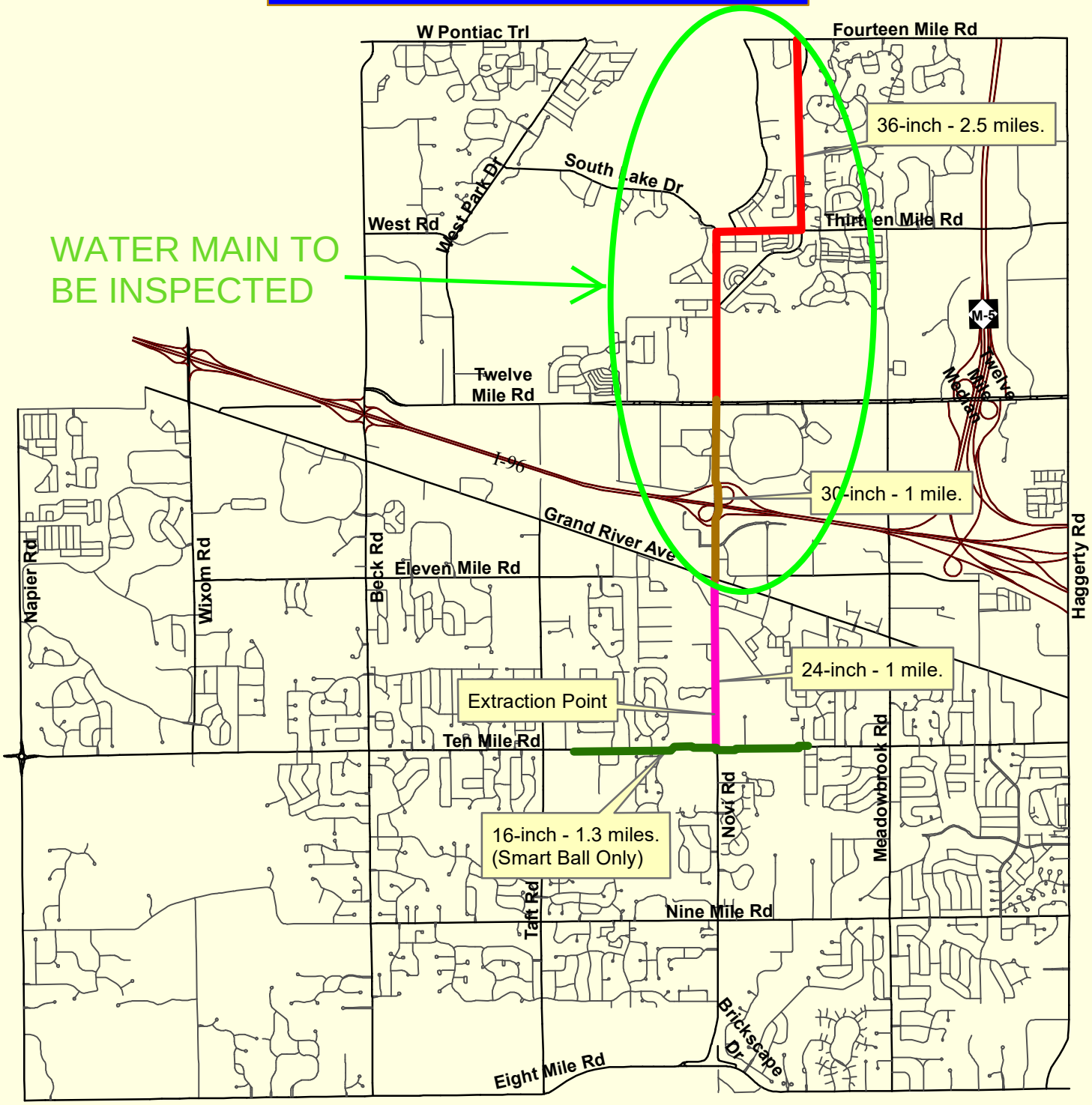
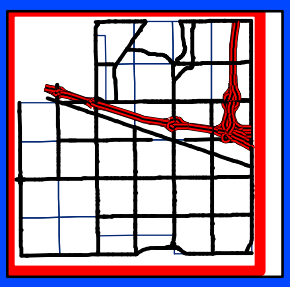
City of Novi
PCCP Transmission Mains



Map Author: Croy
Date: August 2019
Project:
Version #: v3.0

MAP INTERPRETATION NOTICE

Map information depicted is not intended to replace or substitute for any official or primary source. This map was intended to meet National Map Accuracy Standards and use the most recent, accurate sources available to the people of the City of Novi. Boundary measurements and area calculations are approximate and should not be construed as survey measurements performed by a licensed Michigan Surveyor as defined in Michigan Public Act 132 of 1970 as amended. Please contact the City GIS Manager to confirm source and accuracy information related to this map.



City of Novi
Engineering Division
Department of Public Services
26300 Lee BeGole Drive
Novi, MI 48375
cityofnovi.org

Feet
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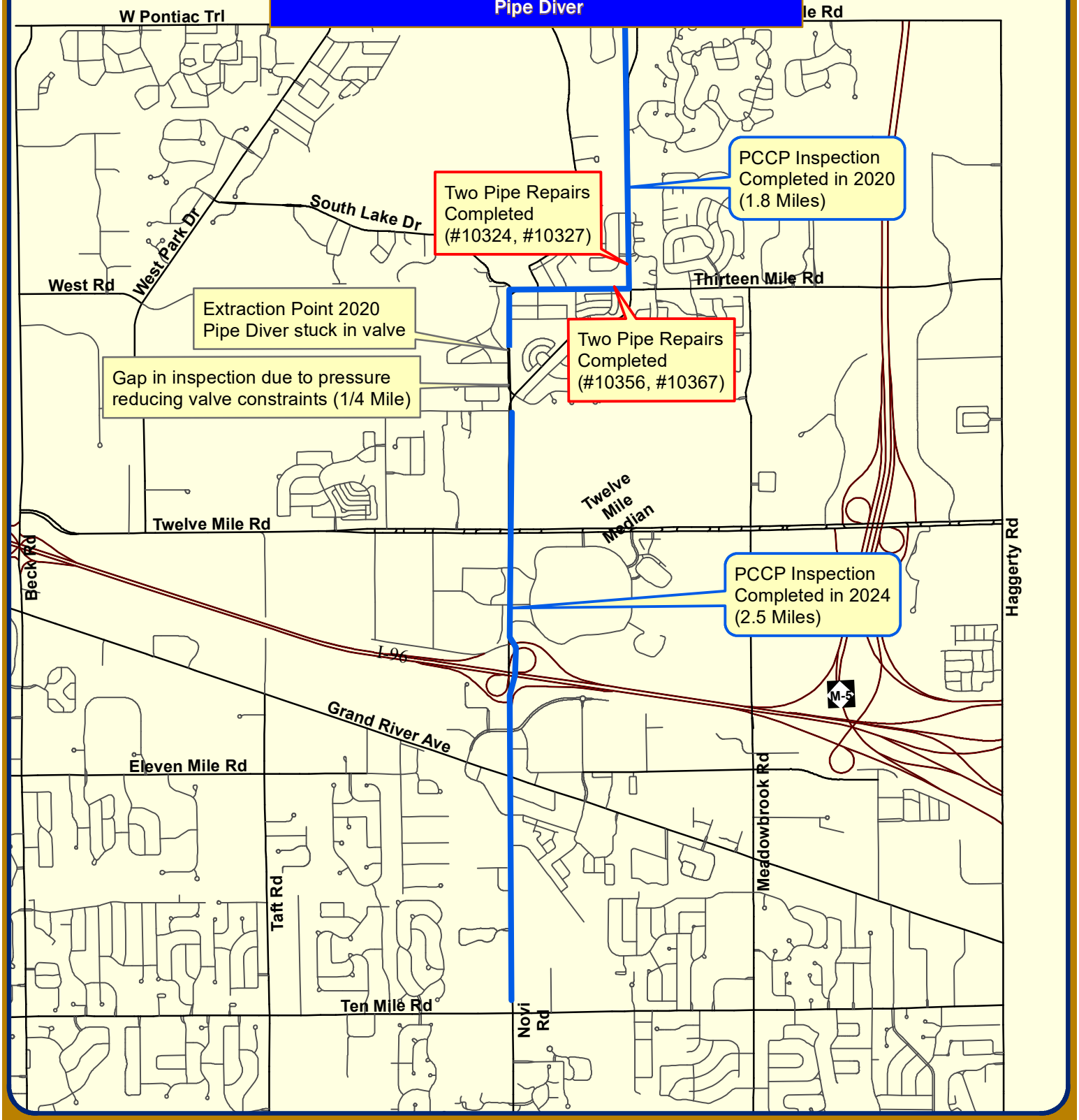
1 inch = 4,400 feet

PCCP Transmission Main Inspection

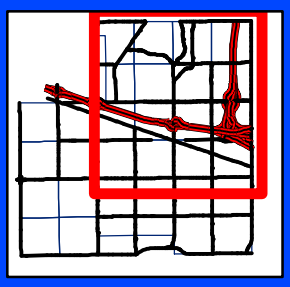
Pipe Diver



Map Author: Croy
Date: August 2024
Project: PCCP Inspection
Version #: v2.0

MAP INTERPRETATION NOTICE

Map information depicted is not intended to replace or substitute for any official or primary source. This map was intended to meet National Map Accuracy Standards and use the most recent, accurate sources available to the people of the City of Novi. Boundary measurements and area calculations are approximate and should not be construed as survey measurements performed by a licensed Michigan Surveyor as defined in Michigan Public Act 132 of 1970 as amended. Please contact the City GIS Manager to confirm source and accuracy information related to this map.



City of Novi
Engineering Division
Department of Public Services
26300 Lee BeGole Drive
Novi, MI 48375
cityofnovi.org

Feet
0 600 1,200 2,400 3,600
1 inch = 2,936 feet

ELIZABETH KUDLA SAARELA
esaarela@rsjalaw.com

27555 Executive Drive, Suite 250
Farmington Hills, Michigan 48331
P 248.489.4100 | F 248.489.1726
rsjalaw.com

ROSATI | SCHULTZ
JOPPICH | AMTSBUECHLER

August 21, 2026

Ben Croy, City Engineer
City of Novi
Field Services Complex
26300 Lee BeGole Drive
Novi, MI 48375

RE: ***Pure Technologies U.S. Inc -Agreement For Soundprint® AFO Monitoring Contract***

Dear Mr. Croy:

We have received and reviewed the Proposal for Acoustic Fiber Optic Pipeline Monitoring from Pure Technologies U.S. Inc., dated June 18, 2026, which also includes its standard Terms and Conditions on pages 35-39. Since this is a single source contract and the City's standard RFP term are not incorporated into the Proposal, we have provided the enclosed standard Service Agreement to be attached to the Proposal to govern the Terms and Conditions of the Contract. The Service Agreement includes the City's standard insurance and indemnification requirements for City Contractors. The Proposal will be attached as Exhibit A defining the price of the contract and the scope of work. We have also requested four changs to the Terms and Conditions Section of the Proposal as follows:

1. Article III – the word "Provincial," should be changed to "State."
2. Article VI – Limit of Liability –Delete Second Paragraph of that Section.
3. Article VII -- They are doing business in Michigan so governing law in Article VII should be "Michigan," not Maryland.
4. Article XI – Limitation of Actions should be deleted. Applicable state law should apply.

We recommend approval of the Proposal and Services Agreement subject to the Contractor working with the City Attorney's Office to resolve the above identified issues prior to the signature of the Services Agreement.

Please feel free to contact me with any questions or concerns in regard to this matter.

Very truly yours,

ROSATI SCHULTZ JOPPICH
& AMTSBUECHLER PC

Elizabeth Kudla Saarela

Enclosure
Cc Cortney Hanson, Clerk
Jeff Herczeg, DPW Director
Thomas R. Schultz, Esq.

C: (w/Enclosures)
Cortney Hanson, Clerk
Charles Boulard, Community Development Director
Lindsay Bell, Director of Planning
Diana Shanahan, Planner
Brad Doane, Planner
Sarah Marchioni, Community Development Building Project Coordinator
Angie Sosnowski, Community Development Bond Coordinator
Humna Anjum, Project Engineer
Kate Purpura, Project Engineer
Alyssa Craigie, Administrative Assistant
Sydney Waynick & Ted Meadows, Spalding DeDecker
Jessica Montagno and Katie Gress, Consumers Energy
Thomas R. Schultz, Esquire

AGREEMENT

BY AND BETWEEN THE CITY OF NOVI, MICHIGAN,
A MICHIGAN MUNICIPAL CORPORATION

AND

PURE TECHNOLOGIES U.S. INC

AGREEMENT FOR SOUNDPRINT® AFO MONITORING CONTRACT

THIS AGREEMENT, made and entered into this _____ day of August, 2026, (the "Effective Date") by and between the CITY OF NOVI, a Michigan municipal corporation of the State of Michigan, (hereinafter called "City"), the address of which is 45175 Ten Mile, Novi, Michigan 48375 and PURE TECHNOLOGIES U.S. INC., a Delaware Corporation (hereinafter called "Contractor"), the address of which is 989 Corporate Boulevard, Suite F, Linthicum Heights, MD 21090. City and Contractor shall be collectively referred to as the "Parties."

