature readings, surge check and recommendation for correction, if needed
- Installation Inspection: pipe misalignment, foundation deficiencies with recommendations
- Filter Inspection and Recommendations
- Protection, (controls), Verify operational only, by technician
- Field Run Test with Report.

CLARIFICATIONS AND COMMENTS:

- The complete scope of supply is as noted above. Any item not specifically noted is not included Reference to Local Control Panels: We assume the MCC will provide the LCPs with a 0-5A, or 4-20mA, AMPS input signal.
- Clarification specification 10182.2.01.J.6; projected performance curves indicate as the drive motor shall operate in an overload condition, however within the 1.10 service factor
- *Due to the age of these blowers, and reusing existing internal components; Gardner Denver cannot guarantee and is not responsible for blower performance constraints in the specifications provided at time of this proposal.
- Motor starters VFDs and installation services of any component are not included unless otherwise noted
- Instillation and removal, (piping, wiring, electrical, loading, off-loading, etc.), is not included and shall be responsibility of customer.
- Motor wiring shall be responsibility of customer
- Finish Paint – 6mil DFT Acrylic with UV protection.
- Freight is included to jobsite FOB, Gardner Denver Repair center St. Peters MO.
- Any accessories quoted are shipped loose for mounting by others unless otherwise noted
- Any existing components discovered at time of teardown inspection to be out of Gardner Denver's specifications shall be quoted; as the project will remain on hold until a formal change order has been received.

COMMERCIAL TERMS:
Quote validity is 90 days from proposal date.

The following Gardner Denver forms are attached and apply:

- Terms and Condition of Sale
- Field Service – Rates

Payment: Subject to Gardner Denver standard terms and conditions.
NET30 days subject to Gardner Denver credit manager approval.

Total not to exceed price: $727,269.86; optional cost adder not included in this value.
(Price escalation will apply if order is not shipped within one year of order date)

Todd Lilly
Product Specialist
Gardner Denver Nash Hoffman & Lamson Products
200 Simko Blvd, PO Box 130
Bentleyville, PA 15314
Mobile 770.755.8356
Fax 724.239.1502

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Ken Rogozinski, P.E.
BissNuss, INC
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Westlake, OH 44145
P 440.871.8394
Fax 440.871.2526
Cell440.666.3792

krogozinski@bissnussinc.com

October 16, 2013

RE: Sole Source letter

Please be advised that Gardner Denver is the sole manufacturer of the Lamson/Hoffman/Invincible Centrifugal Blowers. As the sole manufacturer, we only supply original factory parts.

Additionally, Gardner Denver as the sole manufacturer of Lamson/Hoffman/Invincible Centrifugal Blowers can offer a new one-year factory warranty on blowers we repair and on our preventative maintenance service on your blowers.

Feel free to contact me for any of your needs.

Regards,

Todd Lilly
Product Specialist
Centrifugal Products
Gardner Denver Industrial Products Group
100 Gardner Park
Peachtree City, GA 30269
e-mail: todd.lilly@gardnerdenver.com

EXCEPT AS OTHERWISE AGREED IN WRITING, THESE TERMS AND CONDITIONS GOVERN ALL OUR CONTRACTS TO THE EXCLUSION OF OTHER TERMS AND CONDITIONS. OUR QUOTATIONS AND ESTIMATES ARE NOT OFFERS CAPABLE OF ACCEPTANCE BY YOU, AND ANY ORDER PLACED BY YOU WILL ONLY BE ACCEPTED BY OUR WRITTEN CONFIRMATION OF SUCH ORDER.

GENERAL PROVISIONS

1. The definition of terms used, interpretation of this agreement and rights of parties hereto shall be construed under and governed by the Uniform Commercial Code of the State of Illinois. "Seller" when used herein means GARDNER DENVER, INC. "Purchaser" when used herein means the person, firm or corporation to whom this quotation is addressed. And "Equipment" or "Products" means those articles, supplies, and drawings, data or other property or services described herein.
2. All quotations are for immediate acceptance and subject to change or withdrawal without notice before an order is acknowledged by Seller. This proposal shall not become effective until accepted by an authorized employee of the Seller. This proposal cannot be changed or varied by any verbal agreement. If this proposal is deemed to constitute an offer, it may be accepted only on terms set forth in this proposal, including, without limitation, these Terms and Conditions. If this proposal constitutes an acceptance of an offer, such acceptance is expressly conditioned on Purchaser's assent solely to the terms of proposal, including, without limitation, these Terms and Conditions. An acceptance of any part of the Equipment or services covered hereunder shall be deemed to constitute such assent. Any additional and/or different terms and conditions proposed by Purchaser and/or any attempt by Purchaser to vary any of these terms and conditions shall be deemed a material alteration and is hereby objected to and rejected.
3. Unless otherwise agreed by Seller in writing, Seller's prices are subject to change without advance notice at any time prior to order acknowledgment. Seller reserves the right to adjust the invoice price, after the price is quoted and/or acknowledged, to take account of any material variation in Seller's costs beyond Seller's reasonable control since the date of the quotation or (if no quotation is issued) the order acknowledgement, and the invoice so adjusted shall be payable as if the price set out therein were the original contract price. All sales are subject to increase without notification by the amount of any sales or excise tax levied or charged by any governmental agency and are subject to any price adjustment necessitated by Seller's compliance with any government action.
4. All sales under all orders and these terms and conditions are subject to Seller and/or Government priorities, laws and regulations, now or hereafter established.
5. The Seller reserves the right to change discontinue or modify the design and construction of any product or to substitute material equal to or superior to that originally specified, without notice to the Purchaser.
6. All claims by Purchaser for shortages in a shipment of Equipment or Equipment damaged in transit must be made against the carrier. All claims by Purchaser against Seller for nonconforming Equipment and claims for shortages in a shipment or damaged Equipment (other than claims to be made against the carrier) must be made in writing to Seller within ten (10) days after receipt of shipment or thirty (30) days after date of shipment, whichever occurs first, or they are waived.
7. Any action for breach of the contract hereunder must be commenced within one year after the cause of action has accrued. Only variations or modifications to the contract, which are made in writing signed by Seller and Purchaser, shall be enforceable. Any failure by Seller to enforce its rights under this contract will not be deemed a waiver of such rights.
8. All disputes arising under or in connection with this Contract shall be resolved by (a) good-faith negotiations by knowledgeable, responsible representatives of each party who are fully authorized to settle any such dispute, or (b) in the event such negotiations do not resolve such dispute, binding arbitration held in Chicago, Illinois, by a single arbitrator pursuant to the Commercial Arbitration Rules of the American Arbitration Association. Each party shall bear its own costs of these procedures; the parties shall equally split the fees of the arbitration and the arbitrator. Notwithstanding the above, either party shall have the right to seek a temporary restraining order or an injunction related to the purposes of this Contract, to compel compliance with confidentiality obligations, or to file suit to compel compliance with this dispute resolution process.
9. Purchaser may not assign, novate or otherwise transfer its rights or obligations under this contract without Seller's prior written consent, and any attempt to do so shall be null and void and of no effect.
10. The minimum order value is $100.00.

CANCELLATION

Purchaser cannot cancel orders under any circumstances without Purchaser first reaching an agreement in writing with Seller covering all Sellers' damages. For standard Equipment (catalogue equipment, ordinarily carried in stock), such agreement shall provide, at a minimum, a cancellation charge of at least 15% of the purchase price of the goods covered by the cancelled orders to cover overhead and profit. In addition, for special Equipment (i.e., equipment manufactured per Purchaser's requirements, and not stocked as a standard product), cancellation charges must, at a minimum, reimburse Seller for all expenses incurred (including but not limited to costs of purchased materials), engineering costs, and an amount to cover overhead and profit, and be will based on the following schedule of minimum values, whichever is greater: Order Entry --- 10% of purchase order value; Completion of Engineering --- 25% of purchase order value; Materials on Order --- 50% of purchase order value; Fabrication Started --- 100% of purchase order value.

ENGINEERING CRITERIA

The Equipment furnished by Seller are sophisticated engineering products; accordingly, Purchaser undertakes:

1. That it has provided and will promptly provide all the information reasonably necessary to enable Seller to (i) evaluate the requirements for performing and (ii) perform the Contract, and that all such information is full and accurate;
2. That all premises, plant, engineering support, spare parts, connected pipe work and machinery and inputs that it is required to provide for the design, engineering, installation, testing and use of the Products are fit for their purpose and of good engineering quality;
3. Fully to co-operate with Seller in the design, engineering, installation, testing and use of the Products;
4. To use the Products for the intended purpose only and in accordance with the Product literature; and
5. Not under any circumstances, to use any unapproved spare part, connected machinery, service or repair or use the Products in any manner as may render the Products dangerous and agrees that any breach of these negative criteria will negate all specific and implied conditions and obligations on the part of Seller relating to the quality of the Products.
   Purchaser further agrees that it will be liable to Seller for any costs, expenses and losses it suffers by reason of any breach of these undertakings.

DRAWINGS, DESIGNS AND CONFIDENTIALITY

1. All of Seller's specifications, designs, drawings, indications of physical, chemical and electronic properties and indications of inlet pressure or vacuum, pressure output and power consumptions ("the Designs") are made in good faith and are approximate indications only and are not binding in detail unless Purchaser has specified in writing a particular indication upon which he is relying and Seller shall be entitled to vary the same and/or to correct errors and omissions provided the Products remain in substantial conformity with the contractual requirements.
2. The Designs (including all copyright, design right and other intellectual property in them) shall as between the parties be the property of Seller; and Purchaser is not entitled to make any use of the Designs other than for the purpose of this Contract.
3. Any inventions, modifications, improvements, techniques or know-how affecting the Products made or gained in the course of performing this Contract shall belong to Seller absolutely.
4. Neither party shall disclose to third parties or use for its own purposes any confidential information or trade secrets of the other party.

SHIPMENT, PAYMENT AND CREDIT

1. Credit Terms of Payment: A. Domestic – Net thirty (30) days from date of invoice. Delinquent accounts shall bear interest at 18% per annum thereafter, until paid. Said interest rate shall be reduced to the maximum permissible rate in any state having laws, which so require. B. International – Unless otherwise agreed to by the Seller's Manager of Credit and Collection, payment shall be in U.S. Funds by wire transfer or irrevocable Letter of Credit, confirmed by a major U.S. Bank. In addition to such late payment charges, Seller may add to the amount past due any costs associated with collection thereof, including reasonable attorneys' fees.
2. Seller may, in its sole discretion, accept payment for Products by cash in advance or by money-down with scheduled progress payments, and, unless Seller agrees otherwise in writing, in it's sole discretion, orders over $100,000 will be subject to progress payments.
3. Shipments and deliveries shall be subject to approval of Seller's Credit Department. If Purchaser fails to fulfill the terms of payment, or if at any time before payment in full is made (whether or not payment is yet due) a petition is presented or resolution passed for the winding up or bankruptcy of Purchaser, or in the event of the appointment of a receiver or administrator of Purchaser's business, Seller may defer further shipment or at its option, cancel the unshipped balance. Seller reserves the right previous to making any shipments, to require from Purchaser satisfactory security for performance of Purchaser's obligation. No failure of Seller to exercise any right accruing from any default of Purchase shall impair Seller's right in case of any shipment default of Purchaser.

Gardner Denver, Inc.
100 Gardner Park, Peachtree City, GA 30269
Phone: 800-982-3009 / 770-632-5000
Fax: 770-486-5628
E-mail: cf.blowers@gardnerdenver.com
Web: www.**Hoffman**and**Lamson**.com

"Over 150 Years of Leadership"

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4. All sales are ex-works unless otherwise expressly stipulated. Seller may, in its discretion, select the carrier unless specified in advance by Purchaser.
5. Seller's responsibility for damages in transit ceases upon delivery of goods to destination specified in the Order and Purchaser then assumes responsibility for damage determination and collection from carrier.
6. While expected dates of delivery of goods are given in good faith, the same are not of the essence of or in any way terms of the contract or representations of fact. All shipping dates given are approximate, and while effort is made to maintain schedules, Seller will not be liable for damages on account of delay. In case of delay by Purchaser in furnishing complete schedules or information, delivery dates may be extended for a reasonable time depending on factory conditions. The Seller shall not be responsible for reasonable or excusable delays nor shall the Purchaser refuse to accept delivery because of any such delays. Excusable delays include, without limitation, delays resulting from accidents, fires, floods, severe weather or other acts of God, strike, lockout or other labor difficulties, embargoes, government controls or other forms of intervention, inability to obtain labor, materials or services and other causes beyond Seller's control. If there is a scarcity in any of its products or goods, Seller will allocate its available supply in its sole discretion.
7. All Equipment or parts furnished by Seller shall remain the property of Seller until paid for in full. Pending payment of the full purchase price of the Equipment or parts furnished by Seller, Purchaser shall at all times keep the Equipment or parts comprehensively insured against loss or damage by accident, fire, theft and other risks usually covered by insurance in the type of business carried on by Purchaser in an amount at least equal to the balance of the price for the same from time to time remaining outstanding.
8. Between delivery and payment in full, the risk in the Equipment furnished by Seller shall be with Purchaser, who shall keep the same in good condition and repair, properly stored and labeled as being Seller's property.
9. In the event of Cancellation in accordance with the provisions hereof, or in the event of non-payment (in full or in part) for the Equipment by the due date, Purchaser hereby irrevocably licenses Seller (insofar as it is able) to enter upon any premises to repossess the Equipment.

INDEMNITY

Purchaser will indemnify, defend and hold Seller, its affiliated companies and their respective directors, officers, employees and agents harmless from any loss, claim, cost, expense or damage (including payment of reasonable attorneys' fees) suffered or incurred by any of them and/or for which any of them may be liable to any third party due to, arising from or in connection with, directly or indirectly:

(i.) any violation of law, negligence, omission or intentional misconduct on the part of the Purchaser, its servants, agents or employees;
(ii.) Purchaser's instructions or lack of instructions or Purchaser's failure or delay in taking delivery;
(iii.) the breach of any provision of this Agreement by Purchaser; or
(iv.) any infringement or alleged infringement of patents, trademarks, copyright, design, right or other intellectual property right occasioned by the importation, manufacture or sale of the Equipment if made to the specification or special requirement of Purchaser.

LIABILITY

Seller's total liability for any and all claims, damages, losses and injuries arising out of or relating to Seller's performance or breach of any term herein shall not exceed the purchase price of the Equipment. IN NO EVENT, WHETHER IN CONTRACT, TORT OR OTHERWISE, SHALL SELLER BE LIABLE FOR LIQUIDATED, INDIRECT, EXEMPLARY, INCIDENTAL, SPECIAL OR CONSEQUENTIAL DAMAGES, EXPENSES OR COSTS, INCLUDING BUT NOT LIMITED TO: (1) LOSS OF PROFITS, BUSINESS OR GOODWILL; (2) LOSS OF USE OF EQUIPMENT OR FACILITIES; OR (3) LOSS RESULTING FROM UNUSABLE MACHINERY OR FACILITY DOWNTIME, HOWSOEVER CAUSED AND EVEN IF THE POTENTIAL FOR SUCH DAMAGES WAS DISCLOSED AND/OR KNOWN.

DISCLAIMER OF WARRANTY

SELLER DOES NOT WARRANT THE MERCHANTABILITY OF ITS PRODUCTS AND DOES NOT WARRANT THE FITNESS OF THE PRODUCTS FOR A PARTICULAR PURPOSE. SELLER DOES NOT MAKE, AND HEREBY DISCLAIMS AND EXLUDES, ANY WARRANTY, EXPRESS OR IMPLIED, OTHER THAN THE WARRANTY CONTAINED HEREIN. THERE ARE NO WARRANTIES EXPRESS OR IMPLIED BEYOND THAT WHICH IS DESCRIBED BELOW.

WARRANTY OF GOODS MANUFACTURED BY SELLER

1. Except to the extent Seller specifies another warranty period in writing, Seller warrants products and parts manufactured by it and sold hereunder to be free from material defect in material and workmanship for a period of twelve (12) months from date of startup or eighteen (18) months from date of shipment whichever occurs sooner (the "Warranty Period") provided, however, that Seller's sole responsibility under this warranty shall be to either repair or replace at Seller's option, any part which fails during the Warranty Period because of a defect in workmanship and material. Such replacement parts shall be provided at no cost to Purchaser, at the business establishment of Seller, or a repair facility authorized by Seller, during regular working hours. No Equipment may be returned by Purchaser without Seller's prior written consent, and Seller will not be liable for costs incurred by Purchaser in connection with returning equipment or parts, or otherwise, without Seller's prior written consent. Seller's obligation under this warranty shall not include any transportation charges, cost of installation, duty, taxes or any other charges whatsoever.
2. Seller shall be under no liability for breach of the warranty set forth herein: (i) unless the Equipment has been properly installed, used, maintained and serviced; (ii) unless Purchaser has promptly informed Seller in writing of the defect alleged within the Warranty Period and within 7 days of the discovery thereof; (iii) with respect to wearing and consumable parts; (iv) if Purchaser places Products in long-term storage and fails to perform proper long-term storage preparations per Seller's instructions; and/or (v) to Equipment or component parts or accessories thereof not manufactured by Seller.
3. Seller makes no representation regarding compliance with any state, provincial, or local law, rules, regulations, building code or ordinance relating to the installation or operation of the Equipment.
4. If the Purchaser informs the Seller of a defect after the Warranty Period has expired, then Seller may offer advice (free of charge) and may offer repair or replacement at Purchaser's expense. Any dispute as to whether a defect is covered by the Warranty shall be immediately referred to an expert to be agreed by Seller and Purchaser whose decision shall be final and binding upon the parties.
5. There are no third party beneficiaries of the Warranty granted by Seller herein.

WARRANTY OF OTHER MANUFACTURER'S PRODUCTS

Seller makes no warranties or representations of any kind whatsoever, either expressed, implied or statutory on any component parts or accessories sold hereunder which are not manufactured by Seller. Seller hereby extends the manufacturer's warranty or guaranties, if any, given to Seller by the manufacturer of said component parts and accessories, but only to the extent Seller is able to enforce such warranty or guaranties. Seller does not guaranty warranties of other manufacturers' products. Claims under any manufacturer's warranty shall be made in accordance with the manufacturer's requirements regarding the return, repair or replacement of the goods. Seller agrees to use its best efforts and will cooperate with Purchaser in enforcing any claims against manufacturer(s) for defects that may occur. Seller has not authorized any party to make any representation or warranty other than the above warranty statements.

CONFLICTING LAW

Some jurisdictions provide rights in addition to those listed above, or do not allow the exclusion or limitation of implied warranties, or liability for incidental or consequential damages. If any provision or part of a provision of these terms is found to be illegal, invalid or unenforceable under any applicable law, such provision or part of a provision shall, insofar as it is severable from the remaining terms, be deemed omitted from these terms and shall in no way affect the legality, validity or enforceability of the remaining terms.

SPECIAL PROVISIONS

The Equipment or parts sold hereunder are not designed or manufactured for use in or with any atomic installation or activity. If Purchaser or the ultimate user of these products intends to use them in such an installation or activity, Seller's Terms for Nuclear Sales shall be a part of this Contract. Seller will furnish Purchaser with a copy of its Terms for Nuclear Sales upon request

Gardner Denver, Inc.
100 Gardner Park, Peachtree City, GA 30269
Phone: 800-982-3009 / 770-632-5000
Fax: 770-486-5628
E-mail: cf.blowers@gardnerdenver.com
Web: www.**Hoffman**and**Lamson**.com

"Over 150 Years of Leadership"

© 2011 Gardner Denver, Inc.

Form **W-9**
(Rev. December 2011)
Department of the Treasury
Internal Revenue Service

Request for Taxpayer Identification Number and Certification

Give Form to the requester. Do not send to the IRS.

Print or type
See **Specific Instructions** on page 2.

Name (as shown on your income tax return)
Gardner Denver Nash LLC

Business name/disregarded entity name, if different from above

Check appropriate box for federal tax classification:
☐ Individual/sole proprietor ☐ C Corporation ☐ S Corporation ☐ Partnership ☐ Trust/estate

☑ Limited liability company. Enter the tax classification (C=C corporation, S=S corporation, P=partnership) ▶ C

☐ Other (see instructions) ▶

☐ Exempt payee

Address (number, street, and apt. or suite no.)
200 Simko Blvd

Requester's name and address (optional)

City, state, and ZIP code
Charleroi, PA 15022

List account number(s) here (optional)

Part I Taxpayer Identification Number (TIN)

Enter your TIN in the appropriate box. The TIN provided must match the name given on the "Name" line to avoid backup withholding. For individuals, this is your social security number (SSN). However, for a resident alien, sole proprietor, or disregarded entity, see the Part I instructions on page 3. For other entities, it is your employer identification number (EIN). If you do not have a number, see *How to get a TIN* on page 3.

Note. If the account is in more than one name, see the chart on page 4 for guidelines on whose number to enter.

Social security number
☐☐☐ – ☐☐ – ☐☐☐☐

Employer identification number
5 2 – 2 3 3 4 8 5 4

Part II Certification

Under penalties of perjury, I certify that:

1. The number shown on this form is my correct taxpayer identification number (or I am waiting for a number to be issued to me), and
2. I am not subject to backup withholding because: (a) I am exempt from backup withholding, or (b) I have not been notified by the Internal Revenue Service (IRS) that I am subject to backup withholding as a result of a failure to report all interest or dividends, or (c) the IRS has notified me that I am no longer subject to backup withholding, and
3. I am a U.S. citizen or other U.S. person (defined below).

Certification instructions. You must cross out item 2 above if you have been notified by the IRS that you are currently subject to backup withholding because you have failed to report all interest and dividends on your tax return. For real estate transactions, item 2 does not apply. For mortgage interest paid, acquisition or abandonment of secured property, cancellation of debt, contributions to an individual retirement arrangement (IRA), and generally, payments other than interest and dividends, you are not required to sign the certification, but you must provide your correct TIN. See the instructions on page 4.

Sign Here **Signature of U.S. person ▶** Katie E. Weiss **Date ▶** 01/01/2013

General Instructions

Section references are to the Internal Revenue Code unless otherwise noted.

Purpose of Form

A person who is required to file an information return with the IRS must obtain your correct taxpayer identification number (TIN) to report, for example, income paid to you, real estate transactions, mortgage interest you paid, acquisition or abandonment of secured property, cancellation of debt, or contributions you made to an IRA.

Use Form W-9 only if you are a U.S. person (including a resident alien), to provide your correct TIN to the person requesting it (the requester) and, when applicable, to:

1. Certify that the TIN you are giving is correct (or you are waiting for a number to be issued),

2. Certify that you are not subject to backup withholding, or

3. Claim exemption from backup withholding if you are a U.S. exempt payee. If applicable, you are also certifying that as a U.S. person, your allocable share of any partnership income from a U.S. trade or business is not subject to the withholding tax on foreign partners' share of effectively connected income.

Note. If a requester gives you a form other than Form W-9 to request your TIN, you must use the requester's form if it is substantially similar to this Form W-9.

Definition of a U.S. person. For federal tax purposes, you are considered a U.S. person if you are:

- An individual who is a U.S. citizen or U.S. resident alien,
- A partnership, corporation, company, or association created or organized in the United States or under the laws of the United States,
- An estate (other than a foreign estate), or
- A domestic trust (as defined in Regulations section 301.7701-7).

Special rules for partnerships. Partnerships that conduct a trade or business in the United States are generally required to pay a withholding tax on any foreign partners' share of income from such business. Further, in certain cases where a Form W-9 has not been received, a partnership is required to presume that a partner is a foreign person, and pay the withholding tax. Therefore, if you are a U.S. person that is a partner in a partnership conducting a trade or business in the United States, provide Form W-9 to the partnership to establish your U.S. status and avoid withholding on your share of partnership income.

CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY): 10/03/2013

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER
Aon Risk Services Central, Inc.
8182 Maryland Avenue
St. Louis, MO 63105

CONTACT NAME:
PHONE (A/C, No, Ext):
FAX (A/C, No):
E-MAIL ADDRESS:

INSURER(S) AFFORDING COVERAGE	NAIC #
INSURER A : AIG - Worldsource	
INSURER B :	
INSURER C :	
INSURER D :	
INSURER E :	
INSURER F :	

INSURED
Gardner Denver, Inc.
and All Affiliated Companies
1800 Gardner Expressway
Quincy, IL 62305

COVERAGES **CERTIFICATE NUMBER:** **REVISION NUMBER:**

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSR	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS	
A	GENERAL LIABILITY [X] COMMERCIAL GENERAL LIABILITY [ ] CLAIMS-MADE [X] OCCUR [X] $250,000 SIR GEN'L AGGREGATE LIMIT APPLIES PER: [ ] POLICY [ ] PRO-JECT [ ] LOC			GL7217549	09/30/2013	09/30/2014	EACH OCCURRENCE DAMAGE TO RENTED PREMISES (Ea occurrence) MED EXP (Any one person) PERSONAL & ADV INJURY GENERAL AGGREGATE PRODUCTS - COMP/OP AGG	$ 2,000,000 $ 100,000 $ 10,000 $ 2,000,000 $ 2,000,000 $ 2,000,000 $
	AUTOMOBILE LIABILITY [ ] ANY AUTO [ ] ALL OWNED AUTOS [ ] SCHEDULED AUTOS [ ] HIRED AUTOS [ ] NON-OWNED AUTOS						COMBINED SINGLE LIMIT (Ea accident) BODILY INJURY (Per person) BODILY INJURY (Per accident) PROPERTY DAMAGE (Per accident)	$ XXXXXXXXX $ XXXXXXXXX $ XXXXXXXXX $ XXXXXXXXX $ XXXXXXXXX
	[ ] UMBRELLA LIAB [ ] OCCUR [ ] EXCESS LIAB [ ] CLAIMS-MADE [ ] DED [ ] RETENTION $						EACH OCCURRENCE AGGREGATE	$ XXXXXXXXX $ XXXXXXXXX $
	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICE/MEMBER EXCLUDED? Y / N [ ] (Mandatory in NH) If yes, describe under DESCRIPTION OF OPERATIONS below	N / A					[ ] WC STATU-TORY LIMITS [ ] OTH-ER E.L. EACH ACCIDENT E.L. DISEASE - EA EMPLOYEE E.L. DISEASE - POLICY LIMIT	$ XXXXXXXXX $ XXXXXXXXX $ XXXXXXXXX

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (Attach ACORD 101, Additional Remarks Schedule, if more space is required)
For informational purposes only

CERTIFICATE HOLDER

Gardner Denver Inc and all Affiliated Companies
1800 Gardner Expressway
Quincy, IL 62305

CANCELLATION

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.

AUTHORIZED REPRESENTATIVE
Aon Risk Services Central Inc.

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CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY): 10/03/2013

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PRODUCER
Aon Risk Services Central, Inc.
8182 Maryland Avenue
St. Louis, MO 63105

CONTACT NAME:
PHONE (A/C, No, Ext):
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E-MAIL ADDRESS:

INSURER(S) AFFORDING COVERAGE	NAIC #
INSURER A : AIG - Worldsource	
INSURER B :	
INSURER C :	
INSURER D :	
INSURER E :	
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INSR LTR	TYPE OF INSURANCE	ADDL INSR	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS	
A	GENERAL LIABILITY [X] COMMERCIAL GENERAL LIABILITY [ ] CLAIMS-MADE [X] OCCUR [X] $250,000 SIR GEN'L AGGREGATE LIMIT APPLIES PER: [ ] POLICY [ ] PRO-JECT [ ] LOC			GL7217549	09/30/2013	09/30/2014	EACH OCCURRENCE DAMAGE TO RENTED PREMISES (Ea occurrence) MED EXP (Any one person) PERSONAL & ADV INJURY GENERAL AGGREGATE PRODUCTS - COMP/OP AGG	$ 2,000,000 $ 100,000 $ 10,000 $ 2,000,000 $ 2,000,000 $ 2,000,000 $
	AUTOMOBILE LIABILITY [ ] ANY AUTO [ ] ALL OWNED AUTOS [ ] SCHEDULED AUTOS [ ] HIRED AUTOS [ ] NON-OWNED AUTOS						COMBINED SINGLE LIMIT (Ea accident) BODILY INJURY (Per person) BODILY INJURY (Per accident) PROPERTY DAMAGE (Per accident)	$ XXXXXXXXX $ XXXXXXXXX $ XXXXXXXXX $ XXXXXXXXX $ XXXXXXXXX
	[ ] UMBRELLA LIAB [ ] OCCUR [ ] EXCESS LIAB [ ] CLAIMS-MADE [ ] DED [ ] RETENTION $						EACH OCCURRENCE AGGREGATE	$ XXXXXXXXX $ XXXXXXXXX $
	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICE/MEMBER EXCLUDED? Y / N [ ] (Mandatory in NH) If yes, describe under DESCRIPTION OF OPERATIONS below	N / A					[ ] WC STATU-TORY LIMITS [ ] OTH-ER E.L. EACH ACCIDENT E.L. DISEASE - EA EMPLOYEE E.L. DISEASE - POLICY LIMIT	$ XXXXXXXXX $ XXXXXXXXX $ XXXXXXXXX

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CERTIFICATE HOLDER

Gardner Denver Inc and all Affiliated Companies
1800 Gardner Expressway
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AUTHORIZED REPRESENTATIVE
Aon Risk Services Central Inc.

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SECTION 05

QUOTATION FROM FARRAR SCIENTIFIC (REFRIGERATOR ENVIRONMENTAL CHAMBER – INCUBATOR ENVIRONMENTAL CHAMBER SYSTEM)

Quote: FS080512
Rev 1

May 10, 2013

TO: CT Consultants
8150 Sterling Court
Mentor, OH 44060

Attention: Samuel Morgan 440.530.2237
E-mail: smorgan@ctconsultants.com

Direct all communications for this quote to the above address or
Phone #740-374-8300, Fax #740-374-8310, ATTN: Craig Wood
E-mail: cwood@farrarscientific.com

1. REFRIGERATOR ENVIRONMENTAL CHAMBER/INCUBATOR ENVIRONMENTAL CHAMBER, 0°C to (+20°C) SYSTEM
Budget Price: $140,000.00 FOR QTY: 1, FOB Marietta, Prepay & Add

SPECIFICATIONS:
Interior Size: (Existing) 88.000"H x 40.500" F-B x 19' 8.500" W, Nominal
Interior Material: (Existing) .044 embossed aluminum, natural finish
Capacity: (Existing) 488 internal cubic feet, nominal
Shelving: (Existing) Fixed spacing
Exterior Size: (Existing) 102.000" H x 46.500" F-B x 21' 2.000" W, Nominal
Exterior Material: (Existing) .044 Stucco aluminum, natural finish
Floor Material: (Existing) 14 Gauge galvanized
Construction: Double wall
Frame Material: Integeral
Paint: N/A
Insulation: (Existing) 4" thick urethane walls and ceiling, 4" thick urethane floor
Doors: (New) 48.000" x 67.000", Quantity 4 per chamber, 2 pane heated swinging glass doors each w/window 24.000" x 67.000", doors include a hold open feature.
polished aluminum frame, Incubator side doors to be blacked out to not allow light penetration
Air Flow: (New) Motorized Impellar
Refrigeration: (New) Single stage, air cooled, non-CFC R134 refrigerant, remote mounted on roof of building
Defrost: (New) Automatic
Temperature Range: 0C to +20C, +/- 1.0C control in empty chamber
Temperature Controller: (New)Dual LED PID microprocessor
Electrical: Chamber, 240VAC Single phase/ Condensing unit, 460V 3 phase, 60HZ, FLA: TBD
Alarms: (New) Local overtemp & undertemp audible and visual with remote contact connections
Drain: 1/2" NPT, located on bottom rear
Shipping Weight: TBD# motor freight
Installation: By Farrar Scientific

Included in this proposal are the following materials:

*Replacement evaporator coils, refrigerant piping and associated components
*Replacement roof mounted machine sections utilizing existing equipment rails
*Replacement control panel with up to date electronic control panels and new sensors
*Replacement sliding glass doors with new swinging doors that are equipped with perimeter heat and a hold open feature(Qty 8)
*Provide operation/maintenance manuals/spare parts list/temperature mapping report
*Stainless panels to block glass for the incubator chamber. Can be used on the refrigerator chamber temporarily for storage

Include in this proposal is the following labor tasks:

*Removal and disposal of existing equipment up to but not including the panels
*All labor necessary to install the new doors
*All labor necessary to install the new conditioning equipment and controls
*Start up and testing of new equipment
*24 hour, 12 point temperature mapping of the chambers once construction/testing is complete
*Crane service to set new machine sections and remove existing ones

Options:

*Install new chambers including removal and disposal of existing chambers $54,000.00
Removal and disposal of existing chambers
Material and labor to install new chambers

Please deduct $13,000.00 from the original price of $140,000.00 if new chambers are installed. (Doors)

The equipment quoted herein has been carefully designed to meet or exceed all National Codes for fire, electrical and personnel safety. The component materials used are UL recognized or listed, if available. The finished unit is not UL, CSA, NSF or CE listed .

Thank you for the opportunity of submitting this quotation. If you have further questions or require additional information, please do not hesitate to contact CRAIG WOOD direct. We look forward to receiving your valued order. We reserve the right to correct all typographical and clerical errors which may occur in our prices and/or specifications.

Warranty: One year parts and labor
Budget price firm for a period of 60 days
Terms: Net 30 Days
Delivery: 60 Days after receipt of order dependent upon parts availability and manufacturing capacity at the time the order is received.

Sincerely,

Craig A. Wood
Director of Engineering

SECTION 06

REPORT OF GEOTECHNICAL SUBSURFACE EXPLORATION FROM PROFESSIONAL SERVICES INDUSTRIES, INC.

Information To Build On
Engineering • Consulting • Testing

October 24, 2011

Mr. Ronald J. Champlin, P.E.
Structural Project Manager
CT Consultants, Inc.
8150 Sterling Court
Mentor, Ohio 44060

Re: Report of Geotechnical Subsurface Exploration
Proposed Building Expansion
Canton Water Reclamation Facility
Canton, Ohio
PSI File Number: 0145-449

Dear Mr. Champlin:

In compliance with your instructions, we have conducted a geotechnical subsurface exploration and analysis for the above-referenced project. The results of this exploration, together with our recommendations, are to be found in the accompanying report.

After the plans and specifications are complete, PSI should review the final design and specifications in order to verify that the earthwork and recommendations are properly interpreted and implemented. **It is considered imperative that the geotechnical engineer and/or its representative be present during earthwork operations, foundation and floor slab installation to observe the field conditions with respect to the design assumptions and specifications. PSI will not be held responsible for interpretations and field quality control observations made by others.**

Please advise us of the appropriate time to discuss the field quality control and engineering services, and we will be pleased to meet with you at your convenience.

Respectfully submitted,

PROFESSIONAL SERVICE INDUSTRIES, INC.

Nicholas S. Campanella
Branch Manager

A. Veeramani, P.E.
District Manager

REPORT OF
GEOTECHNICAL SUBSURFACE EXPLORATION

FOR THE PROPOSED

PROPOSED BUILDING EXPANSION
CANTON WATER RECLAMATION FACILITY
3530 CENTRAL AVENUE SE
CANTON, STARK COUNTY, OHIO

PREPARED FOR

CT CONSULTANTS, Inc.
8150 STERLING COURT
MENTOR, OHIO 44060

PREPARED BY

PROFESSIONAL SERVICE INDUSTRIES, INC.
4579 NAVARRE ROAD SW
CANTON, OH 44706

PSI FILE NUMBER: 0145-449

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Floor Slab Design and Construction ..... Page 9

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APPENDIX

PROJECT INFORMATION

Project Authorization

This report presents the results of a geotechnical subsurface exploration and evaluation conducted for CT Consultants, in connection with the proposed Canton Water Reclamation Facility Building Expansion located at 3530 Central Avenue SE, Canton, Stark County, Ohio. PSI's services for this project were performed in accordance with PSI Proposal No. 0145-51701, dated August 22, 2011. Authorization to perform this exploration and analysis was in the form of signed acceptance of the aforementioned proposal by Mr. Ronald Champlin of CT Consultants, dated September 19, 2011.

Project Description

Project information was obtained via RFP documents from Mr. Ronald Champlin of CT Consultants sent to Mr. Alagaiya Veeramani of PSI. Additionally, preliminary plans and existing site drawings dated August 15, 2011 were received.

Based on the available information, it is understood that the proposed building expansion project will include construction of a New Grit and Grease Handling Building, Fine Screenings Building and some underground piping.

The proposed New Grit and Grease Handling Building will be a single story, slab on grade structure will be constructed on the east side of the existing Pre-aeration Tanks. The proposed building structure will occupy an area of approximately 3500 square feet and it will be supported by shallow foundations.

In addition, a new Fine Screenings Building will be built above the southeast end of the pre-aeration tanks with the new loads resting on the existing tank below grade slab/mat foundation. The building will be placed atop the two southern-most tanks that are currently separated by a T-wall. The T-Wall will be demolished prior to the addition of the fine screenings building. The bottom mat/slab foundation of the pre-aeration tank is currently at an elevation of 65' and slopes down to an elevation of 63'. The top elevation of the pre-aeration tank is currently at 81'. The bottom 4 to 6 feet of the existing pre-aeration tanks currently rests below grade. Based on the provided information, continous footings will be placed atop the existing mat/slab foundation, and will have loads exerting on them of between 2 ksf to 4 ksf.

Additionally, the proposed project will include underground piping and pavement improvements.
Presently, no other information is available relative to the proposed development. If any of the noted information is incorrect or has changed, please inform PSI immediately so that we may amend the recommendations presented in this report, if appropriate.

Purpose and Scope of Services

The purposes of this exploration were to evaluate the soil and groundwater conditions at the site, and to provide geotechnical recommendations for foundation, floor slab, site preparation, pavement recommendations, and other construction considerations. The scope of the exploration and analysis included a project site reconnaissance, drilling eight (8) test borings, seven (7) concrete cores, completing a laboratory testing program, and submitting an engineering analysis and evaluation of the subsurface materials.

The scope of services for the geotechnical exploration did not include an environmental assessment for the presence or absence of wetlands or hazardous or toxic materials in the soil, surface water, groundwater, or air, on or below or around this site. Any statements in this report or on the boring logs regarding odors, colors or unusual or suspicious items or conditions are strictly for the information of the client. In addition, the scope of services for this geotechnical exploration does not include pavement recommendations or pavement analysis.

SITE AND SUBSURFACE CONDITIONS

Site Location and Description

The site for the proposed project is located within the existing Canton Water Reclamation Facility located at 3530 Central Avenue SE, in the City of Canton, Stark County, Ohio. Specifically, the proposed building structures will be located immediately adjacent to the east and southeast side of the pre-aeration tanks, near the southeast corner of the Canton Water Reclamation Facility.

The site of the proposed development area consists of the existing water reclamation facility buildings, tanks, and roadways. The surface of the site is covered with grass, asphaltic concrete, and concrete and is relatively flat. Surface drainage was fair during the field drilling operations. Underground utility lines were observed to be running throughout areas of the site; therefore, all utilities should be checked and marked prior to

construction activities.

Subsurface Conditions

The subsurface conditions at the site were explored with a total of 8 test borings and 7 concrete cores, within proposed construction areas. The test borings were drilled to a depth of about 15.5 to 30 feet below the existing surface grades at the approximate locations shown on the Boring Location Plan presented in the *Appendix* of this report. The number of the test borings were selected by others, and the location of the test borings were selected and field located by PSI prior to the field drilling operations.

Field and laboratory testing were completed in general accordance with ASTM standards. The types of subsurface materials encountered in the test borings have been visually classified. The results of the visual classifications, Standard Penetration tests, moisture contents and water level observations are presented on the boring logs in the *Appendix*. Representative samples of the soils were placed in sample jars, and are now stored in the laboratory for further analysis, if requested. Unless notified to the contrary, all samples will be disposed of after 90 days following the date of this report.

Grit/Grease Handling Building (B-1 through B-3)

The surface of the site, at test boring locations B-1 through B-3, was covered with concrete pavement ranging from 8 to 9 inches in thickness with a sand and gravel base. The thickness of the surface materials should be expected to vary throughout the site.

Beneath the concrete pavement in test boring B-2, fill soils were encountered to a depth of approximately 5 feet below existing grades. The fill soils consisted sandy silty clay and silty sand with variable amounts of gravel, rock fragments, slag, and concrete fragments. A layer of concrete or a boulder layer was encountered at approximately 4 feet below existing grades. The moisture content of the fill soils ranged from 7 to 12 percent. It is important to note the depth, extent, and engineering properties of fill soils are highly variable across the site.

Underlying the surficial material and fill soils at borings B-1 through B-3, natural soils were encountered to depths ranging from approximately 22.5 feet to 27 feet below existing grades. These natural soils consisted of layers of silty clay, clay, silt, sand, and silty sand with variable amounts of silt, sand, and rock fragments. These soils exhibited moisture contents ranging from 7 to 36 percent. The cohesive soils exhibited a soft to stiff

consistency and the granular soils exhibited very loose to loose relative densities based on the Standard Penetration tests.

Layers of highly to completely weathered shale were encountered below the natural soils in the above mentioned borings at a depth of approximately 22.5 feet below existing grades in test boring B-3 and possibly encountered at a depth of 27 feet in B-1 and B-2 and continued to the termination depth of the borings at 30 feet below existing grade.

East of Pre-aeration Tank (B-4 and B-5)

The surface of the site, at test boring locations B-4 through B-5, was covered with concrete pavement 9 inches in thickness with a sand and gravel base. The thickness of the surface materials should be expected to vary throughout the site.

Beneath the concrete pavement in both test borings fill soils were encountered to a depth of approximately 2 to 5.5 feet below existing grades. The fill soils consisted silty clay and clayey silt with variable amounts of gravel and rock fragments. The moisture content of the fill soils ranged from 7 to 20 percent. It is important to note the depth, extent, and engineering properties of fill soils are highly variable across the site.

Underlying the surficial material and fill soils at borings B-4 and B-5, natural soils were encountered to depths ranging from approximately 11.5 feet to 12.5 feet below existing grades. These natural soils consisted of layers of silty clay, clayey sand, silty sand, and sand with variable amounts of silt, sand, clay, gravel, and rock fragments. These soils exhibited moisture contents ranging from 6 to 11 percent. The cohesive soils exhibited a soft to medium stiff consistency and the granular soils exhibited very loose to loose relative densities based on the Standard Penetration tests.

Layers of highly weathered shale were encountered below the natural soils in the above mentioned borings to the termination depths of the borings at 20 feet below existing grades. Traces of coal were noted in the highly weathered shale encountered in test boring B-4.

Piping Work (B-6 through B-8)

The surface of the site, at test boring locations B-6 through B-8, was covered with topsoil ranging from 5 to 7 inches in thickness. The thickness of the surface materials should be expected to vary throughout the site.

Beneath the topsoil in test boring B-7, fill soils were encountered to a depth of approximately 1 foot below existing grades. The fill soil consisted light brown sand with gravel and rock fragments. The moisture content of the fill soil was 5 percent. It is important to note the depth, extent, and engineering properties of fill soils are highly variable across the site.

Underlying the surficial material and fill soils at borings B-6 through B-8, natural soils were encountered to depths ranging from approximately 3.5 feet to 14 feet below existing grades. These natural soils consisted of layers of silty clay, clayey silt, and sandy silt with variable amounts of silt, sand, gravel and weathered shale fragments. These soils exhibited moisture contents ranging from 8 to 12 percent. The cohesive soils exhibited a stiff to very stiff consistency and the granular soils exhibited loose to medium dense relative densities based on the Standard Penetration tests.

Layers of highly to completely weathered shale were encountered below the natural soils in the above mentioned borings at a depth of approximately 3.5 feet to 14 below existing grades and continued to the termination depths of the borings at 15.6 feet to 19.1 feet below existing grades. In test boring B-6, completely weathered shale was possibly encountered at 7 feet below existing grades.

In addition to the soil borings, as discussed above, seven concrete cores were taken for thickness measurements. Below is a table depicting the approximate thickness of the extracted cores along with the location in which they were extracted.

Core Number	Core Location	Core Thickness
C-1	South Pre-aeration Tank	17.50"
C-2	Center Pre-aeration Tank	13.75"
C-3	NW Corner Aeration #1	6.50"
C-4	SE Corner Aeration #6	6.25"
C-5	West Drive in-front of Entrance Gate	9.25"
C-6	Center Drive Adjacent to Clarifer	9.50"
C-7	North Drive	7.50"

The subsurface description is of a generalized nature provided to highlight the major strata encountered. The boring logs included in the *Appendix* should be reviewed for specific information at the individual boring locations. The stratifications shown on the boring logs represent the conditions only at the actual test positions. Variations may occur and should be expected between the boring locations. The stratifications represent the approximate

boundary between the subsurface materials, and the transition may be gradual or not clearly defined.

Groundwater Conditions

The below table summarizes the groundwater encountered during and after drilling in test borings B-1 through B-3. .

Groundwater Encountered			
Boring Number	During Drilling (Ft)	Upon Completion of Drilling (Ft)	24 Hour Water Level Reading (Ft)
B-1	13.0	N/A	N/A
B-2	3.0 and again at 10.5	N/A	N/A
B-3	12.0	17.0	4.9

No ground water encountered at the remaining test boring locations. However it is important to note, groundwater levels fluctuate seasonally as a function of precipitation. During a time of year or weather different from the time of drilling, there may be a considerable change in the water table or the occurrence of water where not previously encountered. Furthermore, the water levels in the boreholes often are not representative of the actual groundwater level, because the boreholes remain open for a relatively short time. Therefore, we recommend that the contractor determine the actual groundwater levels at the time of construction to evaluate groundwater impact on the construction procedures.

SITEWORK RECOMMENDATIONS

Site Preparation and Earthwork Construction

Prior to placing concrete floors or engineered fill on this site, general site area clearing should be carried out. All concrete, excessively wet soils, and soft/loose or obviously compressible materials, and any unsuitable fill soils as evidenced in test boring B-2 should be completely removed from the proposed construction area. The decision in connection with the precise extent of required cut and fill should be determined in the field by a representative of PSI following observation of the exposed subgrades and proofrolling operations.

Following the site clearing, stripping and undercutting, and prior to placing engineered fill, the exposed subgrades should be critically proofrolled with a loaded 20-ton tandem-axle

dump truck until the grade offers a relatively unyielding surface. Areas of excessive yielding should be excavated and backfilled with compacted engineered fill and/or the unstable soils can be stabilized by choking the exposed bearing surface with crushed limestone or similar coarse aggregate. After the existing subgrade materials are excavated to design grade, proper control of subgrade compaction and the placement and compaction of new fill materials should be observed and tested by a representative of PSI.

It is recommended to perform the site preparation, proofrolling and earthwork activities during a period of warm and dry weather. If site work is performed during a dry period, the need for soil stabilization, drainage and surface repairs can be significantly reduced.

During site preparation, burn pits, trash pits or other isolated disposal areas may be encountered. All too frequently such buried materials occur in isolated areas outside boring locations. Any such materials encountered during site work or construction should be completely excavated and removed from the site.

Engineered Fill

Engineered fill materials should consist of non-expansive materials. Pyritic and/or potentially expansive materials, such as mine tailings, slag, shale fragments and soil mixed with more than 5 percent of shale fragments, should not be used as engineered fill material. Materials selected for use as engineered fill should contain less than 3 percent by weight of organic matter, waste construction debris, or other deleterious materials. Fill materials should generally have a Standard Proctor maximum dry density greater than 110 pounds per cubic foot (pcf), an Atterberg Liquid Limit less than 40, a Plasticity Index of less than 15, and a maximum particle size of 3 inches or less.

Representative samples of the proposed fill materials should be collected at least one week prior to the start of the filling operations. The samples should be tested to determine the maximum dry density, optimum moisture content, particle size distribution and plasticity characteristics. These tests are needed to determine if the material is acceptable as structural fill and for quality control during the compaction process.

The fill should be placed in layers of not more than 8 inches in thickness, with each layer being compacted to a minimum density of 98 percent of the maximum dry density and within ± 2% of the optimum moisture content, as determined by the Standard Proctor Method ASTM D-698. Moisture control (increasing or decreasing the natural moisture content) of the engineered fill materials may be necessary for compaction.

FOUNDATION RECOMMENDATIONS

Foundation Recommendations for proposed Grit and Grease Handling Building

Considering the subsurface conditions and the proposed construction, the proposed building structure can be founded on conventional shallow bearing isolated and/or continuous spread footing members.

Foundations supporting the proposed building structure bearing on the area's natural soils or compacted engineered fill can be designed utilizing a maximum allowable bearing pressure of 2,000 pounds per square feet (psf). All perimeter foundations must be placed at a minimum depth of 42 inches below the exterior finished grades in order to protect against frost action. Interior foundations in the heated areas may be placed at a depth of at least 18 inches below the floor slab elevation.

Footing bearing surfaces are to be critically inspected and tested to verify consistency and compatibility with subsurface exploration data, and to assure that the recommended bearing capacity is being achieved. A representative of PSI should be present at the site during foundation excavation and construction. If soft/loose, highly organic or excessively wet soils are encountered at the foundation subgrades, they should be completely removed from the foundation areas and extended to bear within the area's natural soil or compacted engineered fill. It is recommended that a representative of PSI be present at the site throughout foundation excavation and construction.

In the event that the new foundations are to be situated in immediate proximity of any existing functional foundation members, caution must be exercised to assure that superimposition of foundation stresses will not result in detrimental settlement of either foundation members. In this respect, it is recommended that the proposed foundation be located, such that no footing is situated within a vertical core extending from the lower contact surface of any existing foundation members, downward and outward at a 45 degree angle.

Based on the assumed structural loads, it is anticipated that total and differential foundation settlements will be less than 1.0-inch and 0.50-inch, respectively. However, actual settlements will be dependent upon the depth of the foundations, column spacing, structural loads and other related factors. The structural and architectural design should include provisions for liberally spaced, vertical control joints to minimize the affects of potential settlement.

Per table 1615.1.1 of the OBC Building Code, the test boring results and review of the geology in vicinity to the project area, a Site Classification of 'D' can be utilized for the seismic design.

Foundation Recommendations for proposed Fine Screening Building

Isolated spread footings or continuous footings supporting the individual columns and walls bearing on the existing mat foundation or imported granular soils over the existing mat foundation can be utilized for the proposed Fine screening building. Shallow foundations can be designed with an allowable bearing pressure of 3, 000 pounds per square foot.

The existing slab/mat foundation of the pre-aeration tank will require complete physical and structural analysis relative to its integrity to support the new loads. Concrete compressive strengths of 4,000 psi and soil subgrade modulus of 50 pci should be utilized for the mat foundation stiffness analysis.

Based on the provided structural loads, it is anticipated that total and differential foundation settlements will be less than 1.0-inch and 0.50-inch, respectively. The structural and architectural design should include provisions for liberally spaced, vertical control joints to minimize the affects of potential settlement.

Floor Slab Design and Construction

Preparation of floor slab subgrades should be in accordance with recommendations outlined in the *Site Preparation* and *Engineered Fill* sections of the report. If the materials at the finished subgrade elevations exhibit excessive moisture contents and unstable subgrade conditions, then undercutting and replacement of the objectionable soils should be performed to achieve firm subgrade support. Alternatively, the unstable soils can be stabilized by choking the exposed bearing surface with crushed limestone or similar coarse aggregate.

A capillary gravel layer (such as AASHTO #57 or equivalent) should be provided between the floor slab and the approved subgrade materials. The gravel layer should have a minimum thickness of 6 inches and should be properly compacted. Also, a vapor barrier is recommended below the floor slab as per ACI specifications. We recommend that a subgrade modulus (k) of 100 pci be used in floor slab design calculations.

Careful field control is to be exercised in finish grading operations in order to assure that

subgrade tolerances are maintained. It is particularly important that no low sectors or depressions be allowed to exist within these areas, water may accumulate and lead to serious loss of supporting capacity.

The floor slab should be suitably reinforced, as per structural considerations, to make it as rigid as practical. Proper joints should be provided at the junctions of the slab and foundation system so that a small amount of independent movement can occur without causing damage. Large floor areas should be provided with joints at frequent intervals to compensate for concrete volume changes during curing and temperature changes.

Underground Piping Excavation Support

In view of the results of the test boring operations, laboratory test studies, analysis and provided information, consideration should be given to the following factors in the design and installation of the proposed underground piping.

Based on the locations of the proposed underground piping and as per OSHA excavation regulations, open cut excavation is possible up to a maximum depth of twenty(20) feet. The excavation slopes should follow OSHA guidelines for type 'C' soils. If temporary excavation support is required, the contractor or specialty subcontractor should be responsible to design and install the required system. For the various subsurface formations encountered, the following soil parameters may be adopted for determining lateral earth pressures:

Type of Soil	Unit Weight (pcf)	Effective Strength	Undrained Strength
Sandy Clay/Silty Clay	120	$\phi' = 25°$, $C' = 100$ psf	$\phi = 28°$, $C = 0$ psf

The design groundwater depth should be determined based on the actual groundwater conditions encountered in the field during construction.

Underground Pipe Support

For the structural and functional integrity of the underground utility lines, it is imperative that the pipes have adequate foundation, i.e., the subsurface materials should have adequate support capabilities and also be able to provide uniform bedding to the pipe. The bedding may be provided either with shaped bottom and tamped backfill, or by compacted granular bedding with tamped backfill. The granular bedding should meet the specification for Type 2 bedding (i.e., ODOT's Construction and Material Specifications Item #603.04). The bedding shall extend up around the pipe for a depth of 6 inches or 30

percent of the outside diameter of the pipe, whichever is greater. The remainder of the backfill should be compacted soil. Granular bedding not only provides firm uniform support for the pipe but also stabilizes the trench bottom.

The subsoil at and below the pipe bearing elevations may exhibit relatively loose or soft structural states. Within such sectors, undercutting and replacement of the questionable soils with coarse aggregates (such as #1 and #2 stones) will be required. The decision in connection with the extent of undercutting or stabilization can be made only in the field following careful visual examination of the exposed bearing materials.

General Pavement Recommendations

Pavement design will include proper preparation of subgrade sectors, careful design of the pavement area drainage systems and utilization of an aggregate base course with asphalt concrete or concrete surface course. Careful attention will be required in fine-grading the subgrade surfaces in order to eliminate undulations and depressions that would tend to collect water.

The results of the test borings, laboratory tests and analysis indicate that an average California Bearing Ratio (CBR) value of five(5) can be utilized for the design of the pavement structures, provided that the subgrade materials consist of the engineered fill or natural soils and are compacted to the minimum specified degree as recommended. The subgrade soils should be verified and approved by a representative of the projects geotechnical engineer prior to the placement of the aggregate base course.

Design for drainage is of the utmost importance to minimize detrimental effects that may shorten the service life of the pavements. The pavement should be crowned or sloped in order to promote effective surface drainage and reduce the risk of water ponding. We recommend a minimum slope of 1.5 percent for the pavement surfaces. In addition, the subgrade should be similarly sloped to promote effective subgrade drainage. We recommend "stub" or "finger" drains be provided around catch basins and in other low areas of the proposed pavements to limit the accumulation of water on the frost susceptible subgrade soils. Additionally, subsurface underdrains should be installed along the perimeter of the pavement areas to intercept and direct subsurface seepage away from the pavement areas.

Subsurface "stub" or "finger" drains should be perforated corrugated plastic pipe or an equivalent. The pipe should be surrounded by a minimum of 4 inches of free draining aggregate, with the aggregate fully encased in a non-woven geotextile filter fabric and the

aggregate backfilled all the way to the pavement base course. The drainage lines should be connected to the catch basins, storm sewers or other suitable and functioning positive outlets.

All materials to be employed and field operations required in connection with the contemplated pavement structures should follow recommendations and procedural details as per the Ohio Department of Transportation, Asphalt Institute, and/or American Concrete Institute.

CONSTRUCTION CONSIDERATIONS

Groundwater Control

Groundwater was encountered at the test boring locations B-1 through B-3 during the field drilling operations. Therefore, groundwater and/or seepage may be encountered during foundation subgrade excavation and construction. Accordingly, a gravity drainage system, or other conventional dewatering procedure, as deemed necessary by the field conditions, should be implemented throughout construction, such that the groundwater is controlled and maintained at an elevation of at least 2 feet below the excavation bottom at all times. Every effort should be made to keep the excavations dry, if water is encountered.

Excavations

In Federal Register, Volume 54, No. 209 (October, 1989), the United States Department of Labor, Occupational Safety and Health Administration (OSHA) amended its "Construction Standards for Excavations, 29 CFR, Part 1926, Subpart P." This document was issued to better insure the safety of workers entering trenches or excavations. It is mandated by this federal regulation that all excavations, whether they be utility trenches, basement excavations or foundation excavations, be constructed in accordance with the new OSHA guidelines. It is our understanding that these regulations are being strictly enforced. If they are not followed closely, the owner and the contractor could be liable for substantial penalties.

The contractor is solely responsible for designing and constructing stable, temporary excavations and should shore, slope, or bench the sides of the excavations as required to maintain stability of both the excavation sides and bottom. The contractor's "responsible person" as defined in "CFR Part 1926," should evaluate the soil exposed in

the excavations as part of the contractor's safety procedures. In no case should slope height, slope inclination, or excavation depth, including utility trench excavation depth, exceed those specified in local, state, and federal safety regulations.

We are providing this information solely as a service to our client. PSI is not assuming responsibility for construction site safety or the contractor's activities; such responsibility is not being implied and should not be inferred. If the excavations are left open and exposed to the elements for a significant length of time, desiccation of the clays may create minute shrinkage cracks which could allow large pieces of clay to collapse or slide into the excavation.

Materials removed from the excavation should not be stockpiled immediately adjacent to the excavation, inasmuch as this load may cause a sudden collapse of the embankment.

Weather Considerations

The soils encountered at this site are known to be sensitive to disturbances caused by construction traffic and to changes in moisture content. During wet weather periods, increases in the moisture content of the soil can cause significant reduction in the soil strength and support capabilities. Care should be exercised during the grading operations at the site. Due to the fine-grained nature of the surficial soils, the traffic of heavy equipment, including heavy compaction equipment, may very well create pumping and a general deterioration of those soils in the presence of water. Therefore, the grading should, if at all possible, be performed during a dry season. A layer of crushed stone may be required to allow the movement of construction traffic over the site during the rainy season. The contractor should maintain positive site drainage and if wet/pumping conditions occur, the contractor will be responsible to over excavate the wet soils and replace them with a properly compacted engineered fill.

REPORT LIMITATIONS

The recommendations submitted in this report are based on the available subsurface information obtained by PSI and design details furnished by Mr. Ronald Champlin of CT Consultants for the proposed development. If there are any revisions to the plans for the proposed building structure, or if deviations from the subsurface conditions noted in this report are encountered during construction, PSI should be retained to determine if changes in the recommendations are required. If PSI is not retained to perform these functions, PSI will not be responsible for the impact of those conditions on the geotechnical recommendations for the project.

The Geotechnical Engineer warrants that the findings, recommendations, specifications, or professional advice contained herein, have been presented after being prepared in accordance with generally accepted professional engineering practice in the fields of foundation engineering, soil mechanics and engineering geology. No other warranties are implied or expressed.

After the plans and specifications are complete, it is recommended that PSI be provided the opportunity to review the final design and specifications, in order to verify that the earthwork and recommendations are properly interpreted and implemented. At that time, it may be necessary to submit supplementary recommendations. This report has been prepared for the exclusive use of CT Consultants, for the specific application to the proposed Building Expansion at the Canton Water Reclamation Facility, located at 3530 Central Avenue SE in the city of Canton, Stark County, Ohio.

APPENDIX

Site Vicinity Map

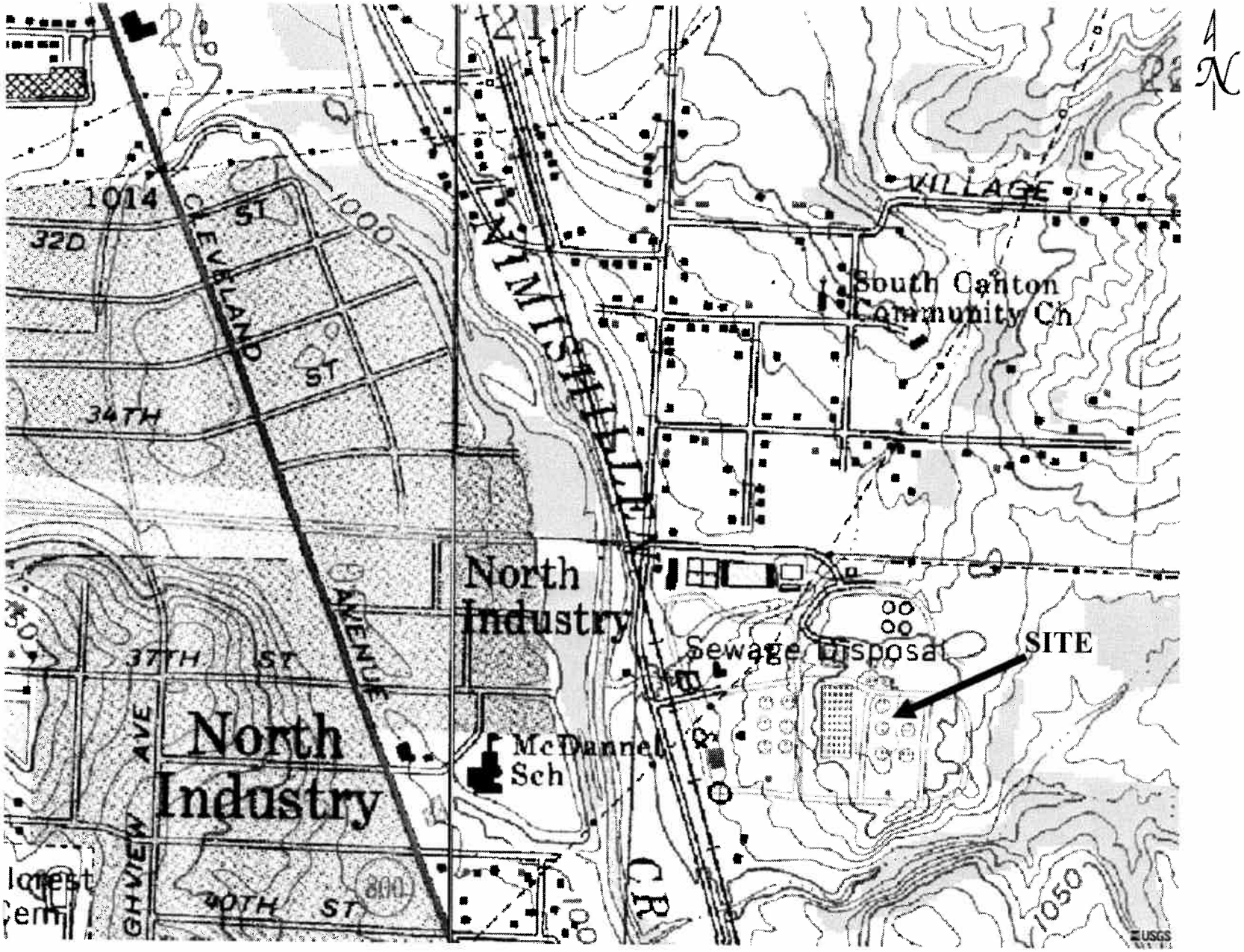
Boring Location Plans

Boring Logs

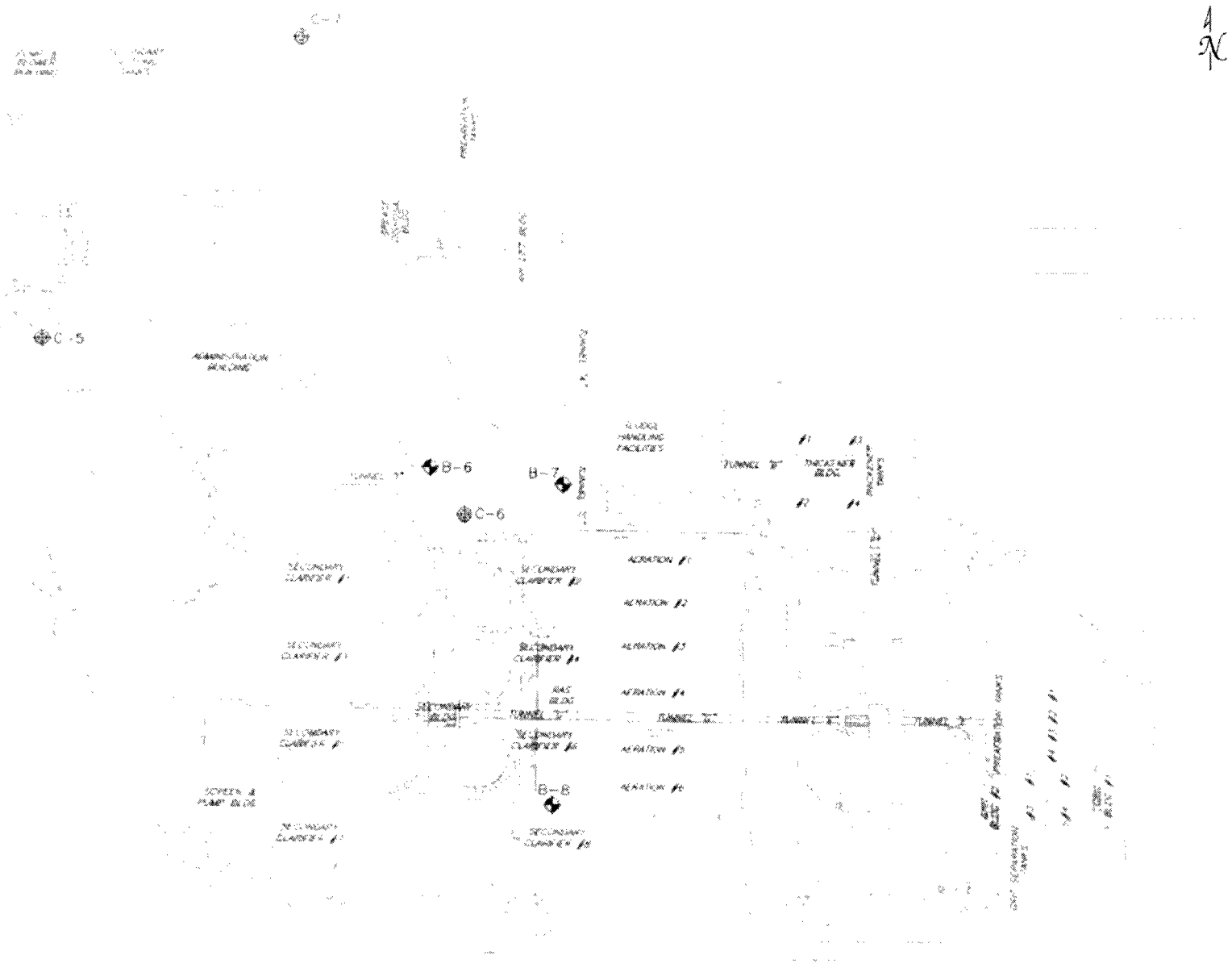
Concrete Core Photo Logs

General Notes

USCS Soil Classification Chart



psi Information To Build On Engineering • Consulting • Testing	Proposed Canton Water Reclamation Facility Improvements 3530 CENTRAL AVENUE SE CANTON, STARK COUNTY, OHIO	Date:10/18/11 Drawing from CT Consultants	Site Vicinity Map PSI Project No.: 0145449



psi Information To Build On Engineering • Consulting • Testing	Proposed Canton Water Reclamation Facility Improvements 3530 CENTRAL AVENUE SE CANTON, STARK COUNTY, OHIO	Date:10/18/11 Drawing from CT Consultants	Boring Location Plan PSI Project No.: 0145449

Professional Service Industries, Inc.
4579 Navarre Road, SW
Canton, OH 44706
Telephone: (330) 478-0081
Fax: (330) 478-3267

LOG OF BORING B-1

PSI Job No.: 0145449
Project: Proposed Canton WWTP Improvements
Location: Canton, Ohio
Stark County

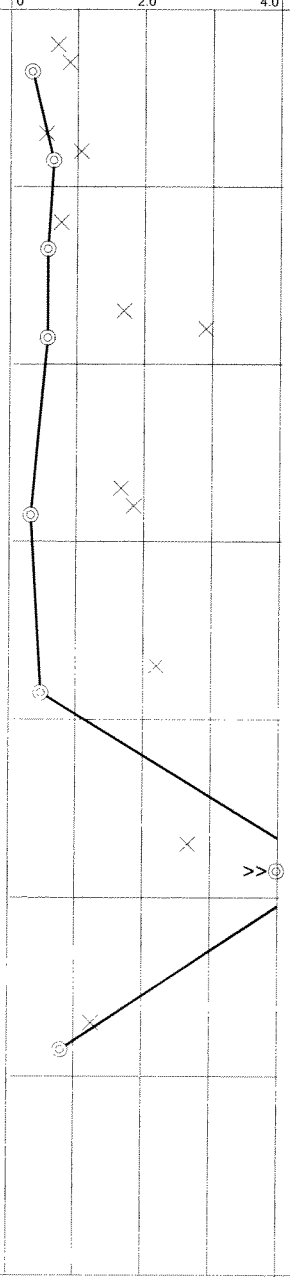
Drilling Method: Hollow Stem Auger
Sampling Method: SS
Hammer Type: Automatic
Boring Location:

WATER LEVELS
While Drilling 13.0 feet
Upon Completion feet
Delay N/A

Station: N/A
Offset: N/A

Elevation (feet)	Depth, (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)	MATERIAL DESCRIPTION	USCS Classification	SPT Blows per 6-inch (SS)	Moisture, %	Additional Remarks
	0					8.5" Concrete with Sand and Gravel Base				
				1	14	Soft, moist, brown trace gray SANDY SILTY CLAY, some gravel, rock fragments	CL	5-2-2 N=4	9 11	
	5			2	17	Loose, moist, oxidized brown SAND, little to some gravel, trace clay pockets	SP	3-4-4 N=8	7 13	
				3	4	Medium stiff, moist, brown and gray SILTY CLAY with sand, some gravel, trace to few weathered shale fragments	CL	3-3-4 N=7	9	
				4	10	Loose, moist, gray SILT, trace to little clay Medium stiff, moist, brown SILTY CLAY	ML CL	3-3-4 N=7	21 36	
	10									
				5	18	Soft, moist, gray SILTY CLAY with silt layers	CL	1-2-2 N=4	21 23	
	15									
				6	3	Medium stiff, moist, gray CLAY	CL	2-3-3 N=6	27	
	20									
				7	18			1/12"-2	33	>>
	25									
				8	18	Stiff, moist, greenish gray SILTY CLAY with some sandy layers, weathered shale fragments *Possibly completely weathered shale	CL	4-5-5 N=10	16	
	30					Bottom of the boring at 30'				

STANDARD PENETRATION TEST DATA
N in blows/ft
Moisture PL LL
0 25 50
STRENGTH, tsf
Qu Qp
0 2.0 4.0



Completion Depth: 30.0 ft
Date Boring Started: 10/4/11
Date Boring Completed: 10/4/11
Logged By:
Drilling Contractor: PSI, Inc.