R E C I T A L S:

The following is a recital of facts underlying this Agreement:

The City desires to avail itself of the services, equipment, labor, materials, skill and expertise of Contractor. The Contractor desires to provide services, equipment, labor, materials, skill and expertise to the City.

NOW, THEREFORE, in consideration of the mutual covenants contained herein, the Parties agree as follows:

1. **Purpose and Term.** The Contractor shall provide all services, equipment, labor, materials, skills, and expertise necessary for installation and monitoring services for AFO system, per the proposal from Contractor-Option2, which is incorporated and attached as ***Exhibit A*** (collectively the "Contract Documents").

2. **Contract Documents.** The Contractor agrees to be bound by the Contract Documents. The Contract Documents shall be defined as this Contract as well as the Contractor's communication attached as ***Exhibit A***. TO THE EXTENT THAT ***EXHIBIT A*** CONFLICTS WITH THIS CONTRACT, THIS CONTRACT SHALL CONTROL; TO THE EXTENT THAT ***EXHIBIT A*** IS SILENT AS TO ANY ISSUE WHICH THIS CONTRACT ADDRESSES, THIS CONTRACT SHALL CONTROL.

3. **Payment.** The Contractor will be paid in accordance with the "contract documents," subject to property detailed and submitted invoices.

4. **Right to Perform.** The City reserves the right to perform or cause to be performed Contractor's obligations in the event that the Contractor does not perform its obligations under this Contract in a satisfactory and timely manner.

5. **Time.** The Parties agree that time is of the essence in the performance of this Contract.

6. **Independent Contractor.** The Parties agree that Contractor is an independent contractor and not an employee of the City as that term is commonly used, and Contractor's employees are not and shall not be considered subcontractors or employees of the City and has no authority to bind the City in any manner. Contractor shall be solely responsible for the withholding and reporting of all federal, State, and local income and employment taxes. Contractor acknowledges that it is not insured in any manner through the City for any bodily injury, personal injury, or property loss whatsoever.

7. **Insurance.**

7.1. Contractor shall maintain in full force and effect during the term of this Contract the following insurance coverages (collectively the "Insurance Policy"):

(a) Commercial General Liability with minimum limits of $1,000,000.00 per occurrence and $1,000,000.00 in aggregate for bodily injury or property damage, and excess liability with a limit of not less than $2,000,000.00 per occurrence and aggregate.

(b) Workers' Compensation insurance with statutory limits and Employers Liability with a $1,000,000.00 per accident limit for bodily injury or disease. Contractor shall not be required to name the City as an additional insured on Contractor's Workers Compensation insurance policy.

(c) Automobile Liability insurance covering all owned, non-owned, and hired vehicles with a $1,000,000.00 per accident limit for bodily injury and property damage.

7.2 The Insurance Policy shall be written to apply to all bodily injury or property damage and shall be endorsed to include the City of Novi as an additional insured. With the exception of workers' compensation coverage, the Insurance Policy shall be written as primary policies, not excess or contributing with or secondary to any other insurance as may be available to the Contractor or additional insured.

7.3 The Insurance Policy shall be endorsed so that the insurance carrier will provide the City not less than thirty (30) days prior written notice of cancellation, modification or nonrenewal of any insurance policy.

7.4 The Contractor shall deliver to the Clerk of the City simultaneous with the execution of this Contract certificates of the Insurance Policy reflecting evidence of

required coverages. The Contractor shall provide true copies of the Policy upon request of the City.

8. **Hold Harmless.** To the fullest extent permitted by law, the Contractor agrees to indemnify, defend, pay on behalf of, and save harmless the City, and its elected and appointed officials, consultants, agents, volunteers, and employees from and against all loss or expense (including costs and attorney's fees) by reason of liability imposed by law upon the City or its elected and appointed officials, consultants, agents, volunteers, and employees for damages to property and for damages because of bodily injury, including death at any time resulting therefrom, sustained by any person or persons or on account of damage to property, including loss of use thereof, directly arising out of the negligent performance of this Contract.

9. **Subcontractors.** It is expressly understood that no subcontractor shall be used by the Contractor in the performance of this Contract except were consistent with the scope of work set for in the Contract Documents.

10. **Notices.** All notices, requests, demands, or other communications hereunder shall be in writing and deemed given (a) when delivered personally, or (b) on the day said communication is sent by registered or certified mail, return receipt requested, postage prepaid, or (c) on the next business day after notice is sent by facsimile or pdf, or (d) on the day said communication is deposited with a nationally recognized overnight courier service, as the case may be, as follows:

If to City:

Cortney Hanson, City Clerk
Jeffrey Herczeg, DPW Director
City of Novi
45175 Ten Mile
Novi, Michigan 48375
Email: chanson@cityofnovi,org
Email: jherczeg@cityofnovi.org

If to Contractor:

[Name]
[Business Name]
[Address]
[City, State, ZIP]
Email: [email here]

Copy to:

Elizabeth Saarela
City Attorney
Rosati Schultz Joppich & Amtsbuechler, PC
27555 Executive Drive, Suite 250
Farmington Hills, Michigan 48331
Email : esaarela@rsjalaw.com
(248) 489-4100

11. **City Agents.** No agent of the City shall have power to revoke, alter, enlarge, or relax the stipulations or requirements of this Contract, without the prior formal written authorization to do so, by ordinance, resolution, or official action of the City.

12. **Waiver.** No failure by the City to insist upon the strict performance of any covenant, term, or condition of this Contract or to exercise any right, term, or remedy consequent upon any breach thereof, shall constitute a waiver of any such breach. No waiver of any breach shall affect or alter this Contract, but each and every covenant, term and condition of this Contract shall continue in full force and effect with respect to any other then existing or subsequent breach thereof.

14. **Termination.** The City may terminate this Agreement in accordance with ***Exhibit A.***

15. **Breach of Contract.** No failure by the City to insist upon the strict performance of any covenant, term or condition of this Agreement or to exercise any right, term, or remedy consequent upon any breach thereof, shall constitute a waiver of any such breach. No waiver of any breach shall affect or alter this Agreement, but each and every covenant, term and condition of this Agreement shall continue in full force and effect with respect to any other then existing or subsequent breach thereof.

16. **Entire Agreement.** This Contract contains the entire agreement between the Parties hereto and no representations, inducements, promises or agreements, oral or otherwise entered into prior to the execution of this Contract, will alter the covenants, agreements, and undertakings herein set forth.

17. **Severability.** If any term or portion of this Contract, or the application thereof, to any person or circumstance shall, to any extent, judicially be determined to be invalid or unenforceable, the remainder of this Contract, or the application of such term or provision to persons or circumstances other than those as to which it is invalid or unenforceable, shall not be affected thereby, and each provision of this Contract shall be valid and enforceable to the fullest extent permitted by law.

18. **Modifications.** This Contract shall not be modified in any manner, except by an instrument in writing executed by the parties.

19. **Venue and Choice of Law.** The Parties concur that any dispute concerning the interpretation of this Contract shall be brought in the applicable State court located in the County of Ingham, Michigan, and that Michigan law shall control.

20. **Counterparts.** This Contract may be executed and delivered in any number of counterparts, each of which so executed and delivered shall be deemed to be an original and all of which shall constitute one and the same instrument. A party may deliver executed signature pages to this Contract by facsimile transmission or electronic mail to the other party, which facsimile or electronic copies shall be deemed to be an original executed signature page binding on the party that so delivered the executed signature page by facsimile or electronic mail.

IN WITNESS WHEREOF, the Parties have caused this Contract to be executed by the persons authorized to do so, as of the day and year first above written.

CITY OF NOVI

BY:_____
Justin Fischer, Mayor

BY:_____
Cortney Hason, Clerk

PURE TECHNOLOGIES U.S. INC

BY:_____

Its:

EXHIBIT A

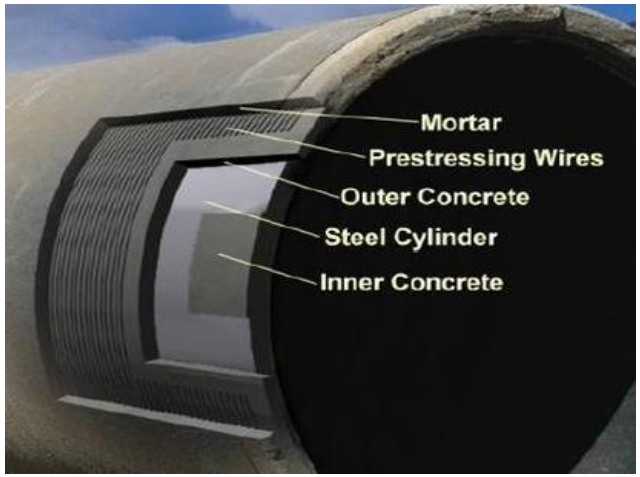
CONTRACT DOCUMENTS

Department of Public Works
Water and Sewer Division

Pre-Stressed Concrete Pipe Assessment and Inspection Program 2019

Pre-Stressed Concrete Cylinder Pipe from GLWA Break 14 Mile Main Break

PCCP Overview



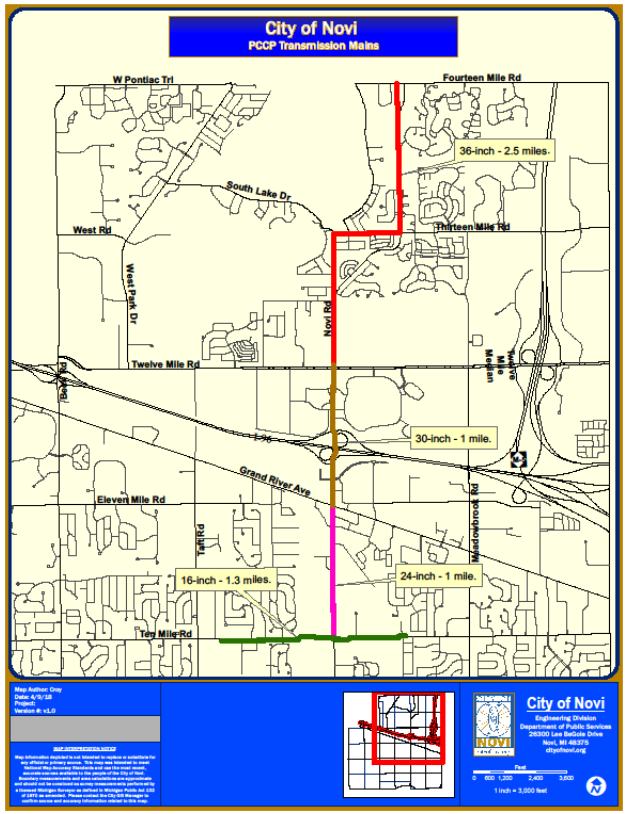
- PCCP is commonly found in water mains
- PCCP can range in size from 16” to 20’ diameter
- A prestressed wire is wrapped helically around the pipe providing resistance to internal pressure and external loads
- Designed to handle high pressures

Types of PCCP Failures

Corrosion

Hydrogen Embrittlment

City has 2.5 Miles of 36”, 1 Mile of 30”, 1 Mile of 24” and 1.3 Mile of 16” PCCP water main. This is the primary water service for the majority of Novi.

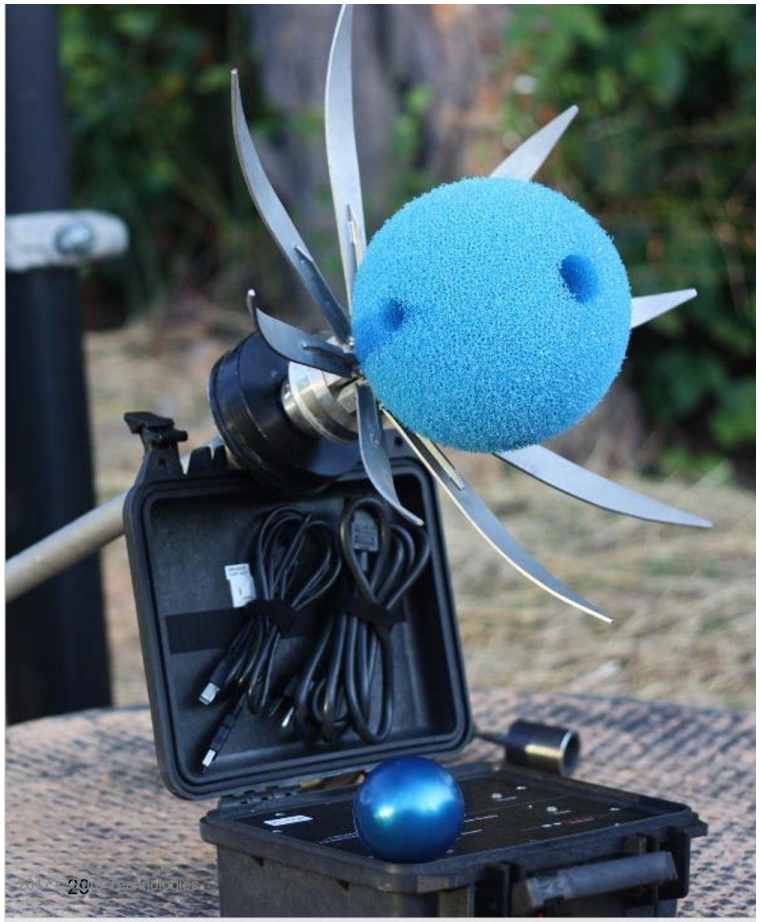


Our goal is to reduce your capital expenditures by focusing repair/rehab/replacement on bad pipe

PCCP Inspection Toolbox

- Transient pressure monitoring
- Leak and air pocket detection (Smart Ball)
- Structural pipe wall inspections - counting wire breaks (Pipe Diver)
  - Electromagnetics
  - Visual and Sounding
  - Forensic investigation and design review
  - Structural assessment
  - Remaining useful life
- Acoustic fiber optic (AFO) monitoring for wire breaks – (Option)

In-line Acoustic Leak & Gas Pocket Detection



- Free Swimming/ Non-Tethered Hydrophone
- Technology
- Locates leaks and gas pockets in transmission or force mains
- Launch and retrieve in live flow through
- 4” openings

Structural Pipe Inspection

External

Diameter: Any

Pipe segments excavated to springline

Manned system

Free-Swimming

Diameter: 16”+

Pipeline In Service

Free swimming

*SONAR

*CCTV recording

PCCP Pipe Inspection Proposal

- SmartBall – Identification and location of any leaks and/or air pockets in the pipeline as well as ARV installation recommendations.
- PipeDiver - Identification and location of the estimated number of broken prestressing wire wraps within each PCCP pipe section inspected.
- Xylem will also provide transient pressure monitoring and structural modeling (FEA curves) to determine the significance of any defects detected.
- Pure Technologies typically provides a presentation summarizing draft results to stakeholders to facilitate review of the draft report.

Summary

- Budgeted in 2019-2020 FY
- Scheduled to start fall 2019
- Preventitive and proactive maintenance with the goal to prevent a catastrophic failure
- Failures result in $$$ and loss of service
- Projects can be planned and more cost effective with control of service maintained
- Same program GLWA just completed first phase of inspection

Proposal for

Acoustic Fiber Optic PCCP Pipeline Monitoring

36 and 30-inch Novi Road PCCP Transmission Main

SoundPrint® AFO

June 18, 2026

Ben Croy
City Engineer
City of Novi Department of Public Works

RE: Acoustic Fiber Optic PCCP Pipeline Monitoring

Dear Mr. Croy:

Pure Technologies U.S. Inc., a Xylem brand, is pleased to offer our services to the City of Novi (Novi) for monitoring the Novi Road PCCP transmission main. The project scope includes monitoring of approximately 3.4 miles of 36 and 30-inch diameter prestressed concrete cylinder pipe (PCCP) potable water pipeline. The planned length for the installation will begin at station 6+20 and end at Station 58+92 near the end of the 30-inch PCCP. We propose using our SoundPrint® Acoustic Fiber Optic (AFO) pipeline monitoring system to identify and locate individual wire breaks and leaks in the pipeline in near real-time. In order to define a baseline condition prior to beginning monitoring, Pure Technologies also proposes to conduct a wall condition assessment prior to the AFO system deployment.

Globally, Pure Technologies has monitored more than 1,000 miles of pipeline and offers a dedicated long-term support team with extensive SoundPrint AFO experience as well as pipeline condition assessment experts to help utilities better understand the AFO results.

Pure Technologies is a recognized industry leader in the inspection, assessment, and management of pressurized water and wastewater pipelines, having built a reputation of providing state-of-the-art and innovative solutions. Pure Technologies has more than 200 engineers and scientists dedicated to this purpose, many of which have taken leadership roles in the industry's recent initiatives to assess pressurized pipelines experts across the nation.

Evan Biedenbach
Business Development Manager
Pure Technologies U.S. Inc.
330-705-0796
evan.biedenbach@xylem.com

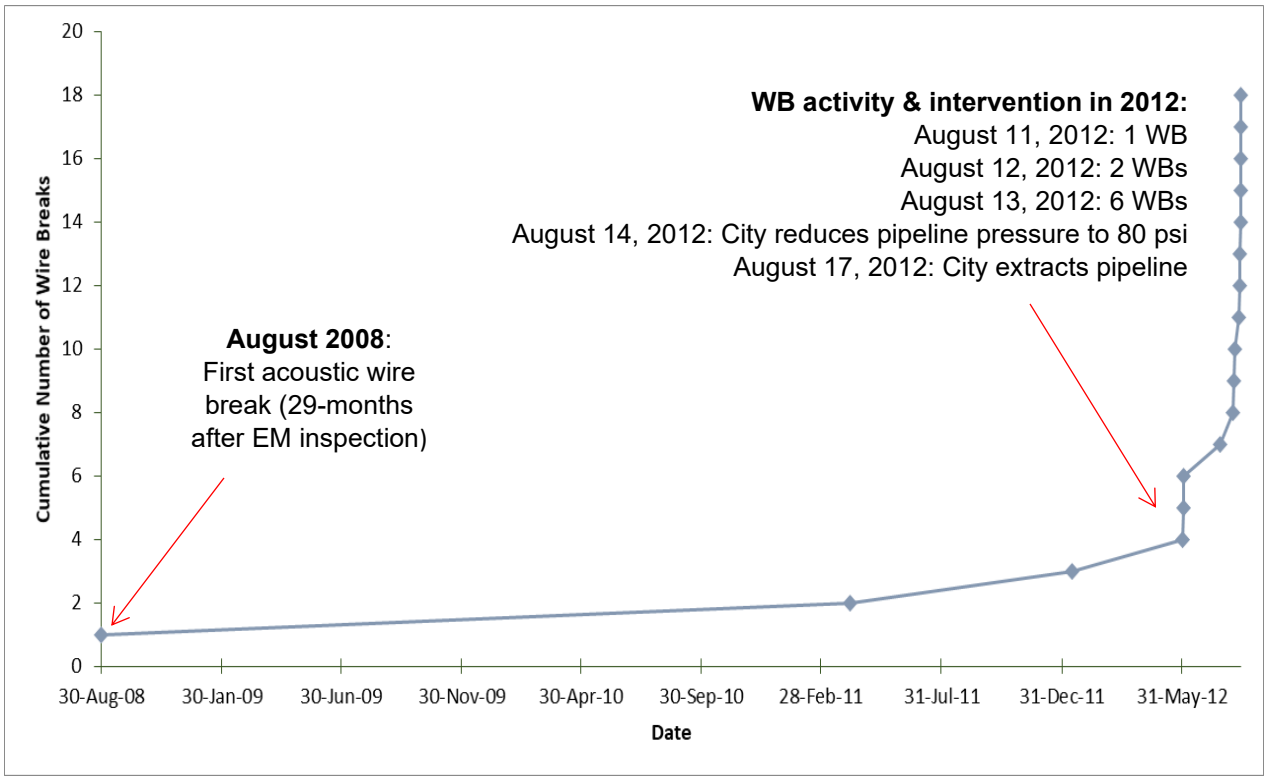
Mike Garaci
Director, Business Development Manager
Pure Technologies U.S. Inc.
416-574-4446
mike.garaci@xylem.com

Continuous Monitoring for Managing PCCP

Prestressed concrete cylinder pipe (PCCP) is a robust and economical option, and therefore common choice, for large diameter water transmission pipelines. While PCCP has a proven track record of low distress rates, when a pipe does fail it does so in a sudden and catastrophic manner, causing owners and communities millions of dollars in system failures, emergency repairs, and potential pipeline replacement.

Historically, electromagnetic (EM) inspections have been used to identify broken wires in PCCP. Although EM inspections allow us to evaluate the current distress and related structural integrity of each pipe at the time of the inspection, they do not provide actionable data with respect to any potential continuation of broken prestressing wires. While Pure Technologies can utilize existing data from EM inspections to perform a statistical analysis to project future wire breaks and remaining useful life of pipes, such an approach has inherent risk associated with the time between periodic EM inspections.

The difficulty in trying to predict a reasonable re-inspection schedule that is both cost effective and provides reliable data is that the wires on prestressed concrete cylinder pipe do not fail in a linear regression. Rather, wires breaks tend to occur in an exponential regression as they near failure, with a resulting failure of the pipe within a short duration once the exponential regression initiates.
The figure below demonstrates the typical exponential regression of wire breaks on PCCP in a water transmission main that was trending towards failure. This pipe was being continuously monitored 24/7 at the time, utilizing Pure Technologies' SoundPrint® acoustic fiber optic (AFO) monitoring system.



When the pipe experienced a significant increase in wire break activity, the client was immediately notified and the pressure in the line was reduced until it could be shut down for excavation, validation, and repair/replacement—avoiding the loss of service to customers as well as a potentially catastrophic rupture resulting in collateral damage requiring emergency response.

The photographs below were taken of the excavated and exposed pipe and associated wire break regression shown above.

Excavation

Damage evident

Inspecting the damage

Wire Breaks

Damage concentrated in 9' section

Damage

AFO monitoring systems have also documented increased wire break activity associated with the de-pressurization and re-pressurization of a PCCP water main, further demonstrating that pressure and flow management are important to effective management of water mains. Given the exponential degradation of low to moderate PCCP, as well as good pipes experiencing an initiation of wire breaks, static EM inspections do not provide an understanding as to how active wire breaks are occurring, or how rapidly they will continue to degrade.

Pure Technologies proposes to mitigate risk associated with potential failure of pipe and extend the remaining useful service life of the Novi Road PCCP water transmission main through the design, furnishing and installation of a permanent and continuous acoustic fiber optic monitoring system to detect and record wire breaks in near real time for each prestressed concrete cylinder pipe.

SoundPrint® AFO Overview

Most structural failures in PCCP result from a breakdown of the exterior mortar coating leading to corrosion or hydrogen embrittlement of the prestressing wire wraps. This breakdown causes incremental wire break damage that continues to grow until the pipe eventually ruptures. A continuous pipeline monitoring system can help detect, record, and locate acoustic events associated with leaks and the breaking of prestressing wires.

- Wire breaks are the primary indicator of deterioration in prestressed concrete pipelines; early detection is key to preventing failures and operational disruptions.
- Leak detection is an effective complement that helps utilities address additional failure modes, such as leaking features, damage from third parties, and issues at the pipe joint.
- Other anomalous events due to third parties, such as construction activity, can indicate disruptions or operational deficiencies to the system.

With near-real-time data collection pipeline owners are empowered to proactively manage their assets with greater confidence, reducing the risk of dangerous and expensive failures and unplanned operational expenses.

The SoundPrint® Acoustic Fiber Optic monitoring system detects and locates these wire breaks, leaks, and other threats. SoundPrint AFO is a proven solution that leverages more than 20 years of experience to reliably and continuously monitor wire breaks in PCCP, the primary indicator of degradation in this pipe type. With this advanced warning system and a dedicated support team, utilities can determine the condition of critical pipelines and take preventive action to avoid large-scale failures.

The SoundPrint AFO acoustic monitoring system consists of a data acquisition system (DAQ) connected to single-mode optical fibers that are bundled in a reinforced “AFO cable.” Lasers are used to project light down the fibers and the DAQ system monitors reflections generated by the acoustic activity in the pipeline.

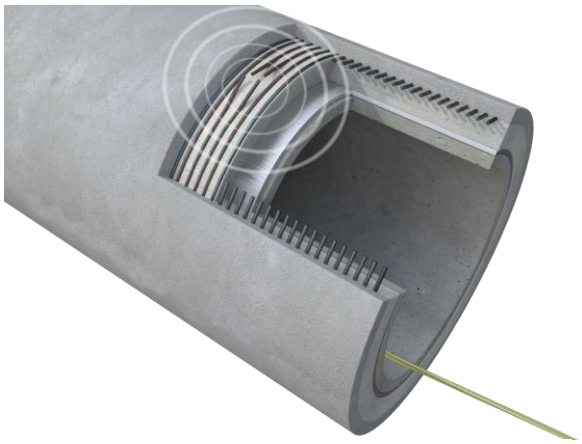


Figure 1: Acoustic Fiber Optic cable detects the energy released when a prestressing wire fails

The acoustically sensitive SoundPrint AFO cable acts as a sensor throughout its length of deployment; the source of the noise activity (i.e., wire breaks or leaks) is never further away than a pipe diameter as shown in **Figure 1**. With the distinctive high frequency noise signature generated by a wire break or leak and the sensor’s proximity, the SoundPrint AFO system reliably detects and locates anomalies in near real time. To detect leaks the SoundPrint AFO system records the entire line periodically instead of waiting for a trigger, based on changes from the baseline scan established at commissioning, the system is able to identify leaks as small as five gallons per minute. Up to 12.5 miles (20 km) of pipeline can be monitored from a single DAQ location and 25 miles (40 km) from a dual DAQ.