Sample Types:
Auger Cutting
Split-Spoon
Rock Core
Shelby Tube
Hand Auger
Calif. Sampler
Texas Cone

Latitude:
Longitude:
Drill Rig:
Remarks:

The stratification lines represent approximate boundaries. The transition may be gradual.

Professional Service Industries, Inc.
4579 Navarre Road, SW
Canton, OH 44706
Telephone: (330) 478-0081
Fax: (330) 478-3267

LOG OF BORING B-2

PSI Job No.: 0145449
Project: Proposed Canton WWTP Improvements
Location: Canton, Ohio
Stark County

Drilling Method: Hollow Stem Auger
Sampling Method: SS
Hammer Type: Automatic
Boring Location:

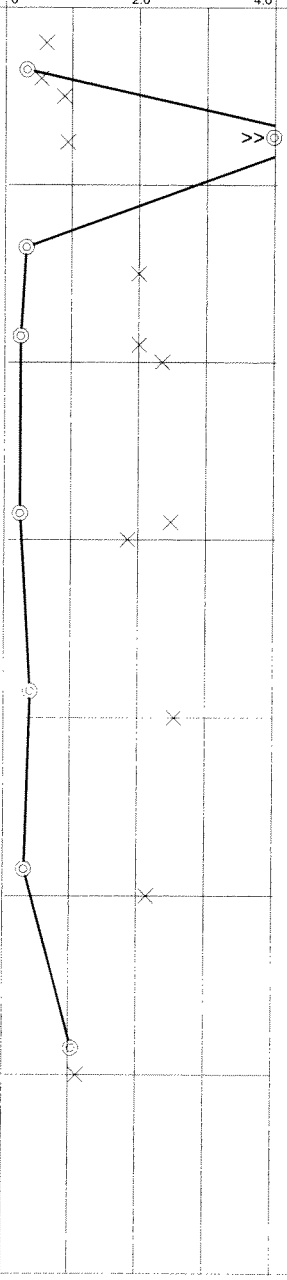
WATER LEVELS

While Drilling	3.0 feet
While Drilling	10 feet
Delay	N/A

Station: N/A
Offset: N/A

Elevation (feet)	Depth, (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)	MATERIAL DESCRIPTION	USCS Classification	SPT Blows per 6-inch (SS)	Moisture, %	Additional Remarks
	0					8" Concrete with Sand and Gravel Base				
				1	17	Moist, brown SANDY SILTY CLAY, some sand layers, some gravel, rock fragments, trace slag	FILL	2-2-2 N=4	8 7 11	
				2	4	Wet, brown SILTY SAND, trace clayey layers, some gravel, rock fragments, trace concrete fragments	FILL FILL	50/4"	12	
	5					Concrete or boulder layer				
				3	18	Very loose, moist, gray SILT with clay layers	ML	1-2-2 N=4	25	
				4	18	Soft, moist, gray SILTY CLAY	CL	1-1-2 N=3	25 29	
	10					Very loose, wet, brown SILTY SAND	SM			
				5	18	Soft to medium stiff, moist, grayish brown SILTY CLAY with fine sandy silt seams		2-1-2 N=3	31 23	
	15									
				6	4		CL	2-2-3 N=5	32	
	20									
				7	18			1-1-3 N=4	27	
	25									
				8	16	Stiff, moist, greenish brown SILTY CLAY, some sandy layers, weathered shale fragments *Possibly completely weathered shale	CL	4-5-8 N=13	14	
	30					Bottom of boring at 30'				

STANDARD PENETRATION TEST DATA
N in blows/ft
Moisture
PL
LL
0 25 50
STRENGTH, tsf
Qu
Qp
0 2.0 4.0



Completion Depth: 30.0 ft
Date Boring Started: 10/4/11
Date Boring Completed: 10/4/11
Logged By:
Drilling Contractor: PSI, Inc.

Sample Types:
Auger Cutting
Split-Spoon
Rock Core
Shelby Tube
Hand Auger
Calif. Sampler
Texas Cone

Latitude:
Longitude:
Drill Rig:
Remarks:

The stratification lines represent approximate boundaries. The transition may be gradual.

Professional Service Industries, Inc.
4579 Navarre Road, SW
Canton, OH 44706
Telephone: (330) 478-0081
Fax: (330) 478-3267

LOG OF BORING B-3

PSI Job No.: 0145449
Project: Proposed Canton WWTP Improvements
Location: Canton, Ohio
Stark County

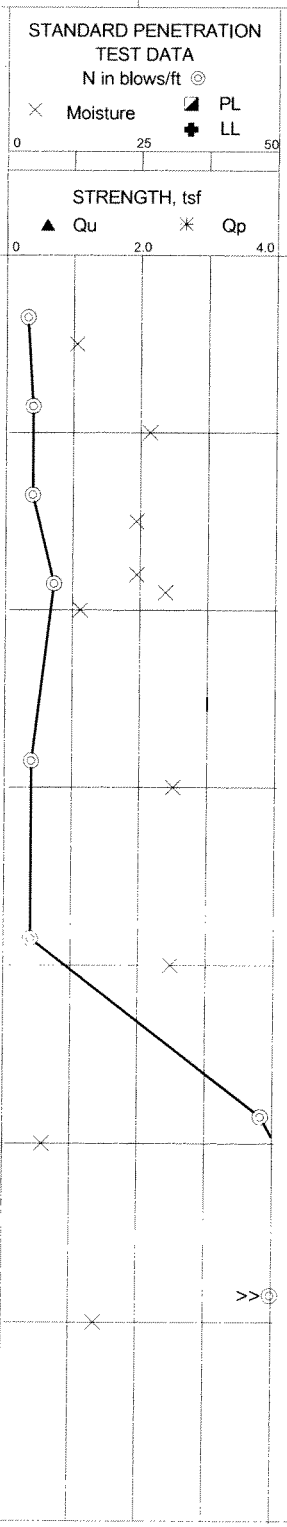
Drilling Method: Hollow Stem Auger
Sampling Method: SS
Hammer Type: Automatic
Boring Location:

WATER LEVELS

While Drilling	12 feet
Upon Completion	17 feet
Delay	4.8 feet

Station: N/A
Offset: N/A

Elevation (feet)	Depth, (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)	MATERIAL DESCRIPTION	USCS Classification	SPT Blows per 6-inch (SS)	Moisture, %	Additional Remarks
	0					9" Concrete				
				1	2	Soft, moist, brown and gray SILTY CLAY, some sand, trace to few gravel, rock fragments	CL	1-2-2 N=4	13	
				2	18	Loose, moist, gray and brown SILT, little clay	ML	1-2-3 N=5	27	
	5			3	18	Medium stiff, moist, gray SILTY CLAY	CL	2-3-2 N=5	24	
				4	18	Stiff, moist, brown SILTY CLAY	CL	3-4-5 N=9	24	
	10					Loose, moist, brown SAND, trace silt	SP		30 14	
				5	15	Medium stiff, moist, gray CLAY, trace to little silt	CL	2-2-3 N=5	31	
	15									
				6	18			2-2-3 N=5	31	
	20					Highly to completely weathered, gray SHALE with sandy layers				
				7	10			5-15-33 N=48	7	
	25									
				8	10			33-35-31 N=66	17	>>
	30					Bottom of boring at 30'				



Completion Depth: 30.0 ft
Date Boring Started: 10/6/11
Date Boring Completed: 10/6/11
Logged By:
Drilling Contractor: PSI, Inc.

Sample Types:
Auger Cutting
Split-Spoon
Rock Core
Shelby Tube
Hand Auger
Calif. Sampler
Texas Cone

Latitude:
Longitude:
Drill Rig:
Remarks:

The stratification lines represent approximate boundaries. The transition may be gradual.

Professional Service Industries, Inc.
4579 Navarre Road, SW
Canton, OH 44706
Telephone: (330) 478-0081
Fax: (330) 478-3267

LOG OF BORING B-4

PSI Job No.: 0145449
Project: Proposed Canton WWTP Improvements
Location: Canton, Ohio
Stark County

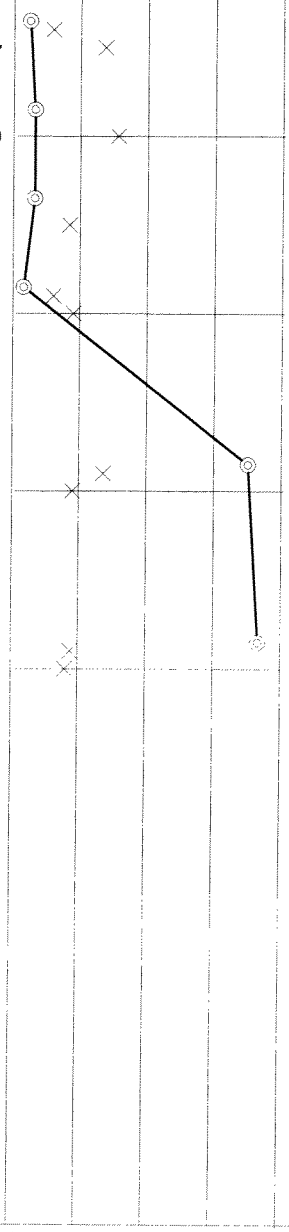
Drilling Method: Hollow Stem Auger
Sampling Method: SS
Hammer Type: Automatic
Boring Location:

WATER LEVELS

Station: N/A
Offset: N/A

Elevation (feet)	Depth, (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)	MATERIAL DESCRIPTION	USCS Classification	SPT Blows per 6-inch (SS)	Moisture, %	Additional Remarks
	0					9" Concrete with Sand and Gravel Base				
				1	16	Moist, brown SILTY CLAY, little to some sand, gravel, rock fragments	FILL	2-1-2 N=3	7 17	
				2	12	Moist, light brown with gray CLAYEY SILT, little to some gravel, rock fragments	FILL	1-2-2 N=4	20	
	5			3	11	Very loose, moist, oxidized brown SILTY CLAYEY SAND, some gravel, rock fragments	SC-SM	2-2-2 N=4	11	
						Moist, oxidized brown SILTY SAND, some gravel, rock fragments, trace clay	SM			
				4	12	Soft, moist, brown SILTY CLAY, little to some sand, gravel, rock fragments	CL	1-1-1 N=2	8 11	
	10					Highly weathered, black and oxidized brown SHALE				
				5	18	Highly weathered, black SHALE *Trace coal fragments in 18.5'-19.5' sample		11-15-29 N=44	17 11	
	15									
				6	18			23-25-21 N=46	11 10	
	20					Bottom of boring at 20'				

STANDARD PENETRATION TEST DATA
N in blows/ft
Moisture
PL
LL
0 25 50
STRENGTH, tsf
Qu
Qp
0 2.0 4.0



Completion Depth: 20.0 ft
Date Boring Started: 10/5/11
Date Boring Completed: 10/5/11
Logged By:
Drilling Contractor: PSI, Inc.

Sample Types:
Auger Cutting
Split-Spoon
Rock Core
Shelby Tube
Hand Auger
Calif. Sampler
Texas Cone

Latitude:
Longitude:
Drill Rig:
Remarks:

The stratification lines represent approximate boundaries. The transition may be gradual.

Professional Service Industries, Inc.
4579 Navarre Road, SW
Canton, OH 44706
Telephone: (330) 478-0081
Fax: (330) 478-3267

LOG OF BORING B-5

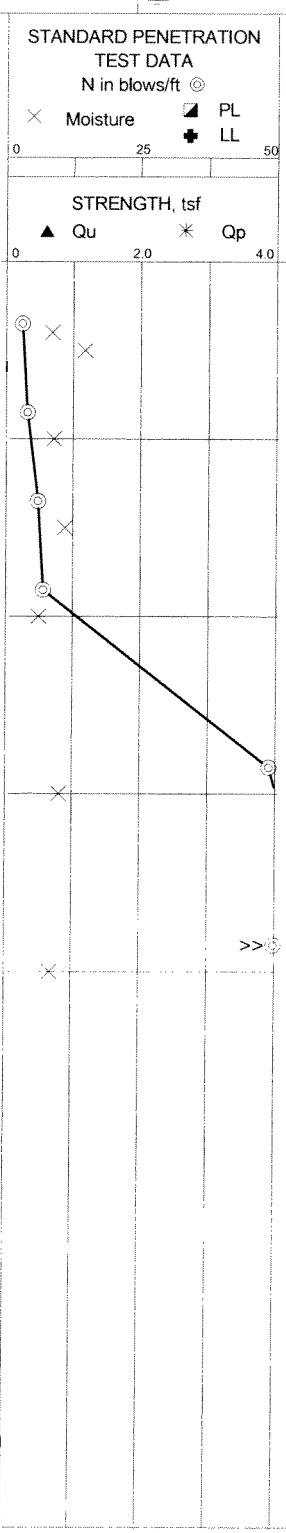
PSI Job No.: 0145449
Project: Proposed Canton WWTP Improvements
Location: Canton, Ohio
Stark County

Drilling Method: Hollow Stem Auger
Sampling Method: SS
Hammer Type: Automatic
Boring Location:

WATER LEVELS

Station: N/A
Offset: N/A

Elevation (feet)	Depth, (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)	MATERIAL DESCRIPTION	USCS Classification	SPT Blows per 6-inch (SS)	Moisture, %	Additional Remarks
	0					9" Concrete with Sand and Gravel Base				
				1	11	Moist, light brown SILTY CLAY, little to some gravel, rock fragments, some sand	FILL	2-1-2 N=3	9 15	
	5			2	12	Very loose, very moist, brown SILTY SAND with clay, some gravel	SM	2-1-3 N=4	9	
				3	9	Medium stiff, moist, brown trace gray SILTY CLAY, some sand, gravel, rock fragments	CL	2-3-3 N=6	11	
	10			4	10	Loose, moist, brown SAND, trace to little silt, some gravel, rock fragments	SP	4-3-4 N=7	6	
						Highly weathered, black with trace oxidation stains SHALE				
	15			5	18			19-22-27 N=49	10	
	20			6	16	Bottom of boring at 20'		27-33-25 N=58	9	



Completion Depth: 20.0 ft
Date Boring Started: 10/5/11
Date Boring Completed: 10/5/11
Logged By:
Drilling Contractor: PSI, Inc.

Sample Types:
Auger Cutting
Split-Spoon
Rock Core
Shelby Tube
Hand Auger
Calif. Sampler
Texas Cone

Latitude:
Longitude:
Drill Rig:
Remarks:

The stratification lines represent approximate boundaries. The transition may be gradual.

Professional Service Industries, Inc.
4579 Navarre Road, SW
Canton, OH 44706
Telephone: (330) 478-0081
Fax: (330) 478-3267

LOG OF BORING B-6

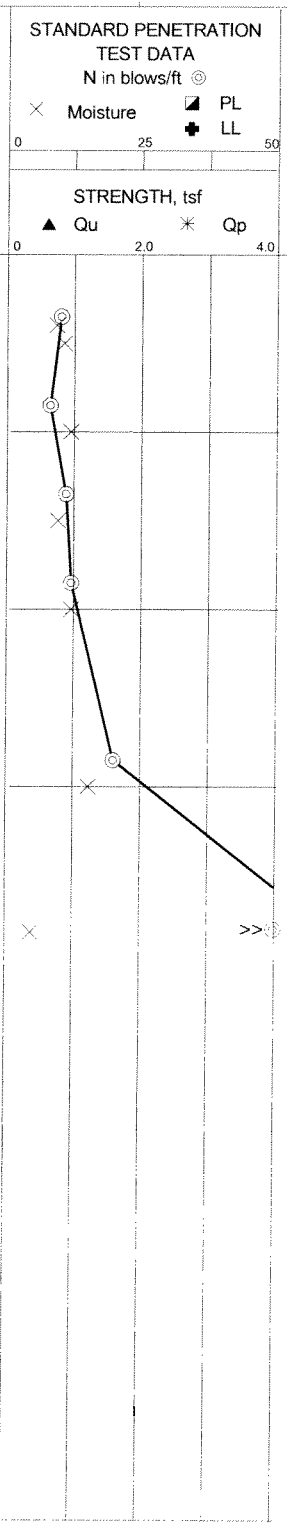
PSI Job No.: 0145449
Project: Proposed Canton WWTP Improvements
Location: Canton, Ohio
Stark County

Drilling Method: Hollow Stem Auger
Sampling Method: SS
Hammer Type: Automatic
Boring Location:

WATER LEVELS

Station: N/A
Offset: N/A

Elevation (feet)	Depth, (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)	MATERIAL DESCRIPTION	USCS Classification	SPT Blows per 6-inch (SS)	Moisture, %	Additional Remarks
	0					5" Topsoil				
				1	18	Loose, moist, brown SILTY SAND, trace to little clay, some gravel, rock fragments	SM	4-5-5 N=10	9 11	
	5			2	13	Medium stiff, moist, brown and gray SILTY CLAY, some weathered shale fragments, rock fragments	CL	5-5-3 N=8	12	
				3	12	Medium dense, moist, brown SANDY SILT, little to some gravel, rock fragments	ML	7-5-6 N=11	10	
	10			4	6	Stiff, moist, light brown SILTY CLAY, little to some sand *Possibly completely weathered shale	CL	7-7-5 N=12	12	
	15			5	12	Highly to completely weathered, gray with trace oxidation stains SHALE		4-12-8 N=20	15	
				6	6	Highly weathered, gray SHALE Bottom of boring at 19.1'		45-50/1"	5	



Completion Depth: 19.1 ft
Date Boring Started: 10/5/11
Date Boring Completed: 10/5/11
Logged By:
Drilling Contractor: PSI, Inc.

Sample Types:
Auger Cutting
Split-Spoon
Rock Core
Shelby Tube
Hand Auger
Calif. Sampler
Texas Cone

Latitude:
Longitude:
Drill Rig:
Remarks:

The stratification lines represent approximate boundaries. The transition may be gradual.

Professional Service Industries, Inc.
4579 Navarre Road, SW
Canton, OH 44706
Telephone: (330) 478-0081
Fax: (330) 478-3267

LOG OF BORING B-7

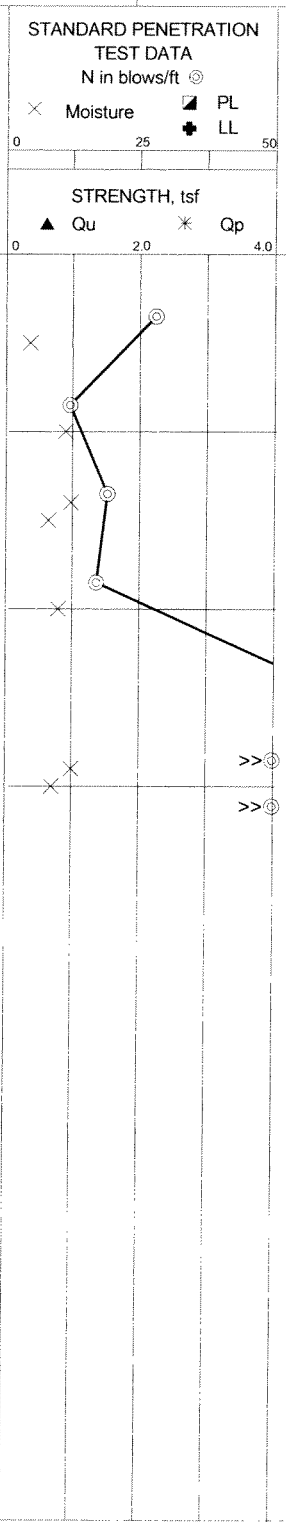
PSI Job No.: 0145449
Project: Proposed Canton WWTP Improvements
Location: Canton, Ohio
Stark County

Drilling Method: Hollow Stem Auger
Sampling Method: SS
Hammer Type: Automatic
Boring Location:

WATER LEVELS

Station: N/A
Offset: N/A

Elevation (feet)	Depth, (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)	MATERIAL DESCRIPTION	USCS Classification	SPT Blows per 6-inch (SS)	Moisture, %	Additional Remarks
	0					6" Topsoil				
				1	6	Moist, light brown SAND with gravel, rock fragments	FILL	15-15-13 N=28	5	
						Very stiff to stiff, moist, grayish green SILTY CLAY	CL			
	5			2	15	Stiff, moist, brown trace gray SILTY CLAY with weathered shale fragments, trace to little sand	CL	4-5-7 N=12	11	
				3	17	Medium dense, moist, brownish green FINE SANDY SILT, trace to little clay, rock fragments, gravel		10-10-9 N=19	12 8	
	10			4	16		ML	5-7-10 N=17	10	
						Gray CLAYEY SILT, some rock fragments	ML			
	15			5	12	High to completely weathered, light gray to gray SHALE, some dark layers, trace brown sandy layers		7-25-65 N=90	12 9	
				6	1			50/1"		
						Highly weathered, gray SILTSTONE/SHALE				
						Bottom of boring at 15.6'				



Completion Depth: 15.6 ft
Date Boring Started: 10/5/11
Date Boring Completed: 10/5/11
Logged By:
Drilling Contractor: PSI, Inc.

Sample Types:
Auger Cutting
Split-Spoon
Rock Core
Shelby Tube
Hand Auger
Calif. Sampler
Texas Cone

Latitude:
Longitude:
Drill Rig:
Remarks:

The stratification lines represent approximate boundaries. The transition may be gradual.

Professional Service Industries, Inc.
4579 Navarre Road, SW
Canton, OH 44706
Telephone: (330) 478-0081
Fax: (330) 478-3267

LOG OF BORING B-8

PSI Job No.: 0145449
Project: Proposed Canton WWTP Improvements
Location: Canton, Ohio
Stark County

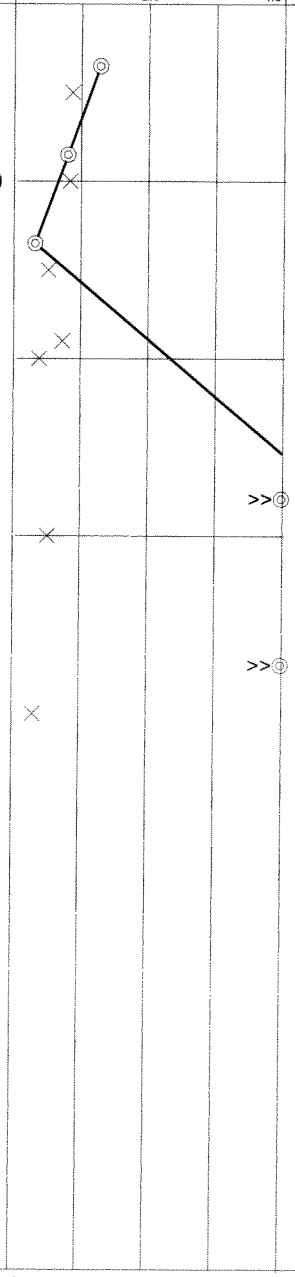
Drilling Method: Hollow Stem Auger
Sampling Method: SS
Hammer Type: Automatic
Boring Location:

WATER LEVELS

Station: N/A
Offset: N/A

Elevation (feet)	Depth, (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)	MATERIAL DESCRIPTION	USCS Classification	SPT Blows per 6-inch (SS)	Moisture, %	Additional Remarks
	0					7" Topsoil				
				1	18	Very stiff, moist, brown trace gray SILTY CLAY, some sand, gravel, rock fragments	CL	5-8-8 N=16	11	
	5			2	12	Highly to completely weathered, gray and brown SHALE		4-6-4 N=10	10	
				3	2			3-3-1 N=4	7	
	10			4	10	Highly to completely weathered, gray SHALE		8-18-50/4"	9 5	
	15			5	6			28-50/4"	6	>>
				6	3	Bottom of boring at 18.7'		50/3"	4	>>

STANDARD PENETRATION TEST DATA
N in blows/ft ◎
× Moisture ◪ PL ✚ LL
0 25 50
STRENGTH, tsf
▲ Qu ✳ Qp
0 2.0 4.0

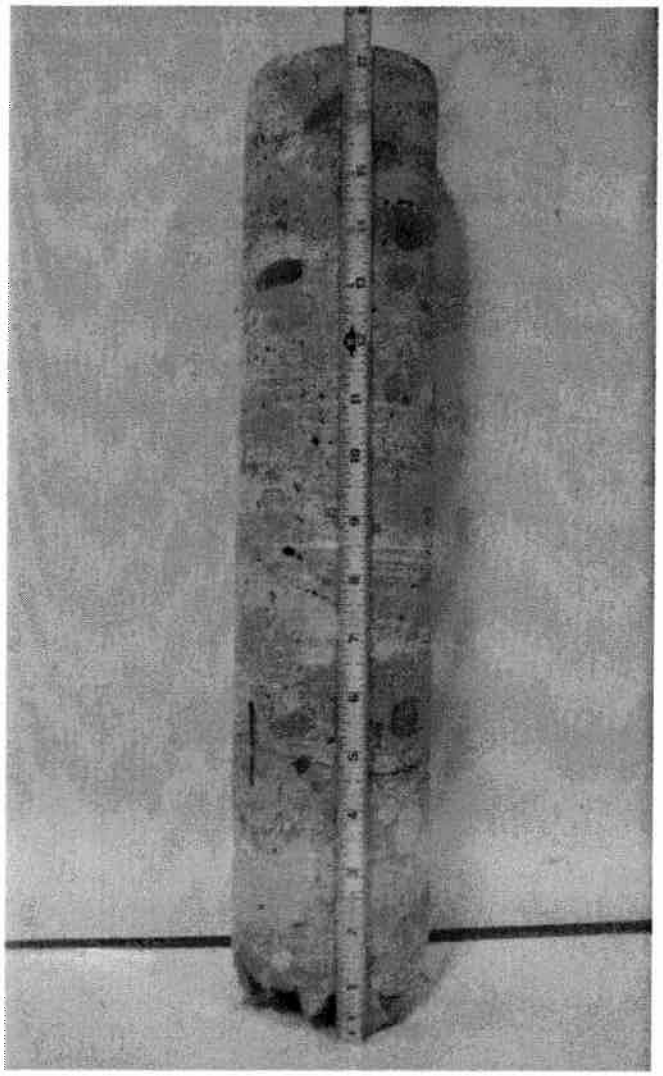


Completion Depth: 18.7 ft
Date Boring Started: 10/6/11
Date Boring Completed: 10/6/11
Logged By:
Drilling Contractor: PSI, Inc.

Sample Types:
Auger Cutting
Split-Spoon
Rock Core
Shelby Tube
Hand Auger
Calif. Sampler
Texas Cone

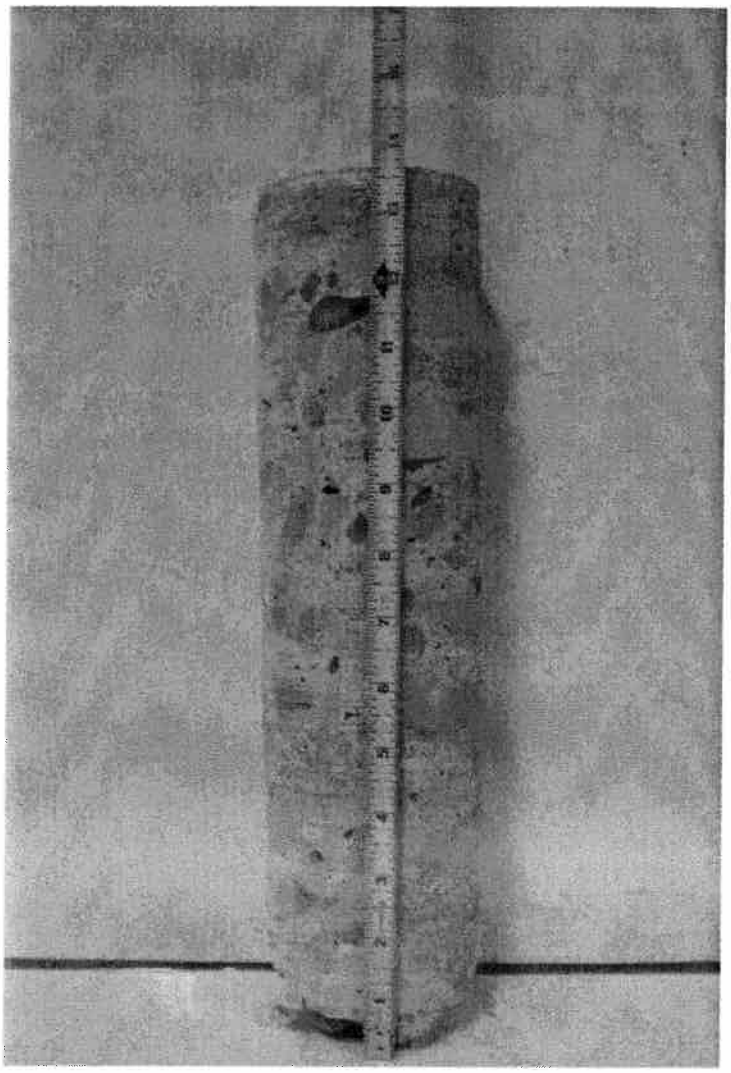
Latitude:
Longitude:
Drill Rig:
Remarks:

The stratification lines represent approximate boundaries. The transition may be gradual.



C- 1

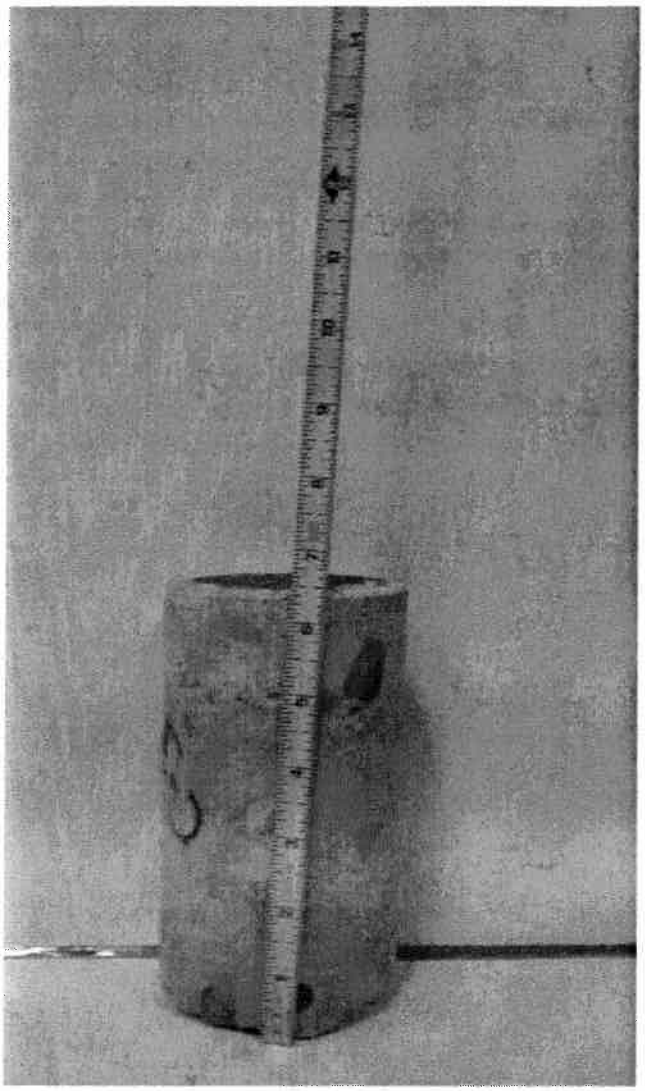
17.5 inches



C- 2

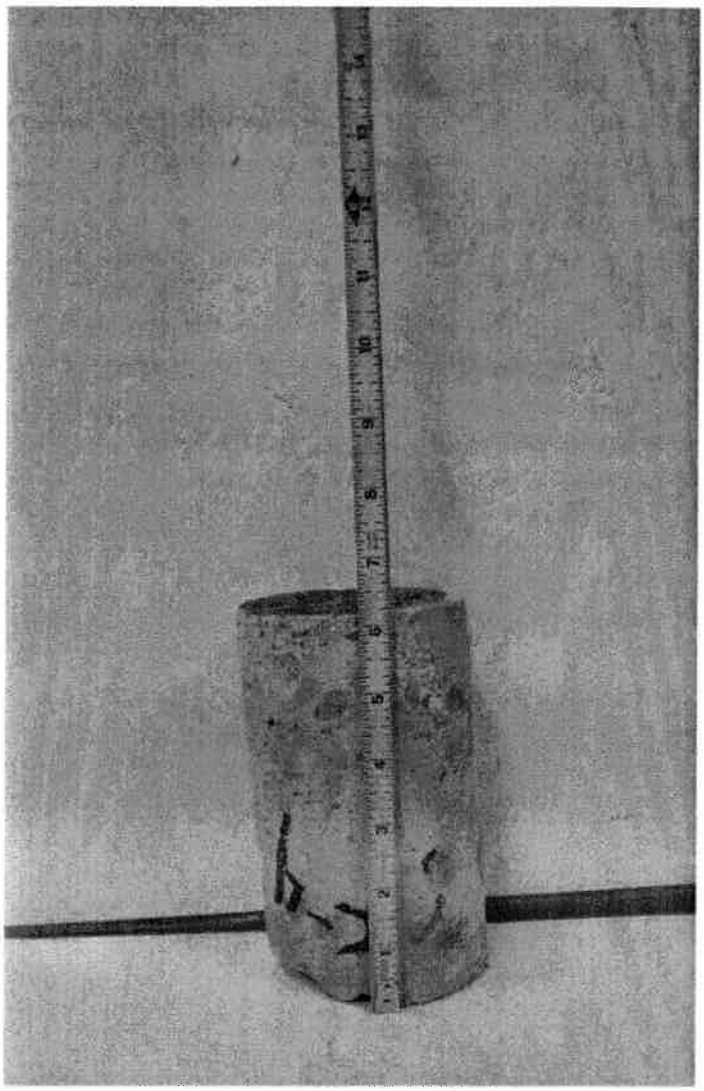
13.75 inches

psi Information To Build On Engineering • Consulting • Testing	Proposed Canton WWTP Improvements E. Central Avenue Canton, Stark County, Ohio	Date:10/13/11	Concrete Cores C-1, C-2
		Photos By: AH	PSI Project No.: 0145449



C- 3

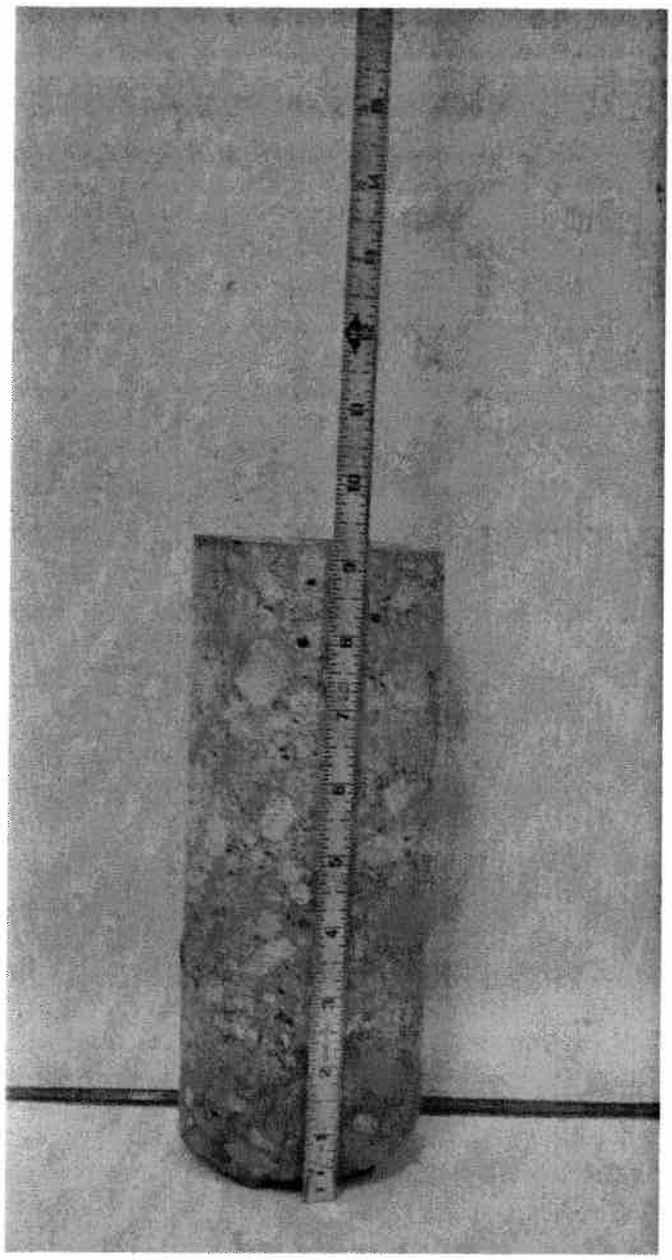
6.5 inches



C- 4

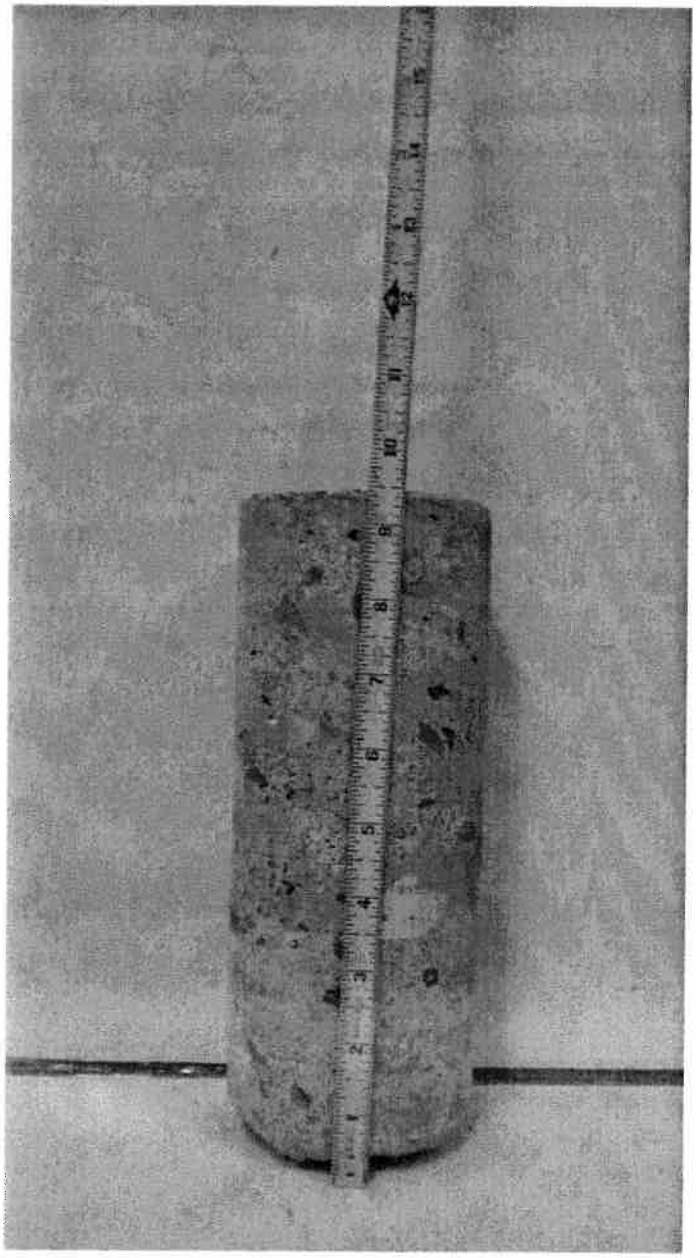
6.25 inches

psi Information To Build On Engineering • Consulting • Testing	Proposed Canton WWTP Improvements E. Central Avenue Canton, Stark County, Ohio	Date:10/13/11	Concrete Cores C-3, C-4
		Photos By: AH	PSI Project No.: 0145449



C- 5

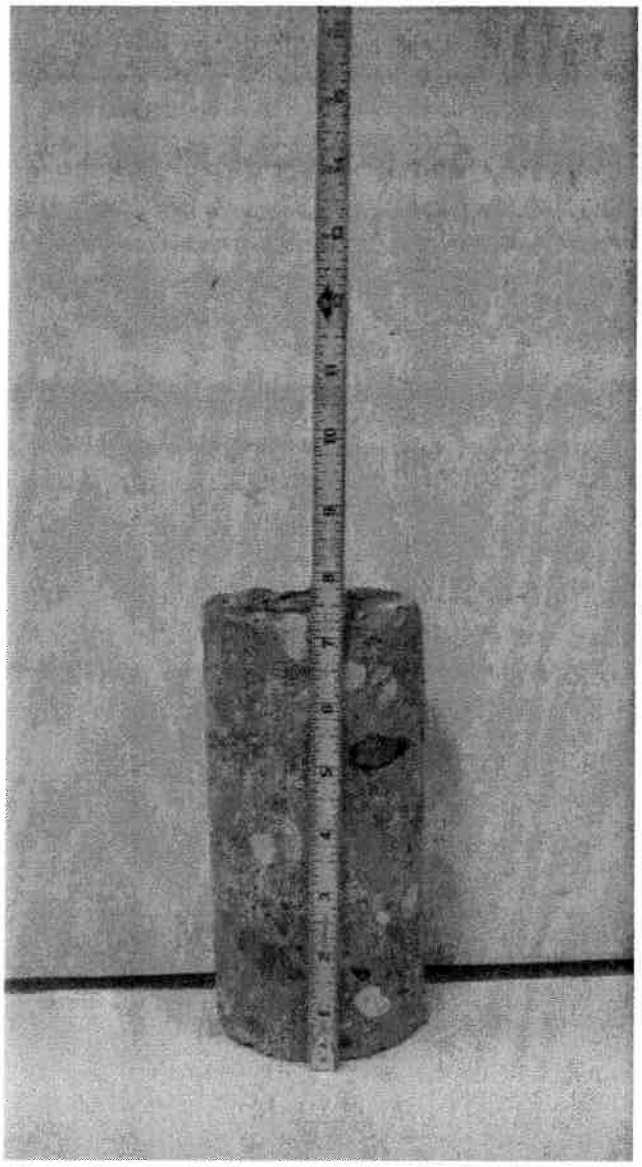
9.25 inches



C- 6

9.5 inches

psi Information To Build On Engineering • Consulting • Testing	Proposed Canton WWTP Improvements E. Central Avenue Canton, Stark County, Ohio	Date:10/13/11	Concrete Cores C-5, C-6
		Photos By: AH	PSI Project No.: 0145449



C- 7

7.5 inches

psi Information To Build On Engineering • Consulting • Testing	Proposed Canton WWTP Improvements E. Central Avenue Canton, Stark County, Ohio	Date:10/13/11	Concrete Cores C-7
		Photos By: AH	PSI Project No.: 0145449

GENERAL NOTES

SAMPLE IDENTIFICATION

The Unified Soil Classification System is used to identify the soil unless otherwise noted.

SOIL PROPERTY SYMBOLS

N:	Standard "N" penetration: Blows per foot of a 140 pound hammer falling 30 inches on a 2 inch O.D. split-spoon.
Qu:	Unconfined compressive strength, tsf.
Qp:	Penetrometer value, index value of unconfined compressive strength, tsf.
Mc:	Water content, %.
PL:	Plastic limit, %.
LL:	Liquid Limit, %.
PI:	Plasticity Index.
γd:	Natural dry density, pcf.
▼	Groundwater level observed at time noted after completion of boring.

DRILLING AND SAMPLING SYMBOLS

SS:	Split-Spoon – 1 3/8" I.D., 2" O.D., except where noted.
ST:	Shelby Tube – 3" O.D., except where noted.
AU:	Auger Sample.
DB:	Diamond Bit.
CB:	Carbide Bit.
WS:	Washed Sample.

RELATIVE DENSITY AND CONSISTENCY CLASSIFICATION (Terzaghi & Peck, 1948)

TERM (COHESIONLESS SOILS)	STANDARD PENETRATION RESISTANCE
Very Loose	0 – 4
Loose	4 – 10
Medium	10 – 30
Dense	30 – 50
Very Dense	Over 50

TERM (COHESIVE SOILS)	Qu – (TSF)
Very Soft	0 – 0.25
Soft	0.25 – 0.50
Medium	0.50 – 1.00
Stiff	1.00 – 2.00
Very Stiff	2.00 – 4.00
Hard	4.00+

PARTICLE SIZE (ASTM D2487 AND D422)

Boulders	≥ 12 in. (300mm)	Medium Sand	<2mm (10 sieve) to 425μm (#40 sieve)
Cobbles	< 12 in.(300mm) to 3 in. (75mm)	Fine Sand	<425μm (#40 sieve) to 75μm (#200 sieve)
Gravel	< 3 in. (75mm) to 4.75mm (#4 sieve)	Silt	<75μm (#200 sieve) to 5μm
Coarse Sand	<4.75mm (#4 sieve) to 2mm (#10 sieve)	Clay	<5μm

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS GRAPH	SYMBOLS LETTER	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	GRAVEL AND GRAVELLY SOILS MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVELS		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
		(LITTLE OR NO FINES)		GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
		(APPRECIABLE AMOUNT OF FINES)		GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
	SAND AND SANDY SOILS MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	CLEAN SANDS		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
		(LITTLE OR NO FINES)		SP	POORLY-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES
		SANDS WITH FINES		SM	SILTY SANDS, SAND - SILT MIXTURES
		(APPRECIABLE AMOUNT OF FINES)		SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

SECTION 07

SOIL RESISTIVITY TEST RESULTS FROM PROFESSIONAL SERVICES INDUSTRIES, INC.

Information To Build On
Engineering • Consulting • Testing

June 14, 2012

Mr. Samuel J. Morgan, PE
CT Consultants, Inc.
8150 Sterling Court
Mentor, Ohio 44060
SMorgan@ctconsultants.com

Re: Soil Resistivity Test Results
Canton Water Reclamation Facility
3530 Central Avenue, Canton, Ohio
PSI File Number: 0138-323

Dear Mr. Morgan:

In compliance with your instructions, we have completed the soil resistivity lab and field tests at Canton Water Reclamation Facility located at 3530 Central Avenue, Canton, Ohio. PSI's services for this project were performed in accordance with Proposal No. 139-66102, dated March 27, 2012. Authorization to perform this exploration and analysis was in the form of signed acceptance of the aforementioned proposal, acknowledged by Mr. Samuel J. Morgan, PE, Project Manager of CT Consultants, Inc., on May 3, 2012.

Project information has been provided by Mr. Samuel J. Morgan, PE, Project Manager of CT Consultants, Inc. Included we received a site plan, showing proposed testing area.

A total of three (3) samples were collected for lab testing, and two (2) sets of field testing were performed at the specified locations as show in the test location plan. All of the test results are attached in the appendix of this report.

Please advise us of the appropriate time to discuss the field quality control and engineering services, and we will be pleased to meet with you at your convenience.

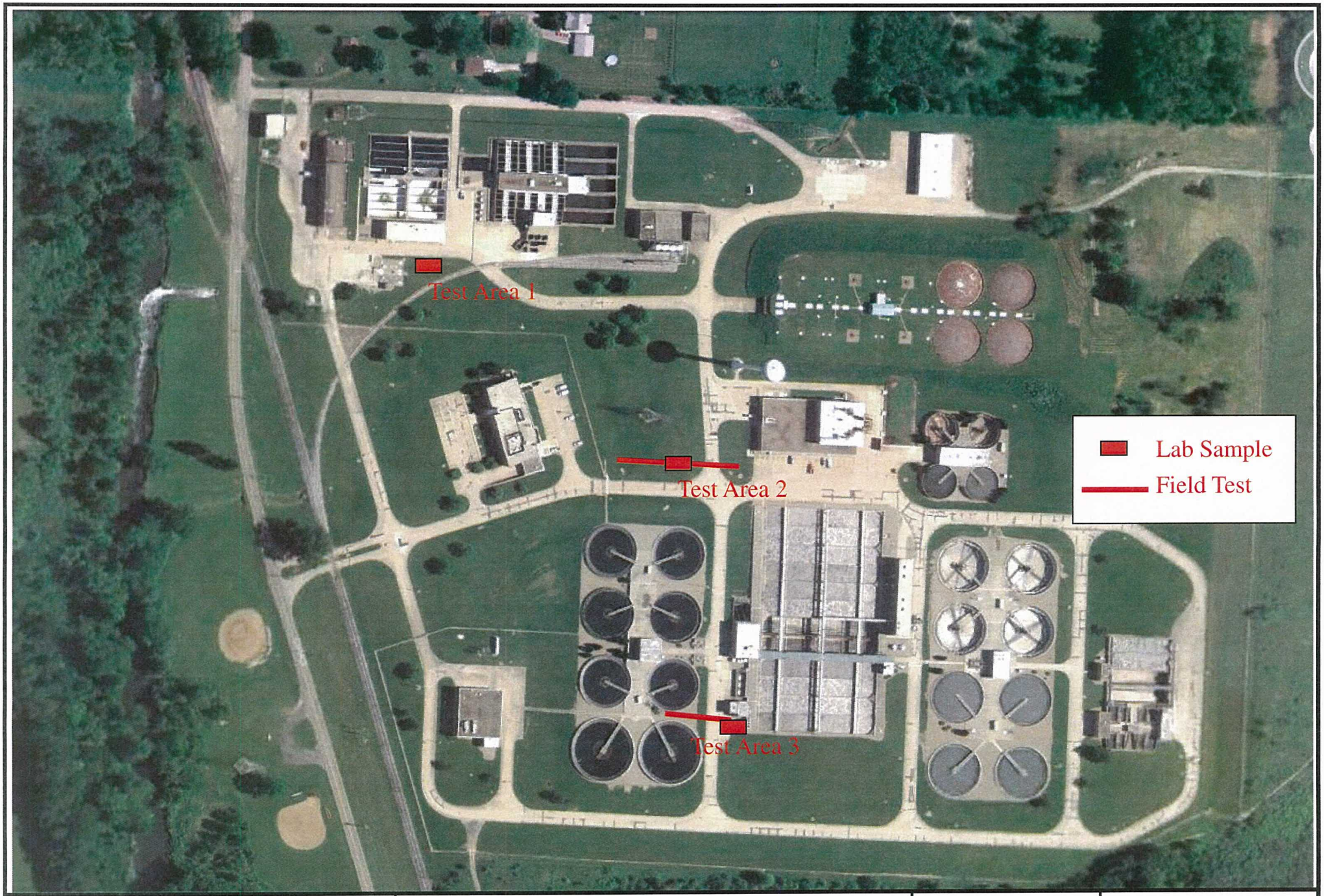
Respectfully submitted,
PROFESSIONAL SERVICE INDUSTRIES, INC.

Surya Thapa, P.E.
Project Manager

A. Veeramani, P.E.
District Manager

APPENDIX

Test Locations
Lab Test Results
Field Test Result



psi Information To Build On
Engineering • Consulting • Testing

Canton Water Reclamation Plant
3530 Central Ave.
Canton, Ohio

Drawn By: AC

Date: 6/13/12

Scale: NA

Test Location Plan

PSI Project No.:
0138-323

Instrument Mfg. AEMC

Model 4500

Serial # 10G33715

Technician: A. Croasmun

Client: CT Consultants, Inc.

Project Name: Canton Water Reclamation Plant

Test Location: Lab Testing

Address: 3530 Central Avenue, Canton, OH

Test Date: 6/7/2012

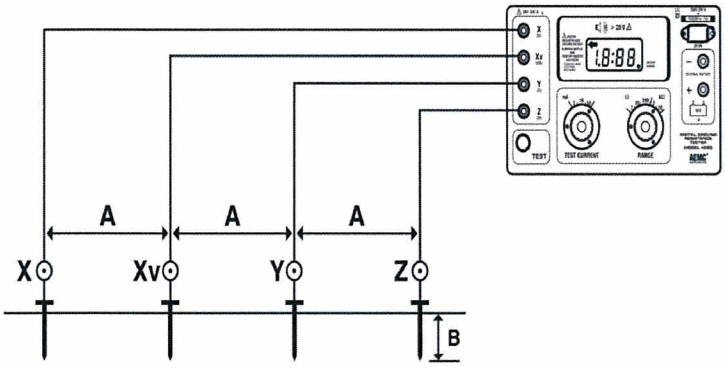
Calibration Date: 12/13/2011

psi Information To Build On
Engineering • Consulting • Testing

Test Conditions

Soil Condition: ☐ Saturated Temperature 75 °F

Soil Type:
- [x] Clay
- [ ] Granite
- [ ] Loam
- [ ] Limestone
- [ ] Shale
- [ ] Slate
- [x] Sand & Gravel
- [ ] Sandstone
- [ ] Other _____



Test Area	Soil Resistivity
1	Over 20,000 Ω
2	2,710 Ω
3	931 Ω

Lab sample collected in the field
at a depth of approximately 8'

Soil Resistivity Test
ASTM G-57

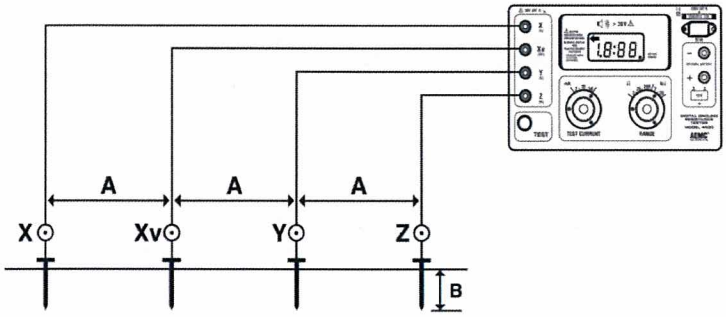
psi Information To Build On
Engineering • Consulting • Testing

Instrument Mfg.	AEMC	Client:	CT Consultants, Inc.		
Model	4500	Project Name:	Canton Water Reclamation Plant		
Serial #	10G33715	Test Location:	Test Area 2	Test Date:	6/7/2012
Technician:	A. Croasmun	Address:	3530 Central Avenue, Canton, OH	Calibration Date:	12/13/2011

Test Conditions

Soil Condition: [ ] Moist [x] Dry Temperature 78 °F

Soil Type: [x] Clay [ ] Limestone [x] Sand & Gravel [ ] Granite [ ] Shale [ ] Sandstone [ ] Loam [ ] Slate [ ] Other _____



rho calculation $\rho = 191.5AR$

Electrode depth (**B**) 0.5 ft

Electrode Spacing (A)	Test Reading	Soil Resistivity
90	0.890	15339.15
60	0.931	10697.19
50	0.624	5974.80
30	1.061	6095.45
20	1.596	6112.68
10	2.781	5325.62
5	12.270	11748.53
2	50.500	19341.50

Instrument Mfg. AEMC

Model 4500

Serial # 10G33715

Technician: A. Croasmun

Client: CT Consultants, Inc.

Project Name: Canton Water Reclamation Plant

Test Location: Test Area 3

Address: 3530 Central Avenue, Canton, OH

Test Date: 6/7/2012

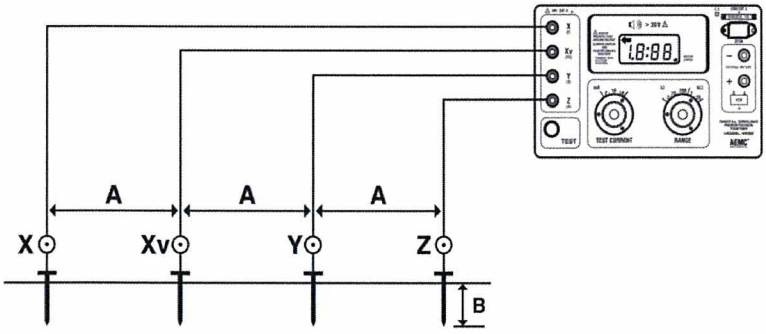
Calibration Date: 12/13/2011

psi Information To Build On
Engineering • Consulting • Testing

Test Conditions

Soil Condition: [ ] Moist [x] Dry Temperature 78 °F

Soil Type: [x] Clay [ ] Limestone [x] Sand & Gravel [ ] Granite [ ] Shale [ ] Sandstone [ ] Loam [ ] Slate [ ] Other _____



rho calculation **ρ = 191.5AR**

Electrode depth (**B**) 0.5 ft

Electrode Spacing (A)	Test Reading	Soil Resistivity
50	0.170	1627.75
30	0.505	2901.23
20	0.745	2853.35
10	1.737	3326.36
5	3.540	3389.55
2	7.770	2975.91

SECTION 08

ANALYTICAL REPORT FROM ALLOWAY (MUDWELL-CENTER WALL SAMPLE)

Alloway
Your Resource for Defensible Data

ANALYTICAL REPORT

Lab Project #	L12-10280
Received:	01/10/2012
Reported:	01/26/2012
Date/Time Sampled:	01/06/2012 08:25
Sampled By:	R/S
Sampled Matrix:	Solid
Containers:	3

Canton, City of
Attn: Kelly Berta
3530 Central Avenue SE
Canton, OH 44707

Project Name: **Tertiary Demolition - Project**

Sample ID: **Mudwell - Center Well**

Lab Sample # **L12-10280-01**

Analyte	Results	Units	PQL	Method	Analyst	Extraction Date	Analysis Date
Paint Filter	* pass	Y/N		SW-9095	KG		01/11/2012
Arsenic, TCLP	<0.50	mg/L	0.50	SW-6010	AB		01/23/2012
Barium, TCLP	0.28	mg/L	0.10	SW-6010	AB		01/23/2012
Cadmium, TCLP	<0.10	mg/L	0.10	SW-6010	AB		01/23/2012
Chromium, TCLP	<0.10	mg/L	0.10	SW-6010	AB		01/23/2012
Lead, TCLP	<0.10	mg/L	0.10	SW-6010	AB		01/23/2012
Selenium, TCLP	<0.50	mg/L	0.50	SW-6010	AB		01/23/2012
Silver, TCLP	<0.10	mg/L	0.10	SW-6010	AB		01/23/2012
Mercury, TCLP	<0.020	mg/L	0.020	SW-7471A	LW		01/18/2012
o-Cresol (2-methylphenol), TCLP	<0.50	mg/L	0.50	SW-8270C	LW	01/13/2012	01/16/2012
m&p-Cresol (3&4-methylphenol), TCLP	<1.00	mg/L	1.00	SW-8270C	LW	01/13/2012	01/16/2012
Pentachlorophenol, TCLP	<0.50	mg/L	0.50	SW-8270C	LW	01/13/2012	01/16/2012
2,4,5-Trichlorophenol, TCLP	<0.50	mg/L	0.50	SW-8270C	LW	01/13/2012	01/16/2012
2,4,6-Trichlorophenol, TCLP	<0.50	mg/L	0.50	SW-8270C	LW	01/13/2012	01/16/2012
2,4-Dinitrotoluene, TCLP	<0.10	mg/L	0.10	SW-8270C	LW	01/13/2012	01/16/2012
Hexachlorobutadiene, TCLP	<0.10	mg/L	0.10	SW-8270C	LW	01/13/2012	01/16/2012
Hexachlorobenzene, TCLP	<0.10	mg/L	0.10	SW-8270C	LW	01/13/2012	01/16/2012
Hexachloroethane, TCLP	<0.10	mg/L	0.10	SW-8270C	LW	01/13/2012	01/16/2012
Nitrobenzene, TCLP	<0.10	mg/L	0.10	SW-8270C	LW	01/13/2012	01/16/2012
Pyridine, TCLP	<1.00	mg/L	1.00	SW-8270C	LW	01/13/2012	01/16/2012
1,4-Dichlorobenzene, TCLP	<0.10	mg/L	0.10	SW-8270C	LW	01/13/2012	01/16/2012
(Surrogate) 2-Fluorophenol	58.2 (22.5-98.5)	%		SW-8270C	LW	01/13/2012	01/16/2012
(Surrogate) Phenol d6	56.4 (21.7-100.1)	%		SW-8270C	LW	01/13/2012	01/16/2012

Analysis Certified By: Radostaw Bolch

1101 N. Cole Street - Lima, Ohio 45805
419.223.1362 - Fax 419.227.3792
800.436.1243

508 Bissman Ct. - Mansfield, Ohio 44903
419.525.1644 - Fax 419.524.5575
800.635.3222

1776 Marion-Waldo Rd. - Marion, Ohio 43302
740.389.5991 - Fax 740.389.1481
800.873.2835

Alloway
Your Resource for Defensible Data

ANALYTICAL REPORT

Lab Project # L12-10280

Canton, City of
Attn: Kelly Berta
3530 Central Avenue SE
Canton, OH 44707

Received: 01/10/2012
Reported: 01/26/2012
Date/Time Sampled: 01/06/2012 08:25
Sampled By: R/S
Sampled Matrix: Solid
Containers: 3

Project Name: **Tertiary Demolition - Project**

Sample ID: **Mudwell - Center Well**
Lab Sample # **L12-10280-01**

Analyte	Results	Units	PQL	Method	Analyst	Extraction Date	Analysis Date
(Surrogate) Nitrobenzene d5	54.8 (6.3-125.0)	%		SW-8270C	LW	01/13/2012	01/16/2012
(Surrogate) 2-Fluorobiphenyl	60.6 (34.8-102.1)	%		SW-8270C	LW	01/13/2012	01/16/2012
(Surrogate) 2,4,6-Tribromophenol	42.3 (14.2-121.6)	%		SW-8270C	LW	01/13/2012	01/16/2012
(Surrogate) p-Terphenyl-d14	55.4 (37.2-96.0)	%		SW-8270C	LW	01/13/2012	01/16/2012
Benzene, TCLP	<0.05	mg/L	0.05	SW-8260B	MS		01/13/2012
Carbon Tetrachloride, TCLP	<0.05	mg/L	0.05	SW-8260B	MS		01/13/2012
Chlorobenzene, TCLP	<0.05	mg/L	0.05	SW-8260B	MS		01/13/2012
Chloroform, TCLP	<0.05	mg/L	0.05	SW-8260B	MS		01/13/2012
1,2-Dichloroethane, TCLP	<0.05	mg/L	0.05	SW-8260B	MS		01/13/2012
1,1-Dichloroethene, TCLP	<0.05	mg/L	0.05	SW-8260B	MS		01/13/2012
Methyl Ethyl Ketone (2-Butanone), TCLP	<1.00	mg/L	1.00	SW-8260B	MS		01/13/2012
Tetrachloroethene, TCLP	<0.05	mg/L	0.05	SW-8260B	MS		01/13/2012
Trichloroethene, TCLP	<0.05	mg/L	0.05	SW-8260B	MS		01/13/2012
Vinyl Chloride, TCLP	<0.05	mg/L	0.05	SW-8260B	MS		01/13/2012
(Surrogate) 1,2-Dichloroethane d4	88.9 (53.6-137.7)	%		SW-8260B	MS		01/13/2012
(Surrogate) Toluene d8	98.3 (69.7-120.9)	%		SW-8260B	MS		01/13/2012
(Surrogate) 4-Bromofluorobenzene	92.0 (31.3-173.6)	%		SW-8260B	MS		01/13/2012
TCLP extraction	*	Y/N		SW-1311	CAM		01/12/2012
Zero Headspace TCLP Extraction	*	Y/N		SW-1311	MS		01/12/2012

Analysis Certified By: Radostaw Poleh

SECTION 09

REPORT OF FINDINGS OF AN ASBESTOS SURVEY FROM HZW ENVIRONMENTAL CONSULTANTS, INC.