Wire break and leak events are located along the fiber optic cable and are then mapped to a pipeline location by our expert data analysts. Upon classification of the event, the pipeline operator receives an email alert of the event with details being available on a GIS-based website. This precise and prompt knowledge of the deterioration of individual pipes within a pipeline allows operators to optimize their capital budget and maximize the life of their assets. Near-real-time data collection empowers pipeline owners to proactively manage their assets with greater confidence, reducing the risk of dangerous and expensive failures and unplanned operational expenses.

Implementing a SoundPrint AFO monitoring system features two distinct project phases:

- **Installation of the system**, often paired with an electromagnetic (EM) inspection to establish a baseline of deterioration, will typically take from three to six months from the notice to proceed and will conclude with the system commissioning.
- **Monitoring and Warranty** will commence once the system is commissioned and will continue for as long as the operator desires the service.

Electromagnetic Baseline Inspection with PipeDiver

PCCP Inspection

Concrete core compression and structural strength of a PCCP, such as the Novi Road PCCP transmission main, comes from tension in the pipe's prestressing wire wraps. When wire wraps break and core compression is lost, the pipe can yield under its internal pressure and can fail in a quick and catastrophic manner. An electromagnetic (EM) inspection can identify where prestressing wire wraps have broken and can allow for proactive management of PCCP prior to failure.
The project scope detailed in this proposal leverages our PipeDiver® inspection platform with EM technology to inspect the current condition of the Novi Road PCCP transmission main for broken wire wraps.

The best way to proactively manage any pipeline is to better understand its health using proven condition assessment solutions combined with advanced analysis. A comprehensive condition assessment of PCCP water pipeline involves deploying inspection tools to accurately assess the health of the buried infrastructure along with advanced engineering analysis to provide a clearer understanding of risks that inform short- and long-term repair and replacement strategies. We propose a condition assessment initiative for Novi.

1. **Inline Wall Inspection** identifies and locates broken wire wraps to provide a critical baseline for pipe degradation. The PipeDiver® platform is a free-swimming condition assessment tool that is easy to deploy and operates while the pipeline remains in service. This will update the baseline inspection data to current condition before installing the AFO System in the transmission main.

PipeDiver

The PipeDiver platform, as shown in **Figure 1**, provides accurate, detailed pipe wall condition data to inform proactive management decisions. Pure Technologies' industry-leading, patented EM technology can locate groups of as few as five broken wire wraps along the length of the pipe. Dig

sheets are provided alongside the PipeDiver report to help Novi accurately locate any pipe in question.

The PipeDiver platform is flexible, offering a number of insertion and extraction options to meet various operational requirements. While the tool can be inserted into a live pipeline under pressure, it is more commonly inserted through a depressurized appurtenance. Extraction options also vary and include nets or grates to stop the tool. The tool can be extracted through a depressurized appurtenance or retrieved at a reservoir, chamber, or tank.

As the platform travels through the pipeline, field crews track the tool from above ground at regular intervals. The PipeDiver platform's flexible design allows it to navigate valves and bends in the pipeline. The tool can also travel long distances in a single deployment.
An overview of the PipeDiver platform inspection process is shown in **Figure 2**.

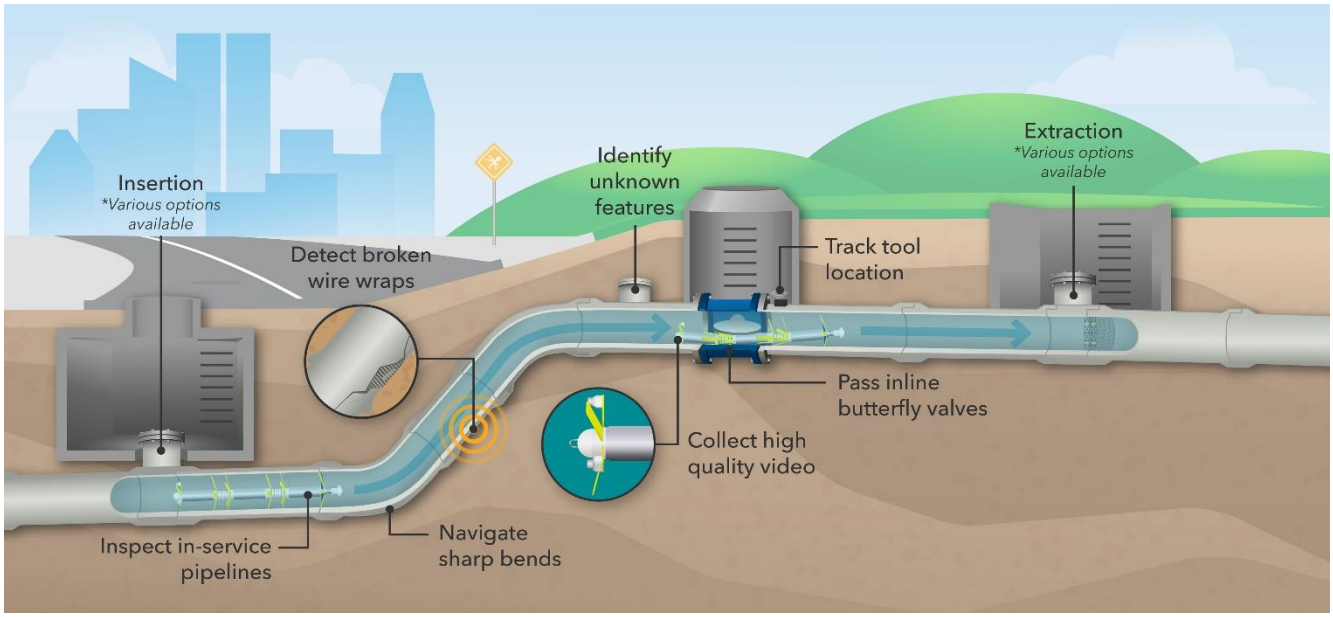


Figure 1: PipeDiver Inspection Overview

PureRobotics Inspection

The PureRobotics platform consists of a modular tethered robotic vehicle capable of numerous configuration options for inspection of small, medium, and large diameter depressurized PCCP pipelines. The vehicle traverses the pipe using independently operable tracks to offer inspection deployments greater than one mile from an access point. A trained operator navigates the vehicle and controls a high-definition pan-tilt-zoom camera with high-intensity LEDs for visual inspection. Simultaneously, an electromagnetics technician monitors electromagnetic (EM) data live and can direct a closer look at visual anomalies that may correlate with collected data. High-definition video and two sets of EM data (forward and reverse pass) are recorded for detailed post inspection analysis. Analysts then identify, quantify, and locate areas of broken prestressing wire wraps.
From our experience successfully inspecting pipelines with the PureRobotics inspection platform, we have identified key factors for success for robotic inspections to minimize risk and downtime associated with the inspection.

An overview of the PureRobotics platform inspection process is shown in **Figure 3**.

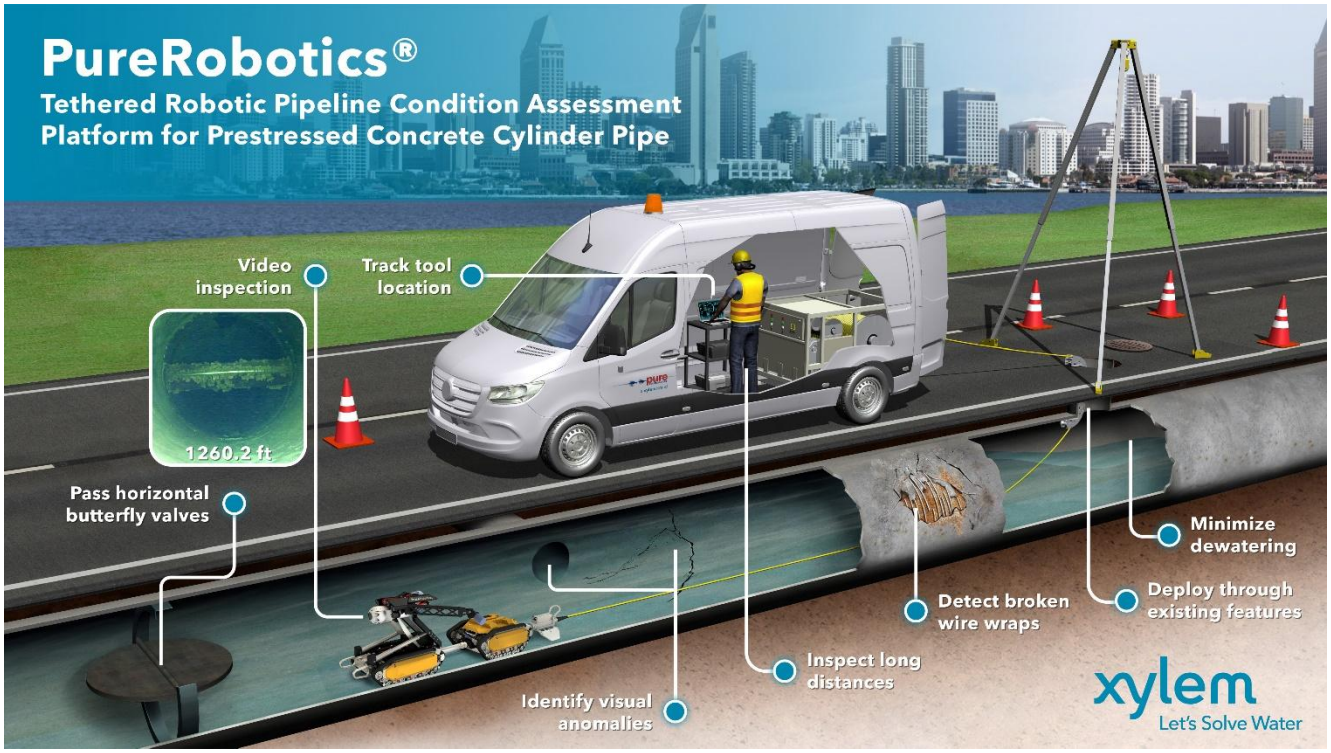


Figure 3: PureRobotics Inspection Platform

SoundPrint AFO System Deployment

The planning process allows Pure Technologies to identify features of the site or the pipe which could prevent a successful deployment and to put steps in place to mitigate the potential risk. We will request from you as much information as possible about the pipeline during our planning process. Based on this information and a preliminary site visit, we will provide you with a detailed Project Planning Document (PPD) prior to commencing our work for your review and feedback.

Once a notice-to-proceed is received, Pure Technologies will begin an iterative design process to optimize the AFO system to the given pipeline that includes the following activities:

- Review all available information on the pipeline and layout a preliminary design.
- Perform a site visit to review suitability of critical locations and meet with client operations staff to discuss any additional considerations.
- Revise system design and develop drawing package and installation plan.
- Submit to Novi for review and comment.
- Develop and submit final revisions.

The PPD will describe execution of the installation process and any necessary support (equipment and personnel) needed to ensure the safe progression of the inspection or deployment team through portions of the pipeline. The planning document improves preparation and communications with all

involved parties and is an important aspect of a successful project. Pure Technologies is dedicated to meeting our clients' needs and will work with Novi to fulfill all submittal requirements.

Installation Approach

The AFO cable can be installed in either a fully dewatered pipeline or into a flowing and operational pipeline. In order to meet Novi's goals, a live installation is proposed for this project.

Live Installation Methodology. The primary advantages of the live installation method with a fully operating pipeline include not requiring the line to be taken out of service or requiring personnel to enter the pipeline. However, the method cannot be used in extremely high or low flow conditions, in pipelines with numerous bends, or where chambers are not suitable or cannot be modified for wet installation.

Additional clearance considerations are required to mount temporary pressure stacks for the installation equipment on top of the AFO plumbing stacks. These consist of DN80 (75 mm)/3-inch Victaulic pipes mounted to the Victaulic nipple on top of the blow out preventer. Typically, 10 ft (3 m) overhead clearance from a stack is required for the Victaulic piping and associated hardware being inserted. As most chambers will not have this unless the taps are under an existing access, an 8-inch (200 mm) core through the chamber lid centered directly above the tap will be required.

Installing and extracting fiber optic cable into and out of a live pipeline is a complex task with many elements:

2. Insert a parachute attached to a string into a live line at the upstream end of a cable run.
3. Allow the flow of the water to carry the parachute downstream to be removed at the extraction site.
4. Catch and extract the parachute downstream.
5. Attach the AFO cable to the string at the upstream location.
6. Set up a hydraulic winch downstream, known as a capstan, to attach to the string and pull the cable into the pipeline.

System Calibration and Commissioning

Each DAQ is built and tested in a Pure Technologies production facility prior to delivery to site, then disassembled to ship the sensitive components. Onsite, technicians will remount all the DAQ hardware on the rack and connect the wiring harnesses and the newly installed fiber optic cable. Once assembled and started up, the monitoring specialist team will remotely test and calibrate the full system to monitor the connected AFO cable.

The SoundPrint AFO system determines the location of an event based on its distance along the fiber from the DAQ. Commissioning impacts are performed in order to relate this location to a specific pipeline station and pipe stick. Each commissioning impact requires a minimum of five strikes at each location, to provide redundancy and to eliminate extraneous results. At a minimum, impacts will be completed at all splice points.

As the AFO cable is only anchored at the splice points, any additional slack that remained in the line due to friction during the installation will slowly shift downstream with the flow of water. This slack will

negatively affect the map accuracy, as well as introduce the risk of cable movement wearing the cable jacket at a higher rate. Following the completion of the installation, and refill of the pipeline for dry installs, Pure Technologies will remobilize approximately 4 weeks later to re-tension the cable and update the map. Once this activity is complete, the tension will be rechecked as required during annual maintenance visits.

System Installation Deliverables

- Project Planning Document that outlines the specific extents and locations, by pipe station, of the AFO monitoring system. Extents are based both on locations to be monitored as well as locations of access structures for the installation of the cable and placement of the DAQ unit.
- A review of the record drawings and other documents, including previous inspection and monitoring projects to identify locations of concern. The results of our review of existing hydraulic monitoring and modeling data will be included.
- A description of civil and electrical work required for DAQ site. The site will be chosen based on access to the main and simplicity of the required work to enable DAQ placement. We anticipate that property owned or controlled by Novi will be available for this purpose and that no easement or property acquisition is required.
- Description of permitting needs and requirements.
- System Drawing Package (before installation).
- Installation plan describing the field schedule of cable installation, DAQ placement and any logistical needs associated with the AFO installation.
- Client Manual documenting system installation including details of DAQ placement and cable installation, system calibration, and quality control measures taken during installation and commissioning. This manual will also document monitoring and communications protocols such as wire break notifications and monitoring reports.
- As built system drawings, after installation is complete.

Novi should review and provide comments or approval of the PPD and System Drawing Package prior to mobilization.

System hardware components will be delivered to an agreed upon location for installation on the pipeline, prior to the mobilization of the installation team.

SoundPrint AFO Monitoring and Warranty

Monitoring

Once the cable installed, DAQ is placed and commissioned, the AFO system will commence monitoring the pipeline. This activity is facilitated by a team of Monitoring Specialists and Data Analysts working together to ensure that the system is performing to the expected standards and delivering actionable data back to the client.

To ensure that the SoundPrint AFO monitoring system is functioning properly, several automated system tests are incorporated into the standard operation of the system. A simulated wire break

sound is used to ensure that events are not mistakenly classified as wire breaks. Automated system tests are performed to optimize the sensitivity of the system based on the site-specific pipeline noise conditions.

Given the sensitivity of the system, processing and analysis of data is accomplished in two phases. The first phase is automated and takes place within the DAQ system, whereby hardware and software filters are applied to incoming raw data. By analyzing the characteristics of events of interest, the filters can be configured to reject most acoustic events that are not of interest. This reduces the quantity of data requiring secondary processing. Secondary processing utilizes a combination of automated and manual analysis and classification.

The DAQ uses the AFO cable to identify acoustic events, saves the event data, and transfers relevant data to the Pure Technologies data analysis team. When an event has been analyzed and classified as a wire break or a leak, an email notification is sent to concerned parties with the time and location information. The data will also be available on the web-based PipeView Portal, accessible only to Novi.

Notifications

Notification and communication protocols will be determined and documented in the Client Manual delivered at the end of the installation phase. Typically, during monitoring wire break activities are posted to the PipeView Portal within one business day of each event and sent to Novi via email notifications. Standard notifications include wire break alert, three pipe alarm, and finite element analysis (FEA) alarm.

Wire Break Alert Emails provide the details of a wire break event and include snapshots from the PipeView portal showing information for the affected pipe. All the information from the email is immediately available on the Portal by clicking on the link at the bottom of the email and logging in.

The **Three Pipe Alarm** is generated when three wire breaks are identified and reported on any of three adjacent pipes within 24 hours. This is meant to identify concerning activity in a concentrated area.

A **Finite Element Analysis Alarm** is generated when an FEA curve exists for the class of pipe, and the total number of wire breaks exceeds 80% of Yield Limit at operating pressure.

A **Leak Detection Alert** is generated when a leak signature is detected above the established baseline set at the time of commissioning. Details of the leak will be provided on the PipeView Portal, and Novi will be notified as soon as they are detected. Levels of detectability will vary depending on pressure and size of leak.

External Acoustic Anomalies notification (i.e., events of interest) and their locations related to nearby construction events or activities in the vicinity or directly impacting the pipeline are reported the next business day.

A pipe section that is highly distressed or has seen an increase in the rate of wire breaks can be classified as a “pipe of concern.” Events on these pipes will draw increased scrutiny from Pure Technologies’ analysis team; resulting notifications will draw attention to the concern.

PipeView Portal

Pure Technologies' web-based PipeView Portal is an asset management platform displaying map-based pipeline data allowing users to access up-to-date data on the pipeline and associated inspection, monitoring and assessment results. Developed from utility records including GIS data and as-built drawings, the interactive map displays pipes, joints, and features such as valves, manholes, and reducers.

Each pipe is associated with attributes such as year installed, diameter, material, rehabilitation or replacement dates, and depth of cover, along with inspection and monitoring results. Pipes can be color-coded by material, Finite Element Analysis (FEA) state, monitoring status, or inspection date as selected by the user. Optionally, other data such as pipe risk or condition data could be migrated into the portal from external sources. Inspection data is displayed along the length of the pipeline. Map layers can be turned off or on; more granular details are displayed as the user zooms in on the map.

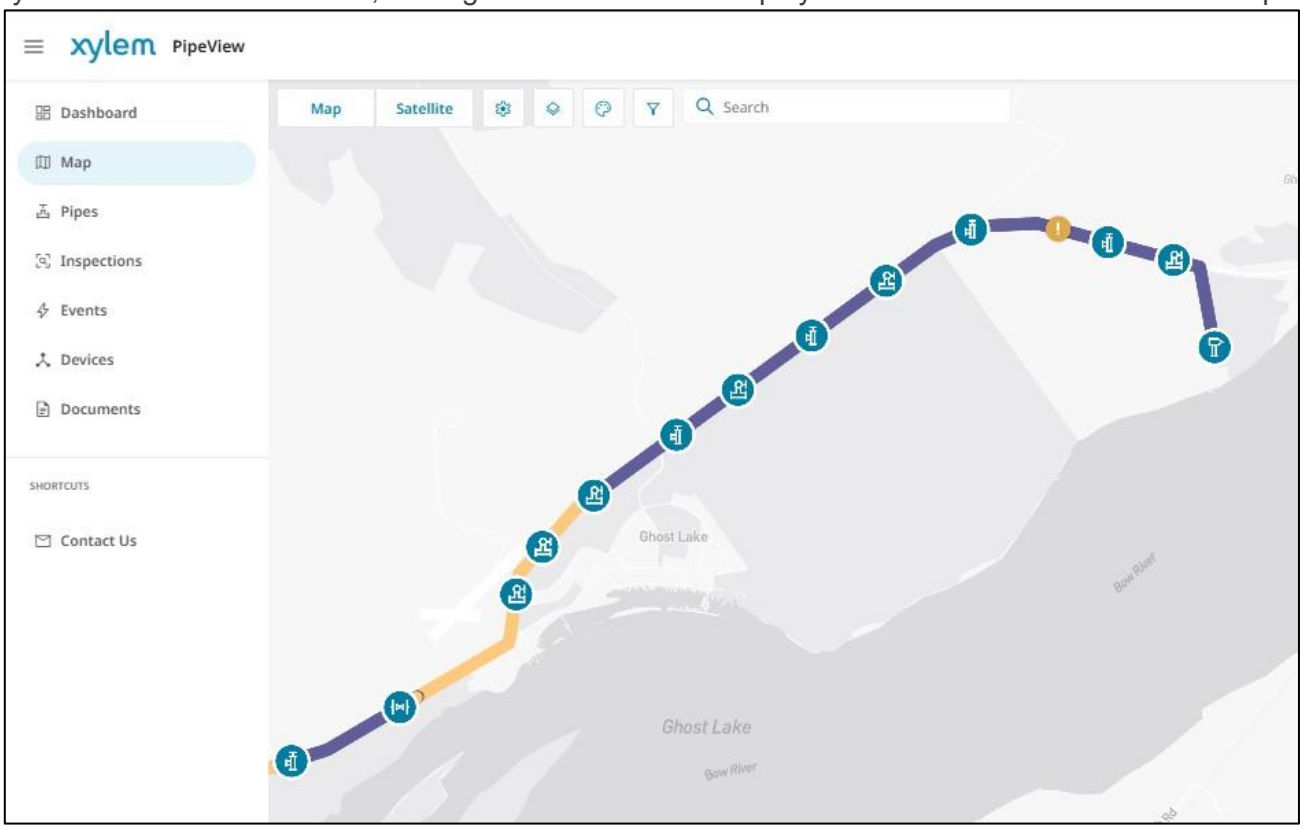


Figure - 2. PipeView Portal Map View

The **PipeView Portal Dashboard** provides a quick glimpse at pipeline statistics such as pipes by material or by inspection type, as well as detailed data on pipeline attributes and inspection and monitoring results.

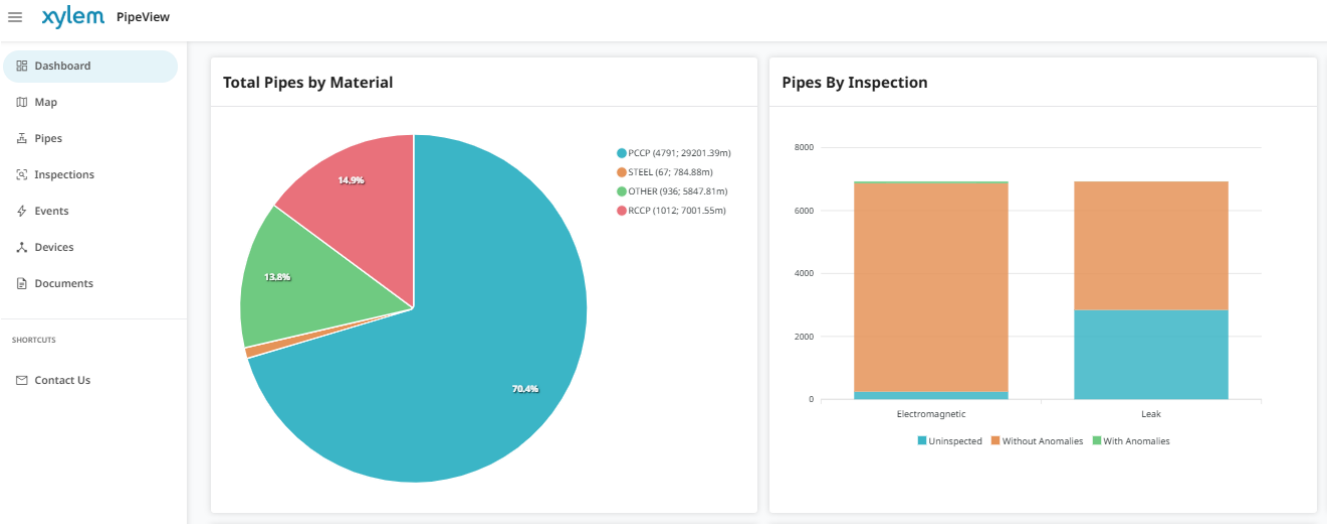


Figure 2. PipeView Dashboard View

The **Pipe Details** page includes information on pipe attributes, inspection types and dates, an FEA curve, wire break trends, operating pressures, elevations, and repairs or replacements. The **Inspection Details** page shows inspections performed on the pipeline along with date, tool, and results. For continuous monitoring installations, the **Devices** page provides information on data acquisition units and the **Events** page details wire breaks and leak events. Records on all detailed pages can be filtered and sorted to support asset management and project planning decisions.

Optionally, users can also access related files such as inspection reports, plans, or videos from an independent shared file repository through this portal.

SoundPrint System Warranty Services

System warranties are provided for the first year of operation with the option to extend long term. The warranty allows Pure Technologies to respond rapidly to onsite equipment issues and ensure system longevity via regular preventative maintenance and as-needed upgrades.

During the regular monitoring of the site, the AFO Monitoring Specialists may identify issues requiring an onsite presence. After exhausting possibilities for identifying and resolving the issues remotely, the Monitoring Specialist will request a qualified technician to visit the site for troubleshooting and remediation.

On an annual basis, Pure Technologies will coordinate with Novi to schedule the maintenance visit. The maintenance for each AFO system addresses four items:

- DAQ maintenance: Inspect, test, and upgrade as required for all DAQ components
    - Any DAQs placed onsite for monitoring are Pure-owned assets, and will be maintained in good working order by Pure, upgraded as needed.
- Cable integrity checks: Test fiber optic cable with optical time domain reflectometer to identify light loss which can negatively affect the monitoring

- Hardware maintenance: Check plumbing stacks for corrosion and leaks, re-tension the AFO cable to extend system life
- System recalibration: Check that the mapping of the fiber optic cable to the pipeline is accurate to ensure quality location information

Novi Responsibilities

It is expected that the activities listed below will be completed by Novi. Requirements will be determined in more detail during the inspection planning process.