HzW ENVIRONMENTAL
CONSULTANTS, LLC

October 10, 2013

Mr. Craig Juday
CT Consultants, Inc.
8150 Sterling Court
Mentor, Ohio 44060

Subject: ***Report of Findings of an Asbestos Survey Conducted at Six (6) Structures Located at the City of Canton Water Pollution Control Center, 3530 Central Avenue, S.E., Canton, Stark County, Ohio (H13051-09)***

Dear Mr. Juday:

HzW Environmental Consultants, LLC (HzW) is pleased to submit this letter report which presents the findings of an asbestos survey conducted at six (6) structures located at the City of Canton Water Pollution Control Center, 3530 Central Avenue, S.E., Canton, Ohio, herein collectively referred to as the "subject structures". The purpose of conducting the asbestos survey at the subject structures was to identify building materials that contain asbestos prior to renovation and/or demolition activities being performed.

BACKGROUND

As indicated by the Client, CT Consultants Inc., four (4) of the six (6) structures are scheduled to be demolished. These four (4) structures consist of the following: Filter building, Filter Influent Pump building, Grit Building No. 1 and Grit Building No. 2. The remaining two (2) structures, the Administration building and Incinerator building, have specific areas that are being renovated. Based on the renovation and demolition activities that are to occur at the City of Canton Water Pollution Control Center, the Client requested HzW's assistance in determining if the building materials to be disturbed as a result of the renovation and/or demolition activities contain asbestos.

METHODS OF INVESTIGATION

During September 2013, a representative of HzW certified as an Asbestos Hazard Emergency Response Act (AHERA) building inspector and an Asbestos Hazard Evaluation Specialist (AHES), performed an asbestos survey at the subject structures. These certifications are required to be maintained by the inspector in accordance with the Asbestos School Hazard Abatement Reauthorization Act (ASHARA) and Ohio Department of Health (ODH) regulations.

The asbestos survey was conducted in accordance with the National Emissions Standard for Hazardous Air Pollutants (NESHAP). As indicated by NESHAP, prior to demolition or renovation activities being conducted, the affected facility or part of the facility where the demolition or renovation operations will occur must be thoroughly inspected for the presence of asbestos. Therefore, for those structures that were scheduled to be demolished, HzW surveyed the entire structure for asbestos-containing materials (ACMs). *An ACM is defined as a material that contains greater than one (1) percent asbestos.* For those structures where renovations were only occurring in a specific area of the structure, only suspect building materials that would be impacted by the renovation activities were evaluated.

NESHAP regulations do not require a specific survey protocol be followed; however, AHERA protocol is recommended. Therefore, the asbestos survey at the subject structures was conducted in accordance with AHERA protocol, which initially requires that all homogeneous areas of building materials located in a building and suspected of containing asbestos be identified. A homogeneous area is a building material/area that is uniform in texture, color, date of application, use or system and appears identical in every other respect. Once all homogeneous areas are identified, functional spaces in which these homogeneous areas exist are subsequently identified. Within each functional space, the AHERA category, condition, quantity, and location of each suspect material is determined.

AHERA classifies friable building materials into the following three (3) categories: surfacing materials, thermal system insulation (TSI) and miscellaneous materials. A friable building material is defined as a material that can be crumbled, pulverized, or reduced to powder by hand pressure. It should be noted that nonfriable building materials are often included by building inspectors under the miscellaneous materials category. Examples of surfacing materials include fireproofing and acoustical plaster. TSI can include, but is not limited to, the following: pipe lagging, pipe wrap, block insulation, batt insulation and mudded fitting insulation. Miscellaneous materials can include, but are not limited, to the following: ceiling tile, drywall and joint compound, floor tile and mastic, roofing materials and transite.

In determining the condition of the material the following guidelines are used:

General Damage Category	AHERA Damage Category	Criteria
Good	No Damage	No Damage
Fair	Damage	Up to 10% overall damage Up to 25% localized damage
Poor	Significant Damage	Over 10% overall damage Over 25% localized damage

The bulk sampling protocol is based on the AHERA category assigned to a specific homogeneous area and the quantity of that homogeneous area identified. For **surfacing materials**, if the size of the homogeneous sampling area is less than 1,000 square feet (ft^2), then a minimum of three (3) samples are collected. If the size of the homogeneous sampling area is between 1,000 and 5,000 ft^2, then a minimum of five (5) samples are collected. If the size of the homogeneous sampling area is greater than 5,000 ft^2, then a minimum of seven (7) samples are collected. HzW uses this sampling protocol for drywall systems and plaster systems.

For **TSI**, at least three (3) samples are collected from each homogeneous area with the following exceptions:

- One (1) sample will only be collected from a small section (less than six linear or square feet) of patched insulation,
- The number of samples taken from each area of insulating cement (mudded fittings such as fittings, tees, and valves) will be determined by the inspector. However, the current rule of thumb is generally accepted as three (3) samples, and
- Fibrous glass, foam glass, rubber and Styrofoam are not considered suspect materials, unless they potentially cover up an asbestos containing material.

Miscellaneous and Nonfriable materials are sampled in a manner sufficient as determined by the inspector. For friable miscellaneous materials, such as ceiling tiles, HzW collected a minimum of two (2) bulk samples from each homogeneous area identified.

The bulk samples collected were submitted to CA Labs, LLC (CA Labs) of Baton Rouge, Louisiana, for analysis of asbestos content by PLM using the Environmental Protection Agency (EPA) Method 600/R-93/116. Those ACMs identified by PLM as containing two (2) percent or less asbestos were subsequently analyzed by point count methodology.

FINDINGS

Based on the findings of the asbestos survey conducted at the subject structures, ACMs, assumed ACMs and/or a trace amount of asbestos were identified at each of the structures or portion of structure surveyed. HzW's Asbestos Bulk Sampling Information form which documents the bulk sampling locations and each sample's characterization (homogeneous area and functional space), AHERA category, quantity and condition, and asbestos content; the laboratory analytical report from CA Labs; and a site sketch documenting the bulk sampling locations for the Administration building are included as **Attachment 1**. HzW's Asbestos Bulk Sampling Information form; the laboratory analytical report from CA Labs; and a site sketch documenting the bulk sampling locations for the Filter building and Filter Influent Pump building are included as **Attachment 2**. HzW's Asbestos Bulk Sampling Information form; the laboratory analytical report from CA Labs; and a site sketch documenting the bulk sampling locations for Grit Building No. 1 and Grit Building No. 2 are included as **Attachment 3**. HzW's Asbestos Bulk Sampling Information form; the laboratory analytical report from CA Labs; and a site sketch documenting the bulk sampling locations for the Incinerator building are included as **Attachment 4**.

Based on the findings of the asbestos survey, the ACMs and assumed ACMs outlined below are required to be abated prior to demolition of the following structures:

Filter Building
- Cement Fiber Board

Filter Influent Pump Building
- Cement Fiber Board

Grit Building No. 1
- Cement Fiber Board

Grit Building No. 2
- Cement Fiber Board

Based on the findings of the asbestos survey, the ACMs and assumed ACMs outlined below are required to be abated prior to renovation activities being conducted at the following structure:

Incinerator Building
- Window Glazing
- Transite Duct Piping
- Vibration Cloth Connector

The quantities of ACMs and assumed ACMs, as presented on HzW's Asbestos Bulk Sampling Information forms, are approximate and represent the majority of accessible building materials that could be quantified during the survey.

DISCUSSION

OSHA's Asbestos Standard for the Construction Industry (29 CFR 1926.1101) **regulates** all renovation and demolition work involving building materials which contain any amount of asbestos. The amount of asbestos identified in a building material would determine which applicable sections of OSHA's Asbestos Standard must be implemented. Building owners and/or contractors who perform renovation and/or demolition activities which disturb building materials identified as containing less than or equal to one (1) percent asbestos are only required to be in compliance with paragraphs (g)(1), (g)(2) and (g)(3) of the Standard. These paragraphs describe the required engineering and work practice controls that must be implemented when building materials containing less than one (1) percent asbestos (built-up roof decking and tar coating on duct associated with the Administration building), are disturbed. A brief description of these paragraphs is included in **Attachment 5**. Building owners and/or contractors who perform renovation and/or demolition activities which disturb building materials identified as containing greater than one (1) percent asbestos, are required to be in compliance with all applicable sections of the Standard.

Unlike OSHA, the EPA under NESHAP regulates all renovation and demolition work involving building materials identified as containing greater than one (1) percent asbestos. Unlike OSHA, NESHAP regulates which ACMs must be removed prior to renovation and demolition activities being performed. The EPA defines three (3) classifications of building materials:

- Regulated ACM (RACM) – is defined as 1) a friable asbestos material, 2) a Category I Nonfriable ACM that has become friable, 3) a Category I Nonfriable ACM that will be or has been subjected to sanding, grinding, cutting or abrading, or 4) a Category II Nonfriable ACM that has a high probability of becoming or has become crumbled, pulverized, or reduced to powder by the forces expected to act on the material in the course of the demolition or renovation activities. All RACMs are **regulated** by NESHAP as long as their quantities meet or exceed 160 square feet or 260 linear feet.

- Category I Nonfriable ACM - is defined as asbestos-containing packings, gaskets, resilient floor covering, and asphalt roofing products containing more than 1 percent asbestos as determined using Polarized Light Microscopy (PLM) analysis.

- Category II Nonfriable ACM - is defined as any material, excluding Category I Nonfriable ACMs, containing more than 1 percent asbestos as determined using PLM analysis.

Several options for controlling asbestos are available. Control options fall into the following five (5) main categories:

Operations & Maintenance Program (O&M) – a program of training, cleaning, work practices and periodic surveillance to maintain friable ACM in good condition, ensure cleanup of asbestos fibers previously released, and prevent further release by minimizing and controlling friable ACM disturbance.

Repair – returning damaged ACM to an undamaged condition or to an intact state through limited replacement and patching.

Encapsulation – treating ACM with a liquid that, after proper application, surrounds or embeds asbestos fibers in an adhesive matrix to prevent fiber release. The material may be a penetrant, which adds cohesion by penetrating the asbestos material, or a bridging encapsulant, which covers the surface of the material with a protective coasting. Both are applied to the surface of the material using airless spray equipment at low pressure in order to reduce fiber release during applications.

Enclosure – an airtight (or as close to airtight as is possible to construct) barrier installed between the friable asbestos and the building environment. They are typically constructed by mechanical attachment or spray application (the latter is sometimes referred to as "encasement"). For example, materials such as PVC or corrugated metal may be fastened around insulated piping or a barrier may be constructed around asbestos fireproofing on structural members by spraying material which cures into a hard shell.

Removal – stripping ACM from its substrate – asbestos material is separated from the underlying surface, collected, and placed in containers for burial in an approved disposal site; or removing entire components containing ACM – i.e., abandoned piping systems with ACM insulation wrapped in polyethylene, labeled before disposal.

The advantages and disadvantages of each control option are described in **Attachment 6.**

RECOMMENDATIONS

Based on the findings of the asbestos survey conducted of the **structures that are to be demolished** (Filter, Filter Influent, Grit No. 1 and Grit No. 2 buildings), the following recommendations are presented for consideration:

1. Notify any outside contractor(s), prior to them working at the above referenced structures, of the presence of any building materials identified as containing or assumed to contain asbestos. Contractors disturbing the building materials identified as containing greater than one (1) percent asbestos or assumed to contain asbestos would be required to conduct their activities in accordance with all applicable sections of OSHA's Asbestos Standard for the Construction Industry as well as applicable EPA NESHAP and ODH regulations.

2. Prior to demolition activities occurring at these structures, contract with a State of Ohio licensed asbestos abatement contractor to abate those materials identified in **red** on HzW's Asbestos Bulk Sampling Information forms. The assumed Category I Nonfriable ACMs identified in good condition on HzW's Asbestos Bulk Sampling Information forms can remain within these structures during the demolition activities as long as the demolition activities do not cause the materials to become friable.

3. Submit the OEPA's "Notification of Demolition and Renovation" form to the OEPA ten (10) days prior to abatement activities that disturb 160 square feet or 260 linear feet of RACMs.

4. Submit the ODH "Prior Notification of Asbestos Hazard Abatement Project" form to the ODH ten (10) days prior to abatement activities, involving the disturbance of fifty (50) square feet or 50 linear feet of friable ACMs, being performed. ODH defines an asbestos hazard abatement activity as any activity involving the removal, renovation, enclosure, repair or encapsulation of reasonably related friable ACMs in an amount greater than 50 linear feet or 50 square feet.

5. If the concrete floor located in the office and locker room of the Filter building is to be recycled, then, in order for the concrete floor to be recycled, the asbestos-containing floor tile mastic must be abated first.

6. In addition, the OEPA Notification of Demolition and Renovation form must also be submitted to the OEPA ten (10) days prior to any demolition activities being performed.

7. As indicated in the OEPA's Notification of Demolition and Renovation form, Section XVII, ensure that an individual trained in the provisions of NESHAP is on site during any demolition activities. This individual would need to be certified by the ODH as an Asbestos Hazard Evaluation Specialist.

Based on the findings of the asbestos survey conducted in those portions of a **structure to be renovated**, specifically in the Administration building and Incinerator building, the following recommendations are presented for consideration:

1. Notify any outside contractor(s), prior to them working at these structures, of the presence of the building materials identified as containing and assumed to contain asbestos. Contractors who perform renovation activities which disturb building materials identified as containing less than or equal to one (1) percent asbestos are required, at a minimum, to be in compliance with paragraphs (g)(1), (g)(2) and (g)(3) of the Standard. Contractors disturbing the building materials identified as containing greater than one (1) percent asbestos or assumed to contain asbestos are required to conduct their activities in accordance with all applicable sections of OSHA's Asbestos Standard for the Construction Industry as well as applicable EPA NESHAP and ODH regulations.

2. The Client should select the control options most advantageous to his/her cause, based on future plans for these structures. However, prior to renovation activities which will disturb the ACMs and assumed ACMs identified in **red** on HzW's Asbestos Bulk Sampling Information form, contract with a State of Ohio licensed asbestos abatement contractor to abate these materials.

   The tar coating on the duct work of Air Handler No. 1 and the built-up roofing decking, both of which are located on the Administration building's roof, were identified as containing a trace amount of asbestos. These materials are not regulated by the OEPA but are still regulated by OSHA. Therefore, these materials, even though identified as containing less than one percent asbestos, should still be handled by a roofing contractor who has received a minimum of eight (8) hours of asbestos training which focused on roofing materials.

3. Submit the OEPA's "Notification of Demolition and Renovation" form to the OEPA ten (10) days prior to the renovation activities that disturb 160 square feet or 260 linear feet of RACMs.

4. Submit the ODH "Prior Notification of Asbestos Hazard Abatement Project" form to the ODH ten (10) days prior to abatement activities, involving the disturbance of fifty (50) square feet or 50 linear feet of friable ACMs, being performed.

5. If building materials identified as containing asbestos or assumed to contain asbestos are to remain in place at any of these structures, then develop and implement an O&M Program whereby these materials are properly managed in accordance with OSHA Asbestos Standard for the Construction Industry. *It should be noted that a comprehensive asbestos survey was not performed in these structures; therefore, additional ACMs may be present.*

HzW appreciates the opportunity you have given us to provide professional consulting services to CT Consultants, Inc. Should you have any questions regarding the information presented above, please do not hesitate to contact us.

Sincerely,

HzW ENVIRONMENTAL CONSULTANTS, LLC

Matthew P. Fergus
Asbestos Hazard Evaluation Specialist (ES33228)

Joan A. Sablar
Senior Industrial Hygienist

JAS:jas\js\H13051-09
Attachments
I:\2013\H13051-09\City of Canton Water Pollution Control Center Asbestos Report.doc

ATTACHMENT 1

<u>ADMINISTRATION BUILDING</u>

- **ASBESTOS BULK SAMPLING INFORMATION FORM**
- **CA LABS REPORT FOR BULK SAMPLES COLLECTED**
- **SITE SKETCH OF STRUCTURE**

CT Consultants, Inc.
Asbestos Survey – City of Canton Water Pollution Control Center
3530 Central Avenue, S.E., Canton, Stark County, Ohio
HzW Environmental Consultants, LLC – Project No. H13051-09
Asbestos Bulk Sampling Information Form

ADMINISTRATION BUILDING

HOMOGENEOUS					AHERA CATEGORY			QUANTITY & CONDITION			RESULT
ID	MATERIAL	LOCATION	VALIDATION FOR SAMPLING	BULK SAMPLE NO.	SUR.	TSI	MISC. F/NF	GOOD	FAIR	POOR	ASBESTOS %
A	Built-up Roof Decking	Roof	Minimum 3 Samples	01				8,835 sq.ft.			ND
				02							Trace
				03							ND
B	Asphaltic Roof Flashing	Roof	Minimum 3 Samples	04							ND
				05							ND
				06							ND
C	Tar Coating on Duct Work	Rooftop Air Handler No.1	Minimum 2 Samples	07				20 sq.ft.			Trace
				08							ND
D	Tar Coating on Duct Work	Rooftop Air Handler No.2	Minimum 2 Samples	09							ND
				10							ND
E	Tar Coating on Duct Work	Rooftop Air Handler No.3	Minimum 2 Samples	11							ND
				12							ND

Items in Red Font Need to be Abated Prior to Renovation/Demolition Activities being Performed
ND – No Asbestos Detected; NA = Not Analyzed

CA Labs
Dedicated to Quality

Crisp Analytical, L.L.C.
1929 Old Denton Road
Carrollton, TX 75006
Phone 972-242-2754
Fax 972-242-2798

CA Labs, L.L.C.
12232 Industriplex, Suite 32
Baton Rouge, LA 70809
Phone 225-751-5632
Fax 225-751-5634

Materials Characterization - Bulk Asbestos Analysis

Laboratory Analysis Report - Polarized Light

HzW Environmental Consultants
6105 Heisley Rd.
Mentor, OH 44060

Attn: Joan Sablar
Customer Project: Canton Water Reclamation Facility
Reference #: CBR13092798 Date: 9/19/2013

Analysis and Method

Summary of polarizing light microscopy (PLM / Stereomicroscopy bulk asbestos analysis) using the methods described in 40CFR Part 763 Appendix E to Subpart E (Interim and EPA 600 / R-93 / 116 (Improved). The sample is first viewed with the aid of stereomicroscopy. Numerous liquid slide preparations are created for analysis under the polarized microscope where identifications and quantifications are preformed. Calibrated liquid refractive oils are used as liquid mouting medium. These oils are used for identification (dispersion staining). A calibrated visual estimation is reported, should any asbestiform mineral be present. Other techniques such as acid washing are used in conjugation with refractive oils for detection of smaller quantities of asbestos. All asbestos percentages are based on calibrated visual estimation traceable to NIST standards for regulated of asbestos. Traceability to measurement and calibration is achieved by using known amounts and types of asbestos from standards where analyst and laboratory accuracy are measured. As little as 0.001% asbestos can be detected in favorable samples, while detection in unfavorable samples may approach the

Discussion

Vermiculite containing samples may have trace amounts of actinolite-tremolite, where not found be PLM should be analyzed using TEM methods and / or water separation techniques. Suspected actinolite/vermiculite presence will be indicated through the sample comment section of this report.

Fibrous talc containing samples may even contain a related asbestos fiber known as anthophyllite. Under certain conditions the same fiber may actually contain both talc and anthophyllite (a phenomenon called intergrowth). Again, TEM detection methods are recommended. CA Labs PLM report comments will denote suspected amounts of asbestiform anthophyllite with talc, where further analysis is recommended.

Some samples (floor tiles, surfacings, etc.) may contain fibers too small to be delectable by PLM analysis and should be analyzed by TEM bulk protocols.

A "trace asbestos" will be reported if the analyst observes far less than 1% asbestos. CA Labs defines "trace asbestos" as a few fibers detected by the analyst in several preparations and will indicate as such under these circumstances.

Quantification of <1% will actually be reported as <=1% (allowable variance close to 1% is high). Such results are ideal for point counting, and the technique is mandatory for friable samples (NESHAP, Nov. 1990 and clarification letter 8 May 1991) under 1% percent asbestos and the "trace asbestos". **In order to make all initial PLM reports issued from CA Labs NESHAP compliant, all <1% asbestos results (except floor tiles) will be point counted at no additional charge.**

Qualifications

CA Labs is accredited by the National Voluntary Accreditation Program (NVLAP) for selected test methods for airborne fiber analysis (TEM), and for bulk asbestos fiber analysis (PLM). All analysts have a college degree in a natural science (geology, biology, or environmental science) or are recognized by a state professional board in one these disciplines .Extensive in-house training programs are used to augment education background of the analyst. The group leader of polarized light has received supplemental McCrone Research training for asbestos identification. This report is not covered by the scope of AIHA accreditation. Analysis performed at CA Labs, LLC 12232 Industriplex, Suite 32 Baton Rouge, LA 70809.

Baton Rouge NVLAP Lab Code 200772-0 TEM/PLM *TDH 30-0370*
LDEQ

CA Labs
Dedicated to Quality

Crisp Analytical, L.L.C.
1929 Old Denton Road
Carrollton, TX 75006
Phone 972-242-2754
Fax 972-242-2798

CA Labs, L.L.C.
12232 Industriplex, Suite 32
Baton Rouge, LA 70809
Phone 225-751-5632
Fax 225-751-5634

Overview of Project Sample Material Containing Asbestos

Customer Project: Canton Water Reclamation Facility **CA Labs Project #:** CBR13092798

Sample #	Layer #	Analysts Physical Description of Subsample	Asbestos type / calibrated visual estimate percent	List of Affected Building Material Types
02	*1-1*	*black roofing material*	***<1% Chrysotile***	***black roofing material*** ***black roofing material with silver backir***
07	*1-1*	*black roofing material with silver backing*	***<1% Chrysotile***	

Baton Rouge NVLAP Lab Code 200772-0 TEM/PLM *TDH 30-0370*
LDEQ

Glossary of abbreviations (non-asbestos fibers and non-fibrous minerals):

ca - carbonate
gypsum - gypsum
bi - binder
or - organic
ma - matrix
mi - mica
ve - vermiculite
ot - other
pe - perlite
qu - quartz
fg - fiberglass
mw - mineral wool
wo - wollastinite
ta - talc
sy - synthetic
ce - cellulose
br - brucite
ka - kaolin (clay)
pa - palygorskite (clay)

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Polarized Light Asbestiform Materials Characterization

Customer Info: **Attn:** Joan Sablar
HzW Environmental Consultants
6105 Heisley Rd.
Mentor, OH 44060

Phone # 440-357-1260
Fax # 440-357-1510

Customer Project:
Canton Water Reclamation Facility
Turnaround Time:
5 days

CA Labs Project #:
CBR13092798

Date: 9/19/2013
Samples Received: 9/13/2013
Date Of Sampling: N/A
Purchase Order #:

Sample #	Comment	Layer #	Analysts Physical Description of Subsample	Homogeneous (Y/N)	Asbestos type / calibrated visual estimate percent	Non-asbestos fiber type / percent	Non-fibrous type / percent
01		*1-1*	*black roofing material*	*n*	***None Detected***	6% fg	94% qu,bi
02		*1-1*	*black roofing material*	*n*	***<1% Chrysotile***	4% fg 6% ce	90% qu,bi
03		*1-1*	*black roofing material*	*n*	***None Detected***	6% fg	94% qu,bi
04		*1-1*	*black roofing material*	*n*	***None Detected***		100% qu,bi
05		*1-1*	*black roofing material*	*n*	***None Detected***	8% fg	92% qu,bi
06		*1-1*	*black roofing material*	*n*	***None Detected***	8% fg	92% qu,bi
07		*1-1*	*black roofing material with silver backing*	*n*	***<1% Chrysotile***	3% fg	97% qu,bi

Baton Rouge NVLAP Lab Code 200772-0 TEM/PLM *TDH 30-0370*

LDEQ

Analysis Method: Interim (40CFR Part 763 Appendix E to Subpart E) / Improved (EPA-600 / R-93/116)
Preparation Method: HCL acid washing for carbonate based samples, chemical reduction for organically bound components, oil immersion for identification of asbestos types by dispersion attaining / becke line method.

ca - carbonate	mi - mica	fg - fiberglass	ce - cellulose
gypsum - gypsum	ve - vermiculite	mw - mineral wool	br - brucite
bi - binder	ot -other	wo - wollastinite	ka - kaolin (clay)
or - organic	pe - perlite	ta - talc	pa - palygorskite (clay)
ma - matrix	qu - quartz	sy - synthetic	

Approved Signatories:

Kelvin York
Analyst

Senior Analyst
Alicia Stretz

Laboratory Director
Chris Williams

1. Fire Damage significant fiber damage - reported percentages reflect unaltered fibers
2. Fire Damage no significant fiber damages effecting fibrous percentages
3. Actinolite in association with Vermiculite
4. Layer not analyzed - attached to previous positive layer and contamination is suspected
5. Not enough sample to analyze
6. Anthophyllite in association with Fibrous Talc
7. Contamination suspected from other building materials
8. Favorable scenario for water separation on vermiculite for possible analysis by another method
9. < 1% Result point counted positive
10 TEM analysis suggested

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CA Labs, L.L.C.
12232 Industriplex, Suite 32
Baton Rouge, LA 70809
Phone 225-751-5632
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Polarized Light Asbestiform Materials Characterization

Customer Info: **Attn:** Joan Sablar
HzW Environmental Consultants
6105 Heisley Rd.
Mentor, OH 44060

Phone # 440-357-1260
Fax # 440-357-1510

Customer Project:
Canton Water Reclamation Facility
Turnaround Time:
5 days

CA Labs Project #:
CBR13092798

Date: 9/19/2013
Samples Received: 9/13/2013
Date Of Sampling: N/A
Purchase Order #:

Sample #	Comment	Layer #	Analysts Physical Description of Subsample	Homogeneous (Y/N)	Asbestos type / calibrated visual estimate percent	Non-asbestos fiber type / percent	Non-fibrous type / percent
08		1-1	*black roofing material with silver backing*	n	***None Detected***	5% fg	95% qu,bi
09		1-1	*black tar with gray backing*	n	***None Detected***	4% ce 10% fg	86% qu,bi
10		1-1	*black tar with gray backing*	n	***None Detected***	4% ce 10% fg	86% qu,bi
11		1-1	*black tar with gray backing*	n	***None Detected***	4% ce 10% fg	86% qu,bi
12		1-1	*black tar with gray backing*	n	***None Detected***	4% ce 10% fg	86% qu,bi

Baton Rouge NVLAP Lab Code 200772-0 TEM/PLM *TDH 30-0370*

LDEQ

Analysis Method: Interim (40CFR Part 763 Appendix E to Subpart E) / Improved (EPA-600 / R-93/116)
Preparation Method: HCL acid washing for carbonate based samples, chemical reduction for organically bound components, oil immersion for identification of asbestos types by dispersion attaining / becke line method.

ca - carbonate	mi - mica	fg - fiberglass	ce - cellulose
gypsum - gypsum	ve - vermiculite	mw - mineral wool	br - brucite
bi - binder	ot -other	wo - wollastinite	ka - kaolin (clay)
or - organic	pe - perlite	ta - talc	pa - palygorskite (clay)
ma - matrix	qu - quartz	sy - synthetic	

Approved Signatories:

Kelvin York
Analyst

Senior Analyst
Alicia Stretz

Laboratory Director
Chris Williams

1. Fire Damage significant fiber damage - reported percentages reflect unaltered fibers
2. Fire Damage no significant fiber damages effecting fibrous percentages
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7. Contamination suspected from other building materials
8. Favorable scenario for water separation on vermiculite for possible analysis by another method
9. < 1% Result point counted positive
10. TEM analysis suggested

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Polarized Light Asbestiform Materials Point Count

Laboratory Analysis Report - Point Count

Analysis and Method

Point counting was performed on a polarized light microscope with a calibrated reticle according to the revised NESHAP method of November 20, 1990 (Federal Register, V.55, N.224, 11/20/90). Origional asbestos content of bulk materials was determined using procedures outlined in the interim method (40 CFR part 763, Appendix E to subpart E) and AHERA method (EPA-600/R-93/116). Samples were prepared using HCL acid washing for carbonate based samples, chemical reduction for organically bound components, oil immersion for identification of asbestos types by dispersion staining / becke line method.

Qualifications

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Customer Info: **Attn:** Joan Sablar
HzW Environmental Consultants
6105 Heisley Rd.
Mentor, OH 44060

Phone # 440-357-1260
Fax # 440-357-1510

Customer Project:
Canton Water Reclamation Facility

Turnaround Time:
5 days

CA Labs Project #:
CBR13092798

Date: 9/19/2013
Samples Received: 9/13/2013
Date Of Sampling: N/A
Purchase Order #:

Sample #	Layer #	Analysts Physical Description of Subsample	Homo-geneous (Y/N)	Point Counted % / Asbestos Type
02	1	*black roofing material*	*n*	***Trace Chrysotile***
07	1	*black roofing material with silver backing*	*n*	***Trace Chrysotile***

Baton Rouge NVLAP Lab Code 200772-0 TEM/PLM *TDH 30-0370*

LDEQ

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Approved Signatories:

Kelvin York
Analyst

Senior Analyst
Alicia Stretz

Laboratory Director
Chris Williams

CA Labs

C.A. Labs, LLC.
12232 Industriplex
Suite 32
Baton Rouge, LA 70809

Phone: 225-751-5632
Fax: 225-751-5634
Mobile: 225-993-3471

Chain of Custody

CBR13092798

Client Name: HZW ENVIRONMENTAL CONSULTANTS, LLC.

CA Labs job # CBR

Client Address: 6105 HEISLEY RD MENTOR, OH 44060

Billing Address: (if different)

phone number: (440) 357-1260

fax number: (440) 357-1510

Send Reports to: JSablar@hzwenv.com

Project Number:

Project Name: CANTON WATER RECLAMATION FACILITY

Contact: JOAN SABLAR

Reports Results VIA: EMAIL ✓ FAX ___ VERBAL ___

Total # Samples Submitted:	Total # Samples to be Analyzed:	Material Matrix:
12		Air / Bulk / Water

Asbestos: *please call ahead for availability of all rush and/or after hours samples.*

TEM	TA Time	PLM	TA Time	Optical / IAQ	TA Time
Circle analysis and TA time		*Circle analysis and TA time*	*2 hour*	Allergen Particle:	*2 hour*
AHERA	*4 hour*	Improved	4 hour	tape/bulk/swab	4 hour
EPA Level II	8 hour	Interim	8 hour	Cyclex-d cassettes	8 hour
Drinking Water	16 hour		16 hour	Air-o-cell cassettes	16 hour
Wipe	24 hour	AHERA	24 hour	Anderson cultures	24 hour
Micro-vac	2 days		2 days	Bulk/swab cultures	2 days
NIOSH 7402	3 days	Point Count -	3 days	Bacteria cultures	3 days
Chatfield Bulk	5 days	(NESHAPS)	5 days	PCM: NIOSH 7400	5-10 days

Lead: *Circle analysis and TA time*

Matrix:	Paint Chips	Soil	Air	Wipes	Wastewater	TCLP
TA Time:	*8 hour*	1 day	2 days	3 days	5 days	6-10 days

Sample Information:

Sample Number:	Sample Location:	Sample Date/Time:	Sample Volume (L)
01	ROOF DECKING		
02			
03			

Custody Information:

Samples relinquished: [illegible] 9/12/13 — Signature / Date / Time

Samples received: [illegible] 9/13/13 11am — Signature / Date / Time

Samples relinquished: — Signature / Date / Time

Samples received: — Signature / Date / Time

* STOP AT FIRST POSITIVE PER GROUP
* POINT COUNT AT 2% OR LESS

CA Labs

12232 Industriplex
Suite 32
Baton Rouge, LA 70809

Phone: 225-751-5632
Fax: 225-751-5634
After hours Mobile: 225-993-3471

CBR13092798

Client Name: HZW ENVIRONMENTAL
CA Labs job #: CBR
Client Address: 6105 WHEELER ROAD
MENTOR, OH 44060
Billing Address:
(if different)
phone number: (440) 357-1260
fax number: (440) 357-1510
Send Reports to: JOAN SABLAK
Project Number:
Project Name: CANTON WATER RECLAMATION FACILITY
Contact: JOAN SABLAK
Reports Results VIA: EMAIL ✓ FAX ___ VERBAL ___

Sample Number:	Sample Location:	Sample Date/Time:	Sample Volume (L)
04	RUST-FLOTATION		
05			
06			
07	TAR COATING		
08			
09	TAR COATING		
10			
11	TAR COATING		
12			

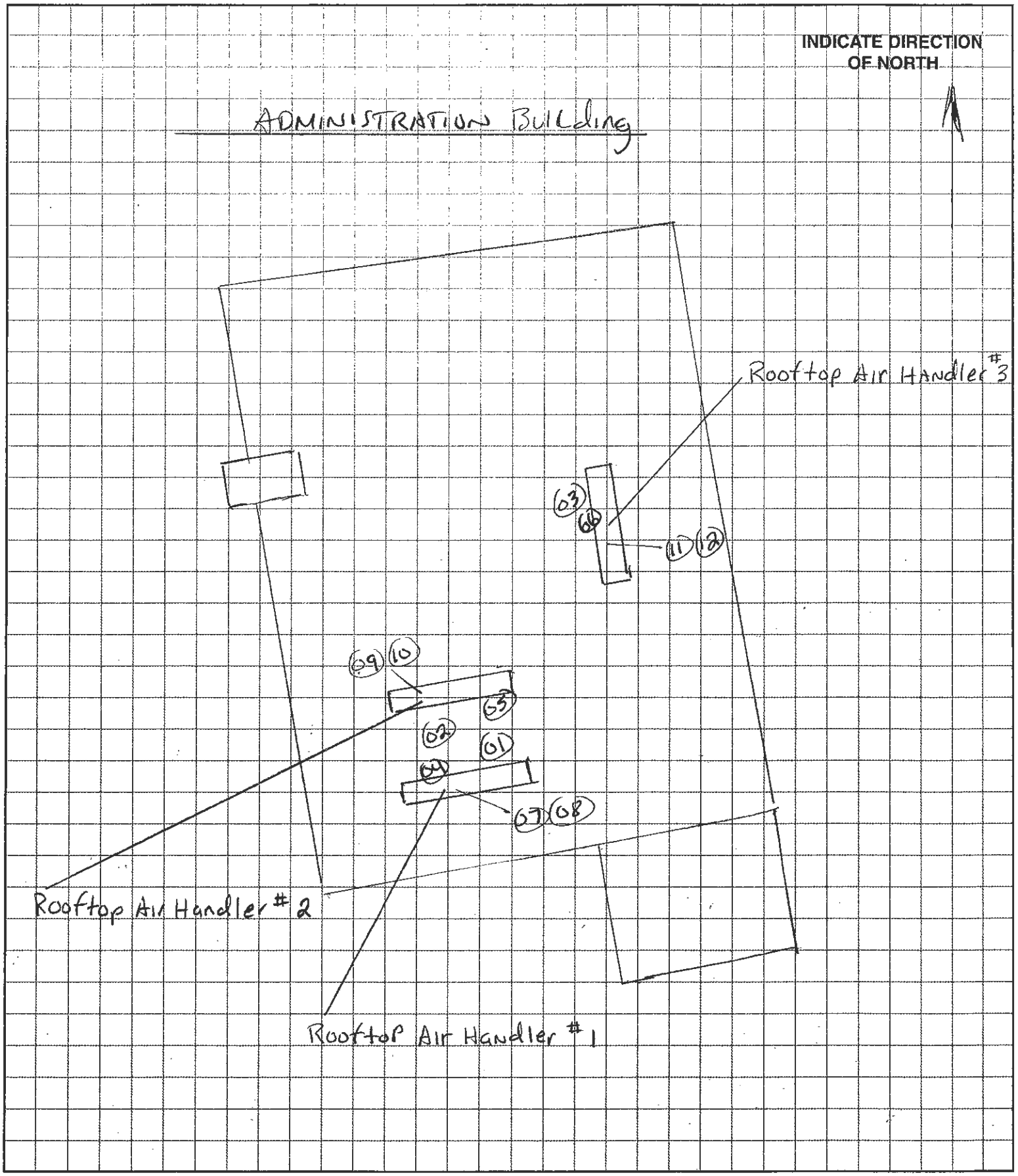
For internal use:
Any initial changes regarding project (indicate yes by checking line)_____

Custody Information:
Samples relinquished: _____ Signature / Date / Time
Samples received: [signature] 9/13/13 11am Signature / Date / Time
Samples relinquished: _____ Signature / Date / Time
Samples received: _____ Signature / Date / Time

HZW ENVIRONMENTAL
CONSULTANTS, LLC

6105 Heisley Road, Mentor, Ohio 44060
phone 440-357-1260 • 800-804-8484
fax 440-357-1510
A WOMAN-OWNED BUSINESS ENTERPRISE

PROJECT City of Canton Water Pollution Control Center
PROJECT NO. 11305-09
PAGE NO. 1 OF 1
FIELD REPRESENTATIVE MJTC DATE 9/12/13
SCALE



ATTACHMENT 2

FILTER AND FILTER INFLUENT PUMP BUILDINGS

- **ASBESTOS BULK SAMPLING INFORMATION FORMS**
- **CA LABS REPORTS FOR BULK SAMPLES COLLECTED**
- **SITE SKETCHES OF STRUCTURES**

CT Consultants, Inc.
Asbestos Survey – City of Canton Water Pollution Control Center
3530 Central Avenue, S.E., Canton, Stark County, Ohio
HzW Environmental Consultants, LLC – Project No. H13051-09
Asbestos Bulk Sampling Information Form

FILTER BUILDING

HOMOGENEOUS					AHERA CATEGORY			QUANTITY & CONDITION			RESULT
ID	MATERIAL	LOCATION	VALIDATION FOR SAMPLING	BULK SAMPLE NO.	SUR.	TSI	MISC. F/NF	GOOD	FAIR	POOR	ASBESTOS %
A	Ceiling Tile – 2-foot by 4-foot, Pin Holes With Indents	Office	Minimum 2 Samples	01							ND
				02							ND ND
B	Floor Tile – 12–inch by 12–inch White With Blue Specks, Mastic	Office and Locker Room	Minimum 2 Samples	03			X	480 sq.ft.			ND 3
				04							ND NA
C	Window Caulking	Interior, Exterior	Minimum 2 Samples	05							ND
				06							ND
D	Ceiling Tile – 2-foot by 4-foot, Pin Holes With Large Holes	Locker Room	Minimum 2 Samples	07							ND ND
				08							ND ND
E	Cement Fiber Board	Exterior	Minimum 2 Samples	09			X	162 sq.ft.			20
				10							NA
F	Built-up Roof Decking	Roof	Category I Nonfriable in Good Condition, Not Sampled				X	4,257 sq.ft.			Assumed
G	Asphaltic Roof Flashing	Roof	Category I Nonfriable in Good Condition, Not Sampled				X	972 sq.ft.			Assumed

Items in Red Font Need to be Abated Prior to Renovation/Demolition Activities being Performed
ND = No Asbestos Detected; NA = Not Analyzed

CT Consultants, Inc.
Asbestos Survey – City of Canton Water Pollution Control Center
3530 Central Avenue, S.E., Canton, Stark County, Ohio
HzW Environmental Consultants, LLC – Project No. H13051-09
Asbestos Bulk Sampling Information Form

FILTER INFLUENT PUMP BUILDING

HOMOGENEOUS					AHERA CATEGORY			QUANTITY & CONDITION			RESULT
ID	MATERIAL	LOCATION	VALIDATION FOR SAMPLING	BULK SAMPLE NO.	SUR.	TSI	MISC. F/NF	GOOD	FAIR	POOR	ASBESTOS %
A	Cement Fiber Board	Exterior	Category II Nonfriable in Good Condition, Not Sampled				X	70 sq.ft.			Assumed
B	Built-up Roof Decking	Roof	Category I Nonfriable in Good Condition, Not Sampled				X	1,161 sq.ft.			Assumed
C	Asphaltic Roof Flashing	Roof	Category I Nonfriable in Good Condition, Not Sampled				X	420 sq.ft.			Assumed

Items in Red Font Need to be Abated Prior to Renovation/Demolition Activities being Performed
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Baton Rouge, LA 70809
Phone 225-751-5632
Fax 225-751-5634

Materials Characterization - Bulk Asbestos Analysis

Laboratory Analysis Report - Polarized Light

HzW Environmental Consultants
6105 Heisley Rd.
Mentor, OH 44060

Attn: Joan Sablar
Customer Project: Canton Water Reclamation Facility Filter Bldg.
Reference #: CBR13092871 Date: 9/23/2013

Analysis and Method

Summary of polarizing light microscopy (PLM / Stereomicroscopy bulk asbestos analysis) using the methods described in 40CFR Part 763 Appendix E to Subpart E (Interim and EPA 600 / R-93 / 116 (Improved). The sample is first viewed with the aid of stereomicroscopy. Numerous liquid slide preparations are created for analysis under the polarized microscope where identifications and quantifications are preformed. Calibrated liquid refractive oils are used as liquid mouting medium. These oils are used for identification (dispersion staining). A calibrated visual estimation is reported, should any asbestiform mineral be present. Other techniques such as acid washing are used in conjugation with refractive oils for detection of smaller quantities of asbestos. All asbestos percentages are based on calibrated visual estimation traceable to NIST standards for regulated of asbestos. Traceability to measurement and calibration is achieved by using known amounts and types of asbestos from standards where analyst and laboratory accuracy are measured. As little as 0.001% asbestos can be detected in favorable samples, while detection in unfavorable samples may approach the

Discussion

Vermiculite containing samples may have trace amounts of actinolite-tremolite, where not found be PLM should be analyzed using TEM methods and / or water separation techniques. Suspected actinolite/vermiculite presence will be indicated through the sample comment section of this report.

Fibrous talc containing samples may even contain a related asbestos fiber known as anthophyllite. Under certain conditions the same fiber may actually contain both talc and anthophyllite (a phenomenon called intergrowth). Again, TEM detection methods are recommended. CA Labs PLM report comments will denote suspected amounts of asbestiform anthophyllite with talc, where further analysis is recommended.

Some samples (floor tiles, surfacings, etc.) may contain fibers too small to be delectable by PLM analysis and should be analyzed by TEM bulk protocols.

A "trace asbestos" will be reported if the analyst observes far less than 1% asbestos. CA Labs defines "trace asbestos" as a few fibers detected by the analyst in several preparations and will indicate as such under these circumstances.

Quantification of <1% will actually be reported as <=1% (allowable variance close to 1% is high). Such results are ideal for point counting, and the technique is mandatory for friable samples (NESHAP, Nov. 1990 and clarification letter 8 May 1991) under 1% percent asbestos and the "trace asbestos". **In order to make all initial PLM reports issued from CA Labs NESHAP compliant, all <1% asbestos results (except floor tiles) will be point counted at no additional charge.**

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CA Labs, L.L.C.
12232 Industriplex, Suite 32
Baton Rouge, LA 70809
Phone 225-751-5632
Fax 225-751-5634

Overview of Project Sample Material Containing Asbestos

Customer Project: Canton Water Reclamation Facility Filter Bldg. **CA Labs Project #:** CBR13092871

Sample #	Layer #	Analysts Physical Description of Subsample	Asbestos type / calibrated visual estimate percent	List of Affected Building Material Types
03	*1-2*	*black mastic*	***3% Chrysotile***	***black mastic*** ***gray transite***
09	*1-1*	*gray transite*	***20% Chrysotile***	

Baton Rouge NVLAP Lab Code 200772-0 TEM/PLM *TDH 30-0370*
LDEQ

Glossary of abbreviations (non-asbestos fibers and non-fibrous minerals):

ca - carbonate
gypsum - gypsum
bi - binder
or - organic
ma - matrix
mi - mica
ve - vermiculite
ot - other
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mw - mineral wool
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ta - talc
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Polarized Light Asbestiform Materials Characterization

Customer Info: **Attn:** Joan Sablar
HzW Environmental Consultants
6105 Heisley Rd.
Mentor, OH 44060

Phone # 440-357-1260
Fax # 440-357-1510

Customer Project:
Canton Water Reclamation Facility
Filter Bldg.
Turnaround Time:
5 days

CA Labs Project #:
CBR13092871

Date: 9/23/2013
Samples Received: 9/18/2013
Date Of Sampling: N/A
Purchase Order #:

Sample #	Comment	Layer #	Analysts Physical Description of Subsample	Homogeneous (Y/N)	Asbestos type / calibrated visual estimate percent	Non-asbestos fiber type / percent	Non-fibrous type / percent
01		*1-1*	*tan ceiling tile*	*y*	***None Detected***	30% fg 70% ce	
02		*1-1*	*white surfacing*	*y*	***None Detected***		100% ca,bi
		1-2	*tan ceiling tile*	*y*	***None Detected***	30% fg 70% ce	
03		*1-1*	*white floor tile*	*y*	***None Detected***		100% qu,ca
		1-2	*black mastic*	*y*	***3% Chrysotile***		97% gy,bi
04		*1-1*	*white floor tile*	*y*	***None Detected***		100% qu,ca
		1-2	*black mastic*	*y*	*positive stop*		

Baton Rouge NVLAP Lab Code 200772-0 TEM/PLM *TDH 30-0370*

LDEQ

Analysis Method: Interim (40CFR Part 763 Appendix E to Subpart E) / Improved (EPA-600 / R-93/116)
Preparation Method: HCL acid washing for carbonate based samples, chemical reduction for organically bound components, oil immersion for identification of asbestos types by dispersion attaining / becke line method.

ca - carbonate	mi - mica	fg - fiberglass	ce - cellulose
gypsum - gypsum	ve - vermiculite	mw - mineral wool	br - brucite
bi - binder	ot -other	wo - wollastinite	ka - kaolin (clay)
or - organic	pe - perlite	ta - talc	pa - palygorskite (clay)
ma - matrix	qu - quartz	sy - synthetic	

Approved Signatories:

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Analyst

Senior Analyst
Alicia Stretz

Laboratory Director
Chris Williams

1. Fire Damage significant fiber damage - reported percentages reflect unaltered fibers
2. Fire Damage no significant fiber damages effecting fibrous percentages
3. Actinolite in association with Vermiculite
4. Layer not analyzed - attached to previous positive layer and contamination is suspected
5. Not enough sample to analyze
6. Anthophyllite in association with Fibrous Talc
7. Contamination suspected from other building materials
8. Favorable scenario for water separation on vermiculite for possible analysis by another method
9. < 1% Result point counted positive
10. TEM analysis suggested

CA Labs
Dedicated to Quality

Crisp Analytical, L.L.C.
1929 Old Denton Road
Carrollton, TX 75006
Phone 972-242-2754
Fax 972-242-2798

CA Labs, L.L.C.
12232 Industriplex, Suite 32
Baton Rouge, LA 70809
Phone 225-751-5632
Fax 225-751-5634

Polarized Light Asbestiform Materials Characterization

Customer Info: **Attn:** Joan Sablar
HzW Environmental Consultants
6105 Heisley Rd.
Mentor, OH 44060

Phone # 440-357-1260
Fax # 440-357-1510

Customer Project:
Canton Water Reclamation Facility
Filter Bldg.
Turnaround Time:
5 days

CA Labs Project #:
CBR13092871

Date: 9/23/2013
Samples Received: 9/18/2013
Date Of Sampling: N/A
Purchase Order #:

Sample #	Comment	Layer #	Analysts Physical Description of Subsample	Homogeneous (Y/N)	Asbestos type / calibrated visual estimate percent	Non-asbestos fiber type / percent	Non-fibrous type / percent
05		*1-1*	*tan sealant*	*y*	***None Detected***	2% ce	98% qu,ca,bi
06		*1-1*	*tan sealant*	*y*	***None Detected***	2% ce	98% qu,ca,bi
07		*1-1*	*white surfacing*	*y*	***None Detected***		100% ca,bi
		1-2	*gray ceiling tile*	*y*	***None Detected***	80% fg	20% qu,ca
08		*1-1*	*white surfacing*	*y*	***None Detected***		100% ca,bi
		1-2	*gray ceiling tile*	*y*	***None Detected***	80% fg	20% qu,ca
09		*1-1*	*gray transite*	*y*	***20% Chrysotile***		80% qu,ma,ca

Baton Rouge NVLAP Lab Code 200772-0 TEM/PLM *TDH 30-0370*

LDEQ

Analysis Method: Interim (40CFR Part 763 Appendix E to Subpart E) / Improved (EPA-600 / R-93/116)
Preparation Method: HCL acid washing for carbonate based samples, chemical reduction for organically bound components, oil immersion for identification of asbestos types by dispersion attaining / becke line method.

ca - carbonate	mi - mica	fg - fiberglass	ce - cellulose
gypsum - gypsum	ve - vermiculite	mw - mineral wool	br - brucite
bi - binder	ot -other	wo - wollastinite	ka - kaolin (clay)
or - organic	pe - perlite	ta - talc	pa - palygorskite (clay)
ma - matrix	qu - quartz	sy - synthetic	

Approved Signatories:

Chris Williams
Analyst

Senior Analyst
Alicia Stretz

Laboratory Director
Chris Williams

1. Fire Damage significant fiber damage - reported percentages reflect unaltered fibers
2. Fire Damage no significant fiber damages effecting fibrous percentages
3. Actinolite in association with Vermiculite
4. Layer not analyzed - attached to previous positive layer and contamination is suspected
5. Not enough sample to analyze
6. Anthophyllite in association with Fibrous Talc
7. Contamination suspected from other building materials
8. Favorable scenario for water separation on vermiculite for possible analysis by another method
9. < 1% Result point counted positive
10. TEM analysis suggested

CA Labs
Dedicated to Quality

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1929 Old Denton Road
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Phone 972-242-2754
Fax 972-242-2798

CA Labs, L.L.C.
12232 Industriplex, Suite 32
Baton Rouge, LA 70809
Phone 225-751-5632
Fax 225-751-5634

Polarized Light Asbestiform Materials Characterization

Customer Info: **Attn:** Joan Sablar
HzW Environmental Consultants
6105 Heisley Rd.
Mentor, OH 44060

Phone # 440-357-1260
Fax # 440-357-1510

Customer Project:
Canton Water Reclamation Facility
Filter Bldg.
Turnaround Time:
5 days

CA Labs Project #:
CBR13092871

Date: 9/23/2013
Samples Received: 9/18/2013
Date Of Sampling: N/A
Purchase Order #:

Sample #	Comment	Layer #	Analysts Physical Description of Subsample	Homogeneous (Y/N)	Asbestos type / calibrated visual estimate percent	Non-asbestos fiber type / percent	Non-fibrous type / percent
10		*1-1*	*gray transite*	*y*	*positive stop*		

Baton Rouge NVLAP Lab Code 200772-0 TEM/PLM *TDH 30-0370*

LDEQ

Analysis Method: Interim (40CFR Part 763 Appendix E to Subpart E) / Improved (EPA-600 / R-93/116)
Preparation Method: HCL acid washing for carbonate based samples, chemical reduction for organically bound components, oil immersion for identification of asbestos types by dispersion attaining / becke line method.

ca - carbonate	mi - mica	fg - fiberglass	ce - cellulose
gypsum - gypsum	ve - vermiculite	mw - mineral wool	br - brucite
bi - binder	ot -other	wo - wollastinite	ka - kaolin (clay)
or - organic	pe - perlite	ta - talc	pa - palygorskite (clay)
ma - matrix	qu - quartz	sy - synthetic	

Approved Signatories:

Chris Williams
Analyst

Senior Analyst
Alicia Stretz

Laboratory Director
Chris Williams

1. Fire Damage significant fiber damage - reported percentages reflect unaltered fibers
2. Fire Damage no significant fiber damages effecting fibrous percentages
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7. Contamination suspected from other building materials
8. Favorable scenario for water separation on vermiculite for possible analysis by another method
9. < 1% Result point counted positive
10. TEM analysis suggested

CA Labs

C.A. Labs, LLC.
12232 Industriplex
Suite 32
Baton Rouge, LA 70809

Phone: 225-751-5632
Fax: 225-751-5634
Mobile: 225-993-3471

Chain of Custody

CBR130928 41

Client Name: HZW Environmental Consultants, LLC.
Client Address: 6105 Heisley Rd, Mentor, OH 44060
phone number: (440) 357-1260
fax number: (440) 357-1510
Project Number:
Contact: Joan Sablar

CA Labs job #: CBR

Billing Address: (if different)

Filter Building

Send Reports to: jsablar@hzweny.com
Project Name: Canton Water Reclamation Facility
Reports Results VIA: EMAIL X FAX ___ VERBAL ___

Total # Samples Submitted:	Total # Samples to be Analyzed:	Material Matrix:
10		Air / (Bulk) / Water

Asbestos: *please call ahead for availability of all rush and/or after hours samples.*

TEM	TA Time	PLM	TA Time	Optical / IAQ	TA Time
Circle analysis and TA time		*Circle analysis and TA time*	*2 hour*	**Allergen Particle:**	*2 hour*
AHERA	*4 hour*	Improved	4 hour	tape/bulk/swab	4 hour
EPA Level II	8 hour	Interim	8 hour	Cyclex-d cassettes	8 hour
Drinking Water	16 hour		16 hour	Air-o-cell cassettes	16 hour
Wipe	24 hour	AHERA	24 hour	Anderson cultures	24 hour
Micro-vac	2 days		2 days	Bulk/swab cultures	2 days
NIOSH 7402	3 days	Point Count -	3 days	Bacteria cultures	3 days
Chatfield Bulk	5 days	(NESHAPS)	5 days	PCM: NIOSH 7400	5-10 days

Lead: *Circle analysis and TA time*

Matrix:	Paint Chips	Soil	Air	Wipes	Wastewater	TCLP
TA Time:	*8 hour*	1 day	2 days	3 days	5 days	6-10 days

Sample Information:

Sample Number:	Sample Location:	Sample Date/Time:	Sample Volume (L)
01	Entry Trap		
02	"		
03	Flow Trap in Manhole		
04	"		

Custody Information:

Samples relinquished: [signature] 9/18/13 — Signature / Date / Time
Samples received: [signature] 9/18/13 11am — Signature / Date / Time

Samples relinquished: — Signature / Date / Time
Samples received: — Signature / Date / Time

* Stop at first positive per group
* Point count at 2% or less

CA Labs

12232 Industriplex
Suite 32
Baton Rouge, LA 70809

Phone: 225-751-5632
Fax: 225-751-5634
After hours Mobile: 225-993-3471

CBR1309287

Client Name:	HZW Environmental	CA Labs job #	CBR
Client Address:	6105 Heisley Road Mentor, OH 44060	Billing Address: (if different)	
phone number:	(440) 357-1860		
fax number:	(440) 357-1510	Send Reports to:	Filter Building
Project Number:		Project Name:	Canton Water Reclamation Facility
Contact:	Joan Sabian	Reports Results VIA:	EMAIL ✓ FAX___ VERBAL___

Sample Number:	Sample Location:	Sample Date/Time:	Sample Volume (L)
05	Window Caulking		
06	/		
07	Ceiling Tile		
08	/		
09	Cement Fiber Board		
10	/		

For internal use:
Any initial changes regarding project (indicate yes by checking line)_____

Custody Information:

Samples relinquished: _____ Signature / Date / Time

Samples received: [signature] 9/18/13 11am Signature / Date / Time

Samples relinquished: _____ Signature / Date / Time

Samples received: _____ Signature / Date / Time

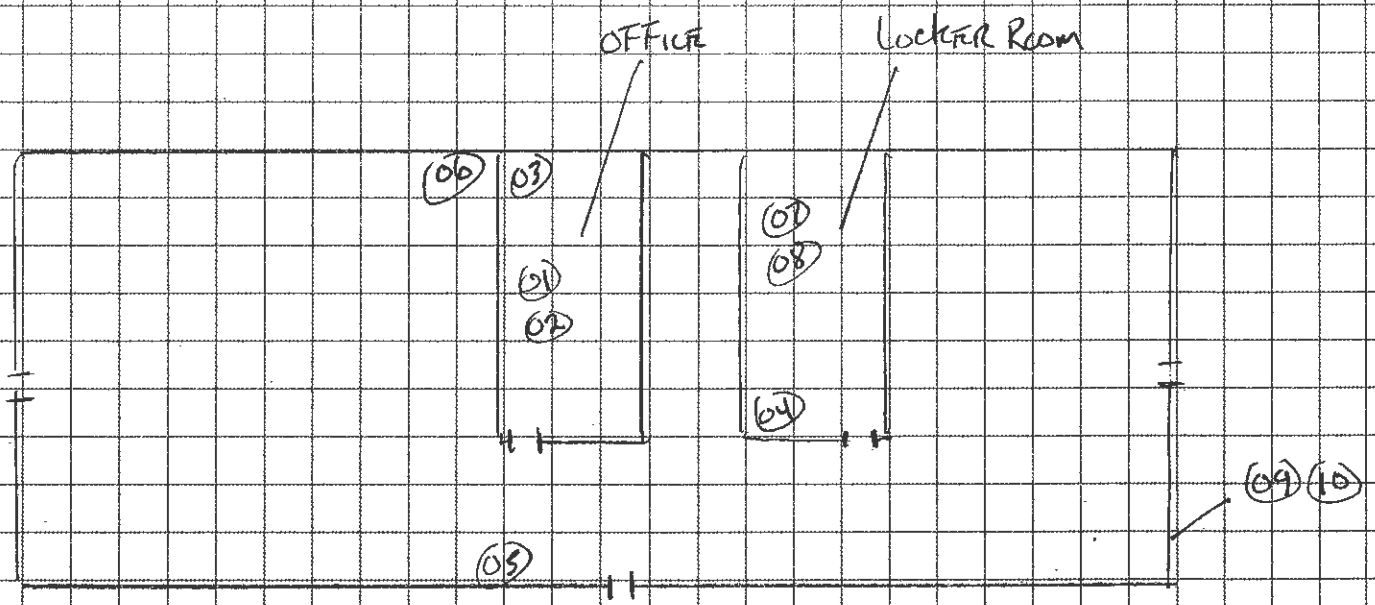
HZW ENVIRONMENTAL
CONSULTANTS, LLC

6105 Heisley Road, Mentor, Ohio 44060
phone 440-357-1260 • 800-804-8484
fax 440-357-1510
A WOMAN-OWNED BUSINESS ENTERPRISE

PROJECT City of Canton Water Pollution Control Center
PROJECT NO. H13051-09
PAGE NO. 1 OF 1
FIELD REPRESENTATIVE MJC DATE 9/12/13
SCALE

INDICATE DIRECTION OF NORTH

Filter Building



ATTACHMENT 3

GRIT BUILDINGS NO. 1 AND 2

- **ASBESTOS BULK SAMPLING INFORMATION FORMS**
- **CA LABS REPORTS FOR BULK SAMPLES COLLECTED**
- **SITE SKETCHES OF STRUCTURES**

CT Consultants, Inc.
Asbestos Survey – City of Canton Water Pollution Control Center
3530 Central Avenue, S.E., Canton, Stark County, Ohio
HzW Environmental Consultants, LLC – Project No. H13051-09
Asbestos Bulk Sampling Information Form

GRIT BUILDING NO. 1

HOMOGENEOUS					AHERA CATEGORY			QUANTITY & CONDITION			RESULT
ID	MATERIAL	LOCATION	VALIDATION FOR SAMPLING	BULK SAMPLE NO.	SUR.	TSI	MISC. F/NF	GOOD	FAIR	POOR	ASBESTOS %
A	Window Glazing	Exterior	Minimum 2 Samples	01							ND
				02							ND
B	Window Caulking	Exterior	Minimum 2 Samples	03							ND
				04							ND
C	Built-up Roof Decking	Roof	Category I Nonfriable in Good Condition, Not Sampled				X	1,265 sq.ft.			Assumed
D	Asphaltic Roof Flashing	Roof	Category I Nonfriable in Good Condition, Not Sampled				X	468 sq.ft.			Assumed
E	Cement Fiber Board	Exterior	Category II Nonfriable in Good Condition, Not Sampled				X	78 sq.ft.			Assumed

Items in Red Font Need to be Abated Prior to Renovation/Demolition Activities being Performed
ND = No Asbestos Detected; NA = Not Analyzed

CT Consultants, Inc.
Asbestos Survey – City of Canton Water Pollution Control Center
3530 Central Avenue, S.E., Canton, Stark County, Ohio
HzW Environmental Consultants, LLC – Project No. H13051-09
Asbestos Bulk Sampling Information Form

GRIT BUILDING NO. 2

HOMOGENEOUS					AHERA CATEGORY			QUANTITY & CONDITION			RESULT
ID	MATERIAL	LOCATION	VALIDATION FOR SAMPLING	BULK SAMPLE NO.	SUR.	TSI	MISC. F/NF	GOOD	FAIR	POOR	ASBESTOS %
A	Window Glazing	Interior and Exterior	Minimum 2 Samples	01							ND
				02							ND
B	Window Caulking	Exterior	Minimum 2 Samples	03							ND
				04							ND
C	Built-up Roof Decking	Roof	Category I Nonfriable in Good Condition, Not Sampled				X	1,265 sq.ft.			Assumed
D	Asphaltic Roof Flashing	Roof	Category I Nonfriable in Good Condition, Not Sampled				X	468 sq.ft.			Assumed
E	Cement Fiber Board	Exterior	Category II Nonfriable in Good Condition, Not Sampled				X	78 sq.ft.			Assumed

Items in Red Font Need to be Abated Prior to Renovation/Demolition Activities being Performed
ND = No Asbestos Detected; NA = Not Analyzed

CA Labs
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Baton Rouge, LA 70809
Phone 225-751-5632
Fax 225-751-5634

Materials Characterization - Bulk Asbestos Analysis

Laboratory Analysis Report - Polarized Light

HzW Environmental Consultants
6105 Heisley Rd.
Mentor, OH 44060

Attn: Joan Sablar
Customer Project: Canton Water Reclamation Facility Grit Bldg. #1
Reference #: CBR13092869 Date: 9/23/2013

Analysis and Method

Summary of polarizing light microscopy (PLM / Stereomicroscopy bulk asbestos analysis) using the methods described in 40CFR Part 763 Appendix E to Subpart E (Interim and EPA 600 / R-93 / 116 (Improved). The sample is first viewed with the aid of stereomicroscopy. Numerous liquid slide preparations are created for analysis under the polarized microscope where identifications and quantifications are preformed. Calibrated liquid refractive oils are used as liquid mouting medium. These oils are used for identification (dispersion staining). A calibrated visual estimation is reported, should any asbestiform mineral be present. Other techniques such as acid washing are used in conjugation with refractive oils for detection of smaller quantities of asbestos. All asbestos percentages are based on calibrated visual estimation traceable to NIST standards for regulated of asbestos. Traceability to measurement and calibration is achieved by using known amounts and types of asbestos from standards where analyst and laboratory accuracy are measured. As little as 0.001% asbestos can be detected in favorable samples, while detection in unfavorable samples may approach the

Discussion

Vermiculite containing samples may have trace amounts of actinolite-tremolite, where not found be PLM should be analyzed using TEM methods and / or water separation techniques. Suspected actinolite/vermiculite presence will be indicated through the sample comment section of this report.

Fibrous talc containing samples may even contain a related asbestos fiber known as anthophyllite. Under certain conditions the same fiber may actually contain both talc and anthophyllite (a phenomenon called intergrowth). Again, TEM detection methods are recommended. CA Labs PLM report comments will denote suspected amounts of asbestiform anthophyllite with talc, where further analysis is recommended.

Some samples (floor tiles, surfacings, etc.) may contain fibers too small to be delectable by PLM analysis and should be analyzed by TEM bulk protocols.

A "trace asbestos" will be reported if the analyst observes far less than 1% asbestos. CA Labs defines "trace asbestos" as a few fibers detected by the analyst in several preparations and will indicate as such under these circumstances.

Quantification of <1% will actually be reported as <=1% (allowable variance close to 1% is high). Such results are ideal for point counting, and the technique is mandatory for friable samples (NESHAP, Nov. 1990 and clarification letter 8 May 1991) under 1% percent asbestos and the "trace asbestos". **In order to make all initial PLM reports issued from CA Labs NESHAP compliant, all <1% asbestos results (except floor tiles) will be point counted at no additional charge.**

Qualifications

CA Labs is accredited by the National Voluntary Accreditation Program (NVLAP) for selected test methods for airborne fiber analysis (TEM), and for bulk asbestos fiber analysis (PLM). All analysts have a college degree in a natural science (geology, biology, or environmental science) or are recognized by a state professional board in one these disciplines .Extensive in-house training programs are used to augment education background of the analyst. The group leader of polarized light has received supplemental McCrone Research training for asbestos identification. This report is not covered by the scope of AIHA accreditation. Analysis performed at CA Labs, LLC 12232 Industriplex, Suite 32 Baton Rouge, LA 70809.