- Provide information about the pipeline during the planning stage including, but not limited to, plan and profile drawings, lay sheets, shop drawings, manufacturing details, and details of access structures and appurtenances – if available.
- Designate a site for the DAQ unit with access to the transmission main and electrical supply and provide access to the DAQ site during the monitoring period.
- Ensure the access chambers are available for the duration of the monitoring period.
- Obtain any required legal right-of-entry on the property and notify landowners of access required.
- Provide support personnel during the inspection for locating the access structures, traffic control, valve operation, pump operation, and other support as necessary.
- Provide Pure Technologies with the typical flow velocities and pressures for pipeline operation, and the expected minimum and maximum values for each. If this data is unavailable, Pure Technologies would like the opportunity to verify flow velocities recommended prior to performing the inspection.
- Provide and maintain safe and reasonable access to all work sites throughout the inspection and obtain permits as required.
- Prepare and/or modify existing pipeline fittings and structures as indicated by Pure Technologies to accommodate insertion and extraction of the equipment as outlined in the Planning Document.
- Render confined space areas safe for the services, including lockout tagout of pumps, valves and motors; dewatering chambers and vaults to permit movement of persons and equipment; and vector and rodent control as necessary.
- Excavate, dewater, shore up, and/or provide scaffolding of job area and other civil activity as necessary in compliance with Occupational Safety and Health Administration and local standards and regulations.
- For live pipeline installations, operate the pipeline in a manner that will achieve the minimum required flow velocity indicated in the Planning Document throughout the inspection.

- Conduct any civil activities required to provide access into the pipeline, including, but not limited to excavation, tapping, shoring, valve and pump operation, maintenance of traffic, provisions for rope support, as well as other activities providing access to the necessary valves and appurtenances identified as being critical to the performance of the project. In the instance these services cannot be carried out by Novi, Pure Technologies can procure these additional services on your behalf.

Project Schedule

The preliminary schedule for the installation of this AFO monitoring system is as follows:

Project Schedule	
Task	**Timing**
Site visit	Within 2- 4 weeks following Notice to Proceed (NTP)
Project Planning Document (PPD)	4 weeks after receipt of NTP (includes baseline inspection and AFO System Design)
Baseline Inspection	4-6 weeks following PPD approval
System Hardware Delivery	Minimum of 90 days following PPD approval
Monitoring Commences	Minimum of 120 days following PPD approval

Proposed Fee and Payment Schedule

Option 1: AFO System Purchase with Baseline Inspection

AFO Components/Equipment				
Category	**Unit**	**Unit Rate**	**Quantity**	**Total**
SoundPrint AFO Single Data Acquisition Unit (Standalone)	each	$260,335.00	1	$260,335.00
AFO cable supply: 4-fiber (Standard)	per foot	$5.14	20,143	$103,532.58
Splice Point and Internal Hardware	per splice point	$15,296.00	13	$198,848.00
			Subtotal AFO Components/Equipment	**$562,718.02**
AFO Installation				
Category	**Unit**	**Unit Rate**	**Quantity**	**Total**
Project Setup, Design Meetings and Coordination	each DAQ system	$80,850.00	1	$80,850.00
Installation of AFO cable (< 2 miles)	per foot	$28.03	10,560	$295,996.80
(next 2 miles) >2 to 4 miles	per foot	$23.23	7,532	$174,968.36
Standby Rate	per crew day	$11,550.00	TBD	TBD
			Subtotal AFO Installation	**$551,815.16**

AFO Monitoring				
Category	**Unit**	**Unit Rate**	**Quantity**	**Total**
Year 1 - Standard monitoring services (wire break, leak detection)	per year per foot	3.67	20,143	$73,924.81
Monitoring Fee with 2.7% Annual Inflation Adjustment				
Year 1	**Year 2**	**Year 3**	**Year 4**	**Year 5**
$73,924.81	*$75,920.78*	*$77,970.64*	*$80,075.85*	*$82,237.9*
Year 6	**Year 7**	**Year 8**	**Year 9**	**Year 10**
$84,458.32	*$86,738.69*	*$89,080.63*	*$91,485.81*	*$93,955.93*
Subtotal AFO Monitoring (10-year Term)				**$750,741.55**
AFO Extended Warranty and Maintenance (After Year 1)				
Category	**Unit**	**Unit Rate**	**Quantity**	**Total**
Warranty for Single Data Acquisition Unit and System Components	per year per DAQ system	$48,681.00	1	$48,681.00
Annual Inspection and Maintenance	per year	$11,330.00	1	$11,330.00
Annual Maintenance with 2.7% Annual Inflation Adjustment				
Year 1	**Year 2**	**Year 3**	**Year 4**	**Year 5**
Included	$11,330.00	$11,635.91	$11,950.08	$12,272.73
Year 6	**Year 7**	**Year 8**	**Year 9**	**Year 10**
$12,604.09	$12,944.40	$13,293.90	$13,652.84	$14,021.47
Optional Annual Warranty with 2.7% Annual Inflation Adjustment				
Year 1	**Year 2**	**Year 3**	**Year 4**	**Year 5**
Included	$48,681.00	$49,995.39	$51,345.27	$52,731.59
Year 6	**Year 7**	**Year 8**	**Year 9**	**Year 10**
$54,155.34	$55,617.53	$57,119.20	$58,661.42	$60,245.28
Subtotal Annual Maintenance (10-year Term)				**$113,705.42**
Subtotal AFO Extended Warranty (10-year Term)				**$488,552.02**
Baseline PCCP EM Inspection Required Prior to AFO Installation				
Category	**Unit**	**Unit Rate**	**Quantity**	**Total**
PipeDiver PCCP EM Baseline Inspection	lump sum	$514,367.42	1	$514,367.42
Pure Robotics PCCP EM Baseline Inspection	lump sum	$240,400.00	1	$240,400.00
Subtotal PCCP EM Baseline Inspection				**$754,367.42**

Option 1 Payment Schedule

AFO Components/Equipment		
Description	**Price**	**Invoicing Period**
SoundPrint AFO Single Data Acquisition Unit (Standalone)	$260,335.00	Upon delivery to the City
AFO cable supply: 4-fiber (Standard)	$103,532.58	Upon delivery to the City
Splice Point and Internal Hardware	$198,848.00	Upon installation

AFO Installation		
Description	**Price**	**Invoicing Period**
Project Setup, Design Meetings and Coordination	$80,850.00	Upon submittal of the AFO System Design Document
Installation of AFO cable	$470,965.16	Upon installation completion
AFO Monitoring and Warranty		
Description	**Price**	**Invoicing Period**
Year 1 Monitoring and Warranty		
Monitoring Services	$73,924.81	Upon commissioning of the system, Payable Month 1 of the Quarter, net 30 days
Warranty and Maintenance	Included	
Year 2 Monitoring and Warranty		
Monitoring Services	$75,920.78	Upon commissioning of the system, Payable Month 1 of the Quarter, net 30 days
Maintenance and Optional Warranty	Per monthly rate	
Year 3 Monitoring and Warranty		
Monitoring Services	$77,970.64	Upon commissioning of the system, Payable Month 1 of the Quarter, net 30 days
Maintenance and Optional Warranty	Per monthly rate	
Year 4 Monitoring and Warranty		
Monitoring Services	$80,075.85	Upon commissioning of the system, Payable Month 1 of the Quarter, net 30 days
Maintenance and Optional Warranty	Per monthly rate	
Year 5 Monitoring and Warranty		
Monitoring Services	$82,237.9	Upon commissioning of the system, Payable Month 1 of the Quarter, net 30 days
Maintenance and Optional Warranty	Per monthly rate	
Year 6 Monitoring and Warranty		
Monitoring Services	$84,458.32	Upon commissioning of the system, Payable Month 1 of the Quarter, net 30 days
Maintenance and Optional Warranty	Per monthly rate	
Year 7 Monitoring and Warranty		
Monitoring Services	$86,738.69	Upon commissioning of the system, Payable Month 1 of the Quarter, net 30 days
Maintenance and Optional Warranty	Per monthly rate	
Year 8 Monitoring and Warranty		
Monitoring Services	$89,080.63	Upon commissioning of the system, Payable Month 1 of the Quarter, net 30 days
Maintenance and Optional Warranty	Per monthly rate	
Year 9 Monitoring and Warranty		
Monitoring Services	$91,485.81	Upon commissioning of the system, Payable Month 1 of the Quarter, net 30 days
Maintenance and Optional Warranty	Per monthly rate	
Year 10 Monitoring and Warranty		
Monitoring Services	$93,955.93	Upon commissioning of the system, Payable Month 1 of the Quarter, net 30 days
Maintenance and Optional Warranty	Per monthly rate	

Baseline PCCP EM Inspection				
Category	Unit	Unit Rate	Quantity	Total
PCCP EM Baseline Inspection	$754,367.42	• 15% - Project Planning Document Submittal • 80% - Upon completion of the Inspections per inspection platform • 5% - upon submittal of the Draft Report		

Proposed Fee and Payment Schedule

Option 2: AFO System Lease with Baseline Inspection Under one Mobilization

AFO Monitoring		
Description	Price	Invoicing Period
Year 1 Monitoring Services	$337,000.00	Upon commissioning of the system, $84,250.00 payable Month 1 of the Quarter, net 30 days
Year 2 Monitoring Services	$337,000.00	Upon commissioning of the system, $84,250.00 payable Month 1 of the Quarter, net 30 days
Year 3 Monitoring Services	$337,000.00	Upon commissioning of the system, $84,250.00 payable Month 1 of the Quarter, net 30 days
Year 4 Monitoring Services	$337,000.00	Upon commissioning of the system, $84,250.00 payable Month 1 of the Quarter, net 30 days
Year 5 Monitoring Services	$337,000.00	Upon commissioning of the system, $84,250.00 payable Month 1 of the Quarter, net 30 days
Year 6 Monitoring Services	$337,000.00	Upon commissioning of the system, $84,250.00 payable Month 1 of the Quarter, net 30 days
Year 7 Monitoring Services	$337,000.00	Upon commissioning of the system, $84,250.00 payable Month 1 of the Quarter, net 30 days
Year 8 Monitoring Services	$337,000.00	Upon commissioning of the system, $84,250.00 payable Month 1 of the Quarter, net 30 days
Year 9 Monitoring Services	$337,000.00	Upon commissioning of the system, $84,250.00 payable Month 1 of the Quarter, net 30 days
Year 10 Monitoring Services	$337,000.00	Upon commissioning of the system, $84,250.00 payable Month 1 of the Quarter, net 30 days

Notes and Assumptions

- Pricing is based on available information provided to date and based on a 10-year binding term. All travel, shipping and related expenses are included.
- Pricing includes furnishing and installing of a four (4) fiber cable that has an NSF approved protective coating. Additional fibers can be provided at an additional fee should the City wish to incorporate said fibers to accommodate communications or other applications.
- Pricing for Option 2 is based on a Subscription Based Pricing Model, whereby Pure Technologies maintains ownership and responsibility for furnishing and installing all AFO

equipment. In turn, Pure Technologies will also be responsible for monitoring and maintenance of the AFO system throughout the duration of the proposed 10-year agreement term.

- Installation fees shall be billed upon completion of tasks as outlined in unit pricing schedule.
- Monitoring fees shall be billed in advance on a quarterly basis as outlined in the Payment Schedule
- Year 1 warranty is included with installation; after Year 1 warranty fees shall be billed on a quarterly basis.
- Pricing as it appears in this proposal is applicable for 180 days. An inflationary increase of 2.7% has been applied to all pricing year upon year for the 10-year monitoring term. Subsequent monitoring years will be subject to CPI annual increase and negotiated prior to the start of the new term.
- Pure Technologies reserves the right to adjust pricing if the annual CPI inflation rate is greater than 2% above the 5-year mean.
- A charge of 25% of the Project Setup, Design Meetings and Coordination may apply should the work be delayed by Novi within two weeks prior to agreed mobilization date. A project delayed into the next calendar year may incur a price increase in the amount of the local Consumer Price Index.
- A stand-by charge of $10,000 per day will apply if the installation project is delayed by others after mobilization.
- Pure Technologies' liability and insurance for this project are standard as detailed in the Standard Terms & Conditions included with this proposal. Standard Terms and Conditions for monitoring are included in Appendix B.
- All taxes, levies, duties, tariffs and other governmental charges, and any incremental increases thereto, shall be paid by Novi. Pure Technologies reserves the right to adjust pricing and schedule of the affected goods to reflect any impact resulting from tariffs not already included in the proposed pricing. Pure Technologies is not obligated to deliver the goods and/or services until an agreement on the new price and/or schedule has been reached.