CA Labs
Dedicated to Quality

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Phone 972-242-2754
Fax 972-242-2798

CA Labs, L.L.C.
12232 Industriplex, Suite 32
Baton Rouge, LA 70809
Phone 225-751-5632
Fax 225-751-5634

Overview of Project Sample Material Containing Asbestos

Customer Project: Canton Water Reclamation Facility Grit Bldg. #1 **CA Labs Project #:** CBR13092869

Sample #	Layer #	Analysts Physical Description of Subsample	Asbestos type / calibrated visual estimate percent	List of Affected Building Material Types

No Asbestos Detected.

Baton Rouge NVLAP Lab Code 200772-0 TEM/PLM *TDH 30-0370*
LDEQ

Glossary of abbreviations (non-asbestos fibers and non-fibrous minerals):

ca - carbonate
gypsum - gypsum
bi - binder
or - organic
ma - matrix
mi - mica
ve - vermiculite
ot - other
pe - perlite
qu - quartz
fg - fiberglass
mw - mineral wool
wo - wollastinite
ta - talc
sy - synthetic
ce - cellulose
br - brucite
ka - kaolin (clay)
pa - palygorskite (clay)

This report relates to the items tested. This report is not to be used by the customer to claim product certification, approval or endorsement by NVLAP, NIST, AIHA LAP, LLC, or any other agency of the federal government. This report may not be reproduced except in full without written permission from CA Labs. These results are submitted pursuant to CA Labs' current terms and sale, condition of sale, including the company's standard warranty and limitations of liability provisions and no responsibility or liability is assumed for the manner in which the results are used or interpreted. Unless notified in writing to return the samples covered by this report, CA Labs will store the samples for a period of ninety (90) days before discarding. A shipping or handling fee may be assessed for the return of any samples.

CA Labs
Dedicated to Quality

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Baton Rouge, LA 70809
Phone 225-751-5632
Fax 225-751-5634

Polarized Light Asbestiform Materials Characterization

Customer Info: **Attn:** Joan Sablar
HzW Environmental Consultants
6105 Heisley Rd.
Mentor, OH 44060

Phone # 440-357-1260
Fax # 440-357-1510

Customer Project:
Canton Water Reclamation Facility
Grit Bldg. #1
Turnaround Time:
5 days

CA Labs Project #:
CBR13092869

Date: 9/23/2013
Samples Received: 9/18/2013
Date Of Sampling: N/A
Purchase Order #:

Sample #	Comment	Layer #	Analysts Physical Description of Subsample	Homogeneous (Y/N)	Asbestos type / calibrated visual estimate percent	Non-asbestos fiber type / percent	Non-fibrous type / percent
01		1-1	*off-white sealant*	y	***None Detected***		100% qu,ca,bi
02		1-1	*off-white sealant*	y	***None Detected***		100% qu,ca,bi
03		1-1	*gray sealant*	y	***None Detected***	2% ce	98% qu,ca,bi
04		1-1	*gray sealant*	y	***None Detected***	2% ce	98% qu,ca,bi

Baton Rouge NVLAP Lab Code 200772-0 TEM/PLM *TDH 30-0370*

LDEQ

Analysis Method: Interim (40CFR Part 763 Appendix E to Subpart E) / Improved (EPA-600 / R-93/116)
Preparation Method: HCL acid washing for carbonate based samples, chemical reduction for organically bound components, oil immersion for identification of asbestos types by dispersion attaining / becke line method.

ca - carbonate	mi - mica	fg - fiberglass	ce - cellulose
gypsum - gypsum	ve - vermiculite	mw - mineral wool	br - brucite
bi - binder	ot -other	wo - wollastinite	ka - kaolin (clay)
or - organic	pe - perlite	ta - talc	pa - palygorskite (clay)
ma - matrix	qu - quartz	sy - synthetic	

Approved Signatories:

Chris Williams
Analyst

Senior Analyst
Alicia Stretz

Laboratory Director
Chris Williams

1. Fire Damage significant fiber damage - reported percentages reflect unaltered fibers
2. Fire Damage no significant fiber damages effecting fibrous percentages
3. Actinolite in association with Vermiculite
4. Layer not analyzed - attached to previous positive layer and contamination is suspected
5. Not enough sample to analyze
6. Anthophyllite in association with Fibrous Talc
7. Contamination suspected from other building materials
8. Favorable scenario for water separation on vermiculite for possible analysis by another method
9. < 1% Result point counted positive
10. TEM analysis suggested

CA Labs

C.A. Labs, LLC.
12232 Industriplex
Suite 32
Baton Rouge, LA 70809

Phone: 225-751-5632
Fax: 225-751-5634
Mobile: 225-993-3471

Chain of Custody

CBR13092869

Client Name: HZW ENVIRONMENTAL CONSULTANTS, LLC.

CA Labs job # CBR

Client Address: 6105 HEISLEY RD MENTOR, OH 44060

Billing Address: (if different)

phone number: (440) 357-1260

fax number: (440) 357-1510

Project Number:

Contact: JOAN SABLAR

Send Reports to: GRIT Building II, JSablar@hzwenv.com

Project Name: CANTON WATER RECLAMATION FACILITY

Reports Results VIA: EMAIL X FAX___ VERBAL___

Total # Samples Submitted:	Total # Samples to be Analyzed:	Material Matrix:
4		Air (Bulk) Water

Asbestos: *please call ahead for availability of all rush and/or after hours samples.*

TEM	TA Time	PLM	TA Time	Optical / IAQ	TA Time
Circle analysis and TA time		*Circle analysis and TA time*	*2 hour*	Allergen Particle:	*2 hour*
AHERA	*4 hour*	Improved	4 hour	tape/bulk/swab	4 hour
EPA Level II	8 hour	Interim	8 hour	Cyclex-d cassettes	8 hour
Drinking Water	16 hour		16 hour	Air-o-cell cassettes	16 hour
Wipe	24 hour	AHERA	24 hour	Anderson cultures	24 hour
Micro-vac	2 days		2 days	Bulk/swab cultures	2 days
NIOSH 7402	3 days	Point Count -	3 days	Bacteria cultures	3 days
Chatfield Bulk	5 days	(NESHAPS)	5 days	PCM: NIOSH 7400	5-10 days

Lead: *Circle analysis and TA time*

Matrix:	Paint Chips	Soil	Air	Wipes	Wastewater	TCLP
TA Time:	*8 hour*	1 day	2 days	3 days	5 days	6-10 days

Sample Information:

Sample Number:	Sample Location:	Sample Date/Time:	Sample Volume (L)
01	[illegible] glazing		
02	"		
03	[illegible] caulking		
04	"		

Custody Information:

Samples relinquished: [illegible] 9/17/13 — Signature / Date / Time

Samples received: [illegible] 9/18/13 [illegible] — Signature / Date / Time

Samples relinquished: — Signature / Date / Time

Samples received: — Signature / Date / Time

* STOP AT FIRST POSITIVE PER GROUP

* [illegible]

CA Labs
Dedicated to Quality

Crisp Analytical, L.L.C.
1929 Old Denton Road
Carrollton, TX 75006
Phone 972-242-2754
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CA Labs, L.L.C.
12232 Industriplex, Suite 32
Baton Rouge, LA 70809
Phone 225-751-5632
Fax 225-751-5634

Materials Characterization - Bulk Asbestos Analysis

Laboratory Analysis Report - Polarized Light

HzW Environmental Consultants
6105 Heisley Rd.
Mentor, OH 44060

Attn: Joan Sablar
Customer Project: Canton Water Reclamation Facility Grit Bldg. #2
Reference #: CBR13092872 Date: 9/23/2013

Analysis and Method

Summary of polarizing light microscopy (PLM / Stereomicroscopy bulk asbestos analysis) using the methods described in 40CFR Part 763 Appendix E to Subpart E (Interim and EPA 600 / R-93 / 116 (Improved). The sample is first viewed with the aid of stereomicroscopy. Numerous liquid slide preparations are created for analysis under the polarized microscope where identifications and quantifications are preformed. Calibrated liquid refractive oils are used as liquid mouting medium. These oils are used for identification (dispersion staining). A calibrated visual estimation is reported, should any asbestiform mineral be present. Other techniques such as acid washing are used in conjugation with refractive oils for detection of smaller quantities of asbestos. All asbestos percentages are based on calibrated visual estimation traceable to NIST standards for regulated of asbestos. Traceability to measurement and calibration is achieved by using known amounts and types of asbestos from standards where analyst and laboratory accuracy are measured. As little as 0.001% asbestos can be detected in favorable samples, while detection in unfavorable samples may approach the

Discussion

Vermiculite containing samples may have trace amounts of actinolite-tremolite, where not found be PLM should be analyzed using TEM methods and / or water separation techniques. Suspected actinolite/vermiculite presence will be indicated through the sample comment section of this report.

Fibrous talc containing samples may even contain a related asbestos fiber known as anthophyllite. Under certain conditions the same fiber may actually contain both talc and anthophyllite (a phenomenon called intergrowth). Again, TEM detection methods are recommended. CA Labs PLM report comments will denote suspected amounts of asbestiform anthophyllite with talc, where further analysis is recommended.

Some samples (floor tiles, surfacings, etc.) may contain fibers too small to be delectable by PLM analysis and should be analyzed by TEM bulk protocols.

A "trace asbestos" will be reported if the analyst observes far less than 1% asbestos CA Labs defines "trace asbestos" as a few fibers detected by the analyst in several preparations and will indicate as such under these circumstances.

Quantification of <1% will actually be reported as <=1% (allowable variance close to 1% is high). Such results are ideal for point counting, and the technique is mandatory for friable samples (NESHAP, Nov. 1990 and clarification letter 8 May 1991) under 1% percent asbestos and the "trace asbestos". In order to make all Initial PLM reports issued from CA Labs NESHAP compliant, all <1% asbestos results (except floor tiles) will be point counted at no additional charge.

Qualifications

CA Labs is accredited by the National Voluntary Accreditation Program (NVLAP) for selected test methods for airborne fiber analysis (TEM), and for bulk asbestos fiber analysis (PLM). All analysts have a college degree in a natural science (geology, biology, or environmental science) or are recognized by a state professional board in one these disciplines .Extensive in-house training programs are used to augment education background of the analyst. The group leader of polarized light has received supplemental McCrone Research training for asbestos identification. This report is not covered by the scope of AIHA accreditation. Analysis pertormed at CA Labs, LLC 12232 Industriplex, Suite 32 Baton Rouge, LA 70809.

CA Labs
Dedicated to Quality

Crisp Analytical, L.L.C.
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CA Labs, L.L.C.
12232 Industriplex, Suite 32
Baton Rouge, LA 70809
Phone 225-751-5632
Fax 225-751-5634

Overview of Project Sample Material Containing Asbestos

Customer Project: Canton Water Reclamation Facility Grit Bldg. #2 **CA Labs Project #:** CBR13092872

Sample #	Layer #	Analysts Physical Description of Subsample	Asbestos type / calibrated visual estimate percent	List of Affected Building Material Types

No Asbestos Detected.

Baton Rouge NVLAP Lab Code 200772-0 TEM/PLM *TDH 30-0370*
LDEQ

Glossary of abbreviations (non-asbestos fibers and non-fibrous minerals):

ca - carbonate
gypsum - gypsum
bi - binder
or - organic
ma - matrix
mi - mica
ve - vermiculite
ot - other
pe - perlite
qu - quartz
fg - fiberglass
mw - mineral wool
wo - wollastinite
ta - talc
sy - synthetic
ce - cellulose
br - brucite
ka - kaolin (clay)
pa - palygorskite (clay)

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CA Labs
Dedicated to Quality

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Carrollton, TX 75006
Phone 972-242-2754
Fax 972-242-2798

CA Labs, L.L.C.
12232 Industriplex, Suite 32
Baton Rouge, LA 70809
Phone 225-751-5632
Fax 225-751-5634

Polarized Light Asbestiform Materials Characterization

Customer Info: **Attn:** Joan Sablar
HzW Environmental Consultants
6105 Heisley Rd.
Mentor, OH 44060

Phone # 440-357-1260
Fax # 440-357-1510

Customer Project:
Canton Water Reclamation Facility
Grit Bldg. #2
Turnaround Time:
5 days

CA Labs Project #:
CBR13092872

Date: 9/23/2013
Samples Received: 9/18/2013
Date Of Sampling: N/A
Purchase Order #:

Sample #	Comment	Layer #	Analysts Physical Description of Subsample	Homogeneous (Y/N)	Asbestos type / calibrated visual estimate percent	Non-asbestos fiber type / percent	Non-fibrous type / percent
01		1-1	*tan sealant*	y	***None Detected***		100% qu,ca,bi
02		1-1	*tan sealant*	y	***None Detected***		100% qu,ca,bi
03		1-1	*gray sealant*	y	***None Detected***	2% ce	98% qu,ca,bi
04		1-1	*gray sealant*	y	***None Detected***	2% ce	98% qu,ca,bi

Baton Rouge NVLAP Lab Code 200772-0 TEM/PLM *TDH 30-0370*

LDEQ

Analysis Method: Interim (40CFR Part 763 Appendix E to Subpart E) / Improved (EPA-600 / R-93/116)
Preparation Method: HCL acid washing for carbonate based samples, chemical reduction for organically bound components, oil immersion for identification of asbestos types by dispersion attaining / becke line method.

ca - carbonate	mi - mica	fg - fiberglass	ce - cellulose
gypsum - gypsum	ve - vermiculite	mw - mineral wool	br - brucite
bi - binder	ot -other	wo - wollastinite	ka - kaolin (clay)
or - organic	pe - perlite	ta - talc	pa - palygorskite (clay)
ma - matrix	qu - quartz	sy - synthetic	

Approved Signatories:

Chris Williams
Analyst

Senior Analyst
Alicia Stretz

Laboratory Director
Chris Williams

1. Fire Damage significant fiber damage - reported percentages reflect unaltered fibers
2. Fire Damage no significant fiber damages effecting fibrous percentages
3. Actinolite in association with Vermiculite
4. Layer not analyzed - attached to previous positive layer and contamination is suspected
5. Not enough sample to analyze
6. Anthophyllite in association with Fibrous Talc
7. Contamination suspected from other building materials
8. Favorable scenario for water separation on vermiculite for possible analysis by another method
9. < 1% Result point counted positive
10. TEM analysis suggested

CA Labs

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Phone: 225-751-5632
Fax: 225-751-5634
Mobile: 225-993-3471

Chain of Custody

CBR13092872

Client Name: HZW ENVIRONMENTAL CONSULTANTS, LLC.

CA Labs job # CBR

Client Address: 6105 HEISLEY RD MENTOR, OH 44060

Billing Address: (if different)

phone number: (440) 357-1260

fax number: (440) 357-1510

Send Reports to: JSablar@hzwenv.com

Project Number:

Project Name: CANTON WATER RECLAMATION FACILITY GRIT Building #2

Contact: JOAN SABLAR

Reports Results VIA: EMAIL ✓ FAX ___ VERBAL ___

Total # Samples Submitted:	Total # Samples to be Analyzed:	Material Matrix:
4		Air (Bulk) / Water

Asbestos: *please call ahead for availability of all rush and/or after hours samples.*

TEM	TA Time	PLM	TA Time	Optical / IAQ	TA Time
Circle analysis and TA time		*Circle analysis and TA time*	*2 hour*	Allergen Particle:	*2 hour*
AHERA	*4 hour*	Improved	4 hour	tape/bulk/swab	4 hour
EPA Level II	8 hour	Interim	8 hour	Cyclex-d cassettes	8 hour
Drinking Water	16 hour		16 hour	Air-o-cell cassettes	16 hour
Wipe	24 hour	AHERA	24 hour	Anderson cultures	24 hour
Micro-vac	2 days		2 days	Bulk/swab cultures	2 days
NIOSH 7402	3 days	Point Count -	3 days	Bacteria cultures	3 days
Chatfield Bulk	5 days	(NESHAPS)	5 days	PCM: NIOSH 7400	5-10 days

Lead: *Circle analysis and TA time*

Matrix:	Paint Chips	Soil	Air	Wipes	Wastewater	TCLP
TA Time:	*8 hour*	1 day	2 days	3 days	5 days	6-10 days

Sample Information:

Sample Number:	Sample Location:	Sample Date/Time:	Sample Volume (L)
C1	Window Gasing		
C2			
C3	Window Caulking		
C4			

Custody Information:

Samples relinquished: [signature] 9/17/13 — Signature / Date / Time

Samples received: [signature] 9/18/13 11am — Signature / Date / Time

Samples relinquished: — Signature / Date / Time

Samples received: — Signature / Date / Time

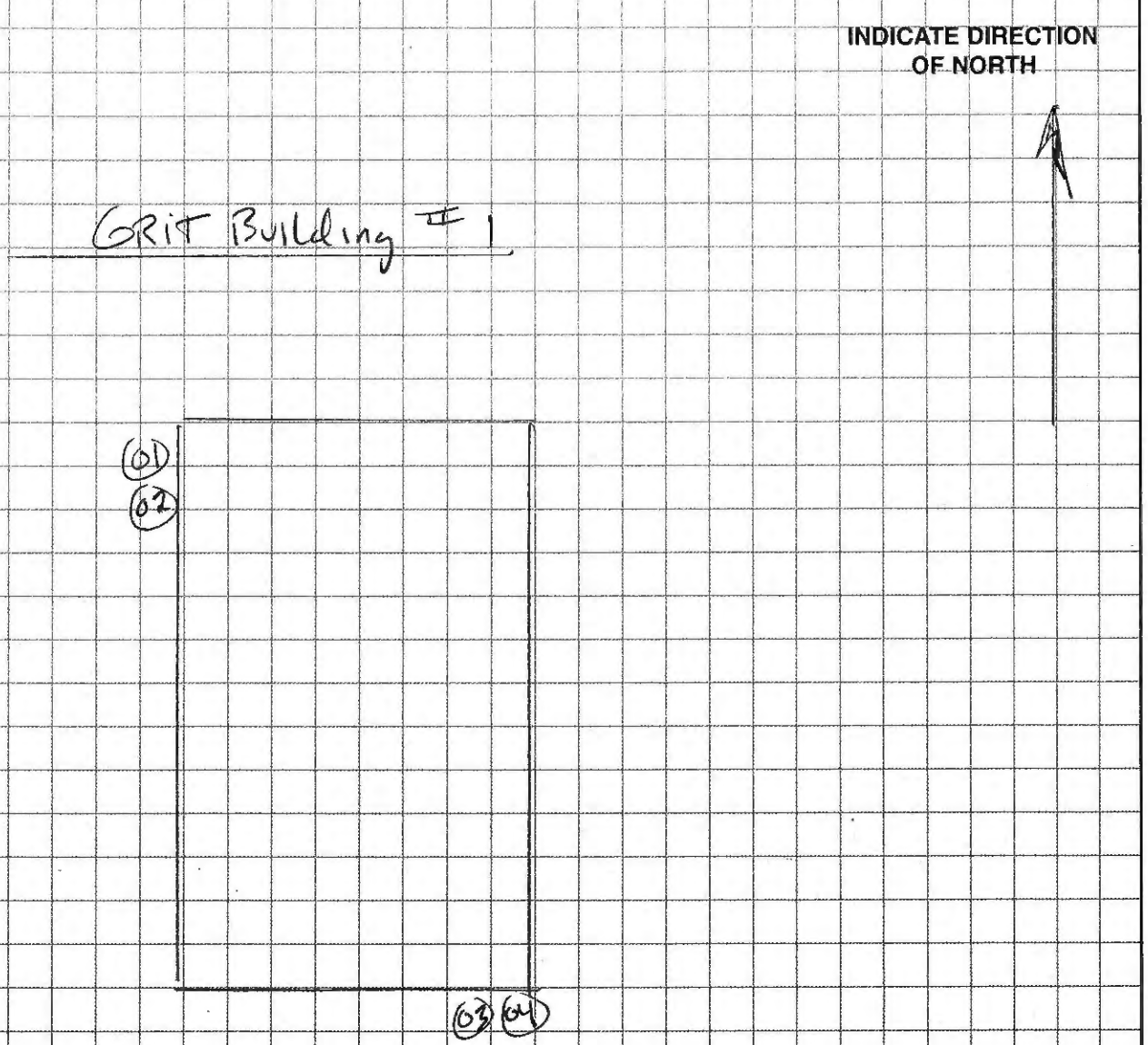
[illegible]

HZW ENVIRONMENTAL
CONSULTANTS, LLC

6105 Heisley Road, Mentor, Ohio 44060
phone 440-357-1260 • 800-804-8484
fax 440-357-1510
A WOMAN-OWNED BUSINESS ENTERPRISE

PROJECT City of Canton Water Pollution Control Center
PROJECT NO. H13051-09
PAGE NO. 1 OF 1
FIELD REPRESENTATIVE MPR DATE 9/12/13
SCALE

INDICATE DIRECTION OF NORTH



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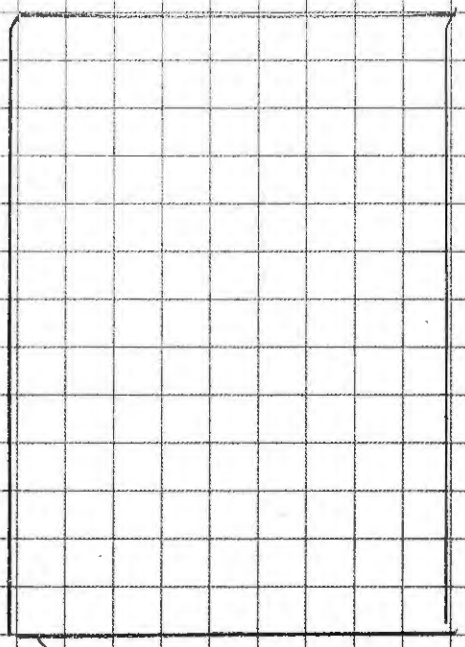
PROJECT City of Canton Water Pollution Control Center
PROJECT NO. H13051-09
PAGE NO. 1 OF 1
FIELD REPRESENTATIVE MJT DATE 9/12/13
SCALE

INDICATE DIRECTION OF NORTH

Grit Building #2



ATTACHMENT 4

INCINERATOR BUILDING

- **ASBESTOS BULK SAMPLING INFORMATION FORM**
- **CA LABS REPORT FOR BULK SAMPLES COLLECTED**
- **SITE SKETCH OF STRUCTURE**

CT Consultants, Inc.
Asbestos Survey – City of Canton Water Pollution Control Center
3530 Central Avenue, S.E., Canton, Stark County, Ohio
HzW Environmental Consultants, LLC – Project No. H13051-09
Asbestos Bulk Sampling Information Form

INCINERATOR BUILDING

HOMOGENEOUS					AHERA CATEGORY			QUANTITY & CONDITION			RESULT
ID	MATERIAL	LOCATION	VALIDATION FOR SAMPLING	BULK SAMPLE NO.	SUR.	TSI	MISC. F/NF	GOOD	FAIR	POOR	ASBESTOS %
A	Mag Block Flue Stack Insulation	Incinerator No.2, Second Floor Level	Minimum 3 Samples	01							ND
				02							ND
				03							ND
B	Woven Cloth Flue Stack Insulation	Incinerator No.2, Second Floor Level	Minimum 2 Samples	04							ND
				05							ND
				06							ND
C	Window Glazing	Exterior	Minimum 2 Samples	07			X			100 sq.ft.	1.25
				08							NA
D	Caulking Material	Exterior, Where Siding meets Windows	Minimum 2 Samples	09							ND
				10							ND
E	Fire Brick	Incinerator No.2 Interior	Minimum 3 Samples	11							ND
				12							ND
				13							ND
F	Soft Insulation	Incinerator No.2 Interior	Minimum 3 Samples	14							ND
				15							ND
				16							ND

Items in Red Font Need to be Abated Prior to Renovation/Demolition Activities being Performed
ND = No Asbestos Detected; NA = Not Analyzed

CT Consultants, Inc.
Asbestos Survey – City of Canton Water Pollution Control Center
3530 Central Avenue, S.E., Canton, Stark County, Ohio
HzW Environmental Consultants, LLC – Project No. H13051-09
Asbestos Bulk Sampling Information Form

INCINERATOR BUILDING

HOMOGENEOUS					AHERA CATEGORY			QUANTITY & CONDITION			RESULT
ID	MATERIAL	LOCATION	VALIDATION FOR SAMPLING	BULK SAMPLE NO.	SUR.	TSI	MISC. F/NF	GOOD	FAIR	POOR	ASBESTOS %
G	Door Insulation	Incinerator No.2 Interior	Minimum 3 Samples	17							ND
				18							ND
				19							ND
H	36-inch Transite Duct Piping	Lower Level, Connecting Incinerators	Category II Nonfriable in Good Condition, Not Sampled				X	200 ln.ft.			Assumed
I	Vibration Cloth Connector	Second Level, Connects Incinerators to Flue Stacks	Category I Nonfriable in Good Condition, Not Sampled				X	24 sq.ft.			Assumed

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ND – No Asbestos Detected; NA = Not Analyzed

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Materials Characterization - Bulk Asbestos Analysis

Laboratory Analysis Report - Polarized Light

HzW Environmental Consultants
6105 Heisley Rd.
Mentor, OH 44060

Attn: Joan Sablar
Customer Project: Canton Water Reclamation Facility Incinerator Bldg.
Reference #: CBR13092870 Date: 9/23/2013

Analysis and Method

Summary of polarizing light microscopy (PLM / Stereomicroscopy bulk asbestos analysis) using the methods described in 40CFR Part 763 Appendix E to Subpart E (Interim and EPA 600 / R-93 / 116 (Improved). The sample is first viewed with the aid of stereomicroscopy. Numerous liquid slide preparations are created for analysis under the polarized microscope where identifications and quantifications are preformed. Calibrated liquid refractive oils are used as liquid mouting medium. These oils are used for identification (dispersion staining). A calibrated visual estimation is reported, should any asbestiform mineral be present. Other techniques such as acid washing are used in conjugation with refractive oils for detection of smaller quantities of asbestos. All asbestos percentages are based on calibrated visual estimation traceable to NIST standards for regulated of asbestos. Traceability to measurement and calibration is achieved by using known amounts and types of asbestos from standards where analyst and laboratory accuracy are measured. As little as 0.001% asbestos can be detected in favorable samples, while detection in unfavorable samples may approach the

Discussion

Vermiculite containing samples may have trace amounts of actinolite-tremolite, where not found be PLM should be analyzed using TEM methods and / or water separation techniques. Suspected actinolite/vermiculite presence will be indicated through the sample comment section of this report.

Fibrous talc containing samples may even contain a related asbestos fiber known as anthophyllite. Under certain conditions the same fiber may actually contain both talc and anthophyllite (a phenomenon called intergrowth). Again, TEM detection methods are recommended. CA Labs PLM report comments will denote suspected amounts of asbestiform anthophyllite with talc, where further analysis is recommended.

Some samples (floor tiles, surfacings, etc.) may contain fibers too small to be delectable by PLM analysis and should be analyzed by TEM bulk protocols.

A "trace asbestos" will be reported if the analyst observes far less than 1% asbestos. CA Labs defines "trace asbestos" as a few fibers detected by the analyst in several preparations and will indicate as such under these circumstances.

Quantification of <1% will actually be reported as <=1% (allowable variance close to 1% is high). Such results are ideal for point counting, and the technique is mandatory for friable samples (NESHAP, Nov. 1990 and clarification letter 8 May 1991) under 1% percent asbestos and the "trace asbestos". **In order to make all initial PLM reports issued from CA Labs NESHAP compliant, all <1% asbestos results (except floor tiles) will be point counted at no additional charge.**

Qualifications

CA Labs is accredited by the National Voluntary Accreditation Program (NVLAP) for selected test methods for airborne fiber analysis (TEM), and for bulk asbestos fiber analysis (PLM). All analysts have a college degree in a natural science (geology, biology, or environmental science) or are recognized by a state professional board in one these disciplines .Extensive in-house training programs are used to augment education background of the analyst. The group leader of polarized light has received supplemental McCrone Research training for asbestos identification. This report is not covered by the scope of AIHA accreditation. Analysis performed at CA Labs, LLC 12232 Industriplex, Suite 32 Baton Rouge, LA 70809.

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Overview of Project Sample Material Containing Asbestos

Customer Project: Canton Water Reclamation Facility Incinerator Bldg. **CA Labs Project #:** CBR13092870

Sample #	Layer #	Analysts Physical Description of Subsample	Asbestos type / calibrated visual estimate percent	List of Affected Building Material Types
				white sealant
07	*1-1*	*white sealant*	***2% Chrysotile***	

Baton Rouge NVLAP Lab Code 200772-0 TEM/PLM *TDH 30-0370*
LDEQ

Glossary of abbreviations (non-asbestos fibers and non-fibrous minerals):

ca - carbonate
gypsum - gypsum
bi - binder
or - organic
ma - matrix
mi - mica
ve - vermiculite
ot - other
pe - perlite
qu - quartz
fg - fiberglass
mw - mineral wool
wo - wollastinite
ta - talc
sy - synthetic
ce - cellulose
br - brucite
ka - kaolin (clay)
pa - palygorskite (clay)

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Polarized Light Asbestiform Materials Characterization

Customer Info: **Attn:** Joan Sablar
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Mentor, OH 44060

Phone # 440-357-1260
Fax # 440-357-1510

Customer Project:
Canton Water Reclamation Facility
Incinerator Bldg.
Turnaround Time:
5 days

CA Labs Project #:
CBR13092870

Date: 9/23/2013
Samples Received: 9/18/2013
Date Of Sampling: N/A
Purchase Order #:

Sample #	Comment	Layer #	Analysts Physical Description of Subsample	Homogeneous (Y/N)	Asbestos type / calibrated visual estimate percent	Non-asbestos fiber type / percent	Non-fibrous type / percent
01		*1-1*	*brown & white insulation*	*n*	***None Detected***	2% ce	98% qu,ca
02		*1-1*	*brown & white insulation*	*n*	***None Detected***	2% ce	98% qu,ca
03		*1-1*	*brown & white insulation*	*n*	***None Detected***	2% ce	98% qu,ca
04		*1-1*	*tan woven wrap*	*y*	***None Detected***	95% fg	5% qu,ma
05		*1-1*	*tan woven wrap*	*y*	***None Detected***	95% fg	5% qu,ma
06		*1-1*	*tan woven wrap*	*y*	***None Detected***	95% fg	5% qu,ma
07		*1-1*	*white sealant*	*y*	***2% Chrysotile***		98% qu,ca,bi

Baton Rouge NVLAP Lab Code 200772-0 TEM/PLM *TDH 30-0370*

LDEQ

Analysis Method: Interim (40CFR Part 763 Appendix E to Subpart E) / Improved (EPA-600 / R-93/116)
Preparation Method: HCL acid washing for carbonate based samples, chemical reduction for organically bound components, oil immersion for identification of asbestos types by dispersion attaining / becke line method.

ca - carbonate	mi - mica	fg - fiberglass	ce - cellulose
gypsum - gypsum	ve - vermiculite	mw - mineral wool	br - brucite
bi - binder	ot -other	wo - wollastinite	ka - kaolin (clay)
or - organic	pe - perlite	ta - talc	pa - palygorskite (clay)
ma - matrix	qu - quartz	sy - synthetic	

Approved Signatories:

Chris Williams
Analyst

Senior Analyst
Alicia Stretz

Laboratory Director
Chris Williams

1. Fire Damage significant fiber damage - reported percentages reflect unaltered fibers
2. Fire Damage no significant fiber damages effecting fibrous percentages
3. Actinolite in association with Vermiculite
4. Layer not analyzed - attached to previous positive layer and contamination is suspected
5. Not enough sample to analyze
6. Anthophyllite in association with Fibrous Talc
7. Contamination suspected from other building materials
8. Favorable scenario for water separation on vermiculite for possible analysis by another method
9. < 1% Result point counted positive
10. TEM analysis suggested

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Turnaround Time:
5 days

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CBR13092870

Date: 9/23/2013
Samples Received: 9/18/2013
Date Of Sampling: N/A
Purchase Order #:

Sample #	Comment	Layer #	Analysts Physical Description of Subsample	Homogeneous (Y/N)	Asbestos type / calibrated visual estimate percent	Non-asbestos fiber type / percent	Non-fibrous type / percent
08		1-1	*white sealant*	y	*positive stop*		
09		1-1	*tan sealant*	y	***None Detected***	2% ce	98% qu,ca,bi
10		1-1	*tan sealant*	y	***None Detected***	2% ce	98% qu,ca,bi
11		1-1	*white brick*	y	***None Detected***	3% ce	97% qu,ma
12		1-1	*white brick*	y	***None Detected***	3% ce	97% qu,ma
13		1-1	*white brick*	y	***None Detected***	3% ce	97% qu,ma
14		1-1	*white fibrous insulation*	y	***None Detected***	100% fg	

Baton Rouge NVLAP Lab Code 200772-0 TEM/PLM *TDH 30-0370*

LDEQ

Analysis Method: Interim (40CFR Part 763 Appendix E to Subpart E) / Improved (EPA-600 / R-93/116)
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or - organic	pe - perlite	ta - talc	pa - palygorskite (clay)
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Turnaround Time:
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CA Labs Project #:
CBR13092870

Date: 9/23/2013
Samples Received: 9/18/2013
Date Of Sampling: N/A
Purchase Order #:

Sample #	Comment	Layer #	Analysts Physical Description of Subsample	Homogeneous (Y/N)	Asbestos type / calibrated visual estimate percent	Non-asbestos fiber type / percent	Non-fibrous type / percent
15		1-1	*white fibrous insulation*	y	***None Detected***	100% fg	
16		1-1	*white fibrous insulation*	y	***None Detected***	95% fg	5% ma
17		1-1	*red insulation*	y	***None Detected***	2% ce	98% qu,ma
18		1-1	*red insulation*	y	***None Detected***	2% ce	98% qu,ma
19		1-1	*red insulation*	y	***None Detected***	2% ce	98% qu,ma

Baton Rouge NVLAP Lab Code 200772-0 TEM/PLM *TDH 30-0370*

LDEQ

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Polarized Light Asbestiform Materials Point Count

Laboratory Analysis Report - Point Count

Analysis and Method

Point counting was performed on a polarized light microscope with a calibrated reticle according to the revised NESHAP method of November 20, 1990 (Federal Register, V.55, N.224, 11/20/90). Origional asbestos content of bulk materials was determined using procedures outlined in the interim method (40 CFR part 763, Appendix E to subpart E) and AHERA method (EPA-600/R-93/116). Samples were prepared using HCL acid washing for carbonate based samples, chemical reduction for organically bound components, oil immersion for identification of asbestos types by dispersion staining / becke line method.

Qualifications

CA Labs is accredited by the National Voluntary Accreditation Program (NVLAP) for selected test methods for airborne fiber analysis (TEM), and for bulk asbestos fiber analysis (PLM). All analysts have a college degree in a natural science (geology, biology, or environmental science) or are recognized by a state professional board in one of these disciplines. Extensive in-house training programs are used to augment education background of the analyst. The group leader of polarized light has received supplemental McCrone Research training for asbestos identification. This report is not covered by the scope of NVLAP or AIHA accreditation. Analysis performed at CA Labs, LLC 12232 Industriplex, Suite 32 Baton Rouge, LA 70809.

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Customer Project:
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Incinerator Bldg.
Turnaround Time:
5 days

CA Labs Project #:
CBR13092870

Date: 9/23/2013
Samples Received: 9/18/2013
Date Of Sampling: N/A
Purchase Order #:

Sample #	Layer #	Analysts Physical Description of Subsample	Homo-geneous (Y/N)	Point Counted % / Asbestos Type
07	1	*white sealant*	*y*	***1.25% Chrysotile***

Baton Rouge NVLAP Lab Code 200772-0 TEM/PLM *TDH 30-0370*

LDEQ

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Approved Signatories:

Chris Williams
Analyst

Senior Analyst
Alicia Stretz

Laboratory Director
Chris Williams

CA Labs

C.A. Labs, LLC.
12232 Industriplex
Suite 32
Baton Rouge, LA 70809

Phone: 225-751-5632
Fax: 225-751-5634
Mobile: 225-993-3471

Chain of Custody

CBR13092870

Client Name: HZW ENVIRONMENTAL CONSULTANTS, LLC.

CA Labs Job # CBR

Client Address: 6105 HEISLEY RD
MENTOR, OH 44060

Billing Address: (if different)

phone number: (440) 357-1260
fax number: (440) 357-1510
Project Number:

Send Reports to: Incinerator Bldg
JSablar@hzwenv.com

Project Name: CANTON WATER RECLAMATION FACILITY

Contact: JOAN SABLAR

Reports Results VIA: EMAIL X FAX ___ VERBAL ___

Total # Samples Submitted:	Total # Samples to be Analyzed:	Material Matrix:
19		Air (Bulk) / Water

Asbestos: *please call ahead for availability of all rush and/or after hours samples.*

TEM	TA Time	PLM	TA Time	Optical / IAQ	TA Time
Circle analysis and TA time		*Circle analysis and TA time*	*2 hour*	Allergen Particle:	*2 hour*
AHERA	*4 hour*	Improved	4 hour	tape/bulk/swab	4 hour
EPA Level II	8 hour	Interim	8 hour	Cyclex-d cassettes	8 hour
Drinking Water	16 hour		16 hour	Air-o-cell cassettes	16 hour
Wipe	24 hour	AHERA	24 hour	Anderson cultures	24 hour
Micro-vac	2 days		2 days	Bulk/swab cultures	2 days
NIOSH 7402	3 days	Point Count -	3 days	Bacteria cultures	3 days
Chatfield Bulk	5 days	(NESHAPS)	5 days	PCM: NIOSH 7400	5-10 days

Lead: *Circle analysis and TA time*

Matrix:	Paint Chips	Soil	Air	Wipes	Wastewater	TCLP
TA Time:	*8 hour*	1 day	2 days	3 days	5 days	6-10 days

Sample Information:

Sample Number:	Sample Location:	Sample Date/Time:	Sample Volume (L)
01	STACK INSULATION		
02			
03			

Custody Information:

Samples relinquished: [illegible] 9/17/13 — Signature / Date / Time

Samples received: [illegible] 9/18/13 11am — Signature / Date / Time

Samples relinquished: — Signature / Date / Time

Samples received: — Signature / Date / Time

STOP AT FIRST POSITIVE PER JOB

CA Labs

12232 Industriplex
Suite 32
Baton Rouge, LA 70809

Phone: 225-751-5632
Fax: 225-751-5634
After hours Mobile: 225-993-3471

CBR13092870

Client Name: HZW ENVIRONMENTAL
Client Address: 6105 HEISLEY ROAD
MENTOR, OH 44060
phone number: (440) 357-1260
fax number: (440) 357-1510
Project Number:
Contact: JOAN SABLAR

CA Labs job # CBR

Billing Address:
(if different)
Send Reports to:
Project Name: CANTON WATER RECLAMATION FACILITY
Reports Results
VIA: EMAIL ✓ FAX ___ VERBAL ___

Sample Number:	Sample Location:	Sample Date/Time:	Sample Volume (L)
04	STACK CLOTH INSULATION		
05			
06			
07	WINDOW GLAZING		
08			
09	CAULKING MATERIAL		
10			
11	FIRE BRICK		
12			
13			
14	SOFT INSULATION		
15			
16			
17	DOOR INSULATION		
18			
19			

For internal use:
Any initial changes regarding project (indicate yes by checking line)_____

Custody Information:

Samples relinquished: _____ Signature / Date / Time

Samples received: [illegible] 9/18/13 11am Signature / Date / Time

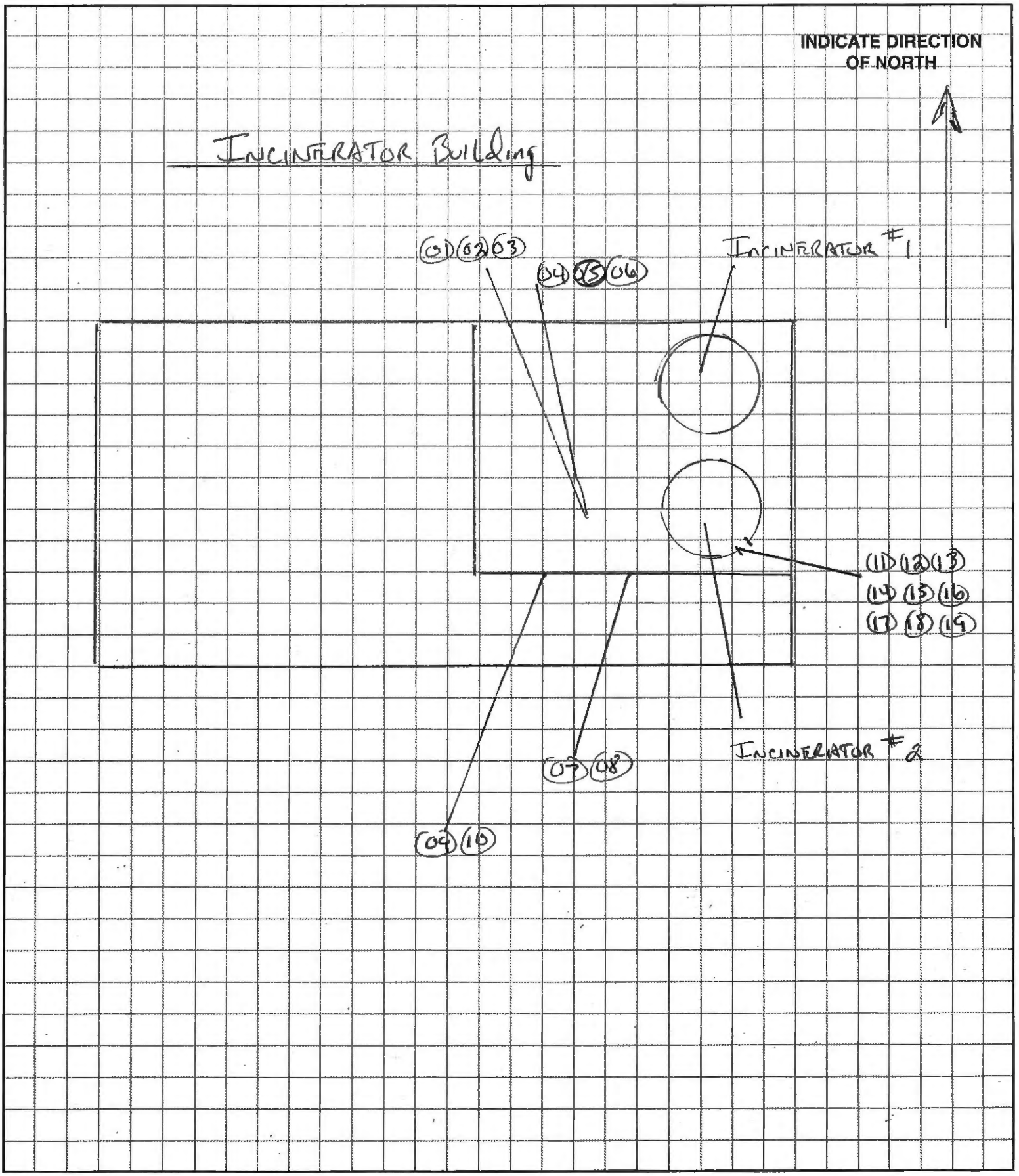
Samples relinquished: _____ Signature / Date / Time

Samples received: _____ Signature / Date / Time

HZW ENVIRONMENTAL
CONSULTANTS, LLC

6105 Heisley Road, Mentor, Ohio 44060
phone 440-357-1260 • 800-804-8484
fax 440-357-1510
A WOMAN-OWNED BUSINESS ENTERPRISE

PROJECT City of Canton Water Pollution Control Center
PROJECT NO. H13051-09
PAGE NO. 1 OF 1
FIELD REPRESENTATIVE MR DATE 9/12/13
SCALE



ATTACHMENT 5

OSHA 29 CFR 1926.1101 SECTIONS (G)(1), (G)(2) & (G)(3)

OSHA 29 CFR 1926.1101 SECTIONS
(g)(1), (g)(2) & (g)(3)

Paragraph (g)(1) states that the following engineering controls and work practices must be implemented:

a) vacuum cleaners equipped with high efficiency particulate air filters to collect all debris and dust;

b) wet methods, or wetting agents to control employee exposure during asbestos handling, mixing, removal, cutting, application and cleanup; and

c) prompt cleanup and disposal of wastes and debris contaminated with asbestos in leak-tight containers.

Paragraph (g)(2) states that in addition to the above requirements the following control methods must be implemented to be in compliance the time-weighted average (TWA) permissible exposure limit and excursion limit as set forth in the Standard:

a) local exhaust ventilation equipped with HEPA filter dust collection systems;

b) enclosure or isolation of processes producing asbestos dust;

c) ventilation of the work area to move contaminated air away from the breathing zone of employees and toward a filtration collection device equipped with a HEPA filter;

d) use of other feasible OSHA accepted work practices and engineering controls; and

e) use of respiratory protection when the above stated engineering controls and work practices are not sufficient to reduce employee exposures below the permissible exposure limit and/or excursion limit.

Paragraph (g)(3) states that the following work practices and engineering controls must not be for work related to asbestos or for work which disturbs ACMs:

a) high-speed abrasive disc saws that are not equipped with point-of-cut ventilator or enclosures with HEPA filtered exhaust air;

b) compressed air unless the compressed air is used in conjunction with an enclosed ventilation system designed to capture the dust cloud created by the compressed air;

c) dry sweeping, shoveling or other dry cleanup of dust and debris containing ACMs; and

d) employee rotation as a means of reducing employee exposure to asbestos.

ATTACHMENT 6

ADVANTAGES AND DISADVANTAGES OF CONTROL OPTIONS

CONTROL OPTIONS ADVANTAGES AND DISADVANTAGES

CONTROL OPTIONS	ADVANTAGES	DISADVANTAGES
Operations & Maintenance	ACM remains Minimal facility disruptions Low initial cost No/Minor waste generated	ACM hazard remains Material may need repaired
Repair	ACM remains Few facility disruptions Low initial cost Small amount of waste generated	ACM hazard remains Areas of facility must be regulated Material needs O&M Possible future removal costs
Encapsulation	ACM remains Few facility disruptions Low initial cost Small amount of waste generated	ACM hazard remains Areas of facility must be regulated Material needs O&M Future removal costs are higher
Enclosure	ACM remains Few facility disruptions Low initial cost Small amount of waste generated	ACM hazard remains Areas of facility must be regulated Material needs O&M Difficult to monitor ACM
Removal	ACM no longer remains Life cycle cost may be less expensive than other alternative	Areas of facility must be regulated High initial costs Large amount of waste generated Many facility disruptions

SECTION 10

2010 REPORT OF THICKLESS INSPECTION FROM ACUREN (RAW PUMP INLET DISCHARGE PIPING)

CITY OF CANTON
Canton, OH

Thickness Inspection
Raw Pump Inlet/Discharge
December 10, 2010

ACUREN

535 Kennedy Rd.
Akron, OH 44305
Phone: 330.733.8160 – Fax: 330.733.8644

Acuren
535 Kennedy Rd.
Suite D
Akron, OH, USA 44685
Phone: (330) 733-8160
(800) 321-0878
Fax: (330) 733-8644

Materials, Engineering & Testing
A Rockwood Company

December 10, 2010

City of Canton
3530 Central Ave. SE
Canton, OH 44707

Mr. Doug Dickerhoff

Subject: Piping Inspection (Pump-1)
Service Call: 228646

WORK SCOPE:

Perform B-scanning on piping at specified locations to determine metal thickness and rate of corrosion. Obtain design parameters and determine minimum thickness. Identify locations for possible repairs.

SUMMARY:

The piping system was suitable for continued service. The corrosion rate was 2.3 mils per year with an estimated remaining life of 7.8 years. The next inspection date should be no later than 4 years (half the estimated remaining life) or December, 2014. In addition to the B-scans, point thickness measurements were obtained at other locations where corrosion was suspected. It is recommended to re-inspect these isolated areas in one year to determine corrosion rate and locate possible repairs.

RESULTS:

- **48" Inlet**- Corrosion was discovered on the top of the inlet measuring 3" wide by 19" long. The original thickness was 0.250" and the current thickness at this area was 0.143". This area was marked for subsequent inspections to determine rate of corrosion.
- **48" Discharge Header**- Corrosion was discovered at the injection point of the discharge header at the bottom of the pipe in a 2" area. The original thickness was 0.250" and the measured thickness was 0.160".
- **24"Elbow To Rotor Valve**- Corrosion was noted on the section before the rotor valve with metal thickness of 0.240" recorded. The average thickness for the remaining portions was 0.420".
- **24" Elbow To Discharge**- Minor internal pitting was noted on the center sections of the elbow with an average pit depth of 0.032".

The minimum calculated thickness for the piping was 0.125". Conservative values were used to determine this value as no actual design data was available with respect to nominal thickness. The original design thickness did meet the requirements of AWWA Standard C-202 for nominal design pipe wall thickness. Additional inspections will be required in the event metal thickness falls below this value.

ACUREN

City of Canton
Pump 1 Piping
December 10, 2010

LAYOUT:

CAD drawings have been included to designate thickness measurement locations and problem areas.

RECOMMENDATIONS

It is recommended to re-inspect the aforementioned corroded areas in one year in order to prevent leaks and determine the rate of corrosion. The remaining sections should be placed on a 5 year inspection interval.

PERSONNEL:

Inspectors:

Rick Conley	API 510 Inspector SNT-TC-1A Level II	Certification #: 27342 MT/PT/UT/ET/RT
Jay Daigle	API Examiner / CWI / SNT-TC-1A Level II MT/PT/UT	

Inspection Review and Evaluation:

Rick Conley	API Inspector / SNT-TC-1A Level II MT/PT/UT/ET/RT

Should you have any additional questions concerning the inspection performed, please feel free to contact this office.

Sincerely,
Acuren Inspection

Richard Conley
API-Inspector

City of Canton
Canton, OH
Acuren Inspection
Akron, OH

(Report in Inches, Corrosion Rates in MPY)
Analysis: Statistical/Straight Line

Report Date: 01/03/2011 11:41:14

Unit: PIPING
Eq/Circ ID: PUMP 1
Eq Type:
Class:
RBI:

Description:

Flange Rating: 0 lb/in²
Design Pressure: 30 lb/in²
Design Temp: 300 °F

TML Corrosion Rates are each the maximum of:

(A) -- Calculated Corrosion Rates x 1.00	:	Varies
(B) -- Default Corrosion Rate	:	2.0 MPY

Representative Corrosion Rate is the Maximum of:

(A) -- Average Corrosion Rate x 1.10	:	2.2 MPY
(B) -- Average Max 25.0% of TMLs, Min of 2	:	2.0 MPY
(C) -- Formula Corrosion Rate (Sigma = 1.28)	:	2.3 MPY
(D) -- Default Corrosion Rate	:	2.0 MPY

Representative Corrosion Rate = 2.3 MPY

TML thickness readings taken above 150.0 °F have been compensated by 1% per 100.0 °F

TML thickness readings have not been compensated for growths.

TML Life calculations are based on the maximum of the Rep. TML CR and the RCR using Short Term, Long Term, and Best Fit Corrosion Rates.

Nominal thickness is used for TML corrosion rate calculations with less than 3 surveys.

Minimum time between inspections required for corrosion rate calculation is 6 months.

TML Inspection Interval is:
(A) -- Minimum(TML Life / 2.00, 5.0 years)

Eq/Circ ID Last Survey Date is based on the LAST of the last 0% of TML survey dates (Min 1).

Eq/Circ ID Estimated life = 7.8 years from the most recent survey date.
(Estimated Life is based on the average of the earliest 0% (Min 1) TML retirement dates.)

Predicted Eq/Circ ID Retirement date is 10/07/2018

Recommended Eq/Circ UT/RT Inspection Date is 11/07/2014
UT/RT Inspection Interval is the minimum(Remaining life / 2.0, 5.0 years).

Caution TML Logic: TML Corrosion Rate > 15.0 MPY .OR. TML Remaining Life < 1.00 Years.

There are 0 Caution TMLs in this Eq/Circ ID.

City of Canton
Canton, OH
Acuren Inspection
Akron, OH

TML Number	Location Description	Ctn TML	First Survey Thick Nt	First Survey Date	Previous Survey Thick Nt	Previous Survey Date	Last Survey Thick Nt	Last Survey Date	Short Term Rate	Long Term Rate	Best Fit Rate	Max Hist CR	Retirement Thickness	Rep TML CR	TML Retirement Date	TML Inspection Due Date
F2	ELBOW	N	N/A	N/A	N/A	N/A	0.421	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	08/22/2139	12/10/2015
F3	ELBOW	N	N/A	N/A	N/A	N/A	0.430	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	07/21/2143	12/10/2015
F4	ELBOW	N	N/A	N/A	N/A	N/A	0.430	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	07/21/2143	12/10/2015
F5	ELBOW	N	N/A	N/A	N/A	N/A	0.240	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	12/10/2060	12/10/2015
F6	ELBOW	N	N/A	N/A	N/A	N/A	0.400	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	07/05/2130	12/10/2015
F7	ELBOW	N	N/A	N/A	N/A	N/A	0.420	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	03/16/2139	12/10/2015
F8	ELBOW	N	N/A	N/A	N/A	N/A	0.423	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	07/05/2140	12/10/2015
G1	HEADER	N	N/A	N/A	N/A	N/A	0.240	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	12/10/2060	12/10/2015
G2	HEADER	N	N/A	N/A	N/A	N/A	0.250	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	04/16/2065	12/10/2015
G3	HEADER	N	N/A	N/A	N/A	N/A	0.250	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	04/16/2065	12/10/2015
G4	HEADER	N	N/A	N/A	N/A	N/A	0.240	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	12/10/2060	12/10/2015
G5	HEADER	N	N/A	N/A	N/A	N/A	0.160	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	02/27/2026	12/10/2015
G6	HEADER	N	N/A	N/A	N/A	N/A	0.230	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	08/04/2056	12/10/2015
G7	HEADER	N	N/A	N/A	N/A	N/A	0.250	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	04/16/2065	12/10/2015
G8	HEADER	N	N/A	N/A	N/A	N/A	0.240	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	12/10/2060	12/10/2015
H1	PIPE	N	N/A	N/A	N/A	N/A	0.145	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	08/21/2019	04/16/2015
H2	PIPE	N *	N/A	N/A	N/A	N/A	0.143	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	10/07/2018	11/08/2014
H3	PIPE	N	N/A	N/A	N/A	N/A	0.230	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	08/04/2056	12/10/2015
H4	PIPE	N	N/A	N/A	N/A	N/A	0.260	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	08/21/2069	12/10/2015
H5	PIPE	N	N/A	N/A	N/A	N/A	0.265	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	10/24/2071	12/10/2015
H6	PIPE	N	N/A	N/A	N/A	N/A	0.250	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	04/16/2065	12/10/2015
H7	PIPE	N	N/A	N/A	N/A	N/A	0.251	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	09/21/2065	12/10/2015
H8	PIPE	N	N/A	N/A	N/A	N/A	0.246	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	07/20/2063	12/10/2015
I1	ELBOW	N	N/A	N/A	N/A	N/A	0.412	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	09/23/2135	12/10/2015
I2	ELBOW	N	N/A	N/A	N/A	N/A	0.414	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	08/05/2136	12/10/2015
I3	ELBOW	N	N/A	N/A	N/A	N/A	0.406	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	02/12/2133	12/10/2015
I4	ELBOW	N	N/A	N/A	N/A	N/A	0.412	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	09/23/2135	12/10/2015
I5	ELBOW	N	N/A	N/A	N/A	N/A	0.407	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	07/21/2133	12/10/2015
I6	ELBOW	N	N/A	N/A	N/A	N/A	0.369	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	01/11/2117	12/10/2015
I7	ELBOW	N	N/A	N/A	N/A	N/A	0.409	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	06/03/2134	12/10/2015
I8	ELBOW	N	N/A	N/A	N/A	N/A	0.410	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	11/09/2134	12/10/2015

City of Canton
Canton, OH
Acuren Inspection
Akron, OH

Corrosion Monitoring Eq/Circ ID Analysis Report

(Report in Inches, Corrosion Rates in MPY)
Analysis: Statistical/Straight Line

Report Date: 01/03/2011 11:41:10

Unit: PIPING
Eq/Circ ID: PUMP 1
Eq Type: Description:
Class:
RBI:

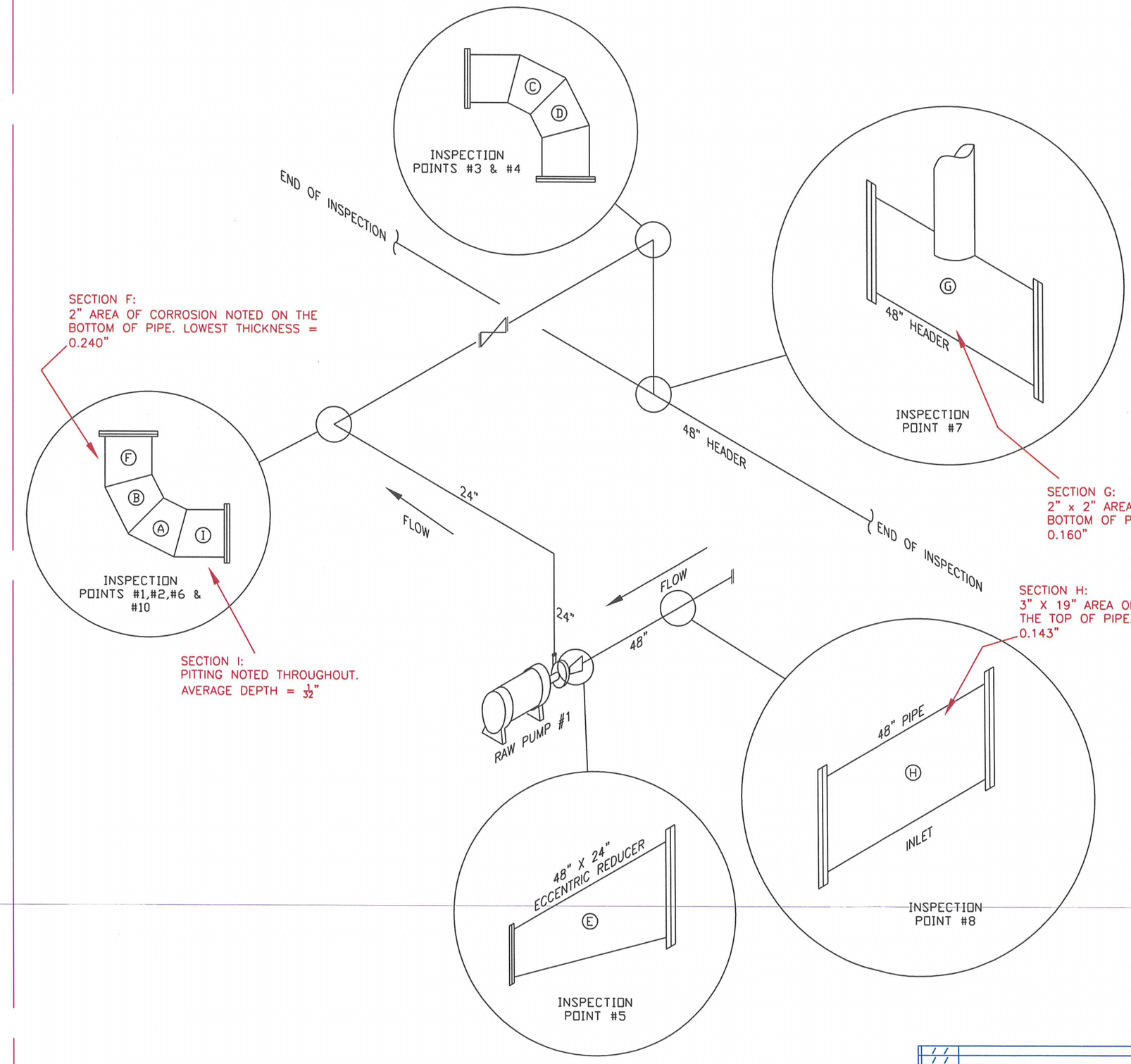
Flange Rating: 0 lb/in²
Design Pressure: 30 lb/in²
Design Temp: 300 °F

Summary: Group Name:
Insp. Due Date = 11/07/2014
Pred. Ret. Date = 10/07/2018

Group description:
RCR = 2.3 MPY
Rem. Life (from last survey 12/10/2010) = 7.8 yrs

0 C.A. Status: No
Total Caution TMLs = 0

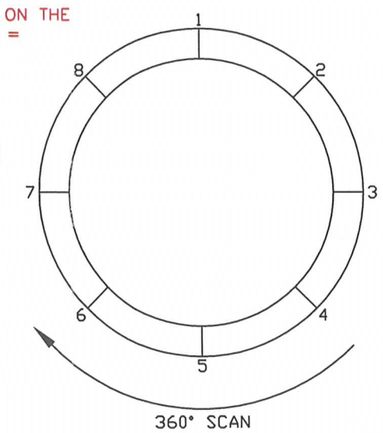
TML Number	Location Description	Ctn TML	First Survey Thick Nt	First Survey Date	Previous Survey Thick Nt	Previous Survey Date	Last Survey Thick Nt	Last Survey Date	Short Term Rate	Long Term Rate	Best Fit Rate	Max Hist CR	Retirement Thickness	Rep TML CR	TML Retirement Date	TML Inspection Due Date
A1	ELBOW	N	N/A	N/A	N/A	N/A	0.392	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	01/12/2127	12/10/2015
A2	ELBOW	N	N/A	N/A	N/A	N/A	0.400	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	07/05/2130	12/10/2015
A3	ELBOW	N	N/A	N/A	N/A	N/A	0.420	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	03/16/2139	12/10/2015
A4	ELBOW	N	N/A	N/A	N/A	N/A	0.406	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	02/12/2133	12/10/2015
A5	ELBOW	N	N/A	N/A	N/A	N/A	0.408	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	12/27/2133	12/10/2015
A6	ELBOW	N	N/A	N/A	N/A	N/A	0.344	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	02/28/2106	12/10/2015
A7	ELBOW	N	N/A	N/A	N/A	N/A	0.388	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	04/17/2125	12/10/2015
A8	ELBOW	N	N/A	N/A	N/A	N/A	0.400	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	07/05/2130	12/10/2015
B1	ELBOW	N	N/A	N/A	N/A	N/A	0.412	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	09/23/2135	12/10/2015
B2	ELBOW	N	N/A	N/A	N/A	N/A	0.416	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	06/19/2137	12/10/2015
B3	ELBOW	N	N/A	N/A	N/A	N/A	0.400	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	07/05/2130	12/10/2015
B4	ELBOW	N	N/A	N/A	N/A	N/A	0.410	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	11/09/2134	12/10/2015
B5	ELBOW	N	N/A	N/A	N/A	N/A	0.408	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	12/27/2133	12/10/2015
B6	ELBOW	N	N/A	N/A	N/A	N/A	0.394	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	11/25/2127	12/10/2015
B7	ELBOW	N	N/A	N/A	N/A	N/A	0.348	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	11/25/2107	12/10/2015
B8	ELBOW	N	N/A	N/A	N/A	N/A	0.350	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	10/08/2108	12/10/2015
C1	ELBOW	N	N/A	N/A	N/A	N/A	0.304	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	10/07/2088	12/10/2015
C2	ELBOW	N	N/A	N/A	N/A	N/A	0.312	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	03/30/2092	12/10/2015
C3	ELBOW	N	N/A	N/A	N/A	N/A	0.295	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	11/08/2084	12/10/2015
C4	ELBOW	N	N/A	N/A	N/A	N/A	0.300	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	01/11/2087	12/10/2015
C5	ELBOW	N	N/A	N/A	N/A	N/A	0.305	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	03/15/2089	12/10/2015
C6	ELBOW	N	N/A	N/A	N/A	N/A	0.311	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	10/24/2091	12/10/2015
C7	ELBOW	N	N/A	N/A	N/A	N/A	0.300	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	01/11/2087	12/10/2015
C8	ELBOW	N	N/A	N/A	N/A	N/A	0.312	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	03/30/2092	12/10/2015
D1	ELBOW	N	N/A	N/A	N/A	N/A	0.310	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	05/18/2091	12/10/2015
D2	ELBOW	N	N/A	N/A	N/A	N/A	0.313	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	09/05/2092	12/10/2015
D3	ELBOW	N	N/A	N/A	N/A	N/A	0.311	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	10/24/2091	12/10/2015
D4	ELBOW	N	N/A	N/A	N/A	N/A	0.312	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	03/30/2092	12/10/2015
D5	ELBOW	N	N/A	N/A	N/A	N/A	0.318	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	11/08/2094	12/10/2015
D6	ELBOW	N	N/A	N/A	N/A	N/A	0.322	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	08/04/2096	12/10/2015
D7	ELBOW	N	N/A	N/A	N/A	N/A	0.320	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	09/22/2095	12/10/2015
D8	ELBOW	N	N/A	N/A	N/A	N/A	0.300	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	01/11/2087	12/10/2015
E1	REDUCER	N	N/A	N/A	N/A	N/A	0.281	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	10/07/2078	12/10/2015
E2	REDUCER	N	N/A	N/A	N/A	N/A	0.275	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	02/28/2076	12/10/2015
E3	REDUCER	N	N/A	N/A	N/A	N/A	0.277	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	01/10/2077	12/10/2015
E4	REDUCER	N	N/A	N/A	N/A	N/A	0.272	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	11/08/2074	12/10/2015
E5	REDUCER	N	N/A	N/A	N/A	N/A	0.270	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	12/26/2073	12/10/2015
E6	REDUCER	N	N/A	N/A	N/A	N/A	0.248	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	06/02/2064	12/10/2015
E7	REDUCER	N	N/A	N/A	N/A	N/A	0.271	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	06/02/2074	12/10/2015
E8	REDUCER	N	N/A	N/A	N/A	N/A	0.263	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	12/10/2070	12/10/2015
F1	ELBOW	N	N/A	N/A	N/A	N/A	0.433	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	11/09/2144	12/10/2015



SPECIFICATIONS

PIPE:	24" & 48" – ASTM A53 GRADE A (SPIRAL)
FITTINGS:	MITERED PIPE – ASTM A53 GRADE A (SPIRAL)
FLANGES:	---
CONSTRUCTION CODE:	---
INSPECTION CODE:	API 570
DESIGN PRESSURE:	---
DESIGN TEMPERATURE:	---
OPERATING PRESSURE:	30 PSI
OPERATING TEMPERATURE:	AMBIENT

1. (X) = THICKNESS MEASUREMENT LOCATIONS (TML)
2. EACH TEST LOCATION WAS SCANNED 360° AND THE LOWEST READING WAS RECORDED FOR EACH POSITION ON THE PIPE.
3. FOR HORIZONTAL LINES RUNNING EAST/WEST, THE SCAN PROGRESSION IS TOP, NORTH, BOTTOM, SOUTH.
4. FOR HORIZONTAL LINES RUNNING NORTH/SOUTH, THE PROGRESSION IS TOP, EAST, BOTTOM, WEST.
5. FOR VERTICAL LINES THE PROGRESSION IS NORTH, EAST SOUTH, WEST.
6. TEST LOCATIONS ARE APPROXIMATED ON THE DRAWING BUT MARKED ON THE ACTUAL PIPE.
7. THE DRAWING IS PROVIDED ONLY AS A REPRESENTATION OF THE TESTING AREAS. NO LINE DIMENSIONS WERE TAKEN DURING THE TESTING.
8. MOST ITEMS ONLY REPRESENT THE EXISTENCE OF A PIPE COMPONENT.