Pricing Exclusions

- Cancellation Fee: If for any reason the City elects to cancel the AFO monitoring agreement in advance of completing the 10-year contract commitment (lease option), a Cancellation Fee to recover sunk costs will apply in accordance with the Cancellation Table presented below:

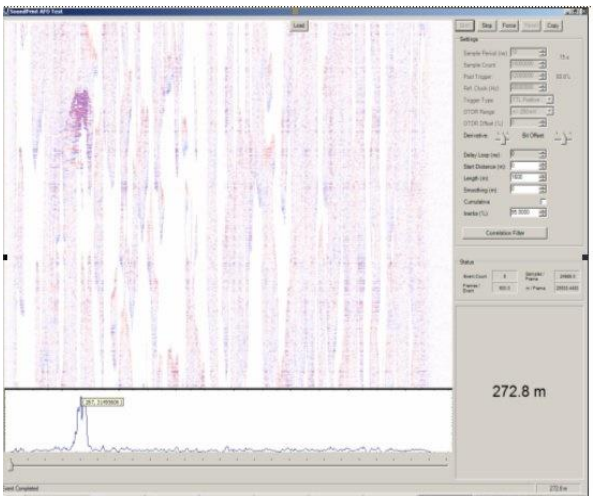
Cancellation Fee Table	
Contract Year Ending	**Cancellation Fee**
1	$1,660,437.00
2	$1,604,138.00
3	$1,540,698.00
4	$1,469,213.00
5	$1,388,661.00
6	$1,297,894.00
7	$1,195,615.00

Cancellation Fee Table	
Contract Year Ending	**Cancellation Fee**
8	$1,080,365.00
9	$950,498.00
10	$200,000.00

- $200,000 demobilization fee shall apply at the end of the 10-year contract should the AFO monitoring not be renewed at end of term for removal of the system from the City's pipeline. See cancellation Fee Table.
- the City to discuss options. The City will need to furnish a concrete pad for a standalone DAQ or furnish a protective structure with conditioned air in which the DAQ can be installed. ***The City will also need to run power to the DAQ unit (requires one (1) 15-amp circuit and one (1) 20-amp circuit for each DAQ unit.***
- Installation of entry/exit stacks with BOP does not include any logistical support or civil work required to access and prepare the existing manways for the entry/exit stacks and BOP's, nor does it include installation of any interconnecting conduit to bypass in-line valve locations. Bypasses for the AFO cable at in-line valves will require a 4-inch PVC buried conduit between the upstream and downstream access manways.
- Federal, State or Local taxes are not included.
- If additional services are required by the City that are outside the scope of this contract, a mutually agreed change order will be required. Such services might include locating and verifying pipes of interest or pipes to be repaired/replaced, assisting the City with the removal and re-installation of the AFO cable in conjunction with repairs, etc. Such services are addressed under Additional Services.
- Pricing excludes providing safe access to the pipeline and appurtenances, including but not limited to pipeline and vault dewatering and ventilation, access roads, and access to client facilities housing Pure Technologies equipment.
- Safe access to the pipeline and appurtenances, including but not limited to pipeline and vault dewatering and ventilation, access roads, and access to client facilities housing Pure Technologies equipment.

Appendix A: AFO Technology

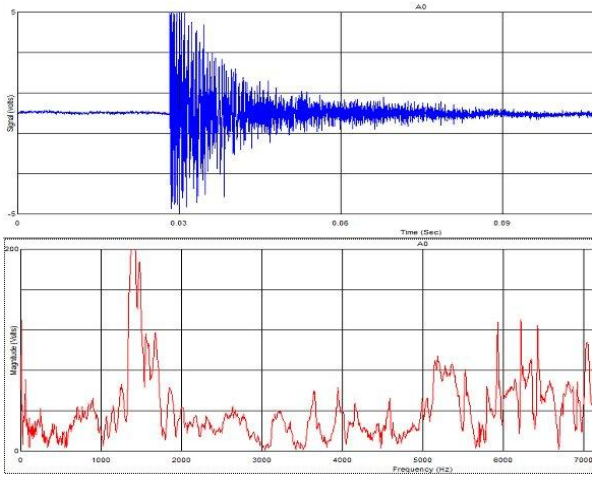
The SoundPrint AFO system will detect, record, and locate acoustic events associated with the breaking of prestressing wires or leaks found in Prestressed Concrete Cylinder Pipe (PCCP). SoundPrint AFO is a patented acoustic monitoring system that consists of a data acquisition system (DAQ) connected to single-mode optical fibers. The optical fibers are bundled in a reinforced cable. Lasers are used to project light down the fiber and the DAQ system monitors reflections generated by the acoustic activity in a pipeline.



The location of an event as determined by the OTDR system. The distance of the event from the DAQ is shown in the bottom right-hand box.

Since the SoundPrint AFO cable is acoustically sensitive, it acts as a continuous sensor throughout its length of deployment; the furthest distance the sensor (optical fiber) is from a noise event (i.e. wire break or leak) is one pipe diameter. Given the sensor's proximity to the wire break and the distinctive high frequency noise signature generated by a wire break or leak, the SoundPrint AFO system reliably detects and records events as they occur in near real-time.

The location of events is determined using an optical time-domain reflectometry (OTDR) technique. This technique, utilizing an ultra-high-speed analog-to-digital conversion, allows location accuracy of +/- 1.5m distances.



Acoustic information acquired by the DAQ system. Time domain (top) and frequency spectrum acquired by interferometric system

Given the sensitivity of the system, processing and analysis of data is accomplished in two phases. The first phase is automated and takes place within the DAQ system, whereby hardware and software filters are applied to incoming raw data. By analyzing the characteristics of events of interest, the filters can be configured to reject most acoustic events that are not of interest. This reduces the quantity of data requiring secondary processing. Secondary processing utilizes a combination of automated and manual analysis and classification.

The DAQ identifies acoustic events along the AFO cable, saves the event data, and transfers relevant data to Pure Technologies central server for analysis. When an event has been analyzed and classified as a wire break, an email notification is sent to concerned parties with the time and location information within one business day. The data will also be available on the PipeView Portal.

System Components

AFO systems can be broken up into four primary categories: the DAQ, the fiber optic cable, and the pipeline entry and exit details, and in-pipe hardware known as cable protection. The systems are designed for an operating life exceeding 20 years under normal operating conditions, with a maximum

flow rate of 10 ft/s (3 m/s) and a maximum pressure of 250psi (17 bar). Pipelines which operate outside of these ranges should consult Pure Technologies for further options.

Data Acquisition System

Up to 12.5 miles (20km) of pipeline can be monitored from a single DAQ location and 25 miles (40km) from a dual DAQ. Site communication will be provided and maintained by Pure Technologies. The standard DAQ must be placed in a secure, dry space, with no loud background noise. Two independent 15-amp, 120-volt electrical circuits are required for the DAQ and the free-standing AC unit. Standard DAQs are intended for placement inside vaults, pumping stations, or other existing structures.

Standard DAQ and AC

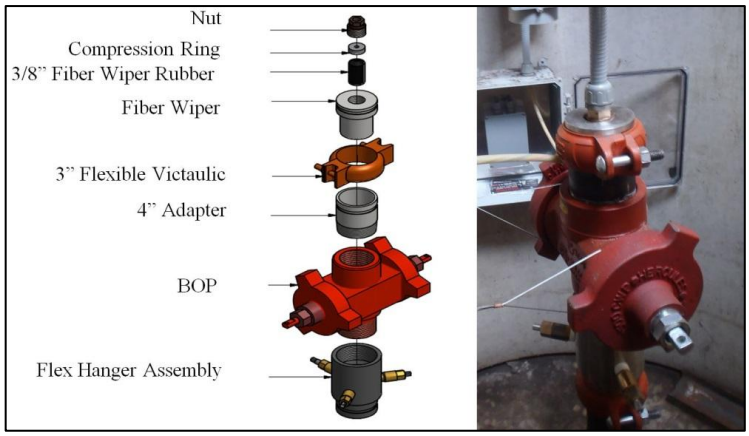
Fiber Optic Cable

AFO cable in pipe

The fiber optic cable installed inside the pipeline is a custom cable manufactured specifically for use inside potable water lines. The standard cable contains four single mode fibers - an acoustic fiber, a locating fiber, and two spares - with an outer diameter of 0.41 inch (10.3mm). Larger cables are available with six, eight, and ten fibers for non-standard applications.

Entry and Exit Details

The cable enters and exits the pipeline via a plumbing stack, connected to the pipeline via a client-furnished connection typically with an isolation valve. Three-inch (75 mm) full port isolation valves with flanged or NPT connections are preferred, though, 2-inch (50 mm) connections and smaller may be acceptable for dry installations – consult Pure Technologies for further information. The entry into the pipeline is protected by a flexible stainless-steel tube which is held in place in the plumbing stack and passes through the client connection.

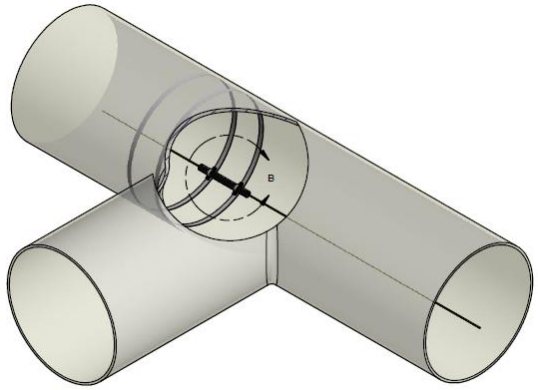


Standard AFO plumbing stack

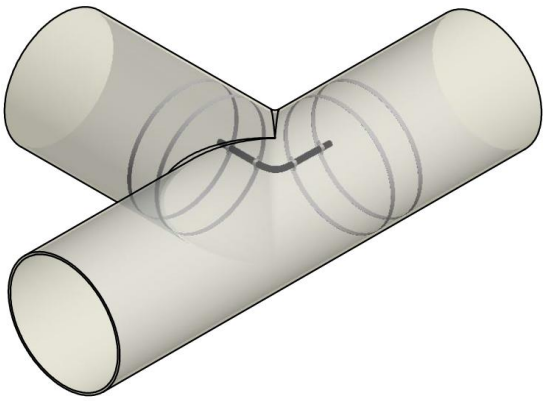
Cable protection into pipe

Cable Protection

Cable protection may be required at features such as bends, tees, wyes, bottom blow-offs, and outlets to prevent cable damage. This is achieved by installing stainless steel expansion hoops and attaching flexible stainless-steel tubing.



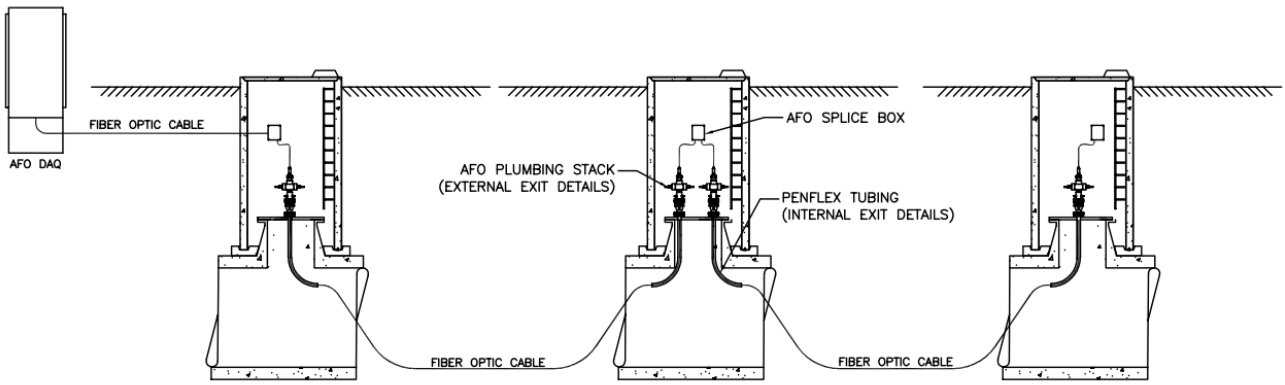
Standard outlet protection - Hoops



Standard outlet protection - Tubing

Installation Process

The AFO cable is installed in the pipe in a number of individual runs. Run boundaries are delineated by splice points outside of the pipeline and are typically determined by valve locations on the pipeline



Typical AFO system layout

and maximum distance criteria. The AFO cable can be installed in either a fully dewatered pipeline or into a flowing and operational pipeline.

Installation in a Dewatered Pipeline

The AFO cable can be installed once the pipe has been removed from service and completely dewatered. The AFO team members perform the installation by completing the following tasks:

1. Cable is spooled into the pipe at the insertion point as a technician guides the fiber into the chamber protecting it from any kinks or abrasive surfaces.

2. Technicians manually pull the cable through the pipe to the designated exit chamber.
3. The cable is routed out of the pipe through Pure Technologies' standard plumbing stack at client-furnished connections.
4. Stainless steel flexible tubing protects the AFO cable from sharp edges as it transitions out of the pipeline or at sharp bends and outlets (when required).
5. Once all runs are installed, the cable is spliced together to create one continuous length.

Cable installation staging

Bend protection in-pipe

AFO Cable splice point

Installation in a Live Pipeline

In some instances, Pure Technologies can install the entirety of the AFO cable into a live pipeline under standard operating conditions by completing the following tasks:

1. Install insertion and extraction plumbing stacks including flexible stainless-steel tubing where the cable enters and exits the pipeline.
2. Insert a parachute attached to a string into the pipeline.
3. Allow the flow to pull the string downstream through the pipeline.
4. Extract the parachute and string at a downstream exit point.
5. Pull the AFO cable into the pipeline using the string.
6. Once all runs are installed, the cable is spliced together to create one continuous length.

Parachute preparation

Feeding cable into the pipeline

Capstan winch pulling string/cable

Method Comparison

Primary advantages of the wet installation method include not requiring the pipeline to be taken out of service or personnel to enter the pipeline. However, the method cannot be used in extremely high or low flow conditions, in pipelines with numerous bends, or where chambers are not suitable or cannot

be modified for installation. Pipelines with features requiring additional cable protection may require a hybrid installation approach for maximum system life.

Dry installations provide more design options, with the ability to install cable protection in-pipe. Features such as outlets, wyes, and sharp bends can utilize stainless steel expansion hoops and tubing to route the cable safely, while wet installations may require tapping on either side of these features and external cable routing. Dry installations are also more predictable, with more variables under control of the installations team reducing unexpected delays.

Timelines for both methods are similar, with approximately one day per run of installation time, and runs up to 15,000 feet (4572m) in length for wet installations and 10,000 feet (3048m) for dry installations – though typically broken down into more manageable shorter lengths.

Site Preparation and Support

Pure Technologies provides the labor to install, calibrate, and commission the AFO system. Peripheral labor and support can be provided by the client, a third-party contractor, or directly by Pure Technologies. Initial discussions will review responsibilities for tasks such as:

- Dewatering (dewatered installations only)
- Ventilation
- Permits and traffic control
- Tapping and modifications to the pipeline as may be required for the installation
- Modifications to the chambers as may be required for the installation
- Trenching and conduit for routing of fiber optic cable outside the pipeline as may be required for the installation
- Top support for confined space entry
- Rope support for work inside pipeline, if necessary
- Emergency rescue services

Monitoring Works

Once installed and commissioned, the AFO system will commence monitoring the pipeline. This is facilitated by a team of Monitoring Specialists and Data Analysts working together to ensure that the system is performing to the expected standards and delivering actionable data back to the client.

Monitoring System Operation

To ensure that the SoundPrint AFO monitoring system is functioning properly, several automated system tests are incorporated into the standard operation of the system..

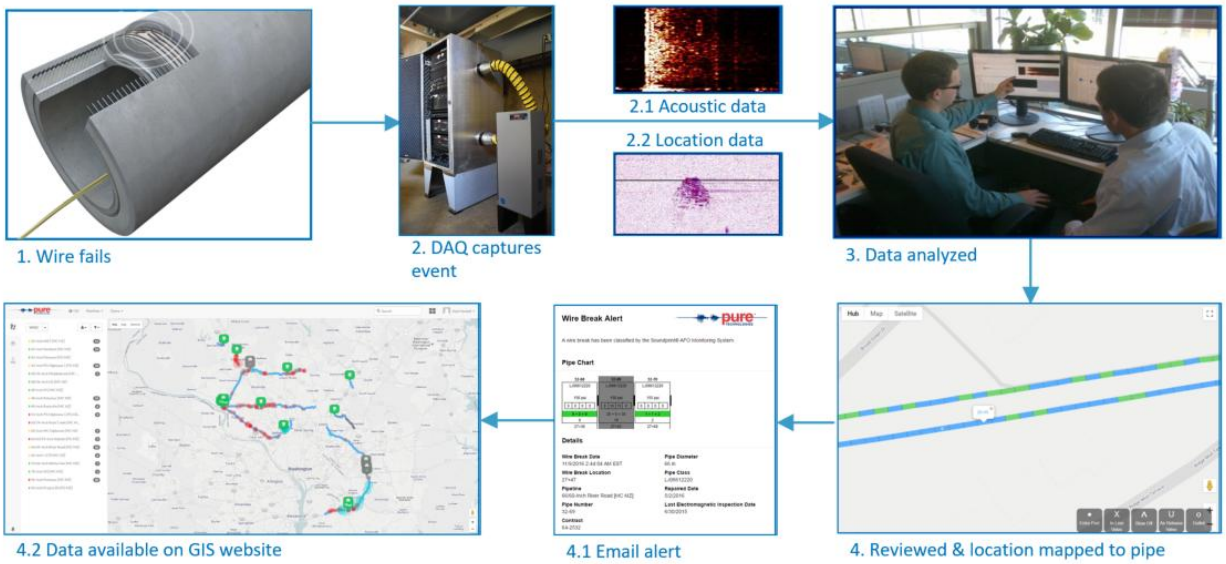
The DAQ knows when it has a system test and looks for it amongst the other noise events that are triggering the monitoring system. In the case that the DAQ cannot find a system test, an alarm is generated by the system. In the case that the DAQ misses a number of system tests consecutively (the setting is site-specific, but is always set to either two or three), the system automatically reboots

itself. An email alarm is sent to alert the Monitoring Specialist. The system is then manually checked to ensure that the issue has been corrected with the automatic reboot. In addition to acoustically testing the SoundPrint AFO monitoring system, the AFO cable is also physically tested by a daily mechanical stimulation of the cable.

Furthermore, each business day morning the DAQ is remotely checked by an AFO Monitoring Specialist to ensure proper function of the system. In addition to completing the standard site check procedure to verify that all vital components are operating correctly, daily statistics from the site (reported automatically at midnight daily) are also reviewed to ensure that the system is operating at an adequate level of sensitivity. The system uptime is rated daily based on the number of tests captured by the system that pass all criteria required to identify and locate actual wire break events.

Data Analysis

All data recorded by the DAQ that passes through the onsite digital data filters is transferred to Pure Technologies' data analysis group for review. The analysts review and classify each event within one business day, with automated alarms identifying concerning trends and allowing for even quicker responses to specific pipes of concern.



AFO Data Flow Diagram

System Warranty

System warranties are provided for the first year of operation with the option to extend long term. The warranty allows Pure Technologies to respond rapidly to onsite equipment issues and ensure system longevity via regular preventative maintenance and as needed upgrades. The following sections break down the works typically taking place on a warrantied system.

As Needed Works

During the regular monitoring of the site, the AFO Monitoring Specialists may identify issues requiring an onsite presence. After exhausting possibilities for identifying and resolving the issues remotely, the

Monitoring Specialist will request a qualified technician to visit the site for troubleshooting and remediation.

Annual Maintenance

On an annual basis, Xylem will coordinate with the client to schedule the maintenance visit. The maintenance for each AFO system addresses four items:

- **DAQ maintenance:** Inspect, test, and upgrade as required for all DAQ components
- **Cable integrity checks:** Test fiber optic cable with optical time domain reflectometer to identify light loss which can negatively affect the monitoring
- **Hardware maintenance:** Check plumbing stacks for corrosion and leaks, re-tension the AFO cable to extend system life
- **System recalibration:** Check that the mapping of the fiber optic cable to the pipeline is accurate to ensure quality location information

Appendix B: Standard Terms and Conditions for Leak Detection and Monitoring

(to be updated upon selection of Option 1 or 2)

PURE TECHNOLOGIES U.S. INC.

SOUNDPRINT® AFO MONITORING CONTRACT

THIS AGREEMENT made as of **Click or tap to enter a date.** (the "Effective Date").

BETWEEN:

PURE TECHNOLOGIES U.S. INC., a corporation incorporated under the laws of the State of Delaware, with its principal office located at 989 Corporate Blvd., Suite F, Linthicum Heights, MD 21090 ("**Pure"**)

AND:

City of Novi ("**Customer**"), with its principal office located at **26300 Lee BeGole Dr. Novi, MI 48375.**

The Customer agrees to purchase and Pure agrees to sell the services specified below ("Services") in relation to the operation of the Acoustic Fiber Optic monitoring system ("AFO System") installed at the location specified below ("Site") for the fee stipulated below ("Service Fee") and in accordance with Schedule "A" AFO Standard Terms and Conditions excluding Article IV contained therein.

SITE

36 and 30-inch Novi Road PCCP Transmission Main from Station 6+20 to Station 58+92.

SERVICES

Under the terms of this agreement Pure shall provide the Customer with the following:

1. Continuous 24-hour monitoring of acoustic events of the Customers pipeline at the specified Site. The AFO System will be operational for a period of not less than 95% aggregate time on an annual basis, excluding power outages or other events outside Pure's control. The percentage of the time the system is operational is the successful percentage of the simulated verifications that are played by the system once per hour every day.

2. Remote operation of the AFO System to enable continuous recording of acoustic events. This includes: hourly simulated verifications, daily remote site checks, and an annual site visit.

3. Continuous downloading of data from the on-site SoundPrint® Data Acquisition system (DAQ) to Pure's central server and event classification by Pure's data processing department, provided that there is continuous regular operation of internet communication with the site.

4. Detect and locate wire breaks and leaks with a resolution of one (1) pulse of light from the Range Sensing Unit (RSU) within the DAQ, a length of one (1) meter three (3) feet [**choose one based on client**]. Location accuracy is plus or minus one frame along the fiber optic cable, which is then mapped to the pipe using Pure's standard field location protocols, a copy of which is

available upon request. The Customer acknowledges that the AFO system is designed to detect certain energy transmissions through Prestressed Concrete Cylinder Pipe (PCCP) and that most wire breaks and leaks generate at least enough energy to be recorded by the AFO monitoring system. In the rare case that a wire break does not exhibit properties below 10 kHz, the wire breaks may not be detected or located. Leaks less than 5 gallons per minute, may not be detected or located.

5. E-mail notification to designated Customer representatives of wire breaks and leaks within one (1) business day of event occurring. This assumes continuous regular operation of the internet to allow data to be transferred from the AFO System for analysis.

6. Notification to the Customer within one business day of the location and extent of the activity of any abnormal activity detected with the monitoring system.

7. Daily updating of wire break and leak events on password protected Client Access section of the PipeView website. Pure will provide the Customer 24/7 online access to the following historical information: time date, location, pipe number, and stationing of all wire break and leak events, conditional upon continuous regular internet operation. User generated reports in .pdf format summarizing the time and location of wire breaks detected by the SoundPrint® AFO system will be available on demand to Customer's authorized users.

8. Remote support for onsite activities during the identification and repair of one (1) contiguous pipe section per year, including the necessary remapping. Onsite support and remote support for additional identifications and repairs are not included and shall be negotiated on a case by case basis as required.

9. Provision and installation of software upgrades useable with the installed AFO System, as they become available. No equipment upgrades are included in this contract.

10. Offsite storage of backup data at a secure third party data storage facility.

For certainty, the Services do not include repair or replacement of any AFO System components. An optional Limited Extended Warranty Agreement for the monitoring equipment is available, if signed before the expiry of the original warranty for such equipment.

CUSTOMER OBLIGATIONS

The Customer is to provide on-site liaison personnel who will have access to the DAQ and can provide information and feedback to Pure's call center personnel.

SERVICE FEE (to be updated upon selection of Option 1 or 2)

The service fee for the duration of this agreement is based on a unit rate of $ /ft./year

ENTER PERIOD	ENTER LENGTH PER MILE/FEET	PRICE

Payable quarterly in advance.

The term of this agreement shall end on [**Click or tap to enter a date.**] after which the agreement can be renegotiated by mutual consent of both parties.

IN WITNESS, WHEREOF, the duly authorized representatives of the parties have executed this agreement on the date first written below.

Executed this **Click or tap here to enter text.** day of **Click or tap here to enter text.**, 2025.

PURE TECHNOLOGIES U.S.INC.	[Insert Name of Customer]
By:	By:
Name: **Click or tap here to enter text.** Title: **Click or tap here to enter text.**	Name: **Click or tap here to enter text.** Title: **Click or tap here to enter text.**

LIMITED EXTENDED WARRANTY AGREEMENT

In consideration of the understandings of the parties hereto, and intending to be legally bound hereby, the parties hereto agree as follows:

Limited Extended Warranty

Pure hereby agrees to provide the Customer with a limited extended warranty, hereinafter called the "Extended Warranty", for the AFO System described in the SoundPrint® AFO Technical Support Contract. The terms and conditions referenced in Schedule "A" shall apply to the Extended Warranty Agreement, except that the period in Article IV shall be extended from what is specified therein to [Insert Date] after which the agreement can be renegotiated by mutual consent of both parties.

Payments

The Customer hereby agrees to pay Pure the sum of $ **Click or tap here to enter text.** annually for the purchase of this Limited Extended Warranty Agreement.

Executed this **Click or tap here to enter text.** day of **Click or tap here to enter text.**, 2025.
IN WITNESS, WHEREOF, the duly authorized representatives of the parties agree to the extended warranty as presented in the Extended Warranty Agreement.

PURE TECHNOLOGIES U.S. INC.	**[Insert Name of Customer]**
By:	By:
Name: **Click or tap here to enter text.**	Name: **Click or tap here to enter text.**
Title: **Click or tap here to enter text.**	Title: **Click or tap here to enter text.**

REFUSAL OF EXTENDED WARRANTY AND UNIT RATE REPAIR COSTS

By refusing the terms of the Extended Warranty presented herein, the Customer acknowledges and agrees to bear the full cost to repair or replace