SCAN PROGRESSION

CITY OF CANTON
WATER RECLAIMATION

3530 CENTRAL AVE. SE – CANTON, OH 44707

TITLE: RAW PUMP DISCHARGE 1

THICKNESS MEASUREMENT LOCATIONS

DATE:	DESCRIPTION	BY:	REV.
/ /			
/ /			
/ /			
/ /			
/ /			

DRAWN BY: LAJ	LAB. NO. 228646	ACUREN INSPECTION 335 KENNEDY RD. AKRON, OH 44305	
CHECKED BY: RC	DEPT. MECH. INT.		
APPROVED BY: RC	SCALE: NTS	DRAWING NO. COCWR-12102010-1-001	REV. 0
	DATE: 12.10.2010		

CITY OF CANTON
Canton, OH

Thickness Inspection
Pump 2 Piping
December 10, 2010

ACUREN

535 Kennedy Rd.
Akron, OH 44305
Phone: 330.733.8160 – Fax: 330.733.8644

Acuren
535 Kennedy Rd.
Suite D
Akron, OH, USA 44685
Phone: (330) 733-8160
(800) 321-0878
Fax: (330) 733-8644

Materials, Engineering & Testing
A Rockwood Company

December 10, 2010

City of Canton
3530 Central Ave. SE
Canton, OH 44707

Mr. Doug Dickerhoff

Subject: Piping Inspection (Pump-2)
Service Call: 228646

WORK SCOPE:

Perform B-scanning on piping at specified locations to determine metal thickness and rate of corrosion. Obtain design parameters and determine minimum thickness. Identify locations for possible repairs.

SUMMARY:

The piping system was suitable for continued service. The corrosion rate was 2.3 mils per year with an estimated remaining life of 20 years. The next inspection date should be no later than 5 years or December, 2015. In addition to the B-scans, point thickness measurements were obtained at other locations where corrosion was suspected. It is recommended to re-inspect these isolated areas in one year to determine corrosion rate and locate possible repairs.

RESULTS:

- **48" Inlet**- No significant corrosion or metal loss was noted.
- **48" Discharge Header**- Corrosion was discovered at the injection point of the discharge header at the bottom west side of the pipe in a 3" area. The original thickness was 0.250" and the measured thickness was 0.190". The remaining portions of the line remain at the nominal thickness of 0.250".
- **24"Elbow To Rotor Valve**- Corrosion was noted on the section before the rotor valve adjacent to the existing repair patch and to a lesser degree throughout the elbow. Metal thickness adjacent to the patch was 0.195". Thicknesses for the remaining portion of the section ranged from 0.370" to 0.420".
- **24" Elbow To Discharge**- No significant corrosion was noted on this elbow.

The minimum calculated thickness for the piping was 0.125". The original design thickness did meet the requirements of AWWA Standard C-202 for nominal design pipe wall thickness. The material of construction was A-53 Grade B. The internal pressure used was 30 psi and a additional weight of 250 pounds was used. Additional inspections will be required in the event metal thickness falls below this value.

ACUREN

City of Canton
Pump 2 Piping
December 10, 2010

LAYOUT:

CAD drawings have been included to designate thickness measurement locations and problem areas.

RECOMMENDATIONS

It is recommended to re-inspect the aforementioned corroded areas in one year in order to prevent leaks and determine the rate of corrosion. The remaining sections should be placed on a 5 year inspection interval.

PERSONNEL:

Inspectors:

Rick Conley	API 510 Inspector SNT-TC-1A Level II	Certification #: 27342 MT/PT/UT/ET/RT
Jay Daigle	API Examiner / CWI / SNT-TC-1A Level II MT/PT/UT	

Inspection Review and Evaluation:

Rick Conley API Inspector / SNT-TC-1A Level II MT/PT/UT/ET/RT

Should you have any additional questions concerning the inspection performed, please feel free to contact this office.

Sincerely,
Acuren Inspection

Richard Conley
API-Inspector

City of Canton
Canton, OH
Acuren Inspection
Akron, OH

Corrosion Monitoring Eq/Circ ID Analysis Report

(Report in Inches, Corrosion Rates in MPY)
Analysis: Statistical/Straight Line

Report Date: 01/03/2011 11:42:05

Unit: PIPING
Eq/Circ ID: PUMP 2
Eq Type:
Class:
RBI:

Description:

Flange Rating: 0 lb/in²
Design Pressure: 30 lb/in²
Design Temp: 300 °F

Summary: Group Name:
Insp. Due Date = 12/10/2015
Pred. Ret. Date = 03/15/2039

Group description:
RCR = 2.3 MPY
Rem. Life (from last survey 12/10/2010) = 28.3 yrs

0 C.A. Status: No
Total Caution TMLs = 0

TML Number	Location Description	Ctn TML	First Survey Thick Nt	First Survey Date	Previous Survey Thick Nt	Previous Survey Date	Last Survey Thick Nt	Last Survey Date	Short Term Rate	Long Term Rate	Best Fit Rate	Max Hist CR	Retirement Thickness	Rep TML CR	TML Retirement Date	TML Inspection Due Date
A1	ELBOW	N	N/A	N/A	N/A	N/A	0.399	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	01/27/2130	12/10/2015
A2	ELBOW	N	N/A	N/A	N/A	N/A	0.390	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	02/28/2126	12/10/2015
A3	ELBOW	N	N/A	N/A	N/A	N/A	0.400	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	07/05/2130	12/10/2015
A4	ELBOW	N	N/A	N/A	N/A	N/A	0.410	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	11/09/2134	12/10/2015
A5	ELBOW	N	N/A	N/A	N/A	N/A	0.415	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	01/11/2137	12/10/2015
A6	ELBOW	N	N/A	N/A	N/A	N/A	0.390	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	02/28/2126	12/10/2015
A7	ELBOW	N	N/A	N/A	N/A	N/A	0.400	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	07/05/2130	12/10/2015
A8	ELBOW	N	N/A	N/A	N/A	N/A	0.420	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	03/16/2139	12/10/2015
B1	ELBOW	N	N/A	N/A	N/A	N/A	0.419	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	10/08/2138	12/10/2015
B2	ELBOW	N	N/A	N/A	N/A	N/A	0.414	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	08/05/2136	12/10/2015
B3	ELBOW	N	N/A	N/A	N/A	N/A	0.415	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	01/11/2137	12/10/2015
B4	ELBOW	N	N/A	N/A	N/A	N/A	0.420	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	03/16/2139	12/10/2015
B5	ELBOW	N	N/A	N/A	N/A	N/A	0.407	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	07/21/2133	12/10/2015
B6	ELBOW	N	N/A	N/A	N/A	N/A	0.405	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	09/06/2132	12/10/2015
B7	ELBOW	N	N/A	N/A	N/A	N/A	0.400	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	07/05/2130	12/10/2015
B8	ELBOW	N	N/A	N/A	N/A	N/A	0.393	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	06/20/2127	12/10/2015
C1	ELBOW	N	N/A	N/A	N/A	N/A	0.312	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	03/30/2092	12/10/2015
C2	ELBOW	N	N/A	N/A	N/A	N/A	0.298	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	02/27/2086	12/10/2015
C3	ELBOW	N	N/A	N/A	N/A	N/A	0.300	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	01/11/2087	12/10/2015
C4	ELBOW	N	N/A	N/A	N/A	N/A	0.319	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	04/16/2095	12/10/2015
C5	ELBOW	N	N/A	N/A	N/A	N/A	0.325	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	11/24/2097	12/10/2015
C6	ELBOW	N	N/A	N/A	N/A	N/A	0.322	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	08/04/2096	12/10/2015
C7	ELBOW	N	N/A	N/A	N/A	N/A	0.320	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	09/22/2095	12/10/2015
C8	ELBOW	N	N/A	N/A	N/A	N/A	0.319	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	04/16/2095	12/10/2015
D1	ELBOW	N	N/A	N/A	N/A	N/A	0.312	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	03/30/2092	12/10/2015
D2	ELBOW	N	N/A	N/A	N/A	N/A	0.312	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	03/30/2092	12/10/2015
D3	ELBOW	N	N/A	N/A	N/A	N/A	0.320	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	09/22/2095	12/10/2015
D4	ELBOW	N	N/A	N/A	N/A	N/A	0.288	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	10/23/2081	12/10/2015
D5	ELBOW	N	N/A	N/A	N/A	N/A	0.296	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	04/16/2085	12/10/2015
D6	ELBOW	N	N/A	N/A	N/A	N/A	0.288	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	10/23/2081	12/10/2015
D7	ELBOW	N	N/A	N/A	N/A	N/A	0.312	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	03/30/2092	12/10/2015
D8	ELBOW	N	N/A	N/A	N/A	N/A	0.321	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	02/28/2096	12/10/2015
E1	REDUCER	N	N/A	N/A	N/A	N/A	0.280	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	05/02/2078	12/10/2015
E2	REDUCER	N	N/A	N/A	N/A	N/A	0.280	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	05/02/2078	12/10/2015
E3	REDUCER	N	N/A	N/A	N/A	N/A	0.278	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	06/18/2077	12/10/2015
E4	REDUCER	N	N/A	N/A	N/A	N/A	0.280	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	05/02/2078	12/10/2015
E5	REDUCER	N	N/A	N/A	N/A	N/A	0.280	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	05/02/2078	12/10/2015
E6	REDUCER	N	N/A	N/A	N/A	N/A	0.275	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	02/28/2076	12/10/2015
E7	REDUCER	N	N/A	N/A	N/A	N/A	0.272	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	11/08/2074	12/10/2015
E8	REDUCER	N	N/A	N/A	N/A	N/A	0.277	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	01/10/2077	12/10/2015
F1	ELBOW	N	N/A	N/A	N/A	N/A	0.415	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	01/11/2137	12/10/2015

City of Canton
Canton, OH
Acuren Inspection
Akron, OH

TML Number	Location Description	Ctn TML	First Survey Thick Nt	First Survey Date	Previous Survey Thick Nt	Previous Survey Date	Last Survey Thick Nt	Last Survey Date	Short Term Rate	Long Term Rate	Best Fit Rate	Max Hist CR	Retirement Thickness	Rep TML CR	TML Retirement Date	TML Inspection Due Date
F2	ELBOW	N	N/A	N/A	N/A	N/A	0.400	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	07/05/2130	12/10/2015
F3	ELBOW	N	N/A	N/A	N/A	N/A	0.391	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	08/06/2126	12/10/2015
F4	ELBOW	N	N/A	N/A	N/A	N/A	0.388	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	04/17/2125	12/10/2015
F5	ELBOW	N	N/A	N/A	N/A	N/A	0.370	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	06/19/2117	12/10/2015
F6	ELBOW	N	N/A	N/A	N/A	N/A	0.376	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	01/28/2120	12/10/2015
F7	ELBOW	N	N/A	N/A	N/A	N/A	0.388	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	04/17/2125	12/10/2015
F8	ELBOW	N	N/A	N/A	N/A	N/A	0.420	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	03/16/2139	12/10/2015
G1	HEADER	N	N/A	N/A	N/A	N/A	0.250	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	04/16/2065	12/10/2015
G2	HEADER	N	N/A	N/A	N/A	N/A	0.245	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	02/12/2063	12/10/2015
G3	HEADER	N	N/A	N/A	N/A	N/A	0.233	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	11/24/2057	12/10/2015
G4	HEADER	N	N/A	N/A	N/A	N/A	0.255	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	06/19/2067	12/10/2015
G5	HEADER	N *	N/A	N/A	N/A	N/A	0.190	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	03/15/2039	12/10/2015
G6	HEADER	N	N/A	N/A	N/A	N/A	0.230	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	08/04/2056	12/10/2015
G7	HEADER	N	N/A	N/A	N/A	N/A	0.250	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	04/16/2065	12/10/2015
G8	HEADER	N	N/A	N/A	N/A	N/A	0.250	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	04/16/2065	12/10/2015
H1	PIPE	N	N/A	N/A	N/A	N/A	0.271	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	06/02/2074	12/10/2015
H2	PIPE	N	N/A	N/A	N/A	N/A	0.266	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	03/30/2072	12/10/2015
H3	PIPE	N	N/A	N/A	N/A	N/A	0.260	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	08/21/2069	12/10/2015
H4	PIPE	N	N/A	N/A	N/A	N/A	0.268	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	02/11/2073	12/10/2015
H5	PIPE	N	N/A	N/A	N/A	N/A	0.270	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	12/26/2073	12/10/2015
H6	PIPE	N	N/A	N/A	N/A	N/A	0.250	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	04/16/2065	12/10/2015
H7	PIPE	N	N/A	N/A	N/A	N/A	0.255	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	06/19/2067	12/10/2015
H8	PIPE	N	N/A	N/A	N/A	N/A	0.258	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	10/07/2068	12/10/2015
I1	ELBOW	N	N/A	N/A	N/A	N/A	0.400	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	07/05/2130	12/10/2015
I2	ELBOW	N	N/A	N/A	N/A	N/A	0.412	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	09/23/2135	12/10/2015
I3	ELBOW	N	N/A	N/A	N/A	N/A	0.407	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	07/21/2133	12/10/2015
I4	ELBOW	N	N/A	N/A	N/A	N/A	0.395	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	05/02/2128	12/10/2015
I5	ELBOW	N	N/A	N/A	N/A	N/A	0.400	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	07/05/2130	12/10/2015
I6	ELBOW	N	N/A	N/A	N/A	N/A	0.388	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	04/17/2125	12/10/2015
I7	ELBOW	N	N/A	N/A	N/A	N/A	0.390	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	02/28/2126	12/10/2015
I8	ELBOW	N	N/A	N/A	N/A	N/A	0.356	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	05/19/2111	12/10/2015
J1	HEADER	N	N/A	N/A	N/A	N/A	0.240	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	12/10/2060	12/10/2015
J2	HEADER	N	N/A	N/A	N/A	N/A	0.252	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	02/27/2066	12/10/2015
J3	HEADER	N	N/A	N/A	N/A	N/A	0.239	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	07/04/2060	12/10/2015
J4	HEADER	N	N/A	N/A	N/A	N/A	0.245	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	02/12/2063	12/10/2015
J5	HEADER	N	N/A	N/A	N/A	N/A	0.250	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	04/16/2065	12/10/2015
J6	HEADER	N	N/A	N/A	N/A	N/A	0.251	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	09/21/2065	12/10/2015
J7	HEADER	N	N/A	N/A	N/A	N/A	0.250	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	04/16/2065	12/10/2015
J8	HEADER	N	N/A	N/A	N/A	N/A	0.253	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	08/05/2066	12/10/2015

City of Canton
Canton, OH
Acuren Inspection
Akron, OH

(Report in Inches, Corrosion Rates in MPY)
Analysis: Statistical/Straight Line

Report Date: 01/03/2011 11:42:10

Unit: PIPING
Eq/Circ ID: PUMP 2
Eq Type:
Class:
RBI:

Description:

Flange Rating: 0 lb/in²
Design Pressure: 30 lb/in²
Design Temp: 300 °F

TML Corrosion Rates are each the maximum of:
(A) -- Calculated Corrosion Rates x 1.00 : Varies
(B) -- Default Corrosion Rate : 2.0 MPY

Representative Corrosion Rate is the Maximum of:
(A) -- Average Corrosion Rate x 1.10 : 2.2 MPY
(B) -- Average Max 25.0% of TMLs, Min of 2 : 2.0 MPY
(C) -- Formula Corrosion Rate (Sigma = 1.28) : 2.3 MPY
(D) -- Default Corrosion Rate : 2.0 MPY
Representative Corrosion Rate = 2.3 MPY

TML thickness readings taken above 150.0 °F have been compensated by 1% per 100.0 °F

TML thickness readings have not been compensated for growths.

TML Life calculations are based on the maximum of the Rep. TML CR and the RCR using Short Term, Long Term, and Best Fit Corrosion Rates.

Nominal thickness is used for TML corrosion rate calculations with less than 3 surveys.

Minimum time between inspections required for corrosion rate calculation is 6 months.

TML Inspection Interval is:
(A) -- Minimum(TML Life / 2.00, 5.0 years)

Eq/Circ ID Last Survey Date is based on the LAST of the last 0% of TML survey dates (Min 1).

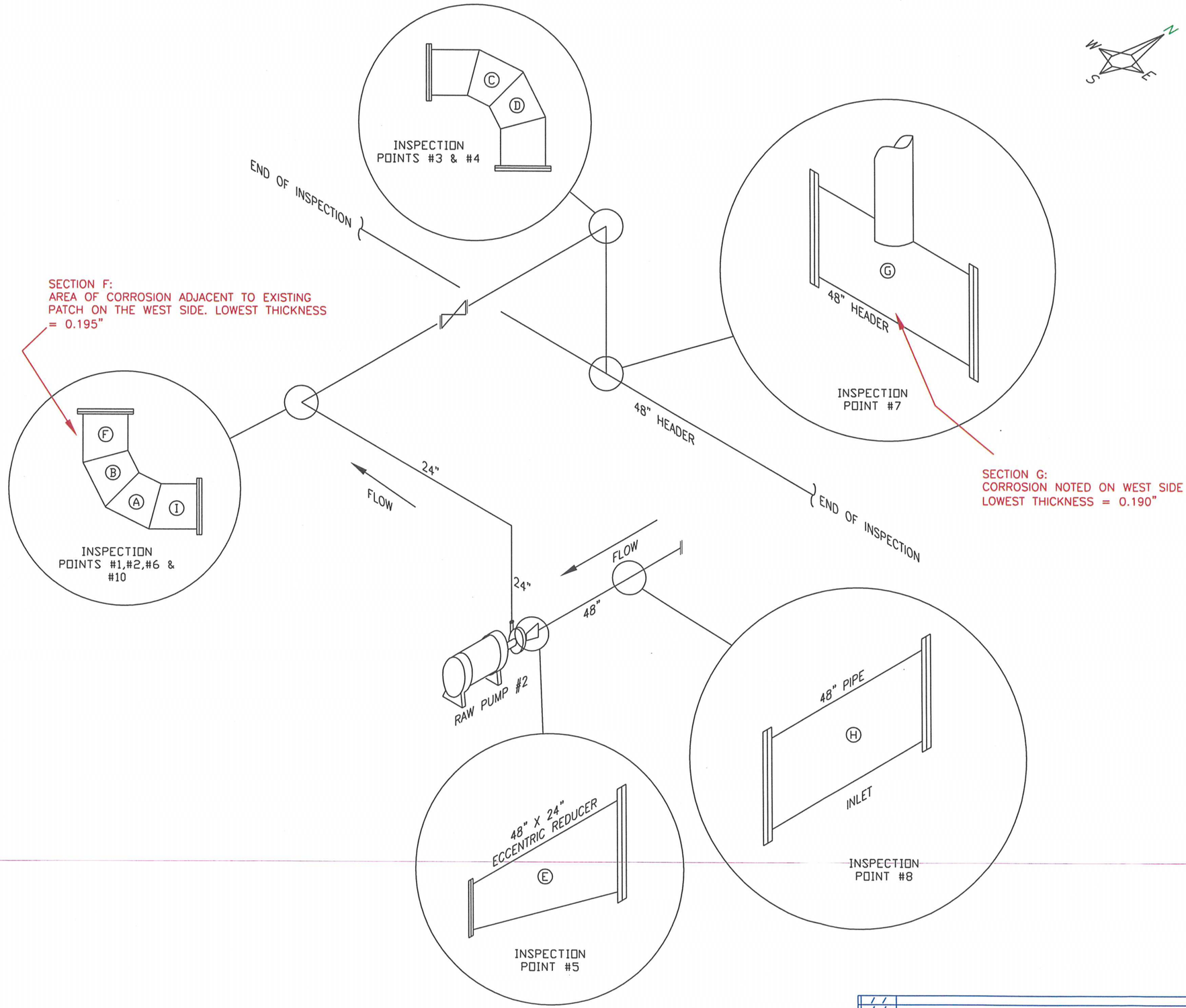
Eq/Circ ID Estimated life = 28.3 years from the most recent survey date.
(Estimated Life is based on the average of the earliest 0% (Min 1) TML retirement dates.)

Predicted Eq/Circ ID Retirement date is 03/15/2039

Recommended Eq/Circ UT/RT Inspection Date is 12/10/2015
UT/RT Inspection Interval is the minimum(Remaining life / 2.0, 5.0 years).

Caution TML Logic: TML Corrosion Rate > 15.0 MPY .OR. TML Remaining Life < 1.00 Years.

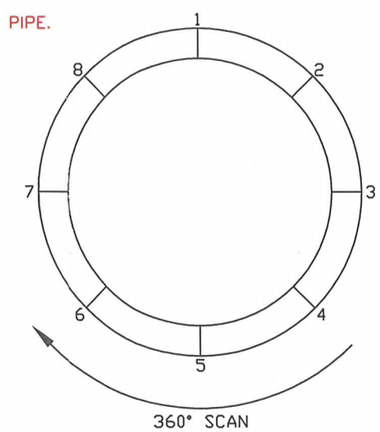
There are 0 Caution TMLs in this Eq/Circ ID.



SPECIFICATIONS

PIPE:	24" & 48" – ASTM A53 GRADE A (SPIRAL)
FITTINGS:	MITERED PIPE – ASTM A53 GRADE A (SPIRAL)
FLANGES:	---
CONSTRUCTION CODE:	---
INSPECTION CODE:	API 570
DESIGN PRESSURE:	---
DESIGN TEMPERATURE:	---
OPERATING PRESSURE:	30 PSI
OPERATING TEMPERATURE:	AMBIENT

1. (X) = THICKNESS MEASUREMENT LOCATIONS (TML)
2. EACH TEST LOCATION WAS SCANNED 360° AND THE LOWEST READING WAS RECORDED FOR EACH POSITION ON THE PIPE.
3. FOR HORIZONTAL LINES RUNNING EAST/WEST, THE SCAN PROGRESSION IS TOP, NORTH, BOTTOM, SOUTH.
4. FOR HORIZONTAL LINES RUNNING NORTH/SOUTH, THE PROGRESSION IS TOP, EAST, BOTTOM, WEST.
5. FOR VERTICAL LINES THE PROGRESSION IS NORTH, EAST SOUTH, WEST.
6. TEST LOCATIONS ARE APPROXIMATED ON THE DRAWING BUT MARKED ON THE ACTUAL PIPE.
7. THE DRAWING IS PROVIDED ONLY AS A REPRESENTATION OF THE TESTING AREAS. NO LINE DIMENSIONS WERE TAKEN DURING THE TESTING.
8. MOST ITEMS ONLY REPRESENT THE EXISTENCE OF A PIPE COMPONENT.



SCAN PROGRESSION

CITY OF CANTON WATER RECLAIMATION

3530 CENTRAL AVE. SE – CANTON, OH 44707

TITLE: RAW PUMP DISCHARGE 2

THICKNESS MEASUREMENT LOCATIONS

DATE:	DESCRIPTION	BY:	REV.
/ /			
/ /			
/ /			
/ /			

DRAWN BY: LAJ	LAB. NO. 228646	ACUREN INSPECTION 535 KENNEDY RD. AKRON, OH 44305	
CHECKED BY: RC	DEPT. MECH. INT.		
APPROVED BY: RC	SCALE: NTS	DRAWING NO. COCWR-12102010-2-001	REV. 0
	DATE: 12.10.2010		

CITY OF CANTON
Canton, OH

Thickness Inspection
Pump 3 Piping
December 10, 2010

ACUREN

535 Kennedy Rd.
Akron, OH 44305
Phone: 330.733.8160 – Fax: 330.733.8644

Acuren
535 Kennedy Rd.
Suite D
Akron, OH, USA 44685
Phone: (330) 733-8160
(800) 321-0878
Fax: (330) 733-8644

Materials, Engineering & Testing
A Rockwood Company

December 10, 2010

City of Canton
3530 Central Ave. SE
Canton, OH 44707

Mr. Doug Dickerhoff

Subject: Piping Inspection (Pump-3)
Service Call: 228646

WORK SCOPE:

Perform B-scanning on piping at specified locations to determine metal thickness and rate of corrosion. Obtain design parameters and determine minimum thickness. Identify locations for possible repairs.

SUMMARY:

The piping system was suitable for continued service. The corrosion rate was 2.3 mils per year with an estimated remaining life of 20 years. The next inspection date should be no later than 5 years or December, 2015. In addition to the B-scans, point thickness measurements were obtained at other locations where corrosion was suspected. It is recommended to re-inspect these isolated areas in one year to determine corrosion rate and locate possible repairs.

RESULTS:

- **48" Inlet**- No significant corrosion or metal loss was noted.
- **48" Discharge Header**- No significant corrosion or metal loss was noted.
- **24"Elbow To Rotor Valve**- Corrosion was noted on the section before the rotor valve located on the bottom of the pipe with the lowest recorded thickness of 0.230". The corroded area encompassed 4".
- **24" Elbow To Discharge**- No significant corrosion was noted on this elbow.

The minimum calculated thickness for the piping was 0.125". The original design thickness did meet the requirements of AWWA Standard C-202 for nominal design pipe wall thickness. The material of construction was A-53 Grade B. The internal pressure used was 30 psi and additional weight of 250 pounds was used. Additional inspections will be required in the event metal thickness falls below this value.

ACUREN

City of Canton
Pump 3 Piping
December 10, 2010

LAYOUT:

CAD drawings have been included to designate thickness measurement locations and problem areas.

RECOMMENDATIONS

It is recommended to re-inspect the aforementioned corroded area on the elbow in one year in order to prevent leaks and determine the rate of corrosion. The remaining sections should be placed on a 5 year inspection interval.

PERSONNEL:

Inspectors:

Rick Conley	API 510 Inspector SNT-TC-1A Level II	Certification #: 27342 MT/PT/UT/ET/RT
Jay Daigle	API Examiner / CWI / SNT-TC-1A Level II MT/PT/UT	

Inspection Review and Evaluation:

Rick Conley	API Inspector / SNT-TC-1A Level II MT/PT/UT/ET/RT

Should you have any additional questions concerning the inspection performed, please feel free to contact this office.

Sincerely,
Acuren Inspection

Richard Conley
API-Inspector

City of Canton
Canton, OH
Acuren Inspection
Akron, OH

Corrosion Monitoring Eq/Circ ID Analysis Report

(Report in Inches, Corrosion Rates in MPY)
Analysis: Statistical/Straight Line

Report Date: 01/03/2011 11:42:44

Unit: PIPING
Eq/Circ ID: PUMP 3
Eq Type: Description:
Class:
RBI:

Flange Rating: 0 lb/in²
Design Pressure: 30 lb/in²
Design Temp: 300 °F

Summary: Group Name:
Insp. Due Date = 12/10/2015
Pred. Ret. Date = 08/04/2056

Group description:
RCR = 2.3 MPY
Rem. Life (from last survey 12/10/2010) = 45.6 yrs

0 C.A. Status: No
Total Caution TMLs = 0

TML Number	Location Description	Ctn TML	First Survey Thick Nt	First Survey Date	Previous Survey Thick Nt	Previous Survey Date	Last Survey Thick Nt	Last Survey Date	Short Term Rate	Long Term Rate	Best Fit Rate	Max Hist CR	Retirement Thickness	Rep TML CR	TML Retirement Date	TML Inspection Due Date
A1	ELBOW	N	N/A	N/A	N/A	N/A	0.400	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	07/05/2130	12/10/2015
A2	ELBOW	N	N/A	N/A	N/A	N/A	0.408	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	12/27/2133	12/10/2015
A3	ELBOW	N	N/A	N/A	N/A	N/A	0.416	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	06/19/2137	12/10/2015
A4	ELBOW	N	N/A	N/A	N/A	N/A	0.360	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	02/12/2113	12/10/2015
A5	ELBOW	N	N/A	N/A	N/A	N/A	0.400	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	07/05/2130	12/10/2015
A6	ELBOW	N	N/A	N/A	N/A	N/A	0.410	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	11/09/2134	12/10/2015
A7	ELBOW	N	N/A	N/A	N/A	N/A	0.390	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	02/28/2126	12/10/2015
A8	ELBOW	N	N/A	N/A	N/A	N/A	0.399	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	01/27/2130	12/10/2015
B1	ELBOW	N	N/A	N/A	N/A	N/A	0.418	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	05/03/2138	12/10/2015
B2	ELBOW	N	N/A	N/A	N/A	N/A	0.420	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	03/16/2139	12/10/2015
B3	ELBOW	N	N/A	N/A	N/A	N/A	0.416	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	06/19/2137	12/10/2015
B4	ELBOW	N	N/A	N/A	N/A	N/A	0.410	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	11/09/2134	12/10/2015
B5	ELBOW	N	N/A	N/A	N/A	N/A	0.370	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	06/19/2117	12/10/2015
B6	ELBOW	N	N/A	N/A	N/A	N/A	0.378	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	12/11/2120	12/10/2015
B7	ELBOW	N	N/A	N/A	N/A	N/A	0.400	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	07/05/2130	12/10/2015
B8	ELBOW	N	N/A	N/A	N/A	N/A	0.406	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	02/12/2133	12/10/2015
C1	ELBOW	N	N/A	N/A	N/A	N/A	0.300	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	01/11/2087	12/10/2015
C2	ELBOW	N	N/A	N/A	N/A	N/A	0.312	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	03/30/2092	12/10/2015
C3	ELBOW	N	N/A	N/A	N/A	N/A	0.320	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	09/22/2095	12/10/2015
C4	ELBOW	N	N/A	N/A	N/A	N/A	0.322	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	08/04/2096	12/10/2015
C5	ELBOW	N	N/A	N/A	N/A	N/A	0.310	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	05/18/2091	12/10/2015
C6	ELBOW	N	N/A	N/A	N/A	N/A	0.305	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	03/15/2089	12/10/2015
C7	ELBOW	N	N/A	N/A	N/A	N/A	0.323	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	01/10/2097	12/10/2015
C8	ELBOW	N	N/A	N/A	N/A	N/A	0.313	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	09/05/2092	12/10/2015
D1	ELBOW	N	N/A	N/A	N/A	N/A	0.305	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	03/15/2089	12/10/2015
D2	ELBOW	N	N/A	N/A	N/A	N/A	0.319	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	04/16/2095	12/10/2015
D3	ELBOW	N	N/A	N/A	N/A	N/A	0.320	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	09/22/2095	12/10/2015
D4	ELBOW	N	N/A	N/A	N/A	N/A	0.315	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	07/20/2093	12/10/2015
D5	ELBOW	N	N/A	N/A	N/A	N/A	0.312	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	03/30/2092	12/10/2015
D6	ELBOW	N	N/A	N/A	N/A	N/A	0.310	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	05/18/2091	12/10/2015
D7	ELBOW	N	N/A	N/A	N/A	N/A	0.305	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	03/15/2089	12/10/2015
D8	ELBOW	N	N/A	N/A	N/A	N/A	0.310	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	05/18/2091	12/10/2015
E1	REDUCER	N	N/A	N/A	N/A	N/A	0.267	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	09/05/2072	12/10/2015
E2	REDUCER	N	N/A	N/A	N/A	N/A	0.264	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	05/18/2071	12/10/2015
E3	REDUCER	N	N/A	N/A	N/A	N/A	0.270	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	12/26/2073	12/10/2015
E4	REDUCER	N	N/A	N/A	N/A	N/A	0.250	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	04/16/2065	12/10/2015
E5	REDUCER	N	N/A	N/A	N/A	N/A	0.267	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	09/05/2072	12/10/2015
E6	REDUCER	N	N/A	N/A	N/A	N/A	0.278	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	06/18/2077	12/10/2015
E7	REDUCER	N	N/A	N/A	N/A	N/A	0.280	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	05/02/2078	12/10/2015
E8	REDUCER	N	N/A	N/A	N/A	N/A	0.281	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	10/07/2078	12/10/2015
F1	ELBOW	N	N/A	N/A	N/A	N/A	0.400	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	07/05/2130	12/10/2015

City of Canton
Canton, OH
Acuren Inspection
Akron, OH

TML Number	Location Description	Ctn TML	First Survey Thick Nt	First Survey Date	Previous Survey Thick Nt	Previous Survey Date	Last Survey Thick Nt	Last Survey Date	Short Term Rate	Long Term Rate	Best Fit Rate	Max Hist CR	Retirement Thickness	Rep TML CR	TML Retirement Date	TML Inspection Due Date
F2	ELBOW	N	N/A	N/A	N/A	N/A	0.393	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	06/20/2127	12/10/2015
F3	ELBOW	N	N/A	N/A	N/A	N/A	0.384	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	07/21/2123	12/10/2015
F4	ELBOW	N	N/A	N/A	N/A	N/A	0.400	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	07/05/2130	12/10/2015
F5	ELBOW	N *	N/A	N/A	N/A	N/A	0.230	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	08/04/2056	12/10/2015
F6	ELBOW	N	N/A	N/A	N/A	N/A	0.300	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	01/11/2087	12/10/2015
F7	ELBOW	N	N/A	N/A	N/A	N/A	0.412	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	09/23/2135	12/10/2015
F8	ELBOW	N	N/A	N/A	N/A	N/A	0.400	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	07/05/2130	12/10/2015
G1	HEADER	N	N/A	N/A	N/A	N/A	0.255	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	06/19/2067	12/10/2015
G2	HEADER	N	N/A	N/A	N/A	N/A	0.259	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	03/15/2069	12/10/2015
G3	HEADER	N	N/A	N/A	N/A	N/A	0.250	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	04/16/2065	12/10/2015
G4	HEADER	N	N/A	N/A	N/A	N/A	0.245	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	02/12/2063	12/10/2015
G5	HEADER	N	N/A	N/A	N/A	N/A	0.260	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	08/21/2069	12/10/2015
G6	HEADER	N	N/A	N/A	N/A	N/A	0.268	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	02/11/2073	12/10/2015
G7	HEADER	N	N/A	N/A	N/A	N/A	0.256	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	11/24/2067	12/10/2015
G8	HEADER	N	N/A	N/A	N/A	N/A	0.260	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	08/21/2069	12/10/2015
H1	PIPE	N	N/A	N/A	N/A	N/A	0.260	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	08/21/2069	12/10/2015
H2	PIPE	N	N/A	N/A	N/A	N/A	0.255	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	06/19/2067	12/10/2015
H3	PIPE	N	N/A	N/A	N/A	N/A	0.250	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	04/16/2065	12/10/2015
H4	PIPE	N	N/A	N/A	N/A	N/A	0.262	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	07/04/2070	12/10/2015
H5	PIPE	N	N/A	N/A	N/A	N/A	0.270	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	12/26/2073	12/10/2015
H6	PIPE	N	N/A	N/A	N/A	N/A	0.265	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	10/24/2071	12/10/2015
H7	PIPE	N	N/A	N/A	N/A	N/A	0.250	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	04/16/2065	12/10/2015
H8	PIPE	N	N/A	N/A	N/A	N/A	0.255	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	06/19/2067	12/10/2015
I1	ELBOW	N	N/A	N/A	N/A	N/A	0.372	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	05/03/2118	12/10/2015
I2	ELBOW	N	N/A	N/A	N/A	N/A	0.360	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	02/12/2113	12/10/2015
I3	ELBOW	N	N/A	N/A	N/A	N/A	0.377	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	07/05/2120	12/10/2015
I4	ELBOW	N	N/A	N/A	N/A	N/A	0.380	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	10/24/2121	12/10/2015
I5	ELBOW	N	N/A	N/A	N/A	N/A	0.360	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	02/12/2113	12/10/2015
I6	ELBOW	N	N/A	N/A	N/A	N/A	0.345	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	08/06/2106	12/10/2015
I7	ELBOW	N	N/A	N/A	N/A	N/A	0.333	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	05/18/2101	12/10/2015
I8	ELBOW	N	N/A	N/A	N/A	N/A	0.340	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	06/03/2104	12/10/2015

City of Canton
Canton, OH
Acuren Inspection
Akron, OH

(Report in Inches, Corrosion Rates in MPY)
Analysis: Statistical/Straight Line

Report Date: 01/03/2011 11:42:49

Unit: PIPING
Eq/Circ ID: PUMP 3
Eq Type:
Class:
RBI:
Description:

Flange Rating: 0 lb/in²
Design Pressure: 30 lb/in²
Design Temp: 300 °F

TML Corrosion Rates are each the maximum of:
(A) -- Calculated Corrosion Rates x 1.00 : Varies
(B) -- Default Corrosion Rate : 2.0 MPY

Representative Corrosion Rate is the Maximum of:
(A) -- Average Corrosion Rate x 1.10 : 2.2 MPY
(B) -- Average Max 25.0% of TMLs, Min of 2 : 2.0 MPY
(C) -- Formula Corrosion Rate (Sigma = 1.28) : 2.3 MPY
(D) -- Default Corrosion Rate : 2.0 MPY
Representative Corrosion Rate = 2.3 MPY

TML thickness readings taken above 150.0 °F have been compensated by 1% per 100.0 °F

TML thickness readings have not been compensated for growths.

TML Life calculations are based on the maximum of the Rep. TML CR and the RCR using Short Term, Long Term, and Best Fit Corrosion Rates.

Nominal thickness is used for TML corrosion rate calculations with less than 3 surveys.

Minimum time between inspections required for corrosion rate calculation is 6 months.

TML Inspection Interval is:
(A) -- Minimum(TML Life / 2.00, 5.0 years)

Eq/Circ ID Last Survey Date is based on the LAST of the last 0% of TML survey dates (Min 1).

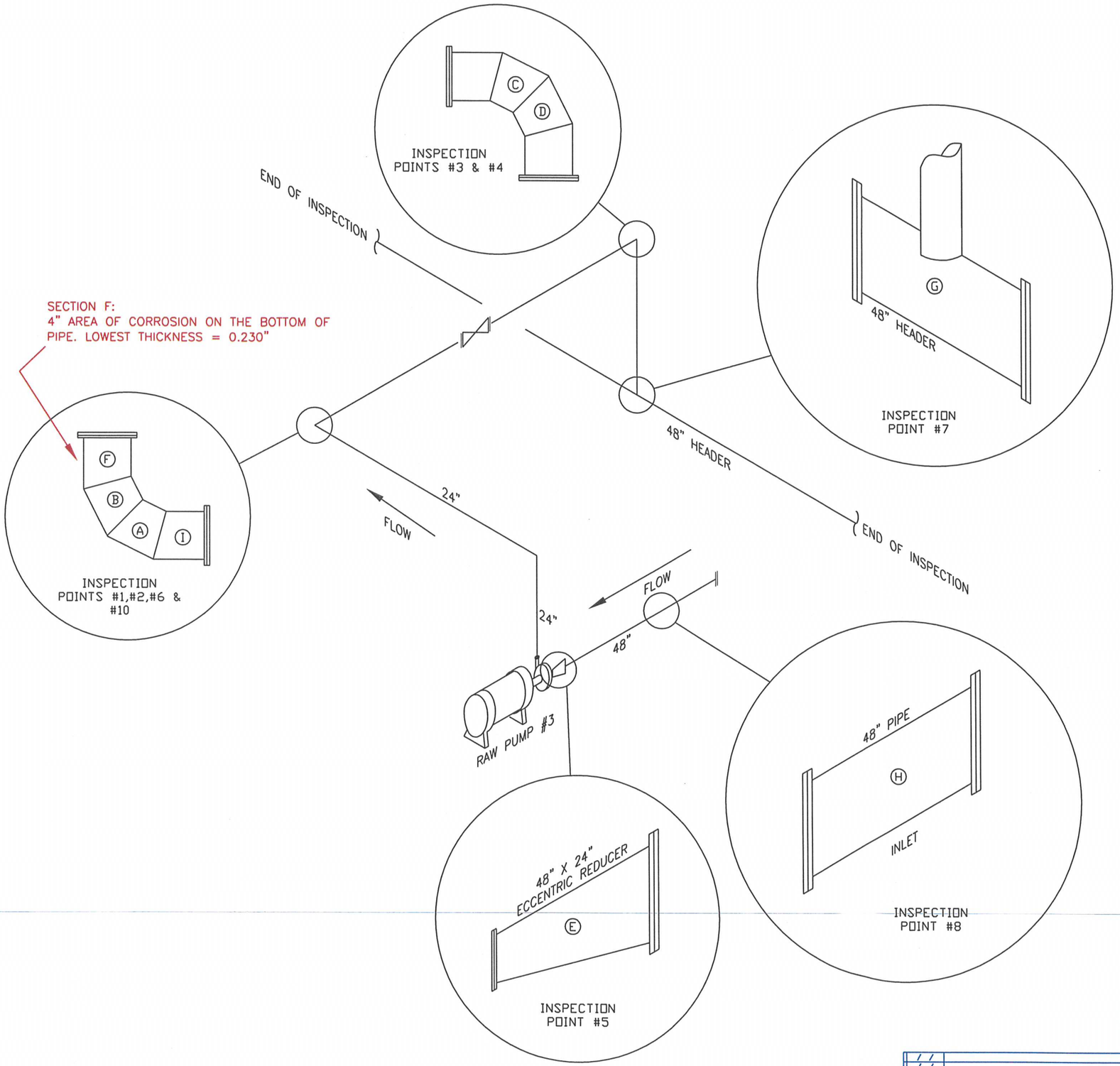
Eq/Circ ID Estimated life = 45.6 years from the most recent survey date.
(Estimated Life is based on the average of the earliest 0% (Min 1) TML retirement dates.)

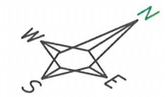
Predicted Eq/Circ ID Retirement date is 08/04/2056

Recommended Eq/Circ UT/RT Inspection Date is 12/10/2015
UT/RT Inspection Interval is the minimum(Remaining life / 2.0, 5.0 years).

Caution TML Logic: TML Corrosion Rate > 15.0 MPY .OR. TML Remaining Life < 1.00 Years.

There are 0 Caution TMLs in this Eq/Circ ID.

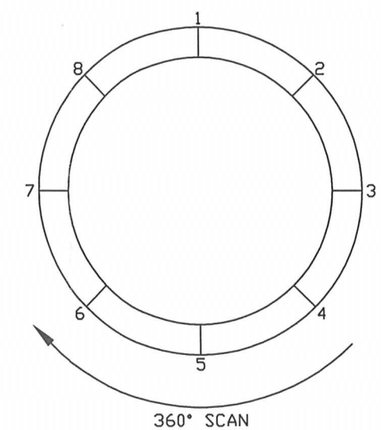




SPECIFICATIONS

PIPE:	24" & 48" – ASTM A53 GRADE A (SPIRAL)
FITTINGS:	MITERED PIPE – ASTM A53 GRADE A (SPIRAL)
FLANGES:	---
CONSTRUCTION CODE:	---
INSPECTION CODE:	API 570
DESIGN PRESSURE:	---
DESIGN TEMPERATURE:	---
OPERATING PRESSURE:	30 PSI
OPERATING TEMPERATURE:	AMBIENT

1. (X) = THICKNESS MEASUREMENT LOCATIONS (TML)
2. EACH TEST LOCATION WAS SCANNED 360° AND THE LOWEST READING WAS RECORDED FOR EACH POSITION ON THE PIPE.
3. FOR HORIZONTAL LINES RUNNING EAST/WEST, THE SCAN PROGRESSION IS TOP, NORTH, BOTTOM, SOUTH.
4. FOR HORIZONTAL LINES RUNNING NORTH/SOUTH, THE PROGRESSION IS TOP, EAST, BOTTOM, WEST.
5. FOR VERTICAL LINES THE PROGRESSION IS NORTH, EAST SOUTH, WEST.
6. TEST LOCATIONS ARE APPROXIMATED ON THE DRAWING BUT MARKED ON THE ACTUAL PIPE.
7. THE DRAWING IS PROVIDED ONLY AS A REPRESENTATION OF THE TESTING AREAS. NO LINE DIMENSIONS WERE TAKEN DURING THE TESTING.
8. MOST ITEMS ONLY REPRESENT THE EXISTENCE OF A PIPE COMPONENT.



SCAN PROGRESSION

CITY OF CANTON
WATER RECLAIMATION

3530 CENTRAL AVE. SE – CANTON, OH 44707

TITLE:
RAW PUMP DISCHARGE 3

THICKNESS MEASUREMENT LOCATIONS

DATE:	DESCRIPTION	BY:	REV.
/ /			
/ /			
/ /			
/ /			
/ /			

DRAWN BY: LAJ	LAB. NO. 228646	ACUREN INSPECTION 535 KENNEDY RD. AKRON, OH 44305	
CHECKED BY: RC	DEPT. MECH. INT.		
APPROVED BY: RC	SCALE: NTS	DRAWING NO. COCWR-12102010-3-001	REV. 0
	DATE: 12.10.2010		

CITY OF CANTON
Canton, OH

Thickness Inspection
Pump 4 Piping
December 10, 2010

ACUREN

535 Kennedy Rd.
Akron, OH 44305
Phone: 330.733.8160 – Fax: 330.733.8644

Acuren
535 Kennedy Rd.
Suite D
Akron, OH, USA 44685
Phone: (330) 733-8160
(800) 321-0878
Fax: (330) 733-8644

Materials, Engineering & Testing
A Rockwood Company

December 10, 2010

City of Canton
3530 Central Ave. SE
Canton, OH 44707

Mr. Doug Dickerhoff

Subject: Piping Inspection (Pump-4)
Service Call: 228646

WORK SCOPE:

Perform B-scanning on piping at specified locations to determine metal thickness and rate of corrosion. Obtain design parameters and determine minimum thickness. Identify locations for possible repairs.

SUMMARY:

The piping system was suitable for continued service. No evidence of excessive deterioration was discovered. The corrosion rate was 2.3 mils per year with an estimated remaining life of 20 years. The next inspection date should be no later than 5 years or December, 2015.

RESULTS:

- **48" Inlet**- No significant corrosion or metal loss was noted. Thickness measurements indicate the nominal thickness was 0.250".
- **48" Discharge Header**- No significant corrosion or metal loss was noted. Thickness measurements indicate the nominal thickness was 0.250".
- **24"Elbow To Rotor Valve**- No significant corrosion or metal loss was noted.
- **24" Elbow To Discharge**- No significant corrosion was noted on this elbow.

The minimum calculated thickness for the piping was 0.125". The original design thickness did meet the requirements of AWWA Standard C-202 for nominal design pipe wall thickness. The material of construction was A-53 Grade B. The internal pressure used was 30 psi and additional weight of 250 pounds was used. Additional inspections will be required in the event metal thickness falls below this value.

ACUREN

City of Canton
Pump 4 Piping
December 10, 2010

LAYOUT:

CAD drawings have been included to designate thickness measurement locations and problem areas.

RECOMMENDATIONS

This piping system should be placed on a 5 year inspection interval.

PERSONNEL:

Inspectors:

Rick Conley	API 510 Inspector SNT-TC-1A Level II	Certification #: 27342 MT/PT/UT/ET/RT
Jay Daigle	API Examiner / CWI / SNT-TC-1A Level II MT/PT/UT	

Inspection Review and Evaluation:

Rick Conley	API Inspector / SNT-TC-1A Level II MT/PT/UT/ET/RT

Should you have any additional questions concerning the inspection performed, please feel free to contact this office.

Sincerely,
Acuren Inspection

Richard Conley
API-Inspector

City of Canton
Canton, OH
Acuren Inspection
Akron, OH

Corrosion Monitoring Eq/Circ ID Analysis Report

(Report in Inches, Corrosion Rates in MPY)
Analysis: Statistical/Straight Line

Report Date: 01/03/2011 11:43:23

Unit: PIPING
Eq/Circ ID: PUMP 4
Eq Type:
Class:
RBI:

Description:

Flange Rating: 0 lb/in²
Design Pressure: 30 lb/in²
Design Temp: 300 °F

Summary: Group Name:
Insp. Due Date = 12/10/2015
Pred. Ret. Date = 02/12/2063

Group description:
RCR = 2.3 MPY
Rem. Life (from last survey 12/10/2010) = 52.2 yrs

0 C.A. Status: No
Total Caution TMLs = 0

TML Number	Location Description	Ctn TML	First Survey Thick Nt	First Survey Date	Previous Survey Thick Nt	Previous Survey Date	Last Survey Thick Nt	Last Survey Date	Short Term Rate	Long Term Rate	Best Fit Rate	Max Hist CR	Retirement Thickness	Rep TML CR	TML Retirement Date	TML Inspection Due Date
A1	ELBOW	N	N/A	N/A	N/A	N/A	0.400	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	07/05/2130	12/10/2015
A2	ELBOW	N	N/A	N/A	N/A	N/A	0.379	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	05/18/2121	12/10/2015
A3	ELBOW	N	N/A	N/A	N/A	N/A	0.380	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	10/24/2121	12/10/2015
A4	ELBOW	N	N/A	N/A	N/A	N/A	0.406	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	02/12/2133	12/10/2015
A5	ELBOW	N	N/A	N/A	N/A	N/A	0.400	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	07/05/2130	12/10/2015
A6	ELBOW	N	N/A	N/A	N/A	N/A	0.406	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	02/12/2133	12/10/2015
A7	ELBOW	N	N/A	N/A	N/A	N/A	0.416	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	06/19/2137	12/10/2015
A8	ELBOW	N	N/A	N/A	N/A	N/A	0.400	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	07/05/2130	12/10/2015
B1	ELBOW	N	N/A	N/A	N/A	N/A	0.416	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	06/19/2137	12/10/2015
B2	ELBOW	N	N/A	N/A	N/A	N/A	0.424	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	12/11/2140	12/10/2015
B3	ELBOW	N	N/A	N/A	N/A	N/A	0.417	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	11/25/2137	12/10/2015
B4	ELBOW	N	N/A	N/A	N/A	N/A	0.412	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	09/23/2135	12/10/2015
B5	ELBOW	N	N/A	N/A	N/A	N/A	0.416	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	06/19/2137	12/10/2015
B6	ELBOW	N	N/A	N/A	N/A	N/A	0.332	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	12/11/2100	12/10/2015
B7	ELBOW	N	N/A	N/A	N/A	N/A	0.420	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	03/16/2139	12/10/2015
B8	ELBOW	N	N/A	N/A	N/A	N/A	0.414	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	08/05/2136	12/10/2015
C1	ELBOW	N	N/A	N/A	N/A	N/A	0.334	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	10/24/2101	12/10/2015
C2	ELBOW	N	N/A	N/A	N/A	N/A	0.336	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	09/07/2102	12/10/2015
C3	ELBOW	N	N/A	N/A	N/A	N/A	0.339	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	12/27/2103	12/10/2015
C4	ELBOW	N	N/A	N/A	N/A	N/A	0.343	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	09/22/2105	12/10/2015
C5	ELBOW	N	N/A	N/A	N/A	N/A	0.341	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	11/09/2104	12/10/2015
C6	ELBOW	N	N/A	N/A	N/A	N/A	0.328	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	03/15/2099	12/10/2015
C7	ELBOW	N	N/A	N/A	N/A	N/A	0.333	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	05/18/2101	12/10/2015
C8	ELBOW	N	N/A	N/A	N/A	N/A	0.338	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	07/21/2103	12/10/2015
D1	ELBOW	N	N/A	N/A	N/A	N/A	0.340	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	06/03/2104	12/10/2015
D2	ELBOW	N	N/A	N/A	N/A	N/A	0.344	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	02/28/2106	12/10/2015
D3	ELBOW	N	N/A	N/A	N/A	N/A	0.346	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	01/12/2107	12/10/2015
D4	ELBOW	N	N/A	N/A	N/A	N/A	0.345	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	08/06/2106	12/10/2015
D5	ELBOW	N	N/A	N/A	N/A	N/A	0.357	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	10/25/2111	12/10/2015
D6	ELBOW	N	N/A	N/A	N/A	N/A	0.340	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	06/03/2104	12/10/2015
D7	ELBOW	N	N/A	N/A	N/A	N/A	0.340	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	06/03/2104	12/10/2015
D8	ELBOW	N	N/A	N/A	N/A	N/A	0.330	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	01/27/2100	12/10/2015
E1	REDUCER	N	N/A	N/A	N/A	N/A	0.270	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	12/26/2073	12/10/2015
E2	REDUCER	N	N/A	N/A	N/A	N/A	0.262	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	07/04/2070	12/10/2015
E3	REDUCER	N	N/A	N/A	N/A	N/A	0.267	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	09/05/2072	12/10/2015
E4	REDUCER	N	N/A	N/A	N/A	N/A	0.270	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	12/26/2073	12/10/2015
E5	REDUCER	N	N/A	N/A	N/A	N/A	0.270	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	12/26/2073	12/10/2015
E6	REDUCER	N	N/A	N/A	N/A	N/A	0.268	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	02/11/2073	12/10/2015
E7	REDUCER	N	N/A	N/A	N/A	N/A	0.260	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	08/21/2069	12/10/2015
E8	REDUCER	N	N/A	N/A	N/A	N/A	0.265	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	10/24/2071	12/10/2015
F1	ELBOW	N	N/A	N/A	N/A	N/A	0.389	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	09/22/2125	12/10/2015

City of Canton
Canton, OH
Acuren Inspection
Akron, OH

TML Number	Location Description	Ctn TML	First Survey Thick Nt	First Survey Date	Previous Survey Thick Nt	Previous Survey Date	Last Survey Thick Nt	Last Survey Date	Short Term Rate	Long Term Rate	Best Fit Rate	Max Hist CR	Retirement Thickness	Rep TML CR	TML Retirement Date	TML Inspection Due Date
F2	ELBOW	N	N/A	N/A	N/A	N/A	0.399	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	01/27/2130	12/10/2015
F3	ELBOW	N	N/A	N/A	N/A	N/A	0.412	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	09/23/2135	12/10/2015
F4	ELBOW	N	N/A	N/A	N/A	N/A	0.391	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	08/06/2126	12/10/2015
F5	ELBOW	N	N/A	N/A	N/A	N/A	0.381	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	04/01/2122	12/10/2015
F6	ELBOW	N	N/A	N/A	N/A	N/A	0.368	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	08/05/2116	12/10/2015
F7	ELBOW	N	N/A	N/A	N/A	N/A	0.394	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	11/25/2127	12/10/2015
F8	ELBOW	N	N/A	N/A	N/A	N/A	0.400	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	07/05/2130	12/10/2015
G1	HEADER	N	N/A	N/A	N/A	N/A	0.250	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	04/16/2065	12/10/2015
G2	HEADER	N *	N/A	N/A	N/A	N/A	0.245	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	02/12/2063	12/10/2015
G3	HEADER	N	N/A	N/A	N/A	N/A	0.250	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	04/16/2065	12/10/2015
G4	HEADER	N	N/A	N/A	N/A	N/A	0.253	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	08/05/2066	12/10/2015
G5	HEADER	N *	N/A	N/A	N/A	N/A	0.245	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	02/12/2063	12/10/2015
G6	HEADER	N	N/A	N/A	N/A	N/A	0.289	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	03/31/2082	12/10/2015
G7	HEADER	N	N/A	N/A	N/A	N/A	0.269	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	07/20/2073	12/10/2015
G8	HEADER	N	N/A	N/A	N/A	N/A	0.248	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	06/02/2064	12/10/2015
H1	PIPE	N	N/A	N/A	N/A	N/A	0.270	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	12/26/2073	12/10/2015
H2	PIPE	N	N/A	N/A	N/A	N/A	0.266	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	03/30/2072	12/10/2015
H3	PIPE	N	N/A	N/A	N/A	N/A	0.250	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	04/16/2065	12/10/2015
H4	PIPE	N	N/A	N/A	N/A	N/A	0.268	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	02/11/2073	12/10/2015
H5	PIPE	N	N/A	N/A	N/A	N/A	0.270	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	12/26/2073	12/10/2015
H6	PIPE	N	N/A	N/A	N/A	N/A	0.266	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	03/30/2072	12/10/2015
H7	PIPE	N	N/A	N/A	N/A	N/A	0.259	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	03/15/2069	12/10/2015
H8	PIPE	N	N/A	N/A	N/A	N/A	0.272	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	11/08/2074	12/10/2015
I1	ELBOW	N	N/A	N/A	N/A	N/A	0.390	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	02/28/2126	12/10/2015
I2	ELBOW	N	N/A	N/A	N/A	N/A	0.400	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	07/05/2130	12/10/2015
I3	ELBOW	N	N/A	N/A	N/A	N/A	0.395	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	05/02/2128	12/10/2015
I4	ELBOW	N	N/A	N/A	N/A	N/A	0.395	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	05/02/2128	12/10/2015
I5	ELBOW	N	N/A	N/A	N/A	N/A	0.324	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	06/18/2097	12/10/2015
I6	ELBOW	N	N/A	N/A	N/A	N/A	0.330	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	01/27/2100	12/10/2015
I7	ELBOW	N	N/A	N/A	N/A	N/A	0.260	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	08/21/2069	12/10/2015
I8	ELBOW	N	N/A	N/A	N/A	N/A	0.348	12/10/2010	N/A	N/A	N/A	0.0	0.125 U	2.0	11/25/2107	12/10/2015

City of Canton
Canton, OH
Acuren Inspection
Akron, OH

(Report in Inches, Corrosion Rates in MPY)
Analysis: Statistical/Straight Line

Report Date: 01/03/2011 11:43:28

Unit: PIPING
Eq/Circ ID: PUMP 4
Eq Type:
Class:
RBI:

Description:

Flange Rating: 0 lb/in²
Design Pressure: 30 lb/in²
Design Temp: 300 °F

TML Corrosion Rates are each the maximum of:
(A) -- Calculated Corrosion Rates x 1.00 : Varies
(B) -- Default Corrosion Rate : 2.0 MPY

Representative Corrosion Rate is the Maximum of:
(A) -- Average Corrosion Rate x 1.10 : 2.2 MPY
(B) -- Average Max 25.0% of TMLs, Min of 2 : 2.0 MPY
(C) -- Formula Corrosion Rate (Sigma = 1.28) : 2.3 MPY
(D) -- Default Corrosion Rate : 2.0 MPY
Representative Corrosion Rate = 2.3 MPY

TML thickness readings taken above 150.0 °F have been compensated by 1% per 100.0 °F

TML thickness readings have not been compensated for growths.

TML Life calculations are based on the maximum of the Rep. TML CR and the RCR using Short Term, Long Term, and Best Fit Corrosion Rates.

Nominal thickness is used for TML corrosion rate calculations with less than 3 surveys.

Minimum time between inspections required for corrosion rate calculation is 6 months.

TML Inspection Interval is:
(A) -- Minimum(TML Life / 2.00, 5.0 years)

Eq/Circ ID Last Survey Date is based on the LAST of the last 0% of TML survey dates (Min 1).

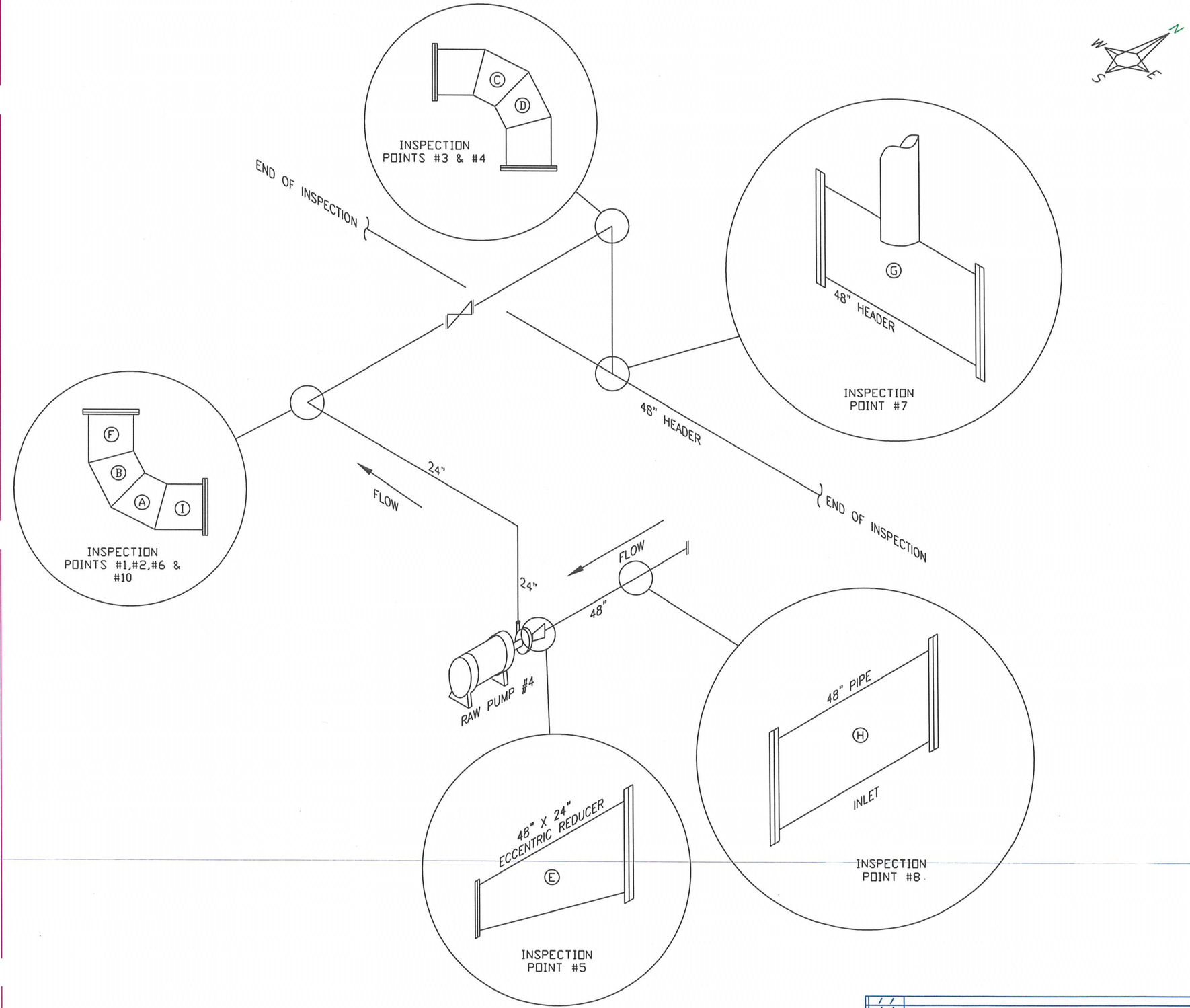
Eq/Circ ID Estimated life = 52.2 years from the most recent survey date.
(Estimated Life is based on the average of the earliest 0% (Min 1) TML retirement dates.)

Predicted Eq/Circ ID Retirement date is 02/12/2063

Recommended Eq/Circ UT/RT Inspection Date is 12/10/2015
UT/RT Inspection Interval is the minimum(Remaining life / 2.0, 5.0 years).

Caution TML Logic: TML Corrosion Rate > 15.0 MPY .OR. TML Remaining Life < 1.00 Years.

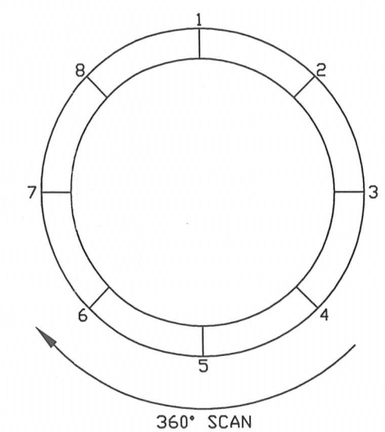
There are 0 Caution TMLs in this Eq/Circ ID.



SPECIFICATIONS

PIPE: 24" & 48" – ASTM A53 GRADE A (SPIRAL)
FITTINGS: MITERED PIPE – ASTM A53 GRADE A (SPIRAL)
FLANGES: ---
CONSTRUCTION CODE: ---
INSPECTION CODE: API 570
DESIGN PRESSURE: ---
DESIGN TEMPERATURE: ---
OPERATING PRESSURE: 30 PSI
OPERATING TEMPERATURE: AMBIENT

1. (X) = THICKNESS MEASUREMENT LOCATIONS (TML)
2. EACH TEST LOCATION WAS SCANNED 360° AND THE LOWEST READING WAS RECORDED FOR EACH POSITION ON THE PIPE.
3. FOR HORIZONTAL LINES RUNNING EAST/WEST, THE SCAN PROGRESSION IS TOP, NORTH, BOTTOM, SOUTH.
4. FOR HORIZONTAL LINES RUNNING NORTH/SOUTH, THE PROGRESSION IS TOP, EAST, BOTTOM, WEST.
5. FOR VERTICAL LINES THE PROGRESSION IS NORTH, EAST SOUTH, WEST.
6. TEST LOCATIONS ARE APPROXIMATED ON THE DRAWING BUT MARKED ON THE ACTUAL PIPE.
7. THE DRAWING IS PROVIDED ONLY AS A REPRESENTATION OF THE TESTING AREAS. NO LINE DIMENSIONS WERE TAKEN DURING THE TESTING.
8. MOST ITEMS ONLY REPRESENT THE EXISTENCE OF A PIPE COMPONENT.



SCAN PROGRESSION

CITY OF CANTON
WATER RECLAIMATION
3530 CENTRAL AVE. SE – CANTON, OH 44707

TITLE:
RAW PUMP DISCHARGE 4
THICKNESS MEASUREMENT LOCATIONS

DATE:	DESCRIPTION	BY:	REV.
/ /			
/ /			
/ /			
/ /			
/ /			

DRAWN BY: LAJ	LAB. NO. 228646	ACUREN INSPECTION 535 KENNEDY RD. AKRON, OH 44305	
CHECKED BY: RC	DEPT. MECH. INT.		
APPROVED BY: RC	SCALE: NTS	DRAWING NO. COCWR-12102010-4-001	REV. 0
	DATE: 12.10.2010		

Structural T-Min based on original design has been calculated using the variables listed below.

OD of the Pipe -in. = 48
Wall Thickness - in. = 0.250
Ro = (Outer Radius of Pipe - in.) = 24
Ri = (Inner Radius of Pipe - in.) = 23.75
SG = (Specific Gravity of Fluid in Pipe) = 1
Df = (Pipe Support Spacing - ft.) = 8.000
Di = (Pipe Support Spacing - in.) = 96
Wa = (Addition Weights Supported by Pipe - lbs (I.E. Fittings, Pipe)) 250
L = (Max Center Load on Pipe - lbs.) = ((WP+ WF)*12)*Df)) + Wa = 7,421
S = (Material Stress of Pipe - lb/in².) = 20,000
CA = (Additional Corrosion Allowance for Pipe - in.) = 0
MW = (The Weight of the Material - in^{3}.) = 0.28333
WP = Pipe Weight / in (answer in lb/in) = $(Ro^2 - Ri^2)*Pi*MW$ = 10.63
WF = Fluid Weight / in (answer in lb/in) = $Pi * Ri^2 * SG * 0.03613$ = 64.08
WL = Load Bending Moment (in-lb) = L * Di / 4 = 178116
X = Max Bending Moment (in-lb) = WL + (WP + WF)*Di*Di/8 = 264174

$t_{s\text{-}min} = (CA + Ro) - ((Ro^4) - ((X*Ro*4) / (S*Pi)))^{0.25} = 0.007$

Minimum Required Thickness Based on ASME B31.3 304.1.2

P (Pressure - PSI) = 30
D (Outside Diameter - in.) = 48
S = (Material Stress of Pipe - lb/in².) = 20000
E (Joint Efficiency) = 0.85
Y(Temperature Coefficient) = 0.4

$t_{min} = (P*D) / 2 (SE + PY) = 0.042$

Wieght:

wieght of pipe per linear ft. (lbs.) = 128
fluid wieght per linear ft. (lbs.) = 769
approx. gals over the span = 738
total combined wieght over the span (lbs.) = 7,421

Strength of Pipe and Pipe Welds

d = (Pipe Diameter -OD -in.) = 48.000
dm = (Mean Pipe Diameter - in.) = 47.875
tn = (Wall Thickness of Pipe - "USER DEFINED VALUE" - in.) = 0.125
S = (Material Stress Value - psi.) = 20,000
Rgs = (Reduction Factor for Groove-Weld Shear) = 0.6
Rps = (Reduction Factor for Pipe-Wall Shear) = 0.7
Rts = (Reduction Factor for Groove-Weld Tension) = 0.74
t_{min} = (Calculated from Pressure or Mechanical Limits - in.) = 0.042

Required Wall Strength (lbs):
((Pi * d)/2) * tmin * S = 63,822

Pipe Wall Strength in Shear (PWS - lbs.):
Rps * S = 14000
((Pi * dm)/2) * tn * PWS = **131,603**

Groove-Weld Strength in Shear (GWS - lbs):
Rgs * S = 12000
((Pi * dm)/2) * tn * GWS = **112,803**

Groove-Weld Strength in Tension (GWT - lbs.)
Rts * S = 14800
((Pi * d)/2) * tn * GWT = **139,487**

The weakest point is in Groove-Weld Shear (lbs) = 112,803

Structural Thickness Limit equals the larger of $t_{s\text{-}min}$ or t_{min} or tn = **0.125**

Structural T-Min based on original design has been calculated using the variables listed below.

OD of the Pipe -in. = 24
Wall Thickness - in. = 0.250
Ro = (Outer Radius of Pipe - in.) = 12
Ri = (Inner Radius of Pipe - in.) = 11.75
SG = (Specific Gravity of Fluid in Pipe) = 1
Df = (Pipe Support Spacing - ft.) = 8.000
Di = (Pipe Support Spacing - in.) = 96
Wa = (Addition Weights Supported by Pipe - lbs (I.E. Fittings, Pipe)) 250
L = (Max Center Load on Pipe - lbs.) = ((WP+ WF)*12)*Df)) + Wa = 2,263
S = (Material Stress of Pipe - lb/in².) = 20,000
CA = (Additional Corrosion Allowance for Pipe - in.) = 0
MW = (The Weight of the Material - in^3.) = 0.28333
WP = Pipe Weight / in (answer in lb/in) = $(Ro^2 - Ri^2)*Pi*MW$ = 5.29
WF = Fluid Weight / in (answer in lb/in) = $Pi * Ri^2 * SG * 0.03613$ = 15.68
WL = Load Bending Moment (in-lb) = L * Di / 4 = 54312
X = Max Bending Moment (in-lb) = WL + (WP + WF)*Di*Di/8 = 78469

$t_{s\text{-}min} = (CA + Ro) - ((Ro^4) - ((X*Ro*4) / (S*Pi)))^{0.25} = 0.009$

Minimum Required Thickness Based on ASME B31.3 304.1.2

P (Pressure - PSI) = 30
D (Outside Diameter - in.) = 24
S = (Material Stress of Pipe - lb/in².) = 20000
E (Joint Efficiency) = 0.85
Y(Temperature Coefficient) = 0.4

$t_{min} = (P*D) / 2 (SE + PY) = 0.021$

Wieght:

wieght of pipe per linear ft. (lbs.) = 63
fluid wieght per linear ft. (lbs.) = 188
approx. gals over the span = 181
total combined wieght over the span (lbs.) = 2,263

Strength of Pipe and Pipe Welds

d = (Pipe Diameter -OD -in.) = 24.000
dm = (Mean Pipe Diameter - in.) = 23.875
tn = (Wall Thickness of Pipe - "USER DEFINED VALUE" - in.) = 0.125
S = (Material Stress Value - psi.) = 20,000
Rgs = (Reduction Factor for Groove-Weld Shear) = 0.6
Rps = (Reduction Factor for Pipe-Wall Shear) = 0.7
Rts = (Reduction Factor for Groove-Weld Tension) = 0.74
t_{min} = (Calculated from Pressure or Mechanical Limits - in.) = 0.021

Required Wall Strength (lbs):
((Pi * d)/2) * tmin * S = 15,955

Pipe Wall Strength in Shear (PWS - lbs.):
Rps * S = 14000
((Pi * dm)/2) * tn * PWS = **65,630**

Groove-Weld Strength in Shear (GWS - lbs):
Rgs * S = 12000
((Pi * dm)/2) * tn * GWS = **56,254**

Groove-Weld Strength in Tension (GWT - lbs.)
Rts * S = 14800
((Pi * d)/2) * tn * GWT = **69,743**

The weakest point is in Groove-Weld Shear (lbs) = 56,254

Structural Thickness Limit equals the larger of $t_{s\text{-}min}$ or t_{min} or tn = **0.125**

SECTION 11

2011 REPORT OF PIPING INSPECTION FROM ACUREN (RAW PUMP INLET DISCHARGE PIPING)

City of Canton
Canton, Ohio

Piping Inspection
Pump 1
December 19, 2011

ACUREN

535 Kennedy Rd.
Akron, OH 44305
Phone: 330.733.8160 – Fax: 330.733.8644

Acuren
535 Kennedy Rd.
Suite D
Akron, OH, USA 44685
Phone: (330) 733-8160
(800) 321-0878
Fax: (330) 733-8644

December 19, 2011

City of Canton
3530 Central Ave. SE
Canton, OH

Mr. Doug Dickerhoff

Subject: Piping Inspection (Pump-2)

WORK SCOPE:

Perform A-scan at previous locations and compare data with 2010 inspection.

SUMMARY:

The piping system was not suitable for continued service. Please see the results and recommendations below. The corrosion rate was 25.6 mils per year with an estimated remaining life of 3 years. The next inspection date should be no later than 1 year (half the estimated remaining life) or December, 2012.

RESULTS:

- **48" Inlet-** This section of pipe is acceptable for continued use.
- **48" Discharge Header-** The area of corrosion that was discovered last year remains at 0.190".
- **24" Elbow To Rotator Valve-** There was a leak noted at the flange weld closest to the pump on the bottom side. Both patches on the bottom side of the elbow are below the minimum required thickness
- **24" Elbow To Discharge-** This section of pipe is acceptable for continued use.

LAYOUT:

CAD drawings have been included to designate thickness measurement locations and problem areas.

RECOMMENDATIONS:

- Repair the leak on the 24" elbow to rotator valve.
- Replace the patches on the bottom side of the same elbow.
- Due to the new areas of corrosion and the high corrosion rate of some of the components of this system, this piping should be re-inspected in December, 2012

ACUREN

City of Canton
Piping Inspection (Pump 2)
December 19, 2011

PERSONNEL:

Inspectors:

Jay Daigle	API Examiner SNT-TC-1A Level II Certified Weld Inspector	MT/PT/UT Certification#: 07090281
Richard Conley	API 510/653 Inspector SNT-TC-1A Level II	Certification#: 27342/40292 UT/MT/PT/VT/ET

Inspection review and evaluation:

Richard Conley	API Inspector SNT-TC-1A Level II	UT/MT/PT/VT

Should you have any additional questions concerning the inspection performed, please feel free to contact this office.

Sincerely,
Acuren Inspection

_____

Richard Conley
Mechanical Integrity Inspector

City of Canton
Canton, Ohio
Acuren Inspection
Akron, Ohio

Corrosion Monitoring Eq/Circ ID Analysis Report

(Report in Inches, Corrosion Rates in MPY)
Analysis: Statistical/Straight Line

Report Date: 12/21/2011 10:19:58

Unit: PIPING
Eq/Circ ID: PUMP 2
Eq Type:
Class:
RBI:

Description:

Flange Rating: 0 lb/in²
Design Pressure: 30 lb/in²
Design Temp: 300 °F

Summary: Group Name:
Insp. Due Date = 08/07/2013
Pred. Ret. Date = 03/27/2015

Group description:
RCR = 25.6 MPY
Rem. Life (from last survey 12/19/2011) = 3.3 yrs

0 C.A. Status: No
Total Caution TMLs = 19

TML Number	Location Description	Ctn TML	First Survey Thick Nt	First Survey Date	Previous Survey Thick Nt	Previous Survey Date	Last Survey Thick Nt	Last Survey Date	Short Term Rate	Long Term Rate	Best Fit Rate	Max Hist CR	Retirement Thickness	Rep TML CR	TML Retirement Date	TML Inspection Due Date
A1	ELBOW	N	0.399	12/10/2010	N/A	N/A	0.395	12/19/2011	N/A	3.9	N/A	3.9	0.125 U	3.9	07/06/2022	12/18/2016
A2	ELBOW	N	0.390	12/10/2010	N/A	N/A	0.383	12/19/2011	N/A	6.8	N/A	6.8	0.125 U	6.8	01/16/2022	12/18/2016
A3	ELBOW	Y	0.400	12/10/2010	N/A	N/A	0.365	12/19/2011	N/A	34.2	N/A	34.2	0.125 U	34.2	12/25/2018	06/22/2015
A4	ELBOW	Y	0.410	12/10/2010	N/A	N/A	0.371	12/19/2011	N/A	38.1	N/A	38.1	0.125 U	38.1	06/03/2018	03/12/2015
A5	ELBOW	Y	0.415	12/10/2010	N/A	N/A	0.382	12/19/2011	N/A	32.2	N/A	32.2	0.125 U	32.2	12/12/2019	12/15/2015
A6	ELBOW	N	0.390	12/10/2010	N/A	N/A	0.385	12/19/2011	N/A	4.9	N/A	4.9	0.125 U	4.9	02/14/2022	12/18/2016
A7	ELBOW	N	0.400	12/10/2010	N/A	N/A	0.400	12/19/2011	N/A	-0.0	N/A	0.0	0.125 U	2.0	09/16/2022	12/18/2016
A8	ELBOW	Y	0.420	12/10/2010	N/A	N/A	0.387	12/19/2011	N/A	32.2	N/A	32.2	0.125 U	32.2	02/07/2020	01/13/2016
B1	ELBOW	N	0.419	12/10/2010	N/A	N/A	0.408	12/19/2011	N/A	10.7	N/A	10.7	0.125 U	10.7	01/08/2023	12/18/2016
B2	ELBOW	Y	0.414	12/10/2010	N/A	N/A	0.391	12/19/2011	N/A	22.5	N/A	22.5	0.125 U	22.5	05/10/2022	12/18/2016
B3	ELBOW	Y	0.415	12/10/2010	N/A	N/A	0.398	12/19/2011	N/A	16.6	N/A	16.6	0.125 U	16.6	08/18/2022	12/18/2016
B4	ELBOW	Y	0.420	12/10/2010	N/A	N/A	0.404	12/19/2011	N/A	15.6	N/A	15.6	0.125 U	15.6	11/12/2022	12/18/2016
B5	ELBOW	N	0.407	12/10/2010	N/A	N/A	0.397	12/19/2011	N/A	9.8	N/A	9.8	0.125 U	9.8	08/04/2022	12/18/2016
B6	ELBOW	N	0.405	12/10/2010	N/A	N/A	0.398	12/19/2011	N/A	6.8	N/A	6.8	0.125 U	6.8	08/18/2022	12/18/2016
B7	ELBOW	N	0.400	12/10/2010	N/A	N/A	0.394	12/19/2011	N/A	5.9	N/A	5.9	0.125 U	5.9	06/22/2022	12/18/2016
B8	ELBOW	N	0.393	12/10/2010	N/A	N/A	0.391	12/19/2011	N/A	2.0	N/A	2.0	0.125 U	2.0	05/10/2022	12/18/2016
C1	ELBOW	N	0.312	12/10/2010	N/A	N/A	0.317	12/19/2011	N/A	0.0	N/A	0.0	0.125 U	2.0	06/19/2019	09/18/2015
C2	ELBOW	N	0.298	12/10/2010	N/A	N/A	0.310	12/19/2011	N/A	0.0	N/A	0.0	0.125 U	2.0	03/12/2019	07/31/2015
C3	ELBOW	N	0.300	12/10/2010	N/A	N/A	0.305	12/19/2011	N/A	0.0	N/A	0.0	0.125 U	2.0	12/30/2018	06/25/2015
C4	ELBOW	Y	0.319	12/10/2010	N/A	N/A	0.297	12/19/2011	N/A	21.5	N/A	21.5	0.125 U	21.5	09/07/2018	04/29/2015
C5	ELBOW	N	0.325	12/10/2010	N/A	N/A	0.312	12/19/2011	N/A	12.7	N/A	12.7	0.125 U	12.7	04/09/2019	08/14/2015
C6	ELBOW	Y *	0.322	12/10/2010	N/A	N/A	0.275	12/19/2011	N/A	45.9	N/A	45.9	0.125 U	45.9	03/27/2015	08/07/2013
C7	ELBOW	Y	0.320	12/10/2010	N/A	N/A	0.299	12/19/2011	N/A	20.5	N/A	20.5	0.125 U	20.5	10/06/2018	05/13/2015
C8	ELBOW	N	0.319	12/10/2010	N/A	N/A	0.313	12/19/2011	N/A	5.9	N/A	5.9	0.125 U	5.9	04/23/2019	08/21/2015
D1	ELBOW	N	0.312	12/10/2010	N/A	N/A	0.325	12/19/2011	N/A	0.0	N/A	0.0	0.125 U	2.0	10/12/2019	11/15/2015
D2	ELBOW	N	0.312	12/10/2010	N/A	N/A	0.322	12/19/2011	N/A	0.0	N/A	0.0	0.125 U	2.0	08/30/2019	10/24/2015
D3	ELBOW	N	0.320	12/10/2010	N/A	N/A	0.315	12/19/2011	N/A	4.9	N/A	4.9	0.125 U	4.9	05/22/2019	09/04/2015
D4	ELBOW	N	0.288	12/10/2010	N/A	N/A	0.311	12/19/2011	N/A	0.0	N/A	0.0	0.125 U	2.0	03/26/2019	08/07/2015
D5	ELBOW	N	0.296	12/10/2010	N/A	N/A	0.308	12/19/2011	N/A	0.0	N/A	0.0	0.125 U	2.0	02/11/2019	07/16/2015
D6	ELBOW	N	0.288	12/10/2010	N/A	N/A	0.301	12/19/2011	N/A	0.0	N/A	0.0	0.125 U	2.0	11/03/2018	05/27/2015
D7	ELBOW	N	0.312	12/10/2010	N/A	N/A	0.299	12/19/2011	N/A	12.7	N/A	12.7	0.125 U	12.7	10/06/2018	05/13/2015
D8	ELBOW	N	0.321	12/10/2010	N/A	N/A	0.306	12/19/2011	N/A	14.6	N/A	14.6	0.125 U	14.6	01/13/2019	07/02/2015
E1	REDUCER	N	0.280	12/10/2010	N/A	N/A	0.284	12/19/2011	N/A	0.0	N/A	0.0	0.125 U	2.0	03/06/2018	01/26/2015
E2	REDUCER	N	0.280	12/10/2010	N/A	N/A	0.275	12/19/2011	N/A	4.9	N/A	4.9	0.125 U	4.9	10/28/2017	11/23/2014
E3	REDUCER	N	0.278	12/10/2010	N/A	N/A	0.268	12/19/2011	N/A	9.8	N/A	9.8	0.125 U	9.8	07/20/2017	10/04/2014
E4	REDUCER	Y	0.280	12/10/2010	N/A	N/A	0.262	12/19/2011	N/A	17.6	N/A	17.6	0.125 U	17.6	04/26/2017	08/22/2014
E5	REDUCER	Y	0.280	12/10/2010	N/A	N/A	0.257	12/19/2011	N/A	22.5	N/A	22.5	0.125 U	22.5	02/13/2017	07/17/2014
E6	REDUCER	N	0.275	12/10/2010	N/A	N/A	0.287	12/19/2011	N/A	0.0	N/A	0.0	0.125 U	2.0	04/17/2018	02/16/2015
E7	REDUCER	N	0.272	12/10/2010	N/A	N/A	0.261	12/19/2011	N/A	10.7	N/A	10.7	0.125 U	10.7	04/11/2017	08/15/2014
E8	REDUCER	N	0.277	12/10/2010	N/A	N/A	0.268	12/19/2011	N/A	8.8	N/A	8.8	0.125 U	8.8	07/20/2017	10/04/2014
F1	ELBOW	N	0.415	12/10/2010	N/A	N/A	0.404	12/19/2011	N/A	10.7	N/A	10.7	0.125 U	10.7	11/12/2022	12/18/2016

City of Canton
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TML Number	Location Description	Ctn TML	First Survey Thick Nt	First Survey Date	Previous Survey Thick Nt	Previous Survey Date	Last Survey Thick Nt	Last Survey Date	Short Term Rate	Long Term Rate	Best Fit Rate	Max Hist CR	Retirement Thickness	Rep TML CR	TML Retirement Date	TML Inspection Due Date
F2	ELBOW	N	0.400	12/10/2010	N/A	N/A	0.412	12/19/2011	N/A	0.0	N/A	0.0	0.125 U	2.0	03/06/2023	12/18/2016
F3	ELBOW	N	0.391	12/10/2010	N/A	N/A	0.387	12/19/2011	N/A	3.9	N/A	3.9	0.125 U	3.9	03/14/2022	12/18/2016
F4	ELBOW	Y	0.388	12/10/2010	N/A	N/A	0.344	12/19/2011	N/A	43.0	N/A	43.0	0.125 U	43.0	01/21/2017	07/06/2014
F5	ELBOW	N	0.370	12/10/2010	N/A	N/A	0.392	12/19/2011	N/A	0.0	N/A	0.0	0.125 U	2.0	05/24/2022	12/18/2016
F6	ELBOW	N	0.376	12/10/2010	N/A	N/A	0.398	12/19/2011	N/A	0.0	N/A	0.0	0.125 U	2.0	08/18/2022	12/18/2016
F7	ELBOW	N	0.388	12/10/2010	N/A	N/A	0.398	12/19/2011	N/A	0.0	N/A	0.0	0.125 U	2.0	08/18/2022	12/18/2016
F8	ELBOW	Y	0.420	12/10/2010	N/A	N/A	0.402	12/19/2011	N/A	17.6	N/A	17.6	0.125 U	17.6	10/14/2022	12/18/2016
G1	HEADER	N	0.250	12/10/2010	N/A	N/A	0.258	12/19/2011	N/A	0.0	N/A	0.0	0.125 U	2.0	02/28/2017	07/25/2014
G2	HEADER	N	0.245	12/10/2010	N/A	N/A	0.246	12/19/2011	N/A	0.0	N/A	0.0	0.125 U	2.0	09/09/2016	04/30/2014
G3	HEADER	N	0.233	12/10/2010	N/A	N/A	0.258	12/19/2011	N/A	0.0	N/A	0.0	0.125 U	2.0	02/28/2017	07/25/2014
G4	HEADER	N	0.255	12/10/2010	N/A	N/A	0.245	12/19/2011	N/A	9.8	N/A	9.8	0.125 U	9.8	08/26/2016	04/23/2014
G5	HEADER	N	0.190	12/10/2010	N/A	N/A	0.282	12/19/2011	N/A	0.0	N/A	0.0	0.125 U	2.0	02/05/2018	01/12/2015
G6	HEADER	N	0.230	12/10/2010	N/A	N/A	0.257	12/19/2011	N/A	0.0	N/A	0.0	0.125 U	2.0	02/13/2017	**07/17/2014**
G7	HEADER	N	0.250	12/10/2010	N/A	N/A	0.245	12/19/2011	N/A	4.9	N/A	4.9	0.125 U	4.9	08/26/2016	04/23/2014
G8	HEADER	N	0.250	12/10/2010	N/A	N/A	0.273	12/19/2011	N/A	0.0	N/A	0.0	0.125 U	2.0	09/30/2017	11/09/2014
H1	PIPE	N	0.271	12/10/2010	N/A	N/A	0.265	12/19/2011	N/A	5.9	N/A	5.9	0.125 U	5.9	06/07/2017	09/12/2014
H2	PIPE	N	0.266	12/10/2010	N/A	N/A	0.271	12/19/2011	N/A	0.0	N/A	0.0	0.125 U	2.0	09/01/2017	10/25/2014
H3	PIPE	N	0.260	12/10/2010	N/A	N/A	0.274	12/19/2011	N/A	0.0	N/A	0.0	0.125 U	2.0	10/14/2017	11/16/2014
H4	PIPE	Y	0.268	12/10/2010	N/A	N/A	0.250	12/19/2011	N/A	17.6	N/A	17.6	0.125 U	17.6	11/05/2016	05/28/2014
H5	PIPE	Y	0.270	12/10/2010	N/A	N/A	0.247	12/19/2011	N/A	22.5	N/A	22.5	0.125 U	22.5	09/24/2016	05/07/2014
H6	PIPE	N	0.250	12/10/2010	N/A	N/A	0.266	12/19/2011	N/A	0.0	N/A	0.0	0.125 U	2.0	06/22/2017	09/20/2014
H7	PIPE	N	0.255	12/10/2010	N/A	N/A	0.264	12/19/2011	N/A	0.0	N/A	0.0	0.125 U	2.0	05/24/2017	09/05/2014
H8	PIPE	N	0.258	12/10/2010	N/A	N/A	0.291	12/19/2011	N/A	0.0	N/A	0.0	0.125 U	2.0	06/13/2018	03/17/2015
I1	ELBOW	Y	0.400	12/10/2010	N/A	N/A	0.378	12/19/2011	N/A	21.5	N/A	21.5	0.125 U	21.5	11/06/2021	11/27/2016
I2	ELBOW	N	0.412	12/10/2010	N/A	N/A	0.401	12/19/2011	N/A	10.7	N/A	10.7	0.125 U	10.7	09/30/2022	12/18/2016
I3	ELBOW	N	0.407	12/10/2010	N/A	N/A	0.394	12/19/2011	N/A	12.7	N/A	12.7	0.125 U	12.7	06/22/2022	12/18/2016
I4	ELBOW	N	0.395	12/10/2010	N/A	N/A	0.392	12/19/2011	N/A	2.9	N/A	2.9	0.125 U	2.9	05/24/2022	12/18/2016
I5	ELBOW	Y	0.400	12/10/2010	N/A	N/A	0.379	12/19/2011	N/A	20.5	N/A	20.5	0.125 U	20.5	11/20/2021	12/04/2016
I6	ELBOW	Y	0.388	12/10/2010	N/A	N/A	0.352	12/19/2011	N/A	35.2	N/A	35.2	0.125 U	35.2	05/31/2018	03/10/2015
I7	ELBOW	N	0.390	12/10/2010	N/A	N/A	0.391	12/19/2011	N/A	0.0	N/A	0.0	0.125 U	2.0	05/10/2022	12/18/2016
I8	ELBOW	N	0.356	12/10/2010	N/A	N/A	0.396	12/19/2011	N/A	0.0	N/A	0.0	0.125 U	2.0	07/21/2022	12/18/2016
J1	HEADER	N	0.240	12/10/2010	N/A	N/A	0.275	12/19/2011	N/A	0.0	N/A	0.0	0.125 U	2.0	10/28/2017	11/23/2014
J2	HEADER	N	0.252	12/10/2010	N/A	N/A	0.237	12/19/2011	N/A	14.6	N/A	14.6	0.125 U	14.6	05/04/2016	02/25/2014
J3	HEADER	N	0.239	12/10/2010	N/A	N/A	0.242	12/19/2011	N/A	0.0	N/A	0.0	0.125 U	2.0	07/14/2016	04/01/2014
J4	HEADER	N	0.245	12/10/2010	N/A	N/A	0.252	12/19/2011	N/A	0.0	N/A	0.0	0.125 U	2.0	12/04/2016	06/12/2014
J5	HEADER	N	0.250	12/10/2010	N/A	N/A	0.278	12/19/2011	N/A	0.0	N/A	0.0	0.125 U	2.0	12/10/2017	12/14/2014
J6	HEADER	N	0.251	12/10/2010	N/A	N/A	0.263	12/19/2011	N/A	0.0	N/A	0.0	0.125 U	2.0	05/10/2017	08/29/2014
J7	HEADER	N	0.250	12/10/2010	N/A	N/A	0.244	12/19/2011	N/A	5.9	N/A	5.9	0.125 U	5.9	08/12/2016	04/16/2014
J8	HEADER	N	0.253	12/10/2010	N/A	N/A	0.249	12/19/2011	N/A	3.9	N/A	3.9	0.125 U	3.9	10/22/2016	05/21/2014

City of Canton
Canton, Ohio
Acuren Inspection
Akron, Ohio

(Report in Inches, Corrosion Rates in MPY)
Analysis: Statistical/Straight Line

Report Date: 12/21/2011 10:20:04

Unit: PIPING
Eq/Circ ID: PUMP 2
Eq Type:
Class:
RBI:

Description:

Flange Rating: 0 lb/in²
Design Pressure: 30 lb/in²
Design Temp: 300 °F

TML Corrosion Rates are each the maximum of:
(A) -- Calculated Corrosion Rates x 1.00 : Varies
(B) -- Default Corrosion Rate : 2.0 MPY

Representative Corrosion Rate is the Maximum of:
(A) -- Average Corrosion Rate x 1.10 : 10.8 MPY
(B) -- Average Max 25.0% of TMLs, Min of 2 : 25.6 MPY
(C) -- Formula Corrosion Rate (Sigma = 1.28) : 11.2 MPY
(D) -- Default Corrosion Rate : 2.0 MPY
Representative Corrosion Rate = 25.6 MPY

TML thickness readings taken above 150.0 °F have been compensated by 1% per 100.0 °F

TML thickness readings have not been compensated for growths.

TML Life calculations are based on the maximum of the Rep. TML CR and the RCR using Short Term, Long Term, and Best Fit Corrosion Rates.

Nominal thickness is used for TML corrosion rate calculations with less than 3 surveys.

Minimum time between inspections required for corrosion rate calculation is 6 months.

TML Inspection Interval is:
(A) -- Minimum(TML Life / 2.00, 5.0 years)

Eq/Circ ID Last Survey Date is based on the LAST of the last 0% of TML survey dates (Min 1).

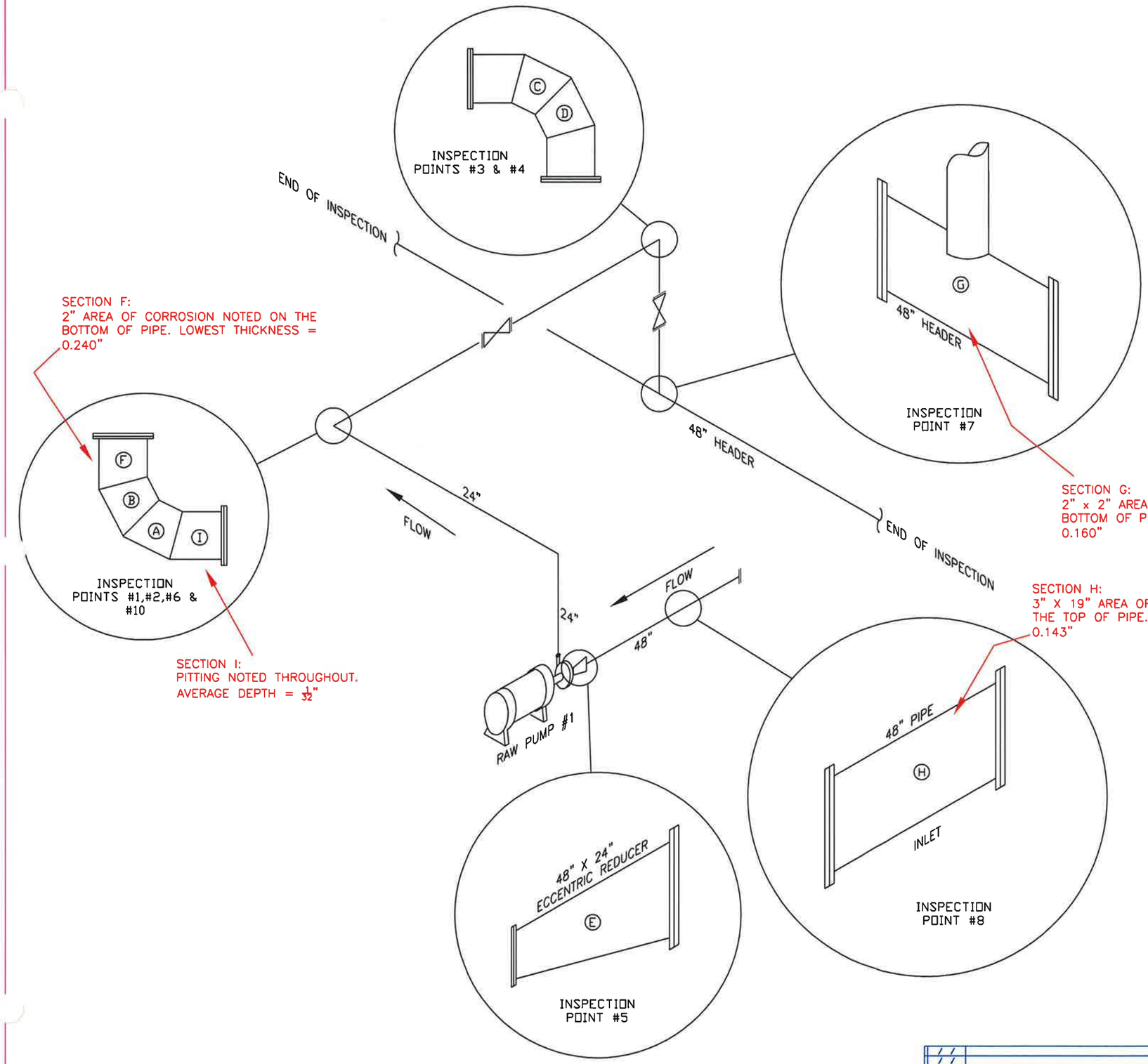
Eq/Circ ID Estimated life = 3.3 years from the most recent survey date.
(Estimated Life is based on the average of the earliest 0% (Min 1) TML retirement dates.)

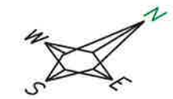
Predicted Eq/Circ ID Retirement date is 03/27/2015

Recommended Eq/Circ UT/RT Inspection Date is 08/07/2013
UT/RT Inspection Interval is the minimum(Remaining life / 2.0, 5.0 years).

Caution TML Logic: TML Corrosion Rate > 15.0 MPY .OR. TML Remaining Life < 1.00 Years.

There are 19 Caution TMLs in this Eq/Circ ID.

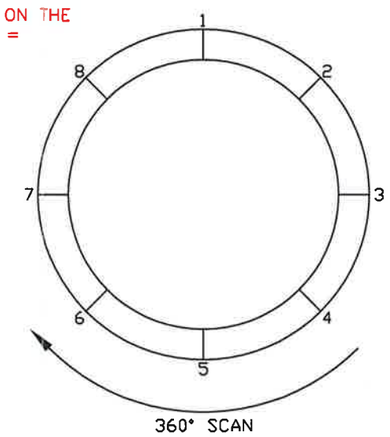




SPECIFICATIONS

PIPE:	24" & 48" – ASTM A53 GRADE A (SPIRAL)
FITTINGS:	MITERED PIPE – ASTM A53 GRADE A (SPIRAL)
FLANGES:	---
CONSTRUCTION CODE:	---
INSPECTION CODE:	API 570
DESIGN PRESSURE:	---
DESIGN TEMPERATURE:	---
OPERATING PRESSURE:	30 PSI
OPERATING TEMPERATURE:	AMBIENT

1. (X) = THICKNESS MEASUREMENT LOCATIONS (TML)
2. EACH TEST LOCATION WAS SCANNED 360° AND THE LOWEST READING WAS RECORDED FOR EACH POSITION ON THE PIPE.
3. FOR HORIZONTAL LINES RUNNING EAST/WEST, THE SCAN PROGRESSION IS TOP, NORTH, BOTTOM, SOUTH.
4. FOR HORIZONTAL LINES RUNNING NORTH/SOUTH, THE PROGRESSION IS TOP, EAST, BOTTOM, WEST.
5. FOR VERTICAL LINES THE PROGRESSION IS NORTH, EAST SOUTH, WEST.
6. TEST LOCATIONS ARE APPROXIMATED ON THE DRAWING BUT MARKED ON THE ACTUAL PIPE.
7. THE DRAWING IS PROVIDED ONLY AS A REPRESENTATION OF THE TESTING AREAS. NO LINE DIMENSIONS WERE TAKEN DURING THE TESTING.
8. MOST ITEMS ONLY REPRESENT THE EXISTENCE OF A PIPE COMPONENT.



SCAN PROGRESSION

CITY OF CANTON
WATER RECLAIMATION

3530 CENTRAL AVE. SE – CANTON, OH 44707

TITLE: RAW PUMP DISCHARGE 1

THICKNESS MEASUREMENT LOCATIONS

DATE:	DESCRIPTION	BY:	REV.
/ /			
/ /			
/ /			
/ /			
/ /			

DRAWN BY: LAJ	LAB. NO. 228646	ACUREN INSPECTION 535 KENNEDY RD. AVRON, OH 44325	
CHECKED BY: RC	DEPT. MECH. INT.		
APPROVED BY: RC	SCALE: NTS DATE: 12.10.2010	DRAWING NO. CCCWR-12102010-1-001	REV. 0

City of Canton
Canton, Ohio

Piping Inspection
Pump 2
December 19, 2011

ACUREN

535 Kennedy Rd.
Akron, OH 44305
Phone: 330.733.8160 – Fax: 330.733.8644

Acuren
535 Kennedy Rd.
Suite D
Akron, OH, USA 44685
Phone: (330) 733-8160
(800) 321-0878
Fax: (330) 733-8644

December 19, 2011

City of Canton
3530 Central Ave. SE
Canton, OH

Mr. Doug Dickerhoff

Subject: Piping Inspection (Pump-1)

WORK SCOPE:

Perform A-scan at previous locations and compare data with 2010 inspection.

SUMMARY:

The piping system was not suitable for continued service. Please see the results and recommendations below. The corrosion rate was 7.6 mils per year with an estimated remaining life of 2 years. The next inspection date should be no later than 1 year (half the estimated remaining life) or December, 2012.

RESULTS:

- **48" Inlet-** The area of corrosion that was discovered last year was 0.143" and is now 0.138".
- **48" Discharge Header-** The area of corrosion that was discovered last year remains at 0.160". A new area next to the flange was discovered. This area had a thickness of 0.170".
- **24" Elbow To Rotator Valve-** The area of corrosion that was discovered last year remains at 0.240". Two new areas were discovered on the bottom. The first was located next to the flange closest to the pump with a thickness reading of 0.310. The second was located on the opposite side of the elbow at the miter weld closest to the valve with a thickness of 0.093". The second area was below the minimum required thickness.
- **24" Elbow To Discharge-** Minor internal pitting is still present but does not eliminate this elbow from service.

LAYOUT:

CAD drawings have been included to designate thickness measurement locations and problem areas.

RECOMMENDATIONS:

- Place a patch over the area of corrosion/erosion at the miter weld on the 24" elbow to rotator valve.
- Due to the new areas of corrosion and the high corrosion rate of some of the components of this system, this piping should be re-inspected in December, 2012

ACUREN

City of Canton
Piping Inspection (Pump 1)
December 19, 2011

PERSONNEL:

Inspectors:

Jay Daigle	API Examiner SNT-TC-1A Level II Certified Weld Inspector	MT/PT/UT Certification#: 07090281
Richard Conley	API 510/653 Inspector SNT-TC-1A Level II	Certification#: 27342/40292 UT/MT/PT/VT/ET

Inspection review and evaluation:

Richard Conley	API Inspector SNT-TC-1A Level II	UT/MT/PT/VT

Should you have any additional questions concerning the inspection performed, please feel free to contact this office.

Sincerely,
Acuren Inspection

_____

Richard Conley
Mechanical Integrity Inspector

City of Canton
Canton, Ohio
Acuren Inspection
Akron, Ohio

Corrosion Monitoring Eq/Circ ID Analysis Report

(Report in Inches, Corrosion Rates in MPY)
Analysis: Statistical/Straight Line

Report Date: 12/21/2011 10:12:34

Unit: PIPING
Eq/Circ ID: PUMP 1
Eq Type:
Class:
RBI:

Description:

Flange Rating: 0 lb/in²
Design Pressure: 30 lb/in²
Design Temp: 300 °F

Summary: Group Name:
Insp. Due Date = 10/26/2012
Pred. Ret. Date = 09/04/2013

Group description:
RCR = 7.6 MPY
Rem. Life (from last survey 12/19/2011) = 1.7 yrs

0 C.A. Status: No
Total Caution TMLs = 0

TML Number	Location Description	Ctn TML	First Survey Thick Nt	First Survey Date	Previous Survey Thick Nt	Previous Survey Date	Last Survey Thick Nt	Last Survey Date	Short Term Rate	Long Term Rate	Best Fit Rate	Max Hist CR	Retirement Thickness	Rep TML CR	TML Retirement Date	TML Inspection Due Date
A1	ELBOW	N	0.392	12/10/2010	N/A	N/A	0.395	12/19/2011	N/A	0.0	N/A	0.0	0.125 U	2.0	06/29/2047	12/18/2016
A2	ELBOW	N	0.400	12/10/2010	N/A	N/A	0.396	12/19/2011	N/A	3.9	N/A	3.9	0.125 U	3.9	08/16/2047	12/18/2016
A3	ELBOW	N	0.420	12/10/2010	N/A	N/A	0.410	12/19/2011	N/A	9.8	N/A	9.8	0.125 U	9.8	01/17/2041	12/18/2016
A4	ELBOW	N	0.406	12/10/2010	N/A	N/A	0.398	12/19/2011	N/A	7.8	N/A	7.8	0.125 U	7.8	12/19/2046	12/18/2016
A5	ELBOW	N	0.408	12/10/2010	N/A	N/A	0.398	12/19/2011	N/A	9.8	N/A	9.8	0.125 U	9.8	10/28/2039	12/18/2016
A6	ELBOW	N	0.344	12/10/2010	N/A	N/A	0.344	12/19/2011	N/A	-0.0	N/A	0.0	0.125 U	2.0	10/12/2040	12/18/2016
A7	ELBOW	N	0.388	12/10/2010	N/A	N/A	0.386	12/19/2011	N/A	2.0	N/A	2.0	0.125 U	2.0	04/22/2046	12/18/2016
A8	ELBOW	N	0.400	12/10/2010	N/A	N/A	0.400	12/19/2011	N/A	-0.0	N/A	0.0	0.125 U	2.0	02/24/2048	12/18/2016
B1	ELBOW	N	0.412	12/10/2010	N/A	N/A	0.408	12/19/2011	N/A	3.9	N/A	3.9	0.125 U	3.9	03/15/2049	12/18/2016
B2	ELBOW	N	0.416	12/10/2010	N/A	N/A	0.418	12/19/2011	N/A	0.0	N/A	0.0	0.125 U	2.0	07/08/2050	12/18/2016
B3	ELBOW	N	0.400	12/10/2010	N/A	N/A	0.396	12/19/2011	N/A	3.9	N/A	3.9	0.125 U	3.9	08/16/2047	12/18/2016
B4	ELBOW	N	0.410	12/10/2010	N/A	N/A	0.402	12/19/2011	N/A	7.8	N/A	7.8	0.125 U	7.8	06/24/2047	12/18/2016
B5	ELBOW	N	0.408	12/10/2010	N/A	N/A	0.401	12/19/2011	N/A	6.8	N/A	6.8	0.125 U	6.8	04/12/2048	12/18/2016
B6	ELBOW	N	0.394	12/10/2010	N/A	N/A	0.392	12/19/2011	N/A	2.0	N/A	2.0	0.125 U	2.0	02/05/2047	12/18/2016
B7	ELBOW	N	0.348	12/10/2010	N/A	N/A	0.345	12/19/2011	N/A	2.9	N/A	2.9	0.125 U	2.9	11/29/2040	12/18/2016
B8	ELBOW	N	0.350	12/10/2010	N/A	N/A	0.350	12/19/2011	N/A	-0.0	N/A	0.0	0.125 U	2.0	07/27/2041	12/18/2016
C1	ELBOW	N	0.304	12/10/2010	N/A	N/A	0.307	12/19/2011	N/A	0.0	N/A	0.0	0.125 U	2.0	11/30/2035	12/18/2016
C2	ELBOW	N	0.312	12/10/2010	N/A	N/A	0.317	12/19/2011	N/A	0.0	N/A	0.0	0.125 U	2.0	03/24/2037	12/18/2016
C3	ELBOW	N	0.295	12/10/2010	N/A	N/A	0.295	12/19/2011	N/A	-0.0	N/A	0.0	0.125 U	2.0	05/02/2034	12/18/2016
C4	ELBOW	N	0.300	12/10/2010	N/A	N/A	0.302	12/19/2011	N/A	0.0	N/A	0.0	0.125 U	2.0	04/03/2035	12/18/2016
C5	ELBOW	N	0.305	12/10/2010	N/A	N/A	0.304	12/19/2011	N/A	1.0	N/A	1.0	0.125 U	2.0	07/09/2035	12/18/2016
C6	ELBOW	N	0.311	12/10/2010	N/A	N/A	0.315	12/19/2011	N/A	0.0	N/A	0.0	0.125 U	2.0	12/18/2036	12/18/2016
C7	ELBOW	N	0.300	12/10/2010	N/A	N/A	0.300	12/19/2011	N/A	-0.0	N/A	0.0	0.125 U	2.0	12/28/2034	12/18/2016
C8	ELBOW	N	0.312	12/10/2010	N/A	N/A	0.312	12/19/2011	N/A	-0.0	N/A	0.0	0.125 U	2.0	07/27/2036	12/18/2016
D1	ELBOW	N	0.310	12/10/2010	N/A	N/A	0.310	12/19/2011	N/A	-0.0	N/A	0.0	0.125 U	2.0	04/22/2036	12/18/2016
D2	ELBOW	N	0.313	12/10/2010	N/A	N/A	0.310	12/19/2011	N/A	2.9	N/A	2.9	0.125 U	2.9	04/22/2036	12/18/2016
D3	ELBOW	N	0.311	12/10/2010	N/A	N/A	0.311	12/19/2011	N/A	-0.0	N/A	0.0	0.125 U	2.0	06/09/2036	12/18/2016
D4	ELBOW	N	0.312	12/10/2010	N/A	N/A	0.315	12/19/2011	N/A	0.0	N/A	0.0	0.125 U	2.0	12/18/2036	12/18/2016
D5	ELBOW	N	0.318	12/10/2010	N/A	N/A	0.307	12/19/2011	N/A	10.7	N/A	10.7	0.125 U	10.7	12/22/2028	12/18/2016
D6	ELBOW	N	0.322	12/10/2010	N/A	N/A	0.318	12/19/2011	N/A	3.9	N/A	3.9	0.125 U	3.9	05/11/2037	12/18/2016
D7	ELBOW	N	0.320	12/10/2010	N/A	N/A	0.319	12/19/2011	N/A	1.0	N/A	1.0	0.125 U	2.0	06/28/2037	12/18/2016
D8	ELBOW	N	0.300	12/10/2010	N/A	N/A	0.301	12/19/2011	N/A	0.0	N/A	0.0	0.125 U	2.0	02/14/2035	12/18/2016
E1	REDUCER	N	0.281	12/10/2010	N/A	N/A	0.284	12/19/2011	N/A	0.0	N/A	0.0	0.125 U	2.0	11/19/2032	12/18/2016
E2	REDUCER	N	0.275	12/10/2010	N/A	N/A	0.268	12/19/2011	N/A	6.8	N/A	6.8	0.125 U	6.8	10/12/2030	12/18/2016
E3	REDUCER	N	0.277	12/10/2010	N/A	N/A	0.270	12/19/2011	N/A	6.8	N/A	6.8	0.125 U	6.8	01/17/2031	12/18/2016
E4	REDUCER	N	0.272	12/10/2010	N/A	N/A	0.275	12/19/2011	N/A	0.0	N/A	0.0	0.125 U	2.0	09/14/2031	12/18/2016
E5	REDUCER	N	0.270	12/10/2010	N/A	N/A	0.270	12/19/2011	N/A	-0.0	N/A	0.0	0.125 U	2.0	01/17/2031	12/18/2016
E6	REDUCER	N	0.248	12/10/2010	N/A	N/A	0.248	12/19/2011	N/A	-0.0	N/A	0.0	0.125 U	2.0	02/24/2028	12/18/2016
E7	REDUCER	N	0.271	12/10/2010	N/A	N/A	0.275	12/19/2011	N/A	0.0	N/A	0.0	0.125 U	2.0	09/14/2031	12/18/2016
E8	REDUCER	N	0.263	12/10/2010	N/A	N/A	0.263	12/19/2011	N/A	-0.0	N/A	0.0	0.125 U	2.0	02/14/2030	12/18/2016
F1	ELBOW	N	0.433	12/10/2010	N/A	N/A	0.429	12/19/2011	N/A	3.9	N/A	3.9	0.125 U	3.9	12/19/2051	12/18/2016

City of Canton
Canton, Ohio
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Akron, Ohio

TML Number	Location Description	Ctn TML	First Survey Thick Nt	First Survey Date	Previous Survey Thick Nt	Previous Survey Date	Last Survey Thick Nt	Last Survey Date	Short Term Rate	Long Term Rate	Best Fit Rate	Max Hist CR	Retirement Thickness	Rep TML CR	TML Retirement Date	TML Inspection Due Date
F2	ELBOW	N	0.421	12/10/2010	N/A	N/A	0.421	12/19/2011	N/A	-0.0	N/A	0.0	0.125 U	2.0	11/30/2050	12/18/2016
F3	ELBOW	N	0.430	12/10/2010	N/A	N/A	0.419	12/19/2011	N/A	10.7	N/A	10.7	0.125 U	10.7	06/11/2039	12/18/2016
F4	ELBOW	N	0.430	12/10/2010	N/A	N/A	0.419	12/19/2011	N/A	10.7	N/A	10.7	0.125 U	10.7	06/11/2039	12/18/2016
F5	ELBOW	N	0.240	12/10/2010	N/A	N/A	0.240	12/19/2011	N/A	-0.0	N/A	0.0	0.125 U	2.0	02/05/2027	12/18/2016
F6	ELBOW	N	0.400	12/10/2010	N/A	N/A	0.400	12/19/2011	N/A	-0.0	N/A	0.0	0.125 U	2.0	02/24/2048	12/18/2016
F7	ELBOW	N	0.420	12/10/2010	N/A	N/A	0.429	12/19/2011	N/A	0.0	N/A	0.0	0.125 U	2.0	12/19/2051	12/18/2016
F8	ELBOW	N	0.423	12/10/2010	N/A	N/A	0.422	12/19/2011	N/A	1.0	N/A	1.0	0.125 U	2.0	01/17/2051	12/18/2016
G1	HEADER	N	0.240	12/10/2010	N/A	N/A	0.245	12/19/2011	N/A	0.0	N/A	0.0	0.125 U	2.0	10/03/2027	12/18/2016
G2	HEADER	N	0.250	12/10/2010	N/A	N/A	0.250	12/19/2011	N/A	-0.0	N/A	0.0	0.125 U	2.0	05/30/2028	12/18/2016
G3	HEADER	N	0.250	12/10/2010	N/A	N/A	0.250	12/19/2011	N/A	-0.0	N/A	0.0	0.125 U	2.0	05/30/2028	12/18/2016
G4	HEADER	N	0.240	12/10/2010	N/A	N/A	0.240	12/19/2011	N/A	-0.0	N/A	0.0	0.125 U	2.0	02/05/2027	12/18/2016
G5	HEADER	N	0.160	12/10/2010	N/A	N/A	0.160	12/19/2011	N/A	-0.0	N/A	0.0	0.125 U	2.0	07/27/2016	04/08/2014
G6	HEADER	N	0.230	12/10/2010	N/A	N/A	0.233	12/19/2011	N/A	0.0	N/A	0.0	0.125 U	2.0	03/05/2026	12/18/2016
G7	HEADER	N	0.250	12/10/2010	N/A	N/A	0.248	12/19/2011	N/A	2.0	N/A	2.0	0.125 U	2.0	02/24/2028	12/18/2016
G8	HEADER	N	0.240	12/10/2010	N/A	N/A	0.240	12/19/2011	N/A	-0.0	N/A	0.0	0.125 U	2.0	02/05/2027	12/18/2016
H1	PIPE	N	0.145	12/10/2010	N/A	N/A	0.145	12/19/2011	N/A	-0.0	N/A	0.0	0.125 U	2.0	08/06/2014	04/12/2013
H2	PIPE	N *	0.143	12/10/2010	N/A	N/A	0.138	12/19/2011	N/A	4.9	N/A	4.9	0.125 U	4.9	09/04/2013	10/26/2012
H3	PIPE	N	0.230	12/10/2010	N/A	N/A	0.230	12/19/2011	N/A	-0.0	N/A	0.0	0.125 U	2.0	10/12/2025	12/18/2016
H4	PIPE	N	0.260	12/10/2010	N/A	N/A	0.253	12/19/2011	N/A	6.8	N/A	6.8	0.125 U	6.8	10/22/2028	12/18/2016
H5	PIPE	N	0.265	12/10/2010	N/A	N/A	0.267	12/19/2011	N/A	0.0	N/A	0.0	0.125 U	2.0	08/25/2030	12/18/2016
H6	PIPE	N	0.250	12/10/2010	N/A	N/A	0.250	12/19/2011	N/A	-0.0	N/A	0.0	0.125 U	2.0	05/30/2028	12/18/2016
H7	PIPE	N	0.251	12/10/2010	N/A	N/A	0.253	12/19/2011	N/A	0.0	N/A	0.0	0.125 U	2.0	10/22/2028	12/18/2016
H8	PIPE	N	0.246	12/10/2010	N/A	N/A	0.245	12/19/2011	N/A	1.0	N/A	1.0	0.125 U	2.0	10/03/2027	12/18/2016
I1	ELBOW	N	0.412	12/10/2010	N/A	N/A	0.405	12/19/2011	N/A	6.8	N/A	6.8	0.125 U	6.8	10/22/2048	12/18/2016
I2	ELBOW	N	0.414	12/10/2010	N/A	N/A	0.406	12/19/2011	N/A	7.8	N/A	7.8	0.125 U	7.8	12/28/2047	12/18/2016
I3	ELBOW	N	0.406	12/10/2010	N/A	N/A	0.406	12/19/2011	N/A	-0.0	N/A	0.0	0.125 U	2.0	12/09/2048	12/18/2016
I4	ELBOW	N	0.412	12/10/2010	N/A	N/A	0.412	12/19/2011	N/A	-0.0	N/A	0.0	0.125 U	2.0	09/23/2049	12/18/2016
I5	ELBOW	N	0.407	12/10/2010	N/A	N/A	0.400	12/19/2011	N/A	6.8	N/A	6.8	0.125 U	6.8	02/24/2048	12/18/2016
I6	ELBOW	N	0.369	12/10/2010	N/A	N/A	0.360	12/19/2011	N/A	8.8	N/A	8.8	0.125 U	8.8	09/02/2038	12/18/2016
I7	ELBOW	N	0.409	12/10/2010	N/A	N/A	0.405	12/19/2011	N/A	3.9	N/A	3.9	0.125 U	3.9	10/22/2048	12/18/2016
I8	ELBOW	N	0.410	12/10/2010	N/A	N/A	0.410	12/19/2011	N/A	-0.0	N/A	0.0	0.125 U	2.0	06/19/2049	12/18/2016

City of Canton
Canton, Ohio
Acuren Inspection
Akron, Ohio

(Report in Inches, Corrosion Rates in MPY)
Analysis: Statistical/Straight Line

Report Date: 12/21/2011 10:12:41

Unit: PIPING
Eq/Circ ID: PUMP 1
Eq Type:
Class:
RBI:

Description:

Flange Rating: 0 lb/in²
Design Pressure: 30 lb/in²
Design Temp: 300 °F

TML Corrosion Rates are each the maximum of:
(A) -- Calculated Corrosion Rates x 1.00 : Varies
(B) -- Default Corrosion Rate : 2.0 MPY

Representative Corrosion Rate is the Maximum of:
(A) -- Average Corrosion Rate x 1.10 : 3.9 MPY
(B) -- Average Max 25.0% of TMLs, Min of 2 : 7.6 MPY
(C) -- Formula Corrosion Rate (Sigma = 1.28) : 4.0 MPY
(D) -- Default Corrosion Rate : 2.0 MPY
Representative Corrosion Rate = 7.6 MPY

TML thickness readings taken above 150.0 °F have been compensated by 1% per 100.0 °F

TML thickness readings have not been compensated for growths.

TML Life calculations are based on the maximum of the Rep. TML CR and the RCR using Short Term, Long Term, and Best Fit Corrosion Rates.

Nominal thickness is used for TML corrosion rate calculations with less than 3 surveys.

Minimum time between inspections required for corrosion rate calculation is 6 months.

TML Inspection Interval is:
(A) -- Minimum(TML Life / 2.00, 5.0 years)

Eq/Circ ID Last Survey Date is based on the LAST of the last 0% of TML survey dates (Min 1).

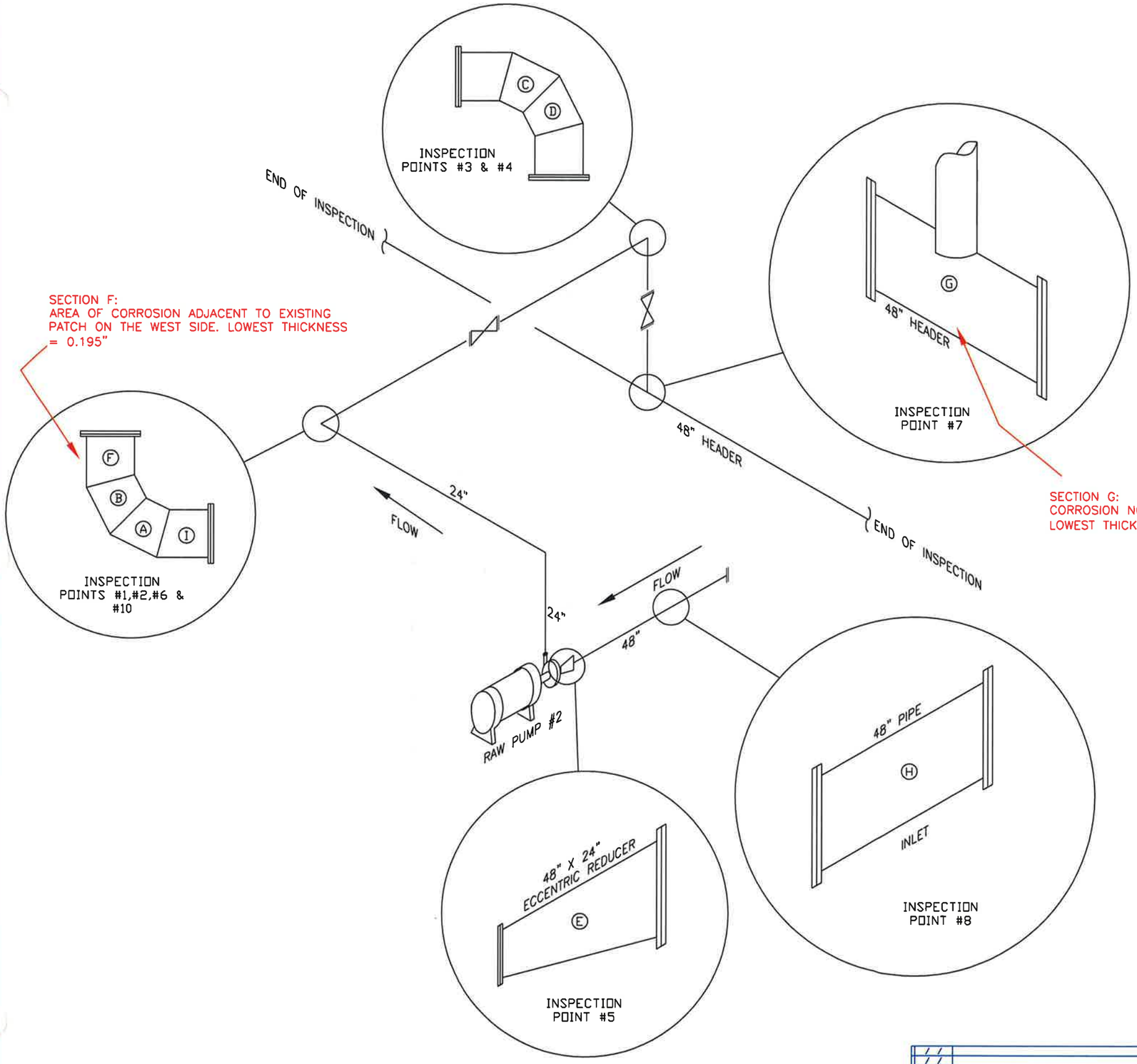
Eq/Circ ID Estimated life = 1.7 years from the most recent survey date.
(Estimated Life is based on the average of the earliest 0% (Min 1) TML retirement dates.)

Predicted Eq/Circ ID Retirement date is 09/04/2013

Recommended Eq/Circ UT/RT Inspection Date is 10/26/2012
UT/RT Inspection Interval is the minimum(Remaining life / 2.0, 5.0 years).

Caution TML Logic: TML Corrosion Rate > 15.0 MPY .OR. TML Remaining Life < 1.00 Years.

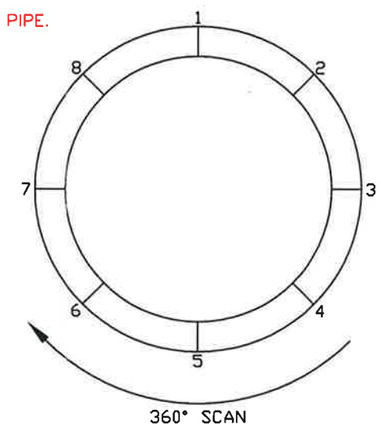
There are 0 Caution TMLs in this Eq/Circ ID.



SPECIFICATIONS

PIPE:	24" & 48" – ASTM A53 GRADE A (SPIRAL)
FITTINGS:	MITERED PIPE – ASTM A53 GRADE A (SPIRAL)
FLANGES:	---
CONSTRUCTION CODE:	---
INSPECTION CODE:	API 570
DESIGN PRESSURE:	---
DESIGN TEMPERATURE:	---
OPERATING PRESSURE:	30 PSI
OPERATING TEMPERATURE:	AMBIENT

1. (X) = THICKNESS MEASUREMENT LOCATIONS (TML)
2. EACH TEST LOCATION WAS SCANNED 360° AND THE LOWEST READING WAS RECORDED FOR EACH POSITION ON THE PIPE.
3. FOR HORIZONTAL LINES RUNNING EAST/WEST, THE SCAN PROGRESSION IS TOP, NORTH, BOTTOM, SOUTH.
4. FOR HORIZONTAL LINES RUNNING NORTH/SOUTH, THE PROGRESSION IS TOP, EAST, BOTTOM, WEST.
5. FOR VERTICAL LINES THE PROGRESSION IS NORTH, EAST SOUTH, WEST.
6. TEST LOCATIONS ARE APPROXIMATED ON THE DRAWING BUT MARKED ON THE ACTUAL PIPE.
7. THE DRAWING IS PROVIDED ONLY AS A REPRESENTATION OF THE TESTING AREAS. NO LINE DIMENSIONS WERE TAKEN DURING THE TESTING.
8. MOST ITEMS ONLY REPRESENT THE EXISTENCE OF A PIPE COMPONENT.



SCAN PROGRESSION

CITY OF CANTON
WATER RECLAIMATION

3530 CENTRAL AVE. SE – CANTON, OH 44707

TITLE: RAW PUMP DISCHARGE 2

THICKNESS MEASUREMENT LOCATIONS

DATE:	DESCRIPTION	BY:	REV.
/ /			
/ /			
/ /			
/ /			
/ /			

DRAWN BY: LAJ	LAB. NO. 228646	ACUREN INSPECTION 535 KENNEDY RD. AURORA, OH 44305	
CHECKED BY: RC	DEPT. MECH. INT.		
APPROVED BY: RC	SCALE: NTS	DRAWING NO. COCWR-12102010-2-001	REV. 0
	DATE: 12.10.2010		

City of Canton
Canton, Ohio

Piping Inspection
Pump 3
December 20, 2011

ACUREN

535 Kennedy Rd.
Akron, OH 44305
Phone: 330.733.8160 – Fax: 330.733.8644

Acuren
535 Kennedy Rd.
Suite D
Akron, OH, USA 44685
Phone: (330) 733-8160
(800) 321-0878
Fax: (330) 733-8644

December 20, 2011

City of Canton
3530 Central Ave. SE
Canton, OH

Mr. Doug Dickerhoff

Subject: Piping Inspection (Pump-3)

WORK SCOPE:

Perform A-scan at previous locations and compare data with 2010 inspection.

SUMMARY:

The piping system was not suitable for continued service. Please see the results and recommendations below. The corrosion rate was 28.1 mils per year with an estimated remaining life of 3 years. The next inspection date should be no later than 1 year (approximately half the estimated remaining life) or December, 2012.

RESULTS:

- **48" Inlet-** This section of pipe is acceptable for continued use.
- **48" Discharge Header-** This section of pipe is acceptable for continued use
- **24"x48" Reducer-** A leak was noted on the weld at the flange closest to the pump.
- **24" Elbow To Rotator Valve-** The patch on the section of the miter closest to the valve is below the minimum required thickness.
- **24" Elbow To Discharge-** This section of pipe is acceptable for continued use.

LAYOUT:

CAD drawings have been included to designate thickness measurement locations and problem areas.

RECOMMENDATIONS:

- Replace the patch on the 24" elbow to rotator valve.
- Repair the lead on the 24"x48" reducer. Patch 4" on each side of the leak.
- Due to the new areas of corrosion and the high corrosion rate of some of the components of this system, this piping should be re-inspected in December, 2012

ACUREN

City of Canton
Piping Inspection (Pump 3)
December 20, 2011

PERSONNEL:

Inspectors:

Jay Daigle	API Examiner SNT-TC-1A Level II Certified Weld Inspector	MT/PT/UT Certification#: 07090281
Richard Conley	API 510/653 Inspector SNT-TC-1A Level II	Certification#: 27342/40292 UT/MT/PT/VT/ET

Inspection review and evaluation:

Richard Conley	API Inspector SNT-TC-1A Level II	UT/MT/PT/VT

Should you have any additional questions concerning the inspection performed, please feel free to contact this office.

Sincerely,
Acuren Inspection

_____

Richard Conley
Mechanical Integrity Inspector

City of Canton
Canton, Ohio
Acuren Inspection
Akron, Ohio

Corrosion Monitoring Eq/Circ ID Analysis Report

(Report in Inches, Corrosion Rates in MPY)
Analysis: Statistical/Straight Line

Report Date: 12/21/2011 11:02:34

Unit: PIPING
Eq/Circ ID: PUMP 3
Eq Type:
Class:
RBI:

Description:

Flange Rating: 0 lb/in²
Design Pressure: 30 lb/in²
Design Temp: 300 °F

Summary: Group Name:
Insp. Due Date = 08/20/2013
Pred. Ret. Date = 04/23/2015

Group description:
RCR = 28.1 MPY
Rem. Life (from last survey 12/20/2011) = 3.3 yrs

0 C.A. Status: No
Total Caution TMLs = 28

TML Number	Location Description	Ctn TML	First Survey Thick Nt	First Survey Date	Previous Survey Thick Nt	Previous Survey Date	Last Survey Thick Nt	Last Survey Date	Short Term Rate	Long Term Rate	Best Fit Rate	Max Hist CR	Retirement Thickness	Rep TML CR	TML Retirement Date	TML Inspection Due Date
A1	ELBOW	Y	0.400	12/10/2010	N/A	N/A	0.383	12/20/2011	N/A	16.6	N/A	16.6	0.125 U	16.6	02/24/2021	07/23/2016
A2	ELBOW	Y	0.408	12/10/2010	N/A	N/A	0.387	12/20/2011	N/A	20.5	N/A	20.5	0.125 U	20.5	04/17/2021	08/18/2016
A3	ELBOW	Y	0.416	12/10/2010	N/A	N/A	0.384	12/20/2011	N/A	31.2	N/A	31.2	0.125 U	31.2	04/08/2020	02/13/2016
A4	ELBOW	N	0.360	12/10/2010	N/A	N/A	0.345	12/20/2011	N/A	14.6	N/A	14.6	0.125 U	14.6	10/19/2019	11/19/2015
A5	ELBOW	Y	0.400	12/10/2010	N/A	N/A	0.380	12/20/2011	N/A	19.5	N/A	19.5	0.125 U	19.5	01/16/2021	07/03/2016
A6	ELBOW	Y	0.410	12/10/2010	N/A	N/A	0.386	12/20/2011	N/A	23.4	N/A	23.4	0.125 U	23.4	04/04/2021	08/11/2016
A7	ELBOW	Y	0.390	12/10/2010	N/A	N/A	0.356	12/20/2011	N/A	33.1	N/A	33.1	0.125 U	33.1	12/12/2018	06/16/2015
A8	ELBOW	N	0.399	12/10/2010	N/A	N/A	0.386	12/20/2011	N/A	12.7	N/A	12.7	0.125 U	12.7	04/04/2021	08/11/2016
B1	ELBOW	Y	0.418	12/10/2010	N/A	N/A	0.389	12/20/2011	N/A	28.2	N/A	28.2	0.125 U	28.2	04/30/2021	08/24/2016
B2	ELBOW	Y	0.420	12/10/2010	N/A	N/A	0.396	12/20/2011	N/A	23.4	N/A	23.4	0.125 U	23.4	08/12/2021	10/15/2016
B3	ELBOW	Y	0.416	12/10/2010	N/A	N/A	0.391	12/20/2011	N/A	24.3	N/A	24.3	0.125 U	24.3	06/08/2021	09/13/2016
B4	ELBOW	Y	0.410	12/10/2010	N/A	N/A	0.384	12/20/2011	N/A	25.3	N/A	25.3	0.125 U	25.3	03/09/2021	07/29/2016
B5	ELBOW	N	0.370	12/10/2010	N/A	N/A	0.386	12/20/2011	N/A	0.0	N/A	0.0	0.125 U	2.0	04/04/2021	08/11/2016
B6	ELBOW	N	0.378	12/10/2010	N/A	N/A	0.379	12/20/2011	N/A	0.0	N/A	0.0	0.125 U	2.0	01/03/2021	06/27/2016
B7	ELBOW	N	0.400	12/10/2010	N/A	N/A	0.394	12/20/2011	N/A	5.8	N/A	5.8	0.125 U	5.8	07/17/2021	10/02/2016
B8	ELBOW	Y	0.406	12/10/2010	N/A	N/A	0.379	12/20/2011	N/A	26.3	N/A	26.3	0.125 U	26.3	01/03/2021	06/27/2016
C1	ELBOW	N	0.300	12/10/2010	N/A	N/A	0.311	12/20/2011	N/A	0.0	N/A	0.0	0.125 U	2.0	08/03/2018	04/12/2015
C2	ELBOW	Y	0.312	12/10/2010	N/A	N/A	0.295	12/20/2011	N/A	16.6	N/A	16.6	0.125 U	16.6	01/07/2018	12/29/2014
C3	ELBOW	Y	0.320	12/10/2010	N/A	N/A	0.303	12/20/2011	N/A	16.6	N/A	16.6	0.125 U	16.6	04/21/2018	02/19/2015
C4	ELBOW	Y	0.322	12/10/2010	N/A	N/A	0.298	12/20/2011	N/A	23.4	N/A	23.4	0.125 U	23.4	02/15/2018	01/17/2015
C5	ELBOW	N	0.310	12/10/2010	N/A	N/A	0.328	12/20/2011	N/A	0.0	N/A	0.0	0.125 U	2.0	03/12/2019	07/31/2015
C6	ELBOW	N	0.305	12/10/2010	N/A	N/A	0.290	12/20/2011	N/A	14.6	N/A	14.6	0.125 U	14.6	11/03/2017	11/26/2014
C7	ELBOW	Y	0.323	12/10/2010	N/A	N/A	0.304	12/20/2011	N/A	18.5	N/A	18.5	0.125 U	18.5	05/04/2018	02/25/2015
C8	ELBOW	N	0.313	12/10/2010	N/A	N/A	0.301	12/20/2011	N/A	11.7	N/A	11.7	0.125 U	11.7	03/26/2018	02/06/2015
D1	ELBOW	N	0.305	12/10/2010	N/A	N/A	0.306	12/20/2011	N/A	0.0	N/A	0.0	0.125 U	2.0	05/30/2018	03/10/2015
D2	ELBOW	N	0.319	12/10/2010	N/A	N/A	0.304	12/20/2011	N/A	14.6	N/A	14.6	0.125 U	14.6	05/04/2018	02/25/2015
D3	ELBOW	Y	0.320	12/10/2010	N/A	N/A	0.303	12/20/2011	N/A	16.6	N/A	16.6	0.125 U	16.6	04/21/2018	02/19/2015
D4	ELBOW	N	0.315	12/10/2010	N/A	N/A	0.305	12/20/2011	N/A	9.7	N/A	9.7	0.125 U	9.7	05/17/2018	03/04/2015
D5	ELBOW	N	0.312	12/10/2010	N/A	N/A	0.304	12/20/2011	N/A	7.8	N/A	7.8	0.125 U	7.8	05/04/2018	02/25/2015
D6	ELBOW	N	0.310	12/10/2010	N/A	N/A	0.300	12/20/2011	N/A	9.7	N/A	9.7	0.125 U	9.7	03/13/2018	01/30/2015
D7	ELBOW	N	0.305	12/10/2010	N/A	N/A	0.306	12/20/2011	N/A	0.0	N/A	0.0	0.125 U	2.0	05/30/2018	03/10/2015
D8	ELBOW	N	0.310	12/10/2010	N/A	N/A	0.303	12/20/2011	N/A	6.8	N/A	6.8	0.125 U	6.8	04/21/2018	02/19/2015
E1	REDUCER	N	0.267	12/10/2010	N/A	N/A	0.274	12/20/2011	N/A	0.0	N/A	0.0	0.125 U	2.0	04/09/2017	08/14/2014
E2	REDUCER	N	0.264	12/10/2010	N/A	N/A	0.272	12/20/2011	N/A	0.0	N/A	0.0	0.125 U	2.0	03/14/2017	08/01/2014
E3	REDUCER	N	0.270	12/10/2010	N/A	N/A	0.266	12/20/2011	N/A	3.9	N/A	3.9	0.125 U	3.9	12/26/2016	06/23/2014
E4	REDUCER	N	0.250	12/10/2010	N/A	N/A	0.258	12/20/2011	N/A	0.0	N/A	0.0	0.125 U	2.0	09/13/2016	05/02/2014
E5	REDUCER	N	0.267	12/10/2010	N/A	N/A	0.264	12/20/2011	N/A	2.9	N/A	2.9	0.125 U	2.9	11/30/2016	06/10/2014
E6	REDUCER	N	0.278	12/10/2010	N/A	N/A	0.269	12/20/2011	N/A	8.8	N/A	8.8	0.125 U	8.8	02/03/2017	07/13/2014
E7	REDUCER	Y	0.280	12/10/2010	N/A	N/A	0.259	12/20/2011	N/A	20.5	N/A	20.5	0.125 U	20.5	09/26/2016	05/09/2014
E8	REDUCER	N	0.281	12/10/2010	N/A	N/A	0.272	12/20/2011	N/A	8.8	N/A	8.8	0.125 U	8.8	03/14/2017	08/01/2014
F1	ELBOW	Y	0.400	12/10/2010	N/A	N/A	0.380	12/20/2011	N/A	19.5	N/A	19.5	0.125 U	19.5	01/16/2021	07/03/2016

City of Canton
Canton, Ohio
Acuren Inspection
Akron, Ohio

TML Number	Location Description	Ctn TML	First Survey Thick Nt	First Survey Date	Previous Survey Thick Nt	Previous Survey Date	Last Survey Thick Nt	Last Survey Date	Short Term Rate	Long Term Rate	Best Fit Rate	Max Hist CR	Retirement Thickness	Rep TML CR	TML Retirement Date	TML Inspection Due Date
F2	ELBOW	Y	0.393	12/10/2010	N/A	N/A	0.351	12/20/2011	N/A	40.9	N/A	40.9	0.125 U	40.9	06/29/2017	09/24/2014
F3	ELBOW	Y	0.384	12/10/2010	N/A	N/A	0.362	12/20/2011	N/A	21.4	N/A	21.4	0.125 U	21.4	05/27/2020	03/08/2016
F4	ELBOW	Y	0.400	12/10/2010	N/A	N/A	0.377	12/20/2011	N/A	22.4	N/A	22.4	0.125 U	22.4	12/08/2020	06/14/2016
F5	ELBOW	N	0.230	12/10/2010	N/A	N/A	0.331	12/20/2011	N/A	0.0	N/A	0.0	0.125 U	2.0	04/20/2019	08/20/2015
F6	ELBOW	N	0.300	12/10/2010	N/A	N/A	0.367	12/20/2011	N/A	0.0	N/A	0.0	0.125 U	2.0	07/31/2020	04/10/2016
F7	ELBOW	N	0.412	12/10/2010	N/A	N/A	0.400	12/20/2011	N/A	11.7	N/A	11.7	0.125 U	11.7	10/03/2021	11/10/2016
F8	ELBOW	N	0.400	12/10/2010	N/A	N/A	0.395	12/20/2011	N/A	4.9	N/A	4.9	0.125 U	4.9	07/30/2021	10/09/2016
G1	HEADER	N	0.255	12/10/2010	N/A	N/A	0.256	12/20/2011	N/A	0.0	N/A	0.0	0.125 U	2.0	08/18/2016	04/19/2014
G2	HEADER	N	0.259	12/10/2010	N/A	N/A	0.253	12/20/2011	N/A	5.8	N/A	5.8	0.125 U	5.8	07/10/2016	03/31/2014
G3	HEADER	N	0.250	12/10/2010	N/A	N/A	0.246	12/20/2011	N/A	3.9	N/A	3.9	0.125 U	3.9	04/10/2016	02/13/2014
G4	HEADER	N	0.245	12/10/2010	N/A	N/A	0.261	12/20/2011	N/A	0.0	N/A	0.0	0.125 U	2.0	10/22/2016	05/22/2014
G5	HEADER	N	0.260	12/10/2010	N/A	N/A	0.263	12/20/2011	N/A	0.0	N/A	0.0	0.125 U	2.0	11/17/2016	06/04/2014
G6	HEADER	Y	0.268	12/10/2010	N/A	N/A	0.236	12/20/2011	N/A	31.2	N/A	31.2	0.125 U	31.2	07/11/2015	09/29/2013
G7	HEADER	N	0.256	12/10/2010	N/A	N/A	0.244	12/20/2011	N/A	11.7	N/A	11.7	0.125 U	11.7	03/15/2016	01/31/2014
G8	HEADER	N	0.260	12/10/2010	N/A	N/A	0.245	12/20/2011	N/A	14.6	N/A	14.6	0.125 U	14.6	03/28/2016	02/07/2014
H1	PIPE	N	0.260	12/10/2010	N/A	N/A	0.264	12/20/2011	N/A	0.0	N/A	0.0	0.125 U	2.0	11/30/2016	06/10/2014
H2	PIPE	N	0.255	12/10/2010	N/A	N/A	0.259	12/20/2011	N/A	0.0	N/A	0.0	0.125 U	2.0	09/26/2016	05/09/2014
H3	PIPE	N	0.250	12/10/2010	N/A	N/A	0.259	12/20/2011	N/A	0.0	N/A	0.0	0.125 U	2.0	09/26/2016	05/09/2014
H4	PIPE	Y	0.262	12/10/2010	N/A	N/A	0.246	12/20/2011	N/A	15.6	N/A	15.6	0.125 U	15.6	04/10/2016	02/13/2014
H5	PIPE	Y	0.270	12/10/2010	N/A	N/A	0.250	12/20/2011	N/A	19.5	N/A	19.5	0.125 U	19.5	06/01/2016	03/11/2014
H6	PIPE	N	0.265	12/10/2010	N/A	N/A	0.279	12/20/2011	N/A	0.0	N/A	0.0	0.125 U	2.0	06/13/2017	09/16/2014
H7	PIPE	N	0.250	12/10/2010	N/A	N/A	0.259	12/20/2011	N/A	0.0	N/A	0.0	0.125 U	2.0	09/26/2016	05/09/2014
H8	PIPE	N	0.255	12/10/2010	N/A	N/A	0.263	12/20/2011	N/A	0.0	N/A	0.0	0.125 U	2.0	11/17/2016	06/04/2014
I1	ELBOW	Y	0.372	12/10/2010	N/A	N/A	0.347	12/20/2011	N/A	24.4	N/A	24.4	0.125 U	24.4	11/14/2019	12/02/2015
I2	ELBOW	Y	0.360	12/10/2010	N/A	N/A	0.342	12/20/2011	N/A	17.5	N/A	17.5	0.125 U	17.5	09/10/2019	10/30/2015
I3	ELBOW	Y	0.377	12/10/2010	N/A	N/A	0.349	12/20/2011	N/A	27.3	N/A	27.3	0.125 U	27.3	12/10/2019	12/15/2015
I4	ELBOW	Y *	0.380	12/10/2010	N/A	N/A	0.320	12/20/2011	N/A	58.4	N/A	58.4	0.125 U	58.4	04/23/2015	08/21/2013
I5	ELBOW	N	0.360	12/10/2010	N/A	N/A	0.390	12/20/2011	N/A	0.0	N/A	0.0	0.125 U	2.0	05/26/2021	09/06/2016
I6	ELBOW	N	0.345	12/10/2010	N/A	N/A	0.389	12/20/2011	N/A	0.0	N/A	0.0	0.125 U	2.0	05/13/2021	08/31/2016
I7	ELBOW	N	0.333	12/10/2010	N/A	N/A	0.409	12/20/2011	N/A	0.0	N/A	0.0	0.125 U	2.0	01/27/2022	12/19/2016
I8	ELBOW	N	0.340	12/10/2010	N/A	N/A	0.388	12/20/2011	N/A	0.0	N/A	0.0	0.125 U	2.0	04/30/2021	08/24/2016

City of Canton
Canton, Ohio
Acuren Inspection
Akron, Ohio

(Report in Inches, Corrosion Rates in MPY)
Analysis: Statistical/Straight Line

Report Date: 12/21/2011 11:02:39

Unit: PIPING
Eq/Circ ID: PUMP 3
Eq Type:
Class:
RBI:

Description:

Flange Rating: 0 lb/in²
Design Pressure: 30 lb/in²
Design Temp: 300 °F

TML Corrosion Rates are each the maximum of:
(A) -- Calculated Corrosion Rates x 1.00 : Varies
(B) -- Default Corrosion Rate : 2.0 MPY

Representative Corrosion Rate is the Maximum of:
(A) -- Average Corrosion Rate x 1.10 : 14.0 MPY
(B) -- Average Max 25.0% of TMLs, Min of 2 : 28.1 MPY
(C) -- Formula Corrosion Rate (Sigma = 1.28) : 14.6 MPY
(D) -- Default Corrosion Rate : 2.0 MPY
Representative Corrosion Rate = 28.1 MPY

TML thickness readings taken above 150.0 °F have been compensated by 1% per 100.0 °F

TML thickness readings have not been compensated for growths.

TML Life calculations are based on the maximum of the Rep. TML CR and the RCR using Short Term, Long Term, and Best Fit Corrosion Rates.

Nominal thickness is used for TML corrosion rate calculations with less than 3 surveys.

Minimum time between inspections required for corrosion rate calculation is 6 months.

TML Inspection Interval is:
(A) -- Minimum(TML Life / 2.00, 5.0 years)

Eq/Circ ID Last Survey Date is based on the LAST of the last 0% of TML survey dates (Min 1).

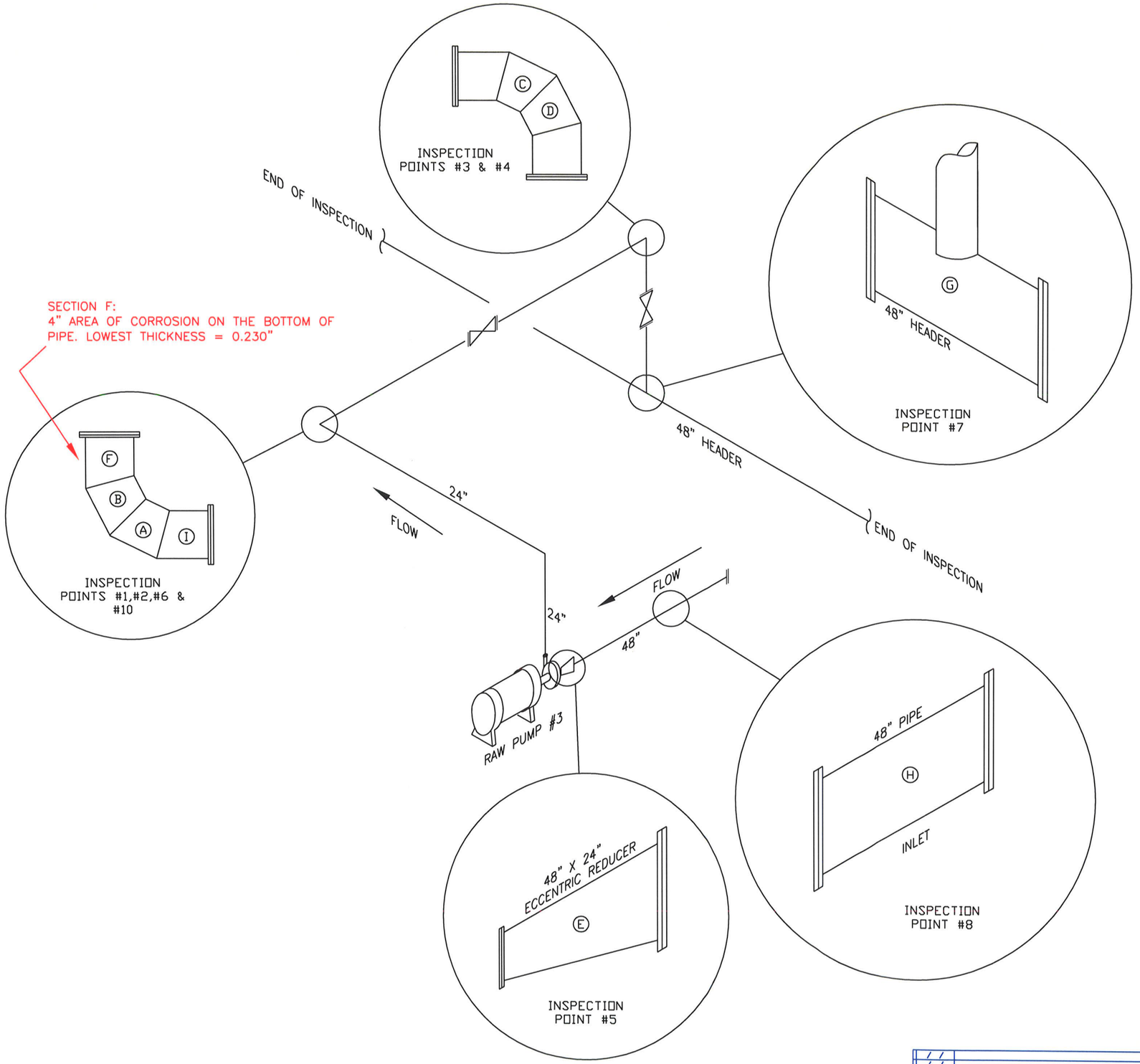
Eq/Circ ID Estimated life = 3.3 years from the most recent survey date.
(Estimated Life is based on the average of the earliest 0% (Min 1) TML retirement dates.)

Predicted Eq/Circ ID Retirement date is 04/23/2015

Recommended Eq/Circ UT/RT Inspection Date is 08/20/2013
UT/RT Inspection Interval is the minimum(Remaining life / 2.0, 5.0 years).

Caution TML Logic: TML Corrosion Rate > 15.0 MPY .OR. TML Remaining Life < 1.00 Years.

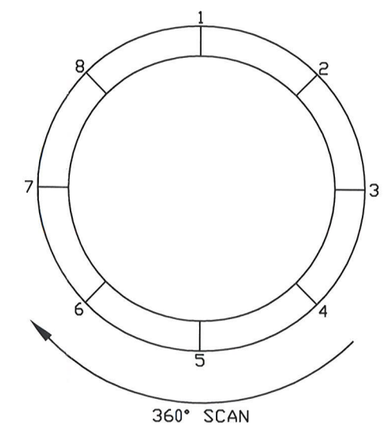
There are 28 Caution TMLs in this Eq/Circ ID.



SPECIFICATIONS

PIPE:	24" & 48" – ASTM A53 GRADE A (SPIRAL)
FITTINGS:	MITERED PIPE – ASTM A53 GRADE A (SPIRAL)
FLANGES:	---
CONSTRUCTION CODE:	---
INSPECTION CODE:	API 570
DESIGN PRESSURE:	---
DESIGN TEMPERATURE:	---
OPERATING PRESSURE:	30 PSI
OPERATING TEMPERATURE:	AMBIENT

1. (X) = THICKNESS MEASUREMENT LOCATIONS (TML)
2. EACH TEST LOCATION WAS SCANNED 360° AND THE LOWEST READING WAS RECORDED FOR EACH POSITION ON THE PIPE.
3. FOR HORIZONTAL LINES RUNNING EAST/WEST, THE SCAN PROGRESSION IS TOP, NORTH, BOTTOM, SOUTH.
4. FOR HORIZONTAL LINES RUNNING NORTH/SOUTH, THE PROGRESSION IS TOP, EAST, BOTTOM, WEST.
5. FOR VERTICAL LINES THE PROGRESSION IS NORTH, EAST SOUTH, WEST.
6. TEST LOCATIONS ARE APPROXIMATED ON THE DRAWING BUT MARKED ON THE ACTUAL PIPE.
7. THE DRAWING IS PROVIDED ONLY AS A REPRESENTATION OF THE TESTING AREAS. NO LINE DIMENSIONS WERE TAKEN DURING THE TESTING.
8. MOST ITEMS ONLY REPRESENT THE EXISTENCE OF A PIPE COMPONENT.



SCAN PROGRESSION

CITY OF CANTON
WATER RECLAIMATION

3530 CENTRAL AVE. SE – CANTON, OH 44707

TITLE:
RAW PUMP DISCHARGE 3

THICKNESS MEASUREMENT LOCATIONS

DATE:	DESCRIPTION	BY:	REV.
/ /			
/ /			
/ /			
/ /			
/ /			

DRAWN BY: LAJ	LAB. NO. 228646	ACUREN INSPECTION 535 KENNEDY RD. AKRON, OH 44305	
CHECKED BY: RC	DEPT. MECH. INT.		
APPROVED BY: RC	SCALE: NTS	DRAWING NO. COCWR-12102010-3-001	REV. 0
	DATE: 12.10.2010		

City of Canton
Canton, Ohio

Piping Inspection
Pump 4
December 20, 2011

ACUREN

535 Kennedy Rd.
Akron, OH 44305
Phone: 330.733.8160 – Fax: 330.733.8644

Acuren
535 Kennedy Rd.
Suite D
Akron, OH, USA 44685
Phone: (330) 733-8160
(800) 321-0878
Fax: (330) 733-8644

December 20, 2011

City of Canton
3530 Central Ave. SE
Canton, OH

Mr. Doug Dickerhoff

Subject: Piping Inspection (Pump-4)

WORK SCOPE:

Perform A-scan at previous locations and compare data with 2010 inspection.

SUMMARY:

The piping system was suitable for continued service. Please see the results and recommendations below. The corrosion rate was 35.6 mils per year with an estimated remaining life of 3 years. The next inspection date should be no later than 1 year (approximately half the estimated remaining life) or December, 2012.

RESULTS:

- **48" Inlet-** This section of pipe is acceptable for continued use.
- **48" Discharge Header-** This section of pipe is acceptable for continued use
- **24"x48" Reducer-** Thickness readings revealed an area of corrosion on the pump side of the 24"x48" reducer. The reading recorded was 0.113" which is below the minimum required thickness.
- **24" Elbow To Rotator Valve-** Thickness readings revealed an area of corrosion on the valve side of this elbow, The area is located at the miter weld closest to the valve with a thickness reading of 0.113" which is below the minimum required thickness.
- **24" Elbow To Discharge-** Thickness readings revealed an area of corrosion on the upper part, bottom, of this valve. The thickness reading was 0.145".

LAYOUT:

CAD drawings have been included to designate thickness measurement locations and problem areas.

RECOMMENDATIONS:

- Install a patch on the 24" elbow to rotator valve. The area is marked on the pipe.
- Patch the low area on the 24"x48" reducer. The area is marked on the pipe.
- Patch the low area on the 24" elbow to discharge. The area is marked on the pipe.
- Due to the new areas of corrosion and the high corrosion rate of some of the components of this system, this piping should be re-inspected in December, 2012

ACUREN

City of Canton
Piping Inspection (Pump 4)
December 20, 2011

PERSONNEL:

Inspectors:

Jay Daigle	API Examiner SNT-TC-1A Level II Certified Weld Inspector	MT/PT/UT Certification#: 07090281
Richard Conley	API 510/653 Inspector SNT-TC-1A Level II	Certification#: 27342/40292 UT/MT/PT/VT/ET

Inspection review and evaluation:

Richard Conley	API Inspector SNT-TC-1A Level II	UT/MT/PT/VT

Should you have any additional questions concerning the inspection performed, please feel free to contact this office.

Sincerely,
Acuren Inspection

_____

Richard Conley
Mechanical Integrity Inspector

City of Canton
Canton, Ohio
Acuren Inspection
Akron, Ohio

Corrosion Monitoring Eq/Circ ID Analysis Report

(Report in Inches, Corrosion Rates in MPY)
Analysis: Statistical/Straight Line

Report Date: 12/21/2011 11:22:11

Unit: PIPING
Eq/Circ ID: PUMP 4
Eq Type:
Class:
RBI:

Description:

Flange Rating: 0 lb/in²
Design Pressure: 30 lb/in²
Design Temp: 300 °F

Summary: Group Name:
Insp. Due Date = 05/30/2013
Pred. Ret. Date = 11/11/2014

Group description:
RCR = 35.6 MPY
Rem. Life (from last survey 12/20/2011) = 2.9 yrs

0 C.A. Status: No
Total Caution TMLs = 40

TML Number	Location Description	Ctn TML	First Survey Thick Nt	First Survey Date	Previous Survey Thick Nt	Previous Survey Date	Last Survey Thick Nt	Last Survey Date	Short Term Rate	Long Term Rate	Best Fit Rate	Max Hist CR	Retirement Thickness	Rep TML CR	TML Retirement Date	TML Inspection Due Date
A1	ELBOW	N	0.400	12/10/2010	N/A	N/A	0.399	12/20/2011	N/A	1.0	N/A	1.0	0.125 U	2.0	08/31/2019	10/25/2015
A2	ELBOW	N	0.379	12/10/2010	N/A	N/A	0.386	12/20/2011	N/A	0.0	N/A	0.0	0.125 U	2.0	04/20/2019	08/20/2015
A3	ELBOW	N	0.380	12/10/2010	N/A	N/A	0.378	12/20/2011	N/A	1.9	N/A	1.9	0.125 U	2.0	01/28/2019	07/10/2015
A4	ELBOW	Y	0.406	12/10/2010	N/A	N/A	0.380	12/20/2011	N/A	25.3	N/A	25.3	0.125 U	25.3	02/17/2019	07/20/2015
A5	ELBOW	N	0.400	12/10/2010	N/A	N/A	0.385	12/20/2011	N/A	14.6	N/A	14.6	0.125 U	14.6	04/10/2019	08/15/2015
A6	ELBOW	Y	0.406	12/10/2010	N/A	N/A	0.381	12/20/2011	N/A	24.4	N/A	24.4	0.125 U	24.4	02/28/2019	07/25/2015
A7	ELBOW	Y	0.416	12/10/2010	N/A	N/A	0.389	12/20/2011	N/A	26.3	N/A	26.3	0.125 U	26.3	05/21/2019	09/04/2015
A8	ELBOW	N	0.400	12/10/2010	N/A	N/A	0.393	12/20/2011	N/A	6.8	N/A	6.8	0.125 U	6.8	07/01/2019	09/25/2015
B1	ELBOW	Y	0.416	12/10/2010	N/A	N/A	0.389	12/20/2011	N/A	26.3	N/A	26.3	0.125 U	26.3	05/21/2019	09/04/2015
B2	ELBOW	Y	0.424	12/10/2010	N/A	N/A	0.388	12/20/2011	N/A	35.1	N/A	35.1	0.125 U	35.1	05/10/2019	08/30/2015
B3	ELBOW	Y	0.417	12/10/2010	N/A	N/A	0.391	12/20/2011	N/A	25.3	N/A	25.3	0.125 U	25.3	06/10/2019	09/14/2015
B4	ELBOW	Y	0.412	12/10/2010	N/A	N/A	0.386	12/20/2011	N/A	25.3	N/A	25.3	0.125 U	25.3	04/20/2019	08/20/2015
B5	ELBOW	Y	0.416	12/10/2010	N/A	N/A	0.384	12/20/2011	N/A	31.2	N/A	31.2	0.125 U	31.2	03/30/2019	08/09/2015
B6	ELBOW	N	0.332	12/10/2010	N/A	N/A	0.338	12/20/2011	N/A	0.0	N/A	0.0	0.125 U	2.0	12/13/2017	12/16/2014
B7	ELBOW	Y	0.420	12/10/2010	N/A	N/A	0.379	12/20/2011	N/A	39.9	N/A	39.9	0.125 U	39.9	05/02/2018	02/24/2015
B8	ELBOW	Y	0.414	12/10/2010	N/A	N/A	0.377	12/20/2011	N/A	36.0	N/A	36.0	0.125 U	36.0	12/20/2018	06/20/2015
C1	ELBOW	Y	0.334	12/10/2010	N/A	N/A	0.312	12/20/2011	N/A	21.4	N/A	21.4	0.125 U	21.4	03/22/2017	08/05/2014
C2	ELBOW	Y	0.336	12/10/2010	N/A	N/A	0.310	12/20/2011	N/A	25.3	N/A	25.3	0.125 U	25.3	03/01/2017	07/26/2014
C3	ELBOW	Y	0.339	12/10/2010	N/A	N/A	0.305	12/20/2011	N/A	33.1	N/A	33.1	0.125 U	33.1	01/09/2017	06/30/2014
C4	ELBOW	Y	0.343	12/10/2010	N/A	N/A	0.303	12/20/2011	N/A	39.0	N/A	39.0	0.125 U	39.0	07/13/2016	04/01/2014
C5	ELBOW	Y	0.341	12/10/2010	N/A	N/A	0.306	12/20/2011	N/A	34.1	N/A	34.1	0.125 U	34.1	01/19/2017	07/05/2014
C6	ELBOW	Y	0.328	12/10/2010	N/A	N/A	0.307	12/20/2011	N/A	20.5	N/A	20.5	0.125 U	20.5	01/29/2017	07/10/2014
C7	ELBOW	Y	0.333	12/10/2010	N/A	N/A	0.308	12/20/2011	N/A	24.4	N/A	24.4	0.125 U	24.4	02/09/2017	07/16/2014
C8	ELBOW	Y	0.338	12/10/2010	N/A	N/A	0.306	12/20/2011	N/A	31.2	N/A	31.2	0.125 U	31.2	01/19/2017	07/05/2014
D1	ELBOW	Y	0.340	12/10/2010	N/A	N/A	0.309	12/20/2011	N/A	30.2	N/A	30.2	0.125 U	30.2	02/19/2017	07/21/2014
D2	ELBOW	Y	0.344	12/10/2010	N/A	N/A	0.309	12/20/2011	N/A	34.1	N/A	34.1	0.125 U	34.1	02/19/2017	07/21/2014
D3	ELBOW	Y	0.346	12/10/2010	N/A	N/A	0.313	12/20/2011	N/A	32.1	N/A	32.1	0.125 U	32.1	04/01/2017	08/10/2014
D4	ELBOW	Y	0.345	12/10/2010	N/A	N/A	0.310	12/20/2011	N/A	34.1	N/A	34.1	0.125 U	34.1	03/01/2017	07/26/2014
D5	ELBOW	Y	0.357	12/10/2010	N/A	N/A	0.311	12/20/2011	N/A	44.8	N/A	44.8	0.125 U	44.8	02/13/2016	01/16/2014
D6	ELBOW	Y	0.340	12/10/2010	N/A	N/A	0.323	12/20/2011	N/A	16.6	N/A	16.6	0.125 U	16.6	07/12/2017	09/30/2014
D7	ELBOW	Y	0.340	12/10/2010	N/A	N/A	0.319	12/20/2011	N/A	20.5	N/A	20.5	0.125 U	20.5	06/01/2017	09/10/2014
D8	ELBOW	N	0.330	12/10/2010	N/A	N/A	0.334	12/20/2011	N/A	0.0	N/A	0.0	0.125 U	2.0	11/02/2017	11/26/2014
E1	REDUCER	N	0.270	12/10/2010	N/A	N/A	0.260	12/20/2011	N/A	9.7	N/A	9.7	0.125 U	9.7	10/05/2015	11/11/2013
E2	REDUCER	N	0.262	12/10/2010	N/A	N/A	0.257	12/20/2011	N/A	4.9	N/A	4.9	0.125 U	4.9	09/04/2015	10/27/2013
E3	REDUCER	Y	0.267	12/10/2010	N/A	N/A	0.251	12/20/2011	N/A	15.6	N/A	15.6	0.125 U	15.6	07/05/2015	09/26/2013
E4	REDUCER	Y	0.270	12/10/2010	N/A	N/A	0.247	12/20/2011	N/A	22.4	N/A	22.4	0.125 U	22.4	05/25/2015	09/06/2013
E5	REDUCER	Y	0.270	12/10/2010	N/A	N/A	0.253	12/20/2011	N/A	16.6	N/A	16.6	0.125 U	16.6	07/25/2015	10/06/2013
E6	REDUCER	Y	0.268	12/10/2010	N/A	N/A	0.248	12/20/2011	N/A	19.5	N/A	19.5	0.125 U	19.5	06/04/2015	09/11/2013
E7	REDUCER	N	0.260	12/10/2010	N/A	N/A	0.262	12/20/2011	N/A	0.0	N/A	0.0	0.125 U	2.0	10/26/2015	11/22/2013
E8	REDUCER	N	0.265	12/10/2010	N/A	N/A	0.254	12/20/2011	N/A	10.7	N/A	10.7	0.125 U	10.7	08/05/2015	10/12/2013
F1	ELBOW	N	0.389	12/10/2010	N/A	N/A	0.392	12/20/2011	N/A	0.0	N/A	0.0	0.125 U	2.0	06/20/2019	09/19/2015

City of Canton
Canton, Ohio
Acuren Inspection
Akron, Ohio

TML Number	Location Description	Ctn TML	First Survey Thick Nt	First Survey Date	Previous Survey Thick Nt	Previous Survey Date	Last Survey Thick Nt	Last Survey Date	Short Term Rate	Long Term Rate	Best Fit Rate	Max Hist CR	Retirement Thickness	Rep TML CR	TML Retirement Date	TML Inspection Due Date
F2	ELBOW	N	0.399	12/10/2010	N/A	N/A	0.399	12/20/2011	N/A	-0.0	N/A	0.0	0.125 U	2.0	08/31/2019	10/25/2015
F3	ELBOW	Y	0.412	12/10/2010	N/A	N/A	0.395	12/20/2011	N/A	16.6	N/A	16.6	0.125 U	16.6	07/21/2019	10/05/2015
F4	ELBOW	N	0.391	12/10/2010	N/A	N/A	0.385	12/20/2011	N/A	5.8	N/A	5.8	0.125 U	5.8	04/10/2019	08/15/2015
F5	ELBOW	N	0.381	12/10/2010	N/A	N/A	0.385	12/20/2011	N/A	0.0	N/A	0.0	0.125 U	2.0	04/10/2019	08/15/2015
F6	ELBOW	N	0.368	12/10/2010	N/A	N/A	0.378	12/20/2011	N/A	0.0	N/A	0.0	0.125 U	2.0	01/28/2019	07/10/2015
F7	ELBOW	N	0.394	12/10/2010	N/A	N/A	0.389	12/20/2011	N/A	4.9	N/A	4.9	0.125 U	4.9	05/21/2019	09/04/2015
F8	ELBOW	N	0.400	12/10/2010	N/A	N/A	0.397	12/20/2011	N/A	2.9	N/A	2.9	0.125 U	2.9	08/11/2019	10/15/2015
G1	HEADER	N	0.250	12/10/2010	N/A	N/A	0.258	12/20/2011	N/A	0.0	N/A	0.0	0.125 U	2.0	09/15/2015	11/01/2013
G2	HEADER	N	0.245	12/10/2010	N/A	N/A	0.257	12/20/2011	N/A	0.0	N/A	0.0	0.125 U	2.0	09/04/2015	10/27/2013
G3	HEADER	N	0.250	12/10/2010	N/A	N/A	0.248	12/20/2011	N/A	1.9	N/A	1.9	0.125 U	2.0	06/04/2015	09/11/2013
G4	HEADER	N	0.253	12/10/2010	N/A	N/A	0.253	12/20/2011	N/A	-0.0	N/A	0.0	0.125 U	2.0	07/25/2015	10/06/2013
G5	HEADER	N	0.245	12/10/2010	N/A	N/A	0.273	12/20/2011	N/A	0.0	N/A	0.0	0.125 U	2.0	02/15/2016	01/17/2014
G6	HEADER	Y	0.289	12/10/2010	N/A	N/A	0.258	12/20/2011	N/A	30.2	N/A	30.2	0.125 U	30.2	09/15/2015	11/01/2013
G7	HEADER	N	0.269	12/10/2010	N/A	N/A	0.264	12/20/2011	N/A	4.9	N/A	4.9	0.125 U	4.9	11/15/2015	12/02/2013
G8	HEADER	Y *	0.248	12/10/2010	N/A	N/A	0.228	12/20/2011	N/A	19.5	N/A	19.5	0.125 U	19.5	11/11/2014	05/31/2013
H1	PIPE	N	0.270	12/10/2010	N/A	N/A	0.257	12/20/2011	N/A	12.7	N/A	12.7	0.125 U	12.7	09/04/2015	10/27/2013
H2	PIPE	Y	0.266	12/10/2010	N/A	N/A	0.246	12/20/2011	N/A	19.5	N/A	19.5	0.125 U	19.5	05/14/2015	08/31/2013
H3	PIPE	N	0.250	12/10/2010	N/A	N/A	0.266	12/20/2011	N/A	0.0	N/A	0.0	0.125 U	2.0	12/06/2015	12/12/2013
H4	PIPE	Y	0.268	12/10/2010	N/A	N/A	0.248	12/20/2011	N/A	19.5	N/A	19.5	0.125 U	19.5	06/04/2015	09/11/2013
H5	PIPE	Y	0.270	12/10/2010	N/A	N/A	0.248	12/20/2011	N/A	21.4	N/A	21.4	0.125 U	21.4	06/04/2015	09/11/2013
H6	PIPE	N	0.266	12/10/2010	N/A	N/A	0.251	12/20/2011	N/A	14.6	N/A	14.6	0.125 U	14.6	07/05/2015	09/26/2013
H7	PIPE	N	0.259	12/10/2010	N/A	N/A	0.256	12/20/2011	N/A	2.9	N/A	2.9	0.125 U	2.9	08/25/2015	10/22/2013
H8	PIPE	N	0.272	12/10/2010	N/A	N/A	0.259	12/20/2011	N/A	12.7	N/A	12.7	0.125 U	12.7	09/25/2015	11/06/2013
I1	ELBOW	Y	0.390	12/10/2010	N/A	N/A	0.349	12/20/2011	N/A	39.9	N/A	39.9	0.125 U	39.9	08/01/2017	10/10/2014
I2	ELBOW	Y	0.400	12/10/2010	N/A	N/A	0.362	12/20/2011	N/A	37.0	N/A	37.0	0.125 U	37.0	05/17/2018	03/04/2015
I3	ELBOW	Y	0.395	12/10/2010	N/A	N/A	0.358	12/20/2011	N/A	36.0	N/A	36.0	0.125 U	36.0	06/10/2018	03/16/2015
I4	ELBOW	Y	0.395	12/10/2010	N/A	N/A	0.352	12/20/2011	N/A	41.9	N/A	41.9	0.125 U	41.9	05/21/2017	09/04/2014
I5	ELBOW	Y	0.324	12/10/2010	N/A	N/A	0.308	12/20/2011	N/A	15.6	N/A	15.6	0.125 U	15.6	02/09/2017	07/16/2014
I6	ELBOW	N	0.330	12/10/2010	N/A	N/A	0.365	12/20/2011	N/A	0.0	N/A	0.0	0.125 U	2.0	09/16/2018	05/04/2015
I7	ELBOW	N	0.260	12/10/2010	N/A	N/A	0.365	12/20/2011	N/A	0.0	N/A	0.0	0.125 U	2.0	09/16/2018	05/04/2015
I8	ELBOW	N	0.348	12/10/2010	N/A	N/A	0.386	12/20/2011	N/A	0.0	N/A	0.0	0.125 U	2.0	04/20/2019	08/20/2015

City of Canton
Canton, Ohio
Acuren Inspection
Akron, Ohio

(Report in Inches, Corrosion Rates in MPY)
Analysis: Statistical/Straight Line

Report Date: 12/21/2011 11:22:16

Unit: PIPING
Eq/Circ ID: PUMP 4
Eq Type:
Class:
RBI:

Description:

Flange Rating: 0 lb/in²
Design Pressure: 30 lb/in²
Design Temp: 300 °F

TML Corrosion Rates are each the maximum of:
(A) -- Calculated Corrosion Rates x 1.00 : Varies
(B) -- Default Corrosion Rate : 2.0 MPY

Representative Corrosion Rate is the Maximum of:
(A) -- Average Corrosion Rate x 1.10 : 19.1 MPY
(B) -- Average Max 25.0% of TMLs, Min of 2 : 35.6 MPY
(C) -- Formula Corrosion Rate (Sigma = 1.28) : 20.0 MPY
(D) -- Default Corrosion Rate : 2.0 MPY
Representative Corrosion Rate = 35.6 MPY

TML thickness readings taken above 150.0 °F have been compensated by 1% per 100.0 °F

TML thickness readings have not been compensated for growths.

TML Life calculations are based on the maximum of the Rep. TML CR and the RCR using Short Term, Long Term, and Best Fit Corrosion Rates.

Nominal thickness is used for TML corrosion rate calculations with less than 3 surveys.

Minimum time between inspections required for corrosion rate calculation is 6 months.

TML Inspection Interval is:
(A) -- Minimum(TML Life / 2.00, 5.0 years)

Eq/Circ ID Last Survey Date is based on the LAST of the last 0% of TML survey dates (Min 1).

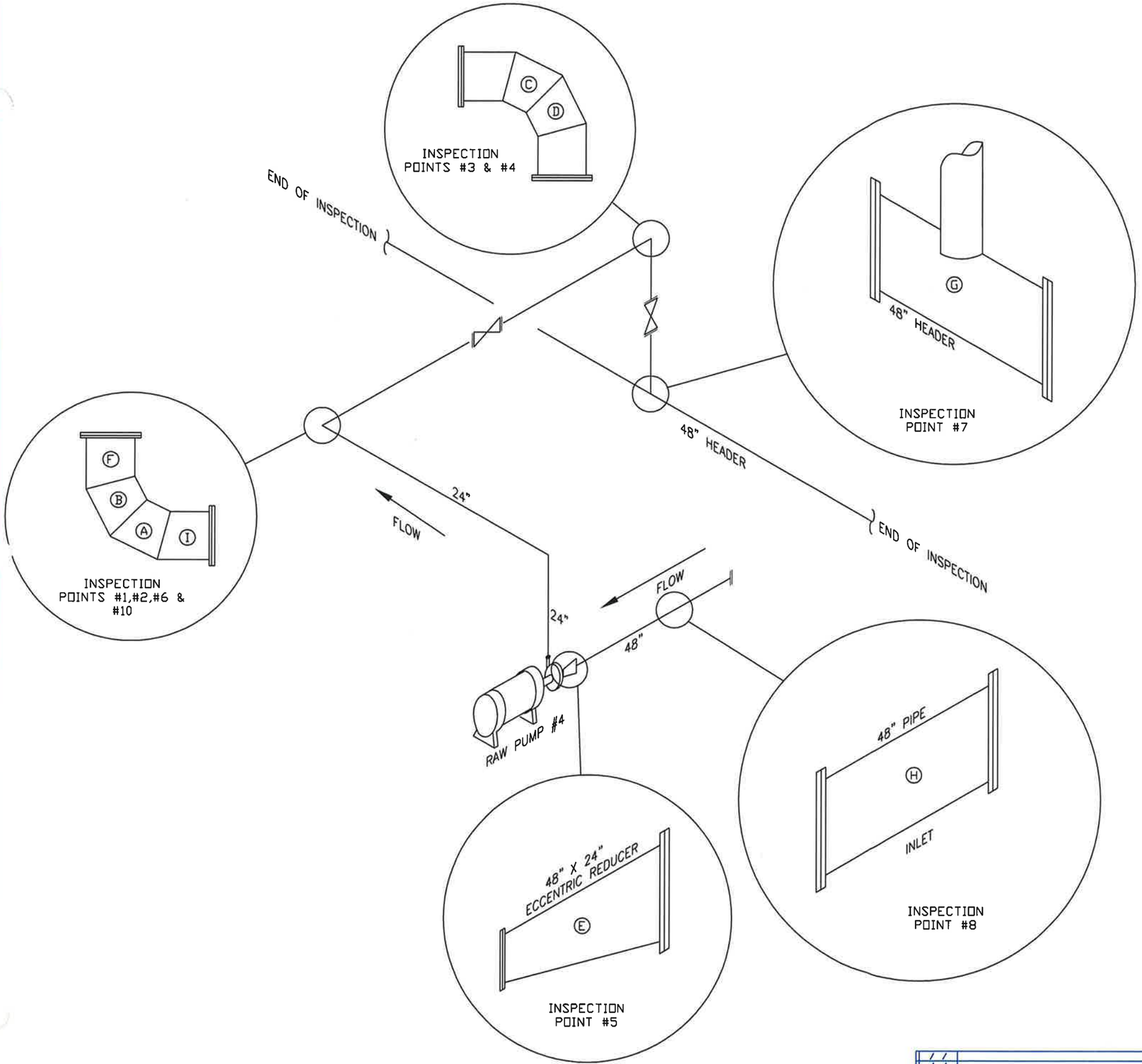
Eq/Circ ID Estimated life = 2.9 years from the most recent survey date.
(Estimated Life is based on the average of the earliest 0% (Min 1) TML retirement dates.)

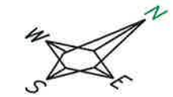
Predicted Eq/Circ ID Retirement date is 11/11/2014

Recommended Eq/Circ UT/RT Inspection Date is 05/30/2013
UT/RT Inspection Interval is the minimum(Remaining life / 2.0, 5.0 years).

Caution TML Logic: TML Corrosion Rate > 15.0 MPY .OR. TML Remaining Life < 1.00 Years.

There are 40 Caution TMLs in this Eq/Circ ID.

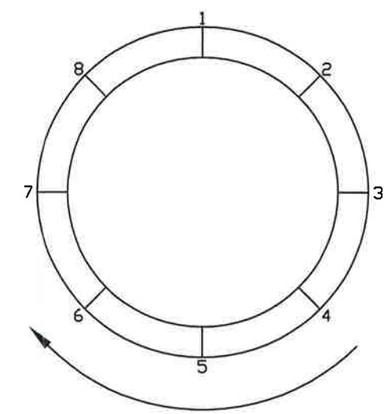




SPECIFICATIONS

PIPE:	24" & 48" – ASTM A53 GRADE A (SPIRAL)
FITTINGS:	MITERED PIPE – ASTM A53 GRADE A (SPIRAL)
FLANGES:	---
CONSTRUCTION CODE:	---
INSPECTION CODE:	API 570
DESIGN PRESSURE:	---
DESIGN TEMPERATURE:	---
OPERATING PRESSURE:	30 PSI
OPERATING TEMPERATURE:	AMBIENT

1. (X) = THICKNESS MEASUREMENT LOCATIONS (TML)
2. EACH TEST LOCATION WAS SCANNED 360° AND THE LOWEST READING WAS RECORDED FOR EACH POSITION ON THE PIPE.
3. FOR HORIZONTAL LINES RUNNING EAST/WEST, THE SCAN PROGRESSION IS TOP, NORTH, BOTTOM, SOUTH.
4. FOR HORIZONTAL LINES RUNNING NORTH/SOUTH, THE PROGRESSION IS TOP, EAST, BOTTOM, WEST.
5. FOR VERTICAL LINES THE PROGRESSION IS NORTH, EAST SOUTH, WEST.
6. TEST LOCATIONS ARE APPROXIMATED ON THE DRAWING BUT MARKED ON THE ACTUAL PIPE.
7. THE DRAWING IS PROVIDED ONLY AS A REPRESENTATION OF THE TESTING AREAS. NO LINE DIMENSIONS WERE TAKEN DURING THE TESTING.
8. MOST ITEMS ONLY REPRESENT THE EXISTENCE OF A PIPE COMPONENT.



360° SCAN

SCAN PROGRESSION

CITY OF CANTON
WATER RECLAIMATION

3530 CENTRAL AVE. SE – CANTON, OH 44707

TITLE: RAW PUMP DISCHARGE 4

THICKNESS MEASUREMENT LOCATIONS

DATE:	DESCRIPTION	BY:	REV.
/ /			
/ /			
/ /			
/ /			
/ /			

DRAWN BY: LAJ	LAB. NO. 228646	ACUREN INSPECTION 535 KENNEDY RD. AKRON, OH 44305	
CHECKED BY: RC	DEPT. MECH. INT.		
APPROVED BY: RC	SCALE: NTS	DRAWING NO. COCWR-12102010-4-001	REV. 0
	DATE: 12.10.2010		

SECTION 12

2012 REPORT OF PIPING INSPECTION FROM ACUREN (RAW PUMP INLET DISCHARGE PIPING)

Acuren
535 Kennedy Rd.
Suite D
Akron, OH, USA 44685
Phone: (330) 733-8160
(800) 321-0878
Fax: (330) 733-8644

December 3, 2012

City of Canton
3530 Central Ave. SE
Canton, OH

Mr. Doug Dickerhoff

Subject: Piping Inspection (Pump-1)

WORK SCOPE:

Perform ultrasonic scans on piping associated with the pumps 1 thru 4 in the pumping building. Replicate the previous inspection and perform additional scans on the header pipe to determine current metal thickness and degree of corrosion and metal loss.

SUMMARY:

Metal thickness below the minimum required thickness was discovered on the horizontal elbow that requires repairs or replacement. In addition the discharge header piping at the inlet was near the retirement thickness and requires a patch repair. Details are stated below. The remaining components were suitable for continued service. The system should remain on the current inspection interval. The next inspection date is December, 2013.

RESULTS:

- **48" Inlet-** The area of corrosion discovered on the top side of the inlet pipe has not changed since the previous inspection and remains 0.138" in thickness. No defects were noted for the reducing section.
- **48" Discharge Header-** Internal corrosion has increased in severity since last year's inspection. Additional scans reveled internal pitting with remaining thickness of 0.150" in scattered areas at the bottom of the header. The minimum required thickness was 0.125". A patch is recommended at this area to prevent future leakage. The repair patch shall be welded beginning 3 inches from the concrete support and extend 30 inches. The width of the patch should extend 25 inches up each side (50 inches wide) and should be 0.250" nominal plate thickness. The patch should have rounded corners. All areas were marked on the pipe itself.
- **24" Elbow To Rotator Valve Horizontal Elbow-** Three separate areas of corrosion were noted on this elbow. Two areas were located on the section after the pump adjacent to the flange on the bottom of the pipe and up the sides. The first area measured 8 by 3 inches and second measured 3 by 7 inches. The other was on the section closest to the rotovalve and measured 17 by 5 inches. Metal thickness was 0.090" was recorded at these areas. It is recommended to replace this horizontal section. The replacement elbow should not be sectioned and be a minimum schedule 40 carbon steel pipe. All areas were marked on the pipe.
- **24" Elbow To Discharge-** Minor internal pitting is still present but does not eliminate this elbow from service.

ACUREN

City of Canton
Piping Inspection (Pump 1)
December 3, 2012

PERSONNEL:

Inspectors:

Katie Barker	API Examiner SNT-TC-1A Level II	PT/RT Level I
Richard Conley	API 510 / 570 / 653 Inspector	Certification#: 27342 / 40292

Should you have any additional questions concerning the inspection performed, please feel free to contact this office.

Sincerely,
Acuren Inspection

Richard Conley
Mechanical Integrity Inspector

City of Canton
Canton, Ohio
Acuren Inspection

Corrosion Monitoring Survey - Columns Report

(Thickness in inches)

Report Date: 12/05/2012 13:28:41

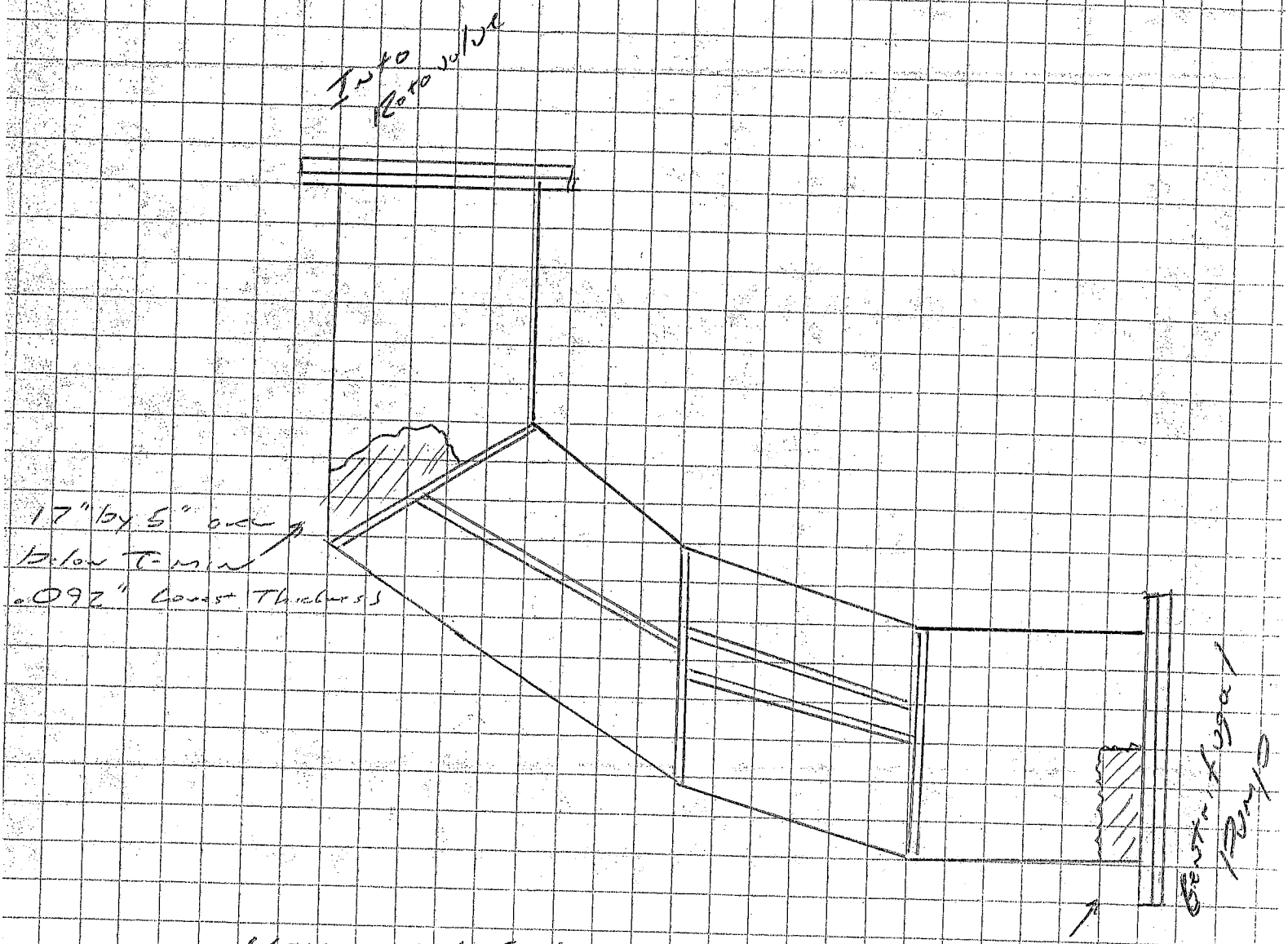
Unit: PIPING
Eq/Circ ID: PUMP 1
Eq Type:
Class:
RBI:

TML No	Location	12/10/2010	12/19/2011	12/03/2012							
A1	ELBOW	0.392	0.395	0.383							
A2	ELBOW	0.400	0.396	0.390							
A3	ELBOW	0.420	0.410	0.400							
A4	ELBOW	0.406	0.398	0.394							
A5	ELBOW	0.408	0.398	0.389							
A6	ELBOW	0.344	0.344	0.345							
A7	ELBOW	0.388	0.386	0.385							
A8	ELBOW	0.400	0.400	0.398							
B1	ELBOW	0.412	0.408	0.395							
B2	ELBOW	0.416	0.418	0.400							
B3	ELBOW	0.400	0.396	0.390							
B4	ELBOW	0.410	0.402	0.400							
B5	ELBOW	0.408	0.401	0.398							
B6	ELBOW	0.394	0.392	0.390							
B7	ELBOW	0.348	0.345	0.345							
B8	ELBOW	0.350	0.350	0.350							
C1	ELBOW	0.304	0.307	0.317							
C2	ELBOW	0.312	0.317	0.307							
C3	ELBOW	0.295	0.295	0.295							
C4	ELBOW	0.300	0.302	0.302							
C5	ELBOW	0.305	0.304	0.300							
C6	ELBOW	0.311	0.315	0.312							
C7	ELBOW	0.300	0.300	0.305							
C8	ELBOW	0.312	0.312	0.315							
D1	ELBOW	0.310	0.310	0.310							
D2	ELBOW	0.313	0.310	0.308							
D3	ELBOW	0.311	0.311	0.312							
D4	ELBOW	0.312	0.315	0.315							
D5	ELBOW	0.318	0.307	0.309							
D6	ELBOW	0.322	0.318	0.312							
D7	ELBOW	0.320	0.319	0.320							
D8	ELBOW	0.300	0.301	0.300							
E1	REDUCER	0.281	0.284	0.275							
E2	REDUCER	0.275	0.268	0.268							
E3	REDUCER	0.277	0.270	0.269							
E4	REDUCER	0.272	0.275	0.260							
E5	REDUCER	0.270	0.270	0.270							
E6	REDUCER	0.248	0.248	0.238							
E7	REDUCER	0.271	0.275	0.280							
E8	REDUCER	0.263	0.263	0.249							
F1	ELBOW	0.433	0.429	0.430							
F2	ELBOW	0.421	0.421	0.420							
F3	ELBOW	0.430	0.419	0.414							
F4	ELBOW	0.430	0.419	0.389							
F5	ELBOW	0.240	0.240	0.240							
F6	ELBOW	0.400	0.400	0.171							

City of Canton
Canton, Ohio
Acuren Inspection

TML No	Location	12/10/2010	12/19/2011	12/03/2012							
F7	ELBOW	0.420	0.429	0.351							
F8	ELBOW	0.423	0.422	0.420							
G1	HEADER	0.240	0.245	0.245							
G2	HEADER	0.250	0.250	0.250							
G3	HEADER	0.250	0.250	0.242							
G4	HEADER	0.240	0.240	0.232							
G5	HEADER	0.160	0.160	0.151							
G6	HEADER	0.230	0.233	0.168							
G7	HEADER	0.250	0.248	0.240							
G8	HEADER	0.240	0.240	0.240							
H1	PIPE	0.145	0.145	0.138							
H2	PIPE	0.143	0.138	0.135							
H3	PIPE	0.230	0.230	0.240							
H4	PIPE	0.260	0.253	0.250							
H5	PIPE	0.265	0.267	0.266							
H6	PIPE	0.250	0.250	0.260							
H7	PIPE	0.251	0.253	0.255							
H8	PIPE	0.246	0.245	0.242							
I1	ELBOW	0.412	0.405	0.400							
I2	ELBOW	0.414	0.406	0.400							
I3	ELBOW	0.406	0.406	0.375							
I4	ELBOW	0.412	0.412	0.340							
I5	ELBOW	0.407	0.400	0.278							
I6	ELBOW	0.369	0.360	0.092							
I7	ELBOW	0.409	0.405	0.220							
I8	ELBOW	0.410	0.410	0.410							

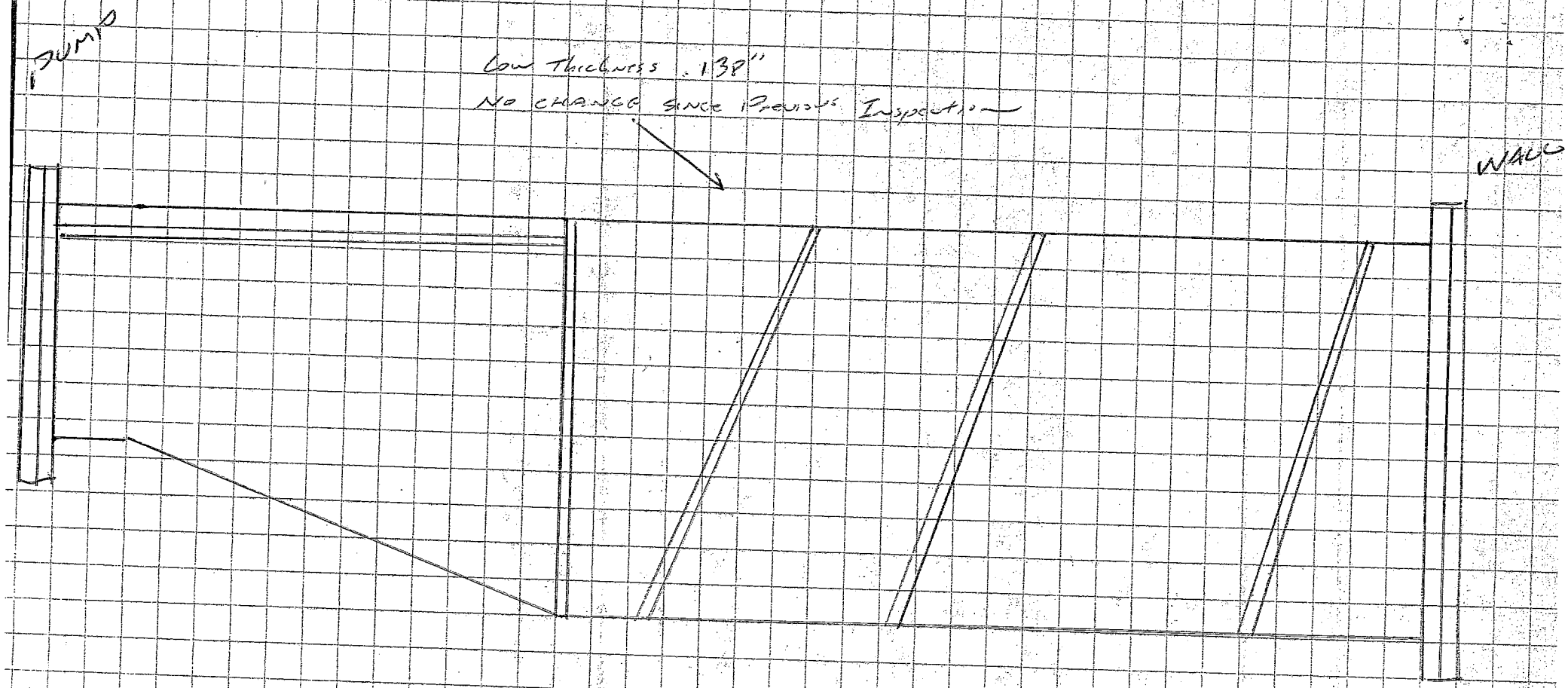
PUMP #1



Horizontal Section
Facing West

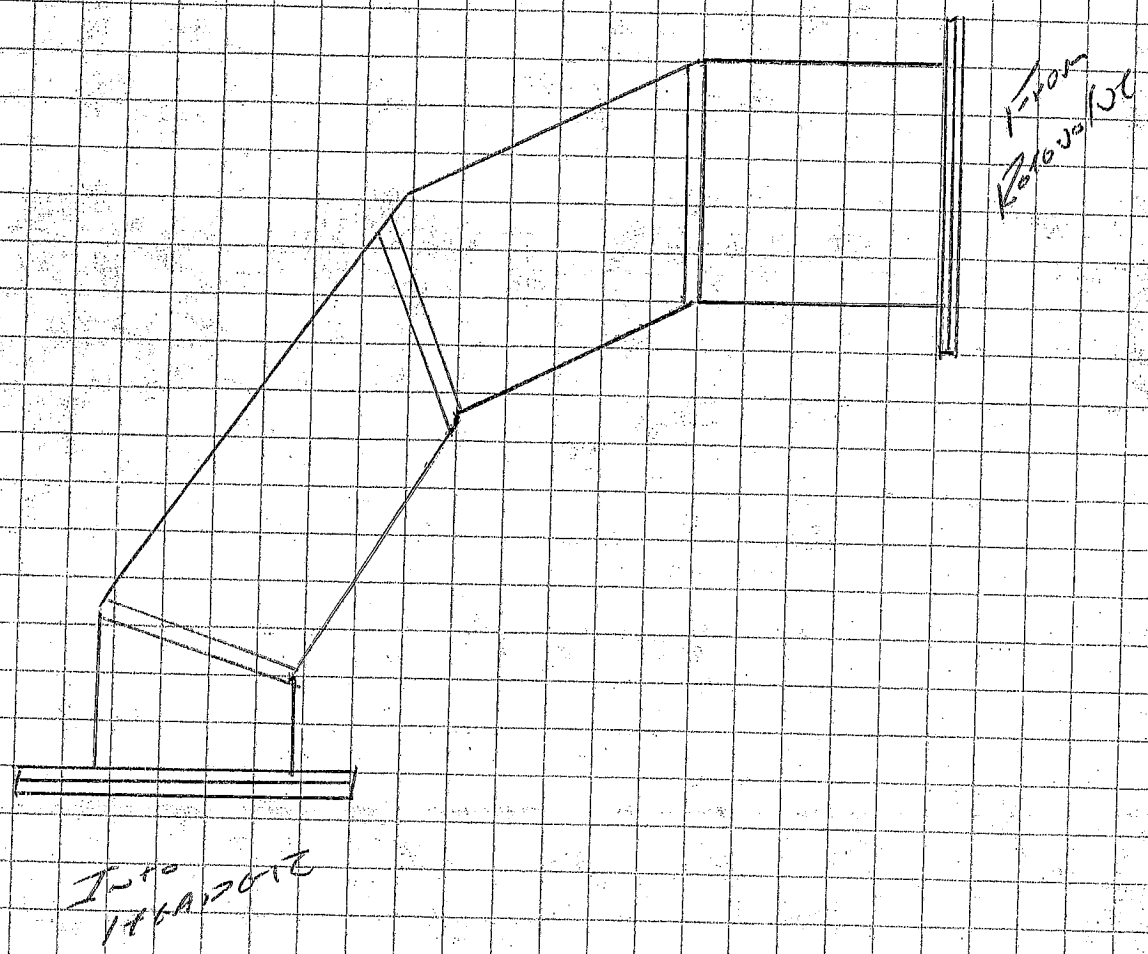
2 Posts
8" x 3" over Lower West
3" x 7" over Lower East

PUMP # 1

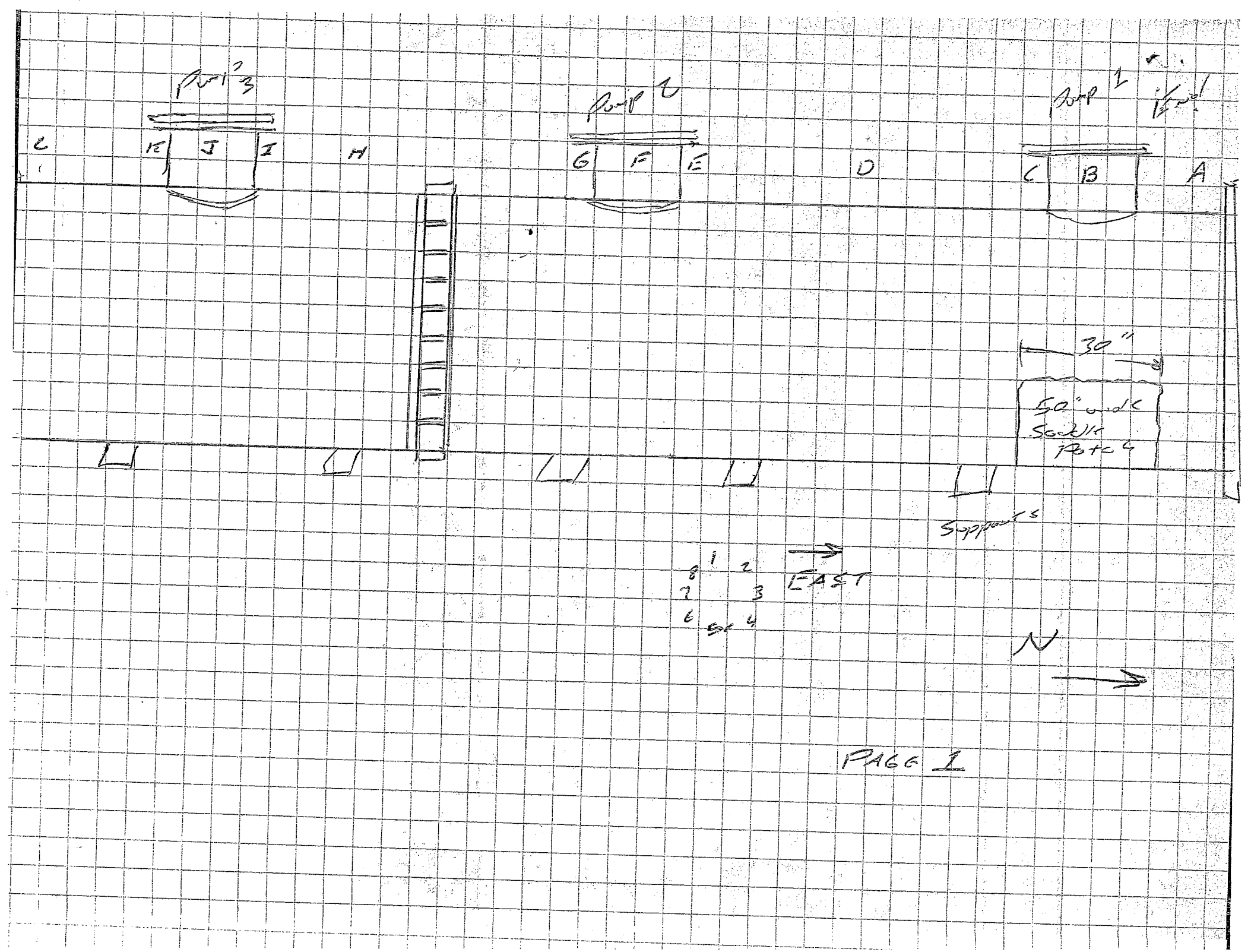


RAW SEWAGE INLET
FACING SOUTH

PUMP #1



ELBOW INTO ISOLATION HEADER
FACING NORTH


Pump 3
Pump 2
Pump 1
L
K
J
I
H
G
F
E
D
C
B
A
30"
50" wide
Sidewalk
Patch
Supports
1
2
3
4
5
6
7
8
EAST
N

PAGE 1

Acuren
535 Kennedy Rd.
Suite D
Akron, OH, USA 44685
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(800) 321-0878
Fax: (330) 733-8644

December 3, 2012

City of Canton
3530 Central Ave. SE
Canton, OH

Mr. Doug Dickerhoff

Subject: Piping Inspection (Pump-2)

WORK SCOPE:

Perform ultrasonic scans on piping associated with the pumps 1 thru 4 in the pumping building. Replicate the previous inspection and perform additional scans on the header pipe to determine current metal thickness and degree of corrosion and metal loss.

SUMMARY:

The piping components associated with this pump were suitable for continued service. Although corrosion was still active the current metal thickness was still sufficient. The system should remain on the current inspection interval. The next inspection date is December, 2013.

RESULTS:

- **48" Inlet-** No significant changes were recorded since the previous inspection.
- **48" Discharge Header-** No significant changes in metal thickness were recorded since the previous inspection.
- **24" Elbow To Rotator Valve Horizontal Elbow-** The leak that was noted on the previous inspection has been repaired. Although corrosion was active, all thickness measurements were sufficient for continued service.
- **24" Elbow To Discharge-** Minor internal pitting is still present but does not eliminate this elbow from service.

ACUREN

City of Canton
Piping Inspection (Pump 2)
December 3, 2012

PERSONNEL:

Inspectors:

Katie Barker	API Examiner SNT-TC-1A Level II	PT/RT Level I
Richard Conley	API 510 / 570 / 653 Inspector	Certification#: 27342 / 40292

Should you have any additional questions concerning the inspection performed, please feel free to contact this office.

Sincerely,
Acuren Inspection

Richard Conley
Mechanical Integrity Inspector

City of Canton
Canton, Ohio
Acuren Inspection

Corrosion Monitoring Survey - Columns Report

(Thickness in inches)

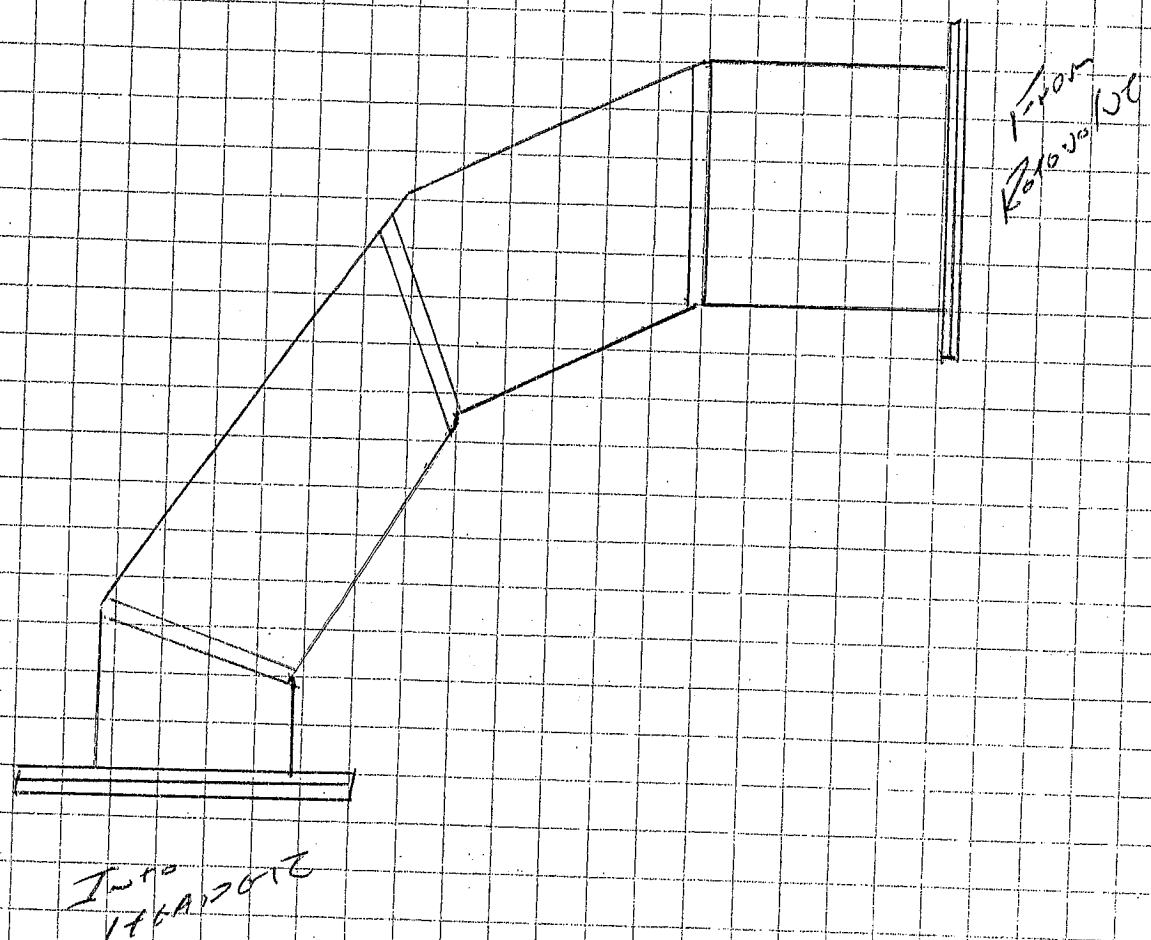
Report Date: 12/05/2012 14:09:09

Unit: PIPING
Eq/Circ ID: PUMP 2
Eq Type:
Class:
RBI:

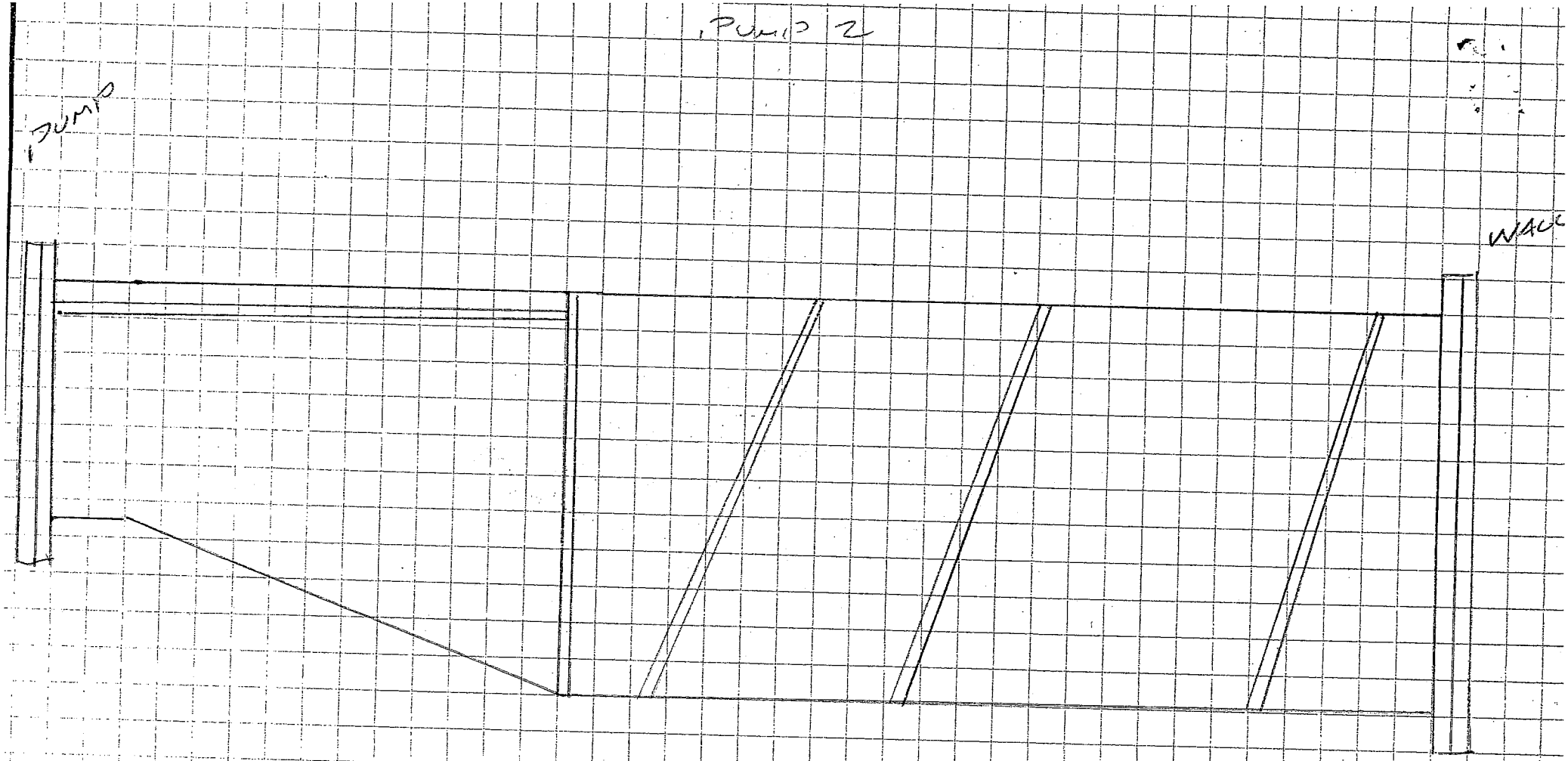
TML No	Location	12/10/2010	12/19/2011	12/03/2012							
A1	ELBOW	0.399	0.395	0.395							
A2	ELBOW	0.390	0.383	0.380							
A3	ELBOW	0.400	0.365	0.349							
A4	ELBOW	0.410	0.371	0.355							
A5	ELBOW	0.415	0.382	0.388							
A6	ELBOW	0.390	0.385	0.390							
A7	ELBOW	0.400	0.400	0.400							
A8	ELBOW	0.420	0.387	0.390							
B1	ELBOW	0.419	0.408	0.408							
B2	ELBOW	0.414	0.391	0.390							
B3	ELBOW	0.415	0.398	0.388							
B4	ELBOW	0.420	0.404	0.400							
B5	ELBOW	0.407	0.397	0.363							
B6	ELBOW	0.405	0.398	0.400							
B7	ELBOW	0.400	0.394	0.405							
B8	ELBOW	0.393	0.391	0.395							
C1	ELBOW	0.312	0.317	0.312							
C2	ELBOW	0.298	0.310	0.300							
C3	ELBOW	0.300	0.305	0.300							
C4	ELBOW	0.319	0.297	0.310							
C5	ELBOW	0.325	0.312	0.312							
C6	ELBOW	0.322	0.275	0.275							
C7	ELBOW	0.320	0.299	0.300							
C8	ELBOW	0.319	0.313	0.315							
D1	ELBOW	0.312	0.325	0.328							
D2	ELBOW	0.312	0.322	0.324							
D3	ELBOW	0.320	0.315	0.319							
D4	ELBOW	0.288	0.311	0.290							
D5	ELBOW	0.296	0.308	0.300							
D6	ELBOW	0.288	0.301	0.305							
D7	ELBOW	0.312	0.299	0.312							
D8	ELBOW	0.321	0.306	0.322							
E1	REDUCER	0.280	0.284	0.277							
E2	REDUCER	0.280	0.275	0.260							
E3	REDUCER	0.278	0.268	0.264							
E4	REDUCER	0.280	0.262	0.268							
E5	REDUCER	0.280	0.257	0.258							
E6	REDUCER	0.275	0.287	0.275							
E7	REDUCER	0.272	0.261	0.265							
E8	REDUCER	0.277	0.268	0.266							
F1	ELBOW	0.415	0.404	0.405							
F2	ELBOW	0.400	0.412	0.412							
F3	ELBOW	0.391	0.387	0.367							
F4	ELBOW	0.388	0.344	0.345							
F5	ELBOW	0.370	0.392	0.384							
F6	ELBOW	0.376	0.398	0.400							

City of Canton
Canton, Ohio
Acuren Inspection

TML No	Location	12/10/2010	12/19/2011	12/03/2012							
F7	ELBOW	0.388	0.398	0.400							
F8	ELBOW	0.420	0.402	0.405							
G1	HEADER	0.250	0.258	0.250							
G2	HEADER	0.245	0.246	0.245							
G3	HEADER	0.233	0.258	0.246							
G4	HEADER	0.255	0.245	0.245							
G5	HEADER	0.190	0.282	0.282							
G6	HEADER	0.230	0.257	0.250							
G7	HEADER	0.250	0.245	0.243							
G8	HEADER	0.250	0.273	0.250							
H1	PIPE	0.271	0.265	0.260							
H2	PIPE	0.266	0.271	0.278							
H3	PIPE	0.260	0.274	0.270							
H4	PIPE	0.268	0.250	0.250							
H5	PIPE	0.270	0.247	0.250							
H6	PIPE	0.250	0.266	0.262							
H7	PIPE	0.255	0.264	0.258							
H8	PIPE	0.258	0.291	0.282							
I1	ELBOW	0.400	0.378	0.380							
I2	ELBOW	0.412	0.401	0.407							
I3	ELBOW	0.407	0.394	0.394							
I4	ELBOW	0.395	0.392	0.390							
I5	ELBOW	0.400	0.379	0.380							
I6	ELBOW	0.388	0.352	0.340							
I7	ELBOW	0.390	0.391	0.392							
I8	ELBOW	0.356	0.396	0.395							
J1	HEADER	0.240	0.275	0.250							
J2	HEADER	0.252	0.237	0.235							
J3	HEADER	0.239	0.242	0.250							
J4	HEADER	0.245	0.252	0.250							
J5	HEADER	0.250	0.278	0.261							
J6	HEADER	0.251	0.263	0.255							
J7	HEADER	0.250	0.244	0.238							
J8	HEADER	0.253	0.249	0.241							

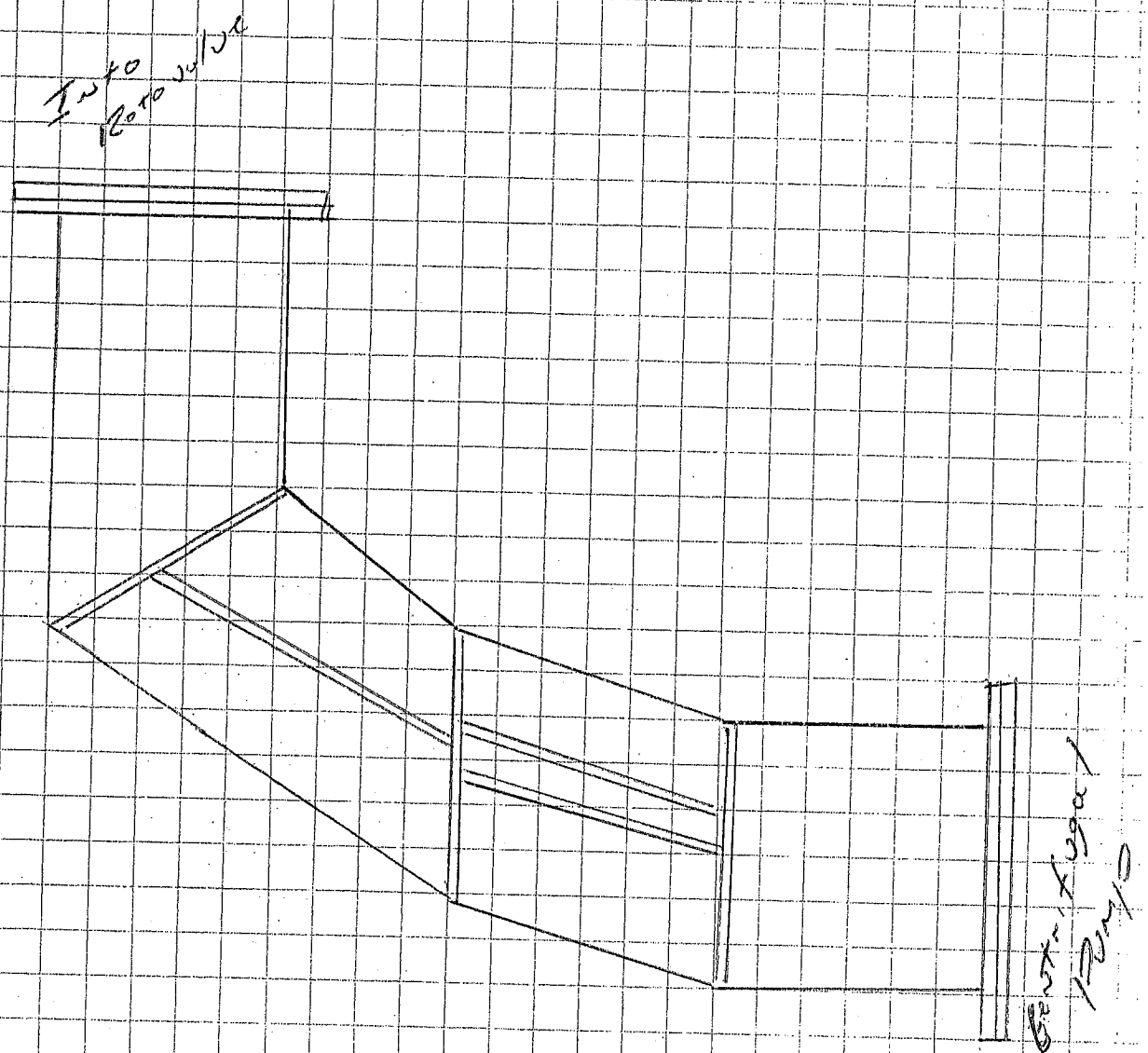


Elbow Into Bottom Hallway
Facing North

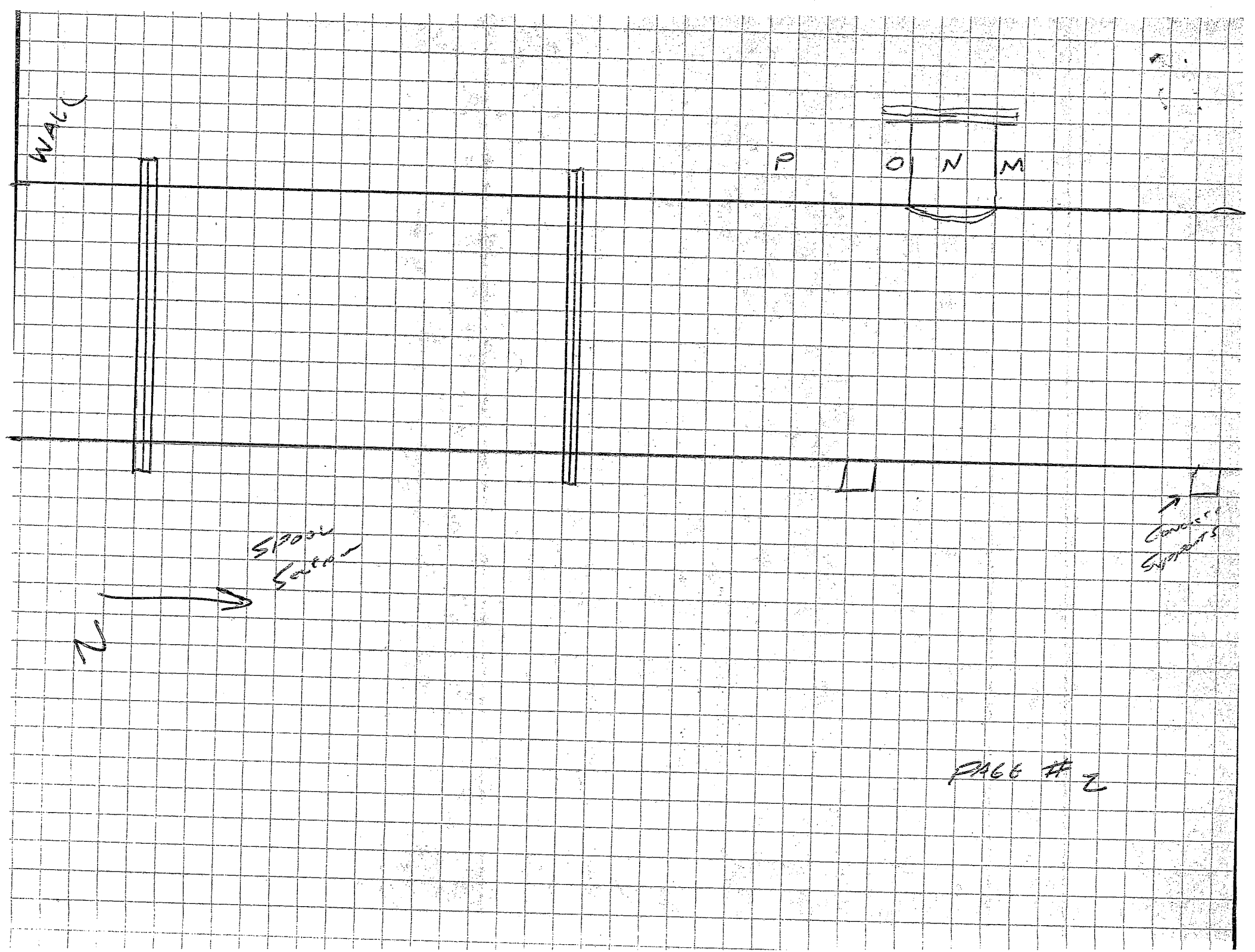


RAW SEWAGE INLET
FACING SOUTH

Plan 2



Horizontal Section
Facing West


WALL
P
O
N
M
Concrete Supports
N

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(800) 321-0878
Fax: (330) 733-8644

December 3, 2012

City of Canton
3530 Central Ave. SE
Canton, OH

Mr. Doug Dickerhoff

Subject: Piping Inspection (Pump-3)

WORK SCOPE:

Perform ultrasonic scans on piping associated with the pumps 1 thru 4 in the pumping building. Replicate the previous inspection and perform additional scans on the header pipe to determine current metal thickness and degree of corrosion and metal loss.

SUMMARY:

Repairs will be required for this system to remain in service. Details are stated below. The system should remain on the current inspection interval. The next inspection date is December, 2013.

RESULTS:

- **48" Inlet-** Metal thickness below minimum was discovered adjacent to the bottom repair patch on the north and east side of the patch extending 1 inch beyond the patch. The patch should be extended 1 inch on the north and east sides. The area was marked on the pipe. In addition, a patch will be required on the reducing section closest to the pump on the bottom. Metal thickness at the minimum was discovered in a 4.5 by 1.5 inch area. The area was marked on the pipe.
- **48" Discharge Header-** No significant changes in metal thickness were recorded since the previous inspection.
- **24" Elbow To Rotator Valve Horizontal Elbow-** Metal thickness below the minimum required thickness of 0.125" was discovered on the section closest to the rotovalve. This elbow should be replaced as the corrosion encompasses existing repair patches.
- **24" Elbow To Discharge-** Minor internal pitting is still present but does not eliminate this elbow from service.

ACUREN

City of Canton
Piping Inspection (Pump 3)
December 3, 2012

PERSONNEL:

Inspectors:

Katie Barker	API Examiner SNT-TC-1A Level II	PT/RT Level I
Richard Conley	API 510 / 570 / 653 Inspector	Certification#: 27342 / 40292

Should you have any additional questions concerning the inspection performed, please feel free to contact this office.

Sincerely,
Acuren Inspection

Richard Conley
Mechanical Integrity Inspector

City of Canton
Canton, Ohio
Acuren Inspection

Corrosion Monitoring Survey - Columns Report

(Thickness in inches)

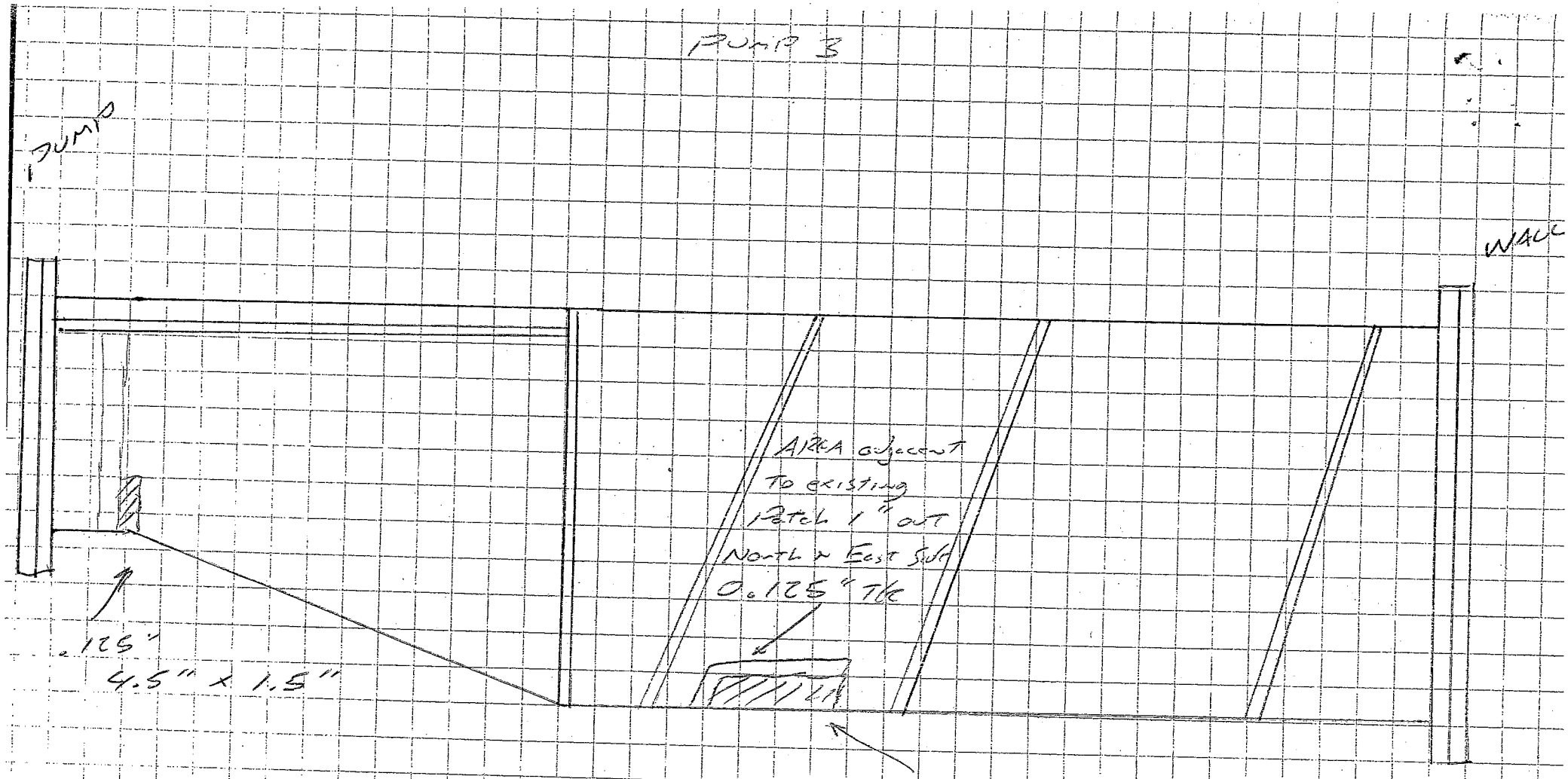
Report Date: 12/05/2012 14:03:07

Unit: PIPING
Eq/Circ ID: PUMP 3
Eq Type:
Class:
RBI:

TML No	Location	12/10/2010	12/20/2011	12/03/2012							
A1	ELBOW	0.400	0.383	0.386							
A2	ELBOW	0.408	0.387	0.387							
A3	ELBOW	0.416	0.384	0.365							
A4	ELBOW	0.360	0.345	0.350							
A5	ELBOW	0.400	0.380	0.380							
A6	ELBOW	0.410	0.386	0.388							
A7	ELBOW	0.390	0.356	0.353							
A8	ELBOW	0.399	0.386	0.385							
B1	ELBOW	0.418	0.389	0.395							
B2	ELBOW	0.420	0.396	0.396							
B3	ELBOW	0.416	0.391	0.385							
B4	ELBOW	0.410	0.384	0.384							
B5	ELBOW	0.370	0.386	0.390							
B6	ELBOW	0.378	0.379	0.386							
B7	ELBOW	0.400	0.394	0.394							
B8	ELBOW	0.406	0.379	0.380							
C1	ELBOW	0.300	0.311	0.300							
C2	ELBOW	0.312	0.295	0.295							
C3	ELBOW	0.320	0.303	0.119							
C4	ELBOW	0.322	0.298	0.090							
C5	ELBOW	0.310	0.328	0.247							
C6	ELBOW	0.305	0.290	0.290							
C7	ELBOW	0.323	0.304	0.310							
C8	ELBOW	0.313	0.301	0.301							
D1	ELBOW	0.305	0.306	0.306							
D2	ELBOW	0.319	0.304	0.300							
D3	ELBOW	0.320	0.303	0.305							
D4	ELBOW	0.315	0.305	0.305							
D5	ELBOW	0.312	0.304	0.305							
D6	ELBOW	0.310	0.300	0.300							
D7	ELBOW	0.305	0.306	0.310							
D8	ELBOW	0.310	0.303	0.365							
E1	REDUCER	0.267	0.274	0.260							
E2	REDUCER	0.264	0.272	0.272							
E3	REDUCER	0.270	0.266	0.266							
E4	REDUCER	0.250	0.258	0.256							
E5	REDUCER	0.267	0.264	0.125							
E6	REDUCER	0.278	0.269	0.268							
E7	REDUCER	0.280	0.259	0.260							
E8	REDUCER	0.281	0.272	0.248							
F1	ELBOW	0.400	0.380	0.300							
F2	ELBOW	0.393	0.351	0.295							
F3	ELBOW	0.384	0.362	0.106							
F4	ELBOW	0.400	0.377	0.090							
F5	ELBOW	0.230	0.331	0.247							
F6	ELBOW	0.300	0.367	0.290							

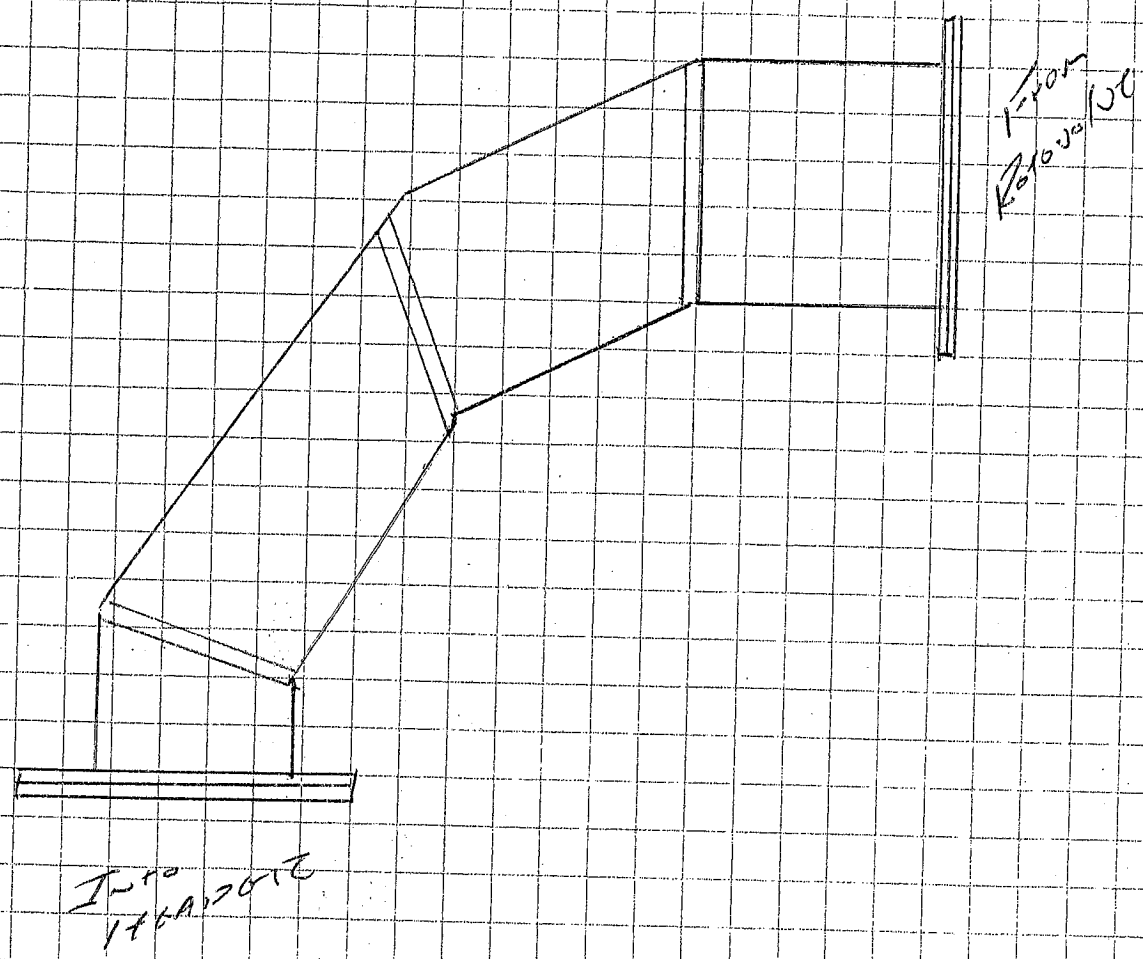
City of Canton
Canton, Ohio
Acuren Inspection

TML No	Location	12/10/2010	12/20/2011	12/03/2012							
F7	ELBOW	0.412	0.400	0.310							
F8	ELBOW	0.400	0.395	0.301							
G1	HEADER	0.255	0.256	0.250							
G2	HEADER	0.259	0.253	0.248							
G3	HEADER	0.250	0.246	0.246							
G4	HEADER	0.245	0.261	0.249							
G5	HEADER	0.260	0.263	0.245							
G6	HEADER	0.268	0.236	0.210							
G7	HEADER	0.256	0.244	0.236							
G8	HEADER	0.260	0.245	0.245							
H1	PIPE	0.260	0.264	0.265							
H2	PIPE	0.255	0.259	0.260							
H3	PIPE	0.250	0.259	0.262							
H4	PIPE	0.262	0.246	0.250							
H5	PIPE	0.270	0.250	0.095							
H6	PIPE	0.265	0.279	0.270							
H7	PIPE	0.250	0.259	0.259							
H8	PIPE	0.255	0.263	0.265							
I1	ELBOW	0.372	0.347	0.347							
I2	ELBOW	0.360	0.342	0.345							
I3	ELBOW	0.377	0.349	0.350							
I4	ELBOW	0.380	0.320	0.320							
I5	ELBOW	0.360	0.390	0.338							
I6	ELBOW	0.345	0.389	0.380							
I7	ELBOW	0.333	0.409	0.375							
I8	ELBOW	0.340	0.388	0.369							



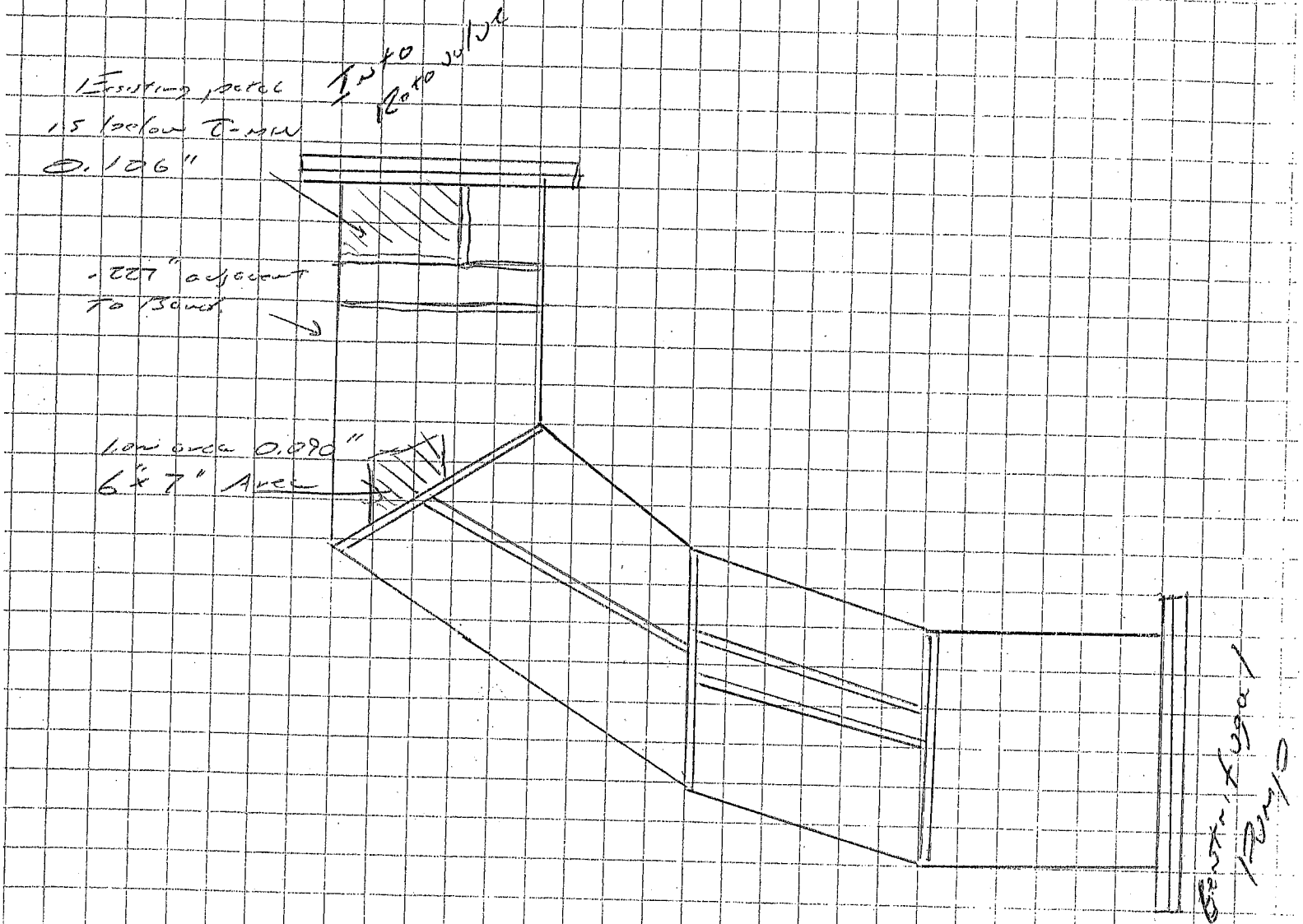
RAW SEWAGE INLET
Facing SOUTH

PUMP #3



ELBOW INTO BOTTOM HEADER
FACING NORTH

Ramp #3



Horizontal Section
Facing West

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535 Kennedy Rd.
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Fax: (330) 733-8644

December 3, 2012

City of Canton
3530 Central Ave. SE
Canton, OH

Mr. Doug Dickerhoff

Subject: Piping Inspection (Pump-4)

WORK SCOPE:

Perform ultrasonic scans on piping associated with the pumps 1 thru 4 in the pumping building. Replicate the previous inspection and perform additional scans on the header pipe to determine current metal thickness and degree of corrosion and metal loss.

SUMMARY:

Repairs will be required for this system to remain in service. Details are stated below. The system should remain on the current inspection interval. The next inspection date is December, 2013.

RESULTS:

- **48" Inlet-** A repair patch will be required on the reducing section closest to the pump on the bottom. Metal thickness of 0.120" was discovered in a 14 by 1 inch area. The minimum required thickness was 0.125". The area was marked on the pipe.
- **48" Discharge Header-** No significant changes in metal thickness were recorded since the previous inspection.
- **24" Elbow To Rotator Valve Horizontal Elbow-** Metal thickness below the minimum required thickness of 0.125" was discovered on the section closest to the rotovalve in a 5 by 7 inch area. The area was marked on the elbow and a patch should be installed. Metal thickness at this area was 0.113".
- **24" Elbow To Discharge-** A patch was installed at the previous corroded area and the elbow was suitable for continued service.

ACUREN

City of Canton
Piping Inspection (Pump 4)
December 3, 2012

PERSONNEL:

Inspectors:

Katie Barker	API Examiner SNT-TC-1A Level II	PT/RT Level I
Richard Conley	API 510 / 570 / 653 Inspector	Certification#: 27342 / 40292

Should you have any additional questions concerning the inspection performed, please feel free to contact this office.

Sincerely,
Acuren Inspection

Richard Conley
Mechanical Integrity Inspector

City of Canton
Canton, Ohio
Acuren Inspection

Corrosion Monitoring Survey - Columns Report

(Thickness in inches)

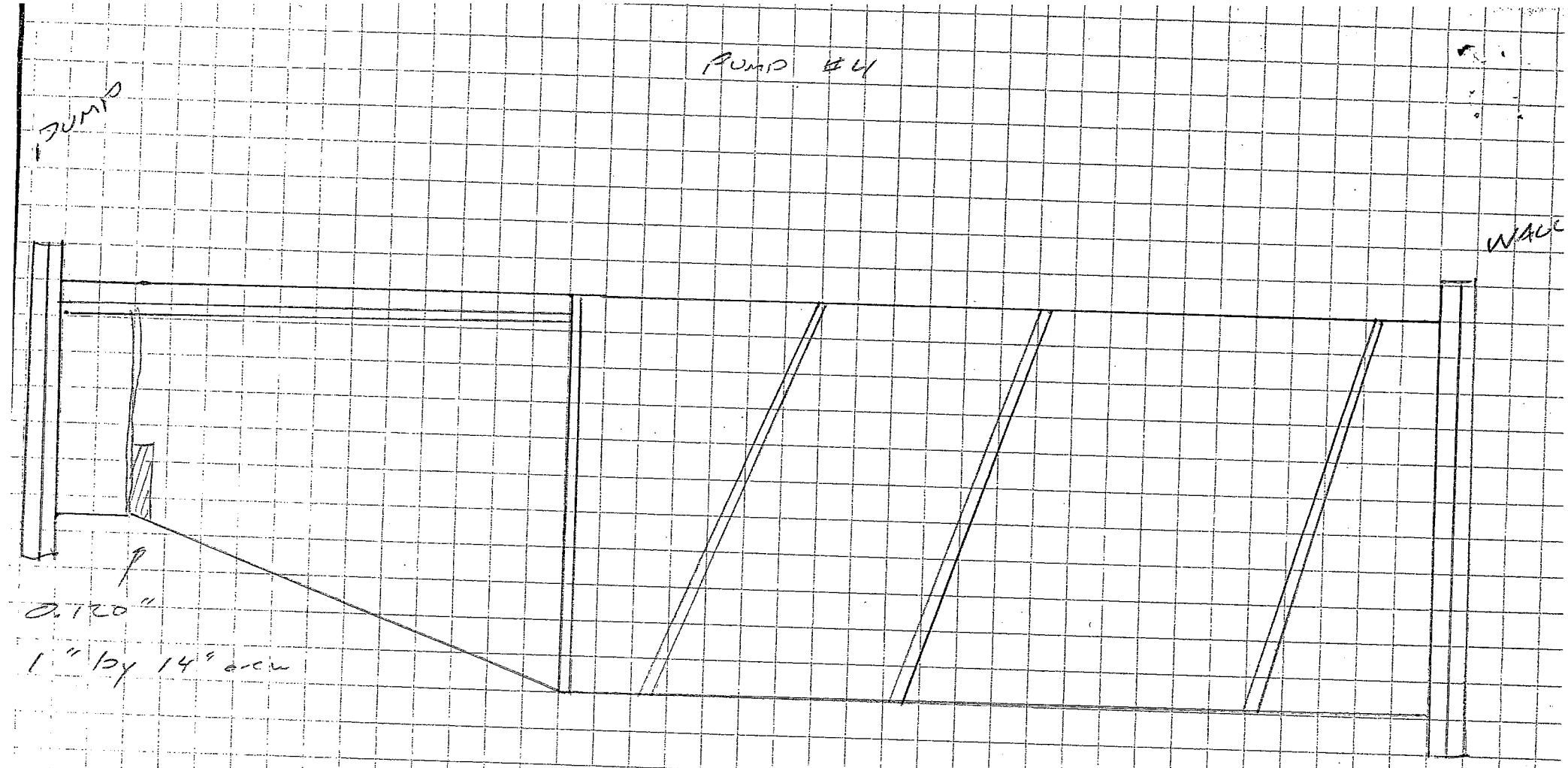
Report Date: 12/05/2012 14:42:38

Unit: PIPING
Eq/Circ ID: PUMP 4
Eq Type:
Class:
RBI:

TML No	Location	12/10/2010	12/20/2011	12/04/2012							
A1	ELBOW	0.400	0.399	0.389							
A2	ELBOW	0.379	0.386	0.385							
A3	ELBOW	0.380	0.378	0.380							
A4	ELBOW	0.406	0.380	0.380							
A5	ELBOW	0.400	0.385	0.385							
A6	ELBOW	0.406	0.381	0.380							
A7	ELBOW	0.416	0.389	0.382							
A8	ELBOW	0.400	0.393	0.389							
B1	ELBOW	0.416	0.389	0.389							
B2	ELBOW	0.424	0.388	0.385							
B3	ELBOW	0.417	0.391	0.390							
B4	ELBOW	0.412	0.386	0.371							
B5	ELBOW	0.416	0.384	0.367							
B6	ELBOW	0.332	0.338	0.338							
B7	ELBOW	0.420	0.379	0.378							
B8	ELBOW	0.414	0.377	0.377							
C1	ELBOW	0.334	0.312	0.312							
C2	ELBOW	0.336	0.310	0.310							
C3	ELBOW	0.339	0.305	0.300							
C4	ELBOW	0.343	0.303	0.312							
C5	ELBOW	0.341	0.306	0.310							
C6	ELBOW	0.328	0.307	0.307							
C7	ELBOW	0.333	0.308	0.312							
C8	ELBOW	0.338	0.306	0.314							
D1	ELBOW	0.340	0.309	0.315							
D2	ELBOW	0.344	0.309	0.314							
D3	ELBOW	0.346	0.313	0.313							
D4	ELBOW	0.345	0.310	0.310							
D5	ELBOW	0.357	0.311	0.314							
D6	ELBOW	0.340	0.323	0.320							
D7	ELBOW	0.340	0.319	0.318							
D8	ELBOW	0.330	0.334	0.328							
E1	REDUCER	0.270	0.260	0.260							
E2	REDUCER	0.262	0.257	0.255							
E3	REDUCER	0.267	0.251	0.253							
E4	REDUCER	0.270	0.247	0.243							
E5	REDUCER	0.270	0.253	0.138							
E6	REDUCER	0.268	0.248	0.248							
E7	REDUCER	0.260	0.262	0.260							
E8	REDUCER	0.265	0.254	0.230							
F1	ELBOW	0.389	0.392	0.392							
F2	ELBOW	0.399	0.399	0.398							
F3	ELBOW	0.412	0.395	0.390							
F4	ELBOW	0.391	0.385	0.378							
F5	ELBOW	0.381	0.385	0.364							
F6	ELBOW	0.368	0.378	0.113							

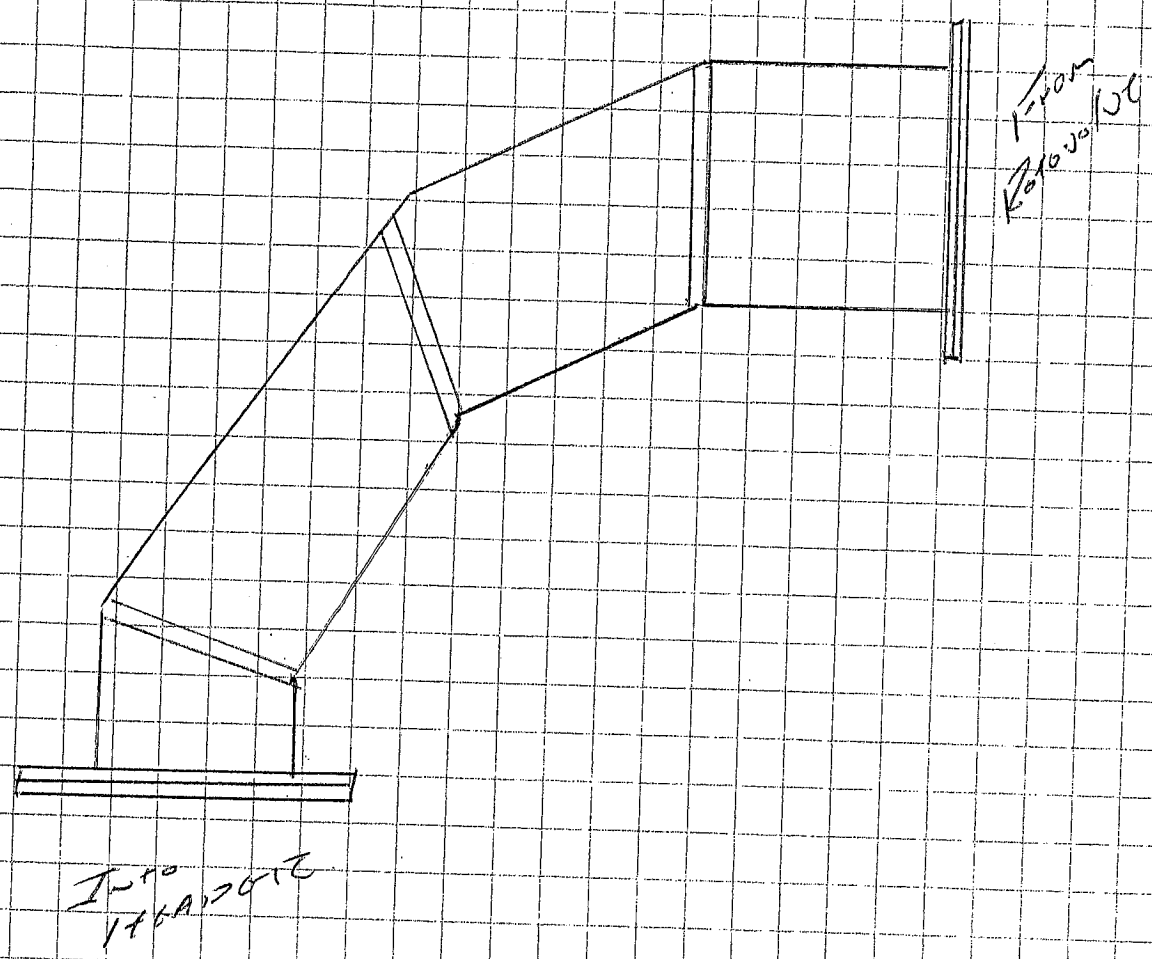
City of Canton
Canton, Ohio
Acuren Inspection

TML No	Location	12/10/2010	12/20/2011	12/04/2012							
F7	ELBOW	0.394	0.389	0.388							
F8	ELBOW	0.400	0.397	0.390							
G1	HEADER	0.250	0.258	0.250							
G2	HEADER	0.245	0.257	0.250							
G3	HEADER	0.250	0.248	0.238							
G4	HEADER	0.253	0.253	0.249							
G5	HEADER	0.245	0.273	0.250							
G6	HEADER	0.289	0.258	0.241							
G7	HEADER	0.269	0.264	0.255							
G8	HEADER	0.248	0.228	0.210							
H1	PIPE	0.270	0.257	0.260							
H2	PIPE	0.266	0.246	0.250							
H3	PIPE	0.250	0.266	0.262							
H4	PIPE	0.268	0.248	0.251							
H5	PIPE	0.270	0.248	0.248							
H6	PIPE	0.266	0.251	0.250							
H7	PIPE	0.259	0.256	0.265							
H8	PIPE	0.272	0.259	0.255							
I1	ELBOW	0.390	0.349	0.350							
I2	ELBOW	0.400	0.362	0.360							
I3	ELBOW	0.395	0.358	0.355							
I4	ELBOW	0.395	0.352	0.352							
I5	ELBOW	0.324	0.308	0.324							
I6	ELBOW	0.330	0.365	0.294							
I7	ELBOW	0.260	0.365	0.193							
I8	ELBOW	0.348	0.386	0.376							



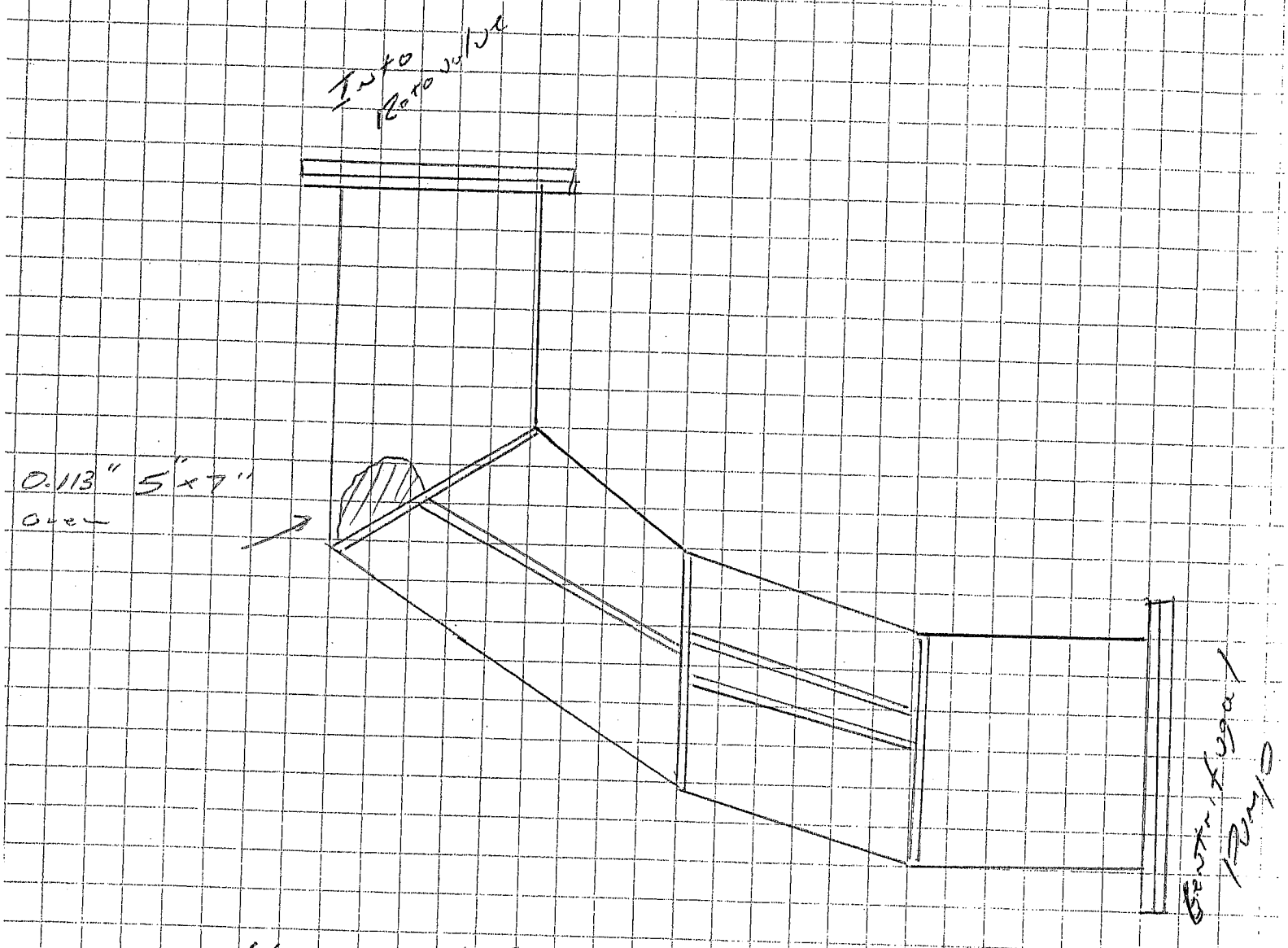
RAW SEWAGE INLET
FACING SOUTH

PUMP RM



ELBOW INTO BOTTOM HEADER
FACING NORTH

Pump #4



Horizontal Section
Facing West

ACUREN

CONTRACTOR WEEKLY REPORT

535 Kennedy Rd., Akron, OH 44305
Phone: (330) 733-8160 • Fax: (330) 733-8644

Customer: Canton City Water Treatment
Location: Canton OH
Customer #:
P.O. #:
Service Call #:

Week Ending: 12/9/2012
Work Schedule:
Job Description:

☐ Last Invoice - Job Complete ☐ Lump Sum ☐ T&M

Work Scope

Equipment Inspected	Visual	Thickness	B-Scan	MFE	Settlement	Crawler	Other	Repairs	CAD	DATA	Formal Report
Pumps 1	EXT	UTT								Other Formal	
Pump 2	EXT	UTT									
Pump 3	EXT	UTT									
Pump 4	EXT	UTT									
HEADER PIPE	EXT	UTT									

LABOR

Employee Name	Class	Rate ST	Rate OT	MON ST	MON OT	TUE ST	TUE OT	WED 12/5 ST	WED OT	THU ST	THU OT	FRI ST	FRI OT	SAT ST	SAT OT	SUN ST	SUN OT	TOTAL ST	TOTAL OT	TOTAL AMOUNT
Rich Cowley				8	2	8	2	8	2											
Kevin Barker				8	2	8	2	8	2											
	TOTAL LABOR																			

PER DIEM (Double Occupancy)											
PER DIEM (Single Occupancy)											

EQUIPMENT / COSTS

Description	Qty.	Unit Cost	Per Unit	MON	TUE	WED	THU	FRI	SAT	SUN	TOTAL UNITS	TOTAL AMOUNT
UT Scopes				1	1	1						
											EQUIPMENT / COSTS TOTAL	

CONSUMABLES

Description	Qty.	Unit Cost	TOTAL AMOUNT
Couplant	1 Gallon		
		CONSUMABLES TOTAL	

Note: PENDING THIRD PARTY COST

I HAVE REVIEWED THIS PROJECT INVOICE, AND VERIFIED TO THE BEST OF MY KNOWLEDGE BASED UPON MY MANAGEMENT OF THIS JOB, THAT THE LABOR, MATERIALS, AND EQUIPMENT INDICATED WERE USED ON THE PURCHASE ORDER NOTED ABOVE. CORRECTNESS OF QUANTITIES AND AMOUNTS ARE SUBJECT TO FURTHER REVIEW.

(CUSTOMER) — (DATE) 5Dec12

I CERTIFY THAT THIS IS A TRUE STATEMENT OF COST ACTUALLY INCURRED FOR W/E DATE SHOWN FOR THE BENEFIT OF THE CUSTOMER AS RELATED SPECIFICALLY TO THE PURCHASE ORDER AND JOB NOTED ABOVE.

(Acuren Inspection) — (DATE) 5Dec12

TIME AND MATERIALS TOTAL	NA
LUMP SUM PRICE	

Scope of Services

The agreement of Acuren Inspection / Rockwood Services to perform services extends only to those services provided for in writing. Under no circumstances shall such services extend beyond the performance of the requested inspection of specific equipment and the preparation of reports or similar documents reflecting the inspection data obtained or observations of the examiner and are not intended nor can they be construed as representations or warranties as to the actual circumstances. Acuren Inspection is not assuming any responsibilities of the owner/operator and the owner/operator retains complete responsibility for the engineering, repair and use decisions as a result of the Acuren Inspection's liability in respect of the services referred to herein exceed the amount paid for such services.

Standard of Care

In performing the services provided, Acuren Inspection / Rockwood Services uses the degree, care and skill ordinarily exercised under similar circumstances by others performing such services in the same or similar locality. No other warranty, expressed or implied, is made or intended by Acuren Inspection / Rockwood Services.

Limitations of Liability

Nothing in this Agreement shall be construed to mean that Acuren Inspection / Rockwood Services assumes any liability on account of injury to persons or property, including death, except those directly caused by negligent acts of Acuren Inspection / Rockwood Services or its employees and that Purchaser's own responsibility for injury to persons or properties while on or about Purchaser's equipment is in no way affected by this Agreement. Acuren Inspection / Rockwood Services shall not be held responsible of liable for and loss, damage, detention or delay caused by accidents, strikes, lock-outs, fire, flood, acts of civil or military authorities, or by insurrection or riot, or by any other cause that is unavoidable or beyond Acuren Inspection / Rockwood Services' control or in any event for consequential damages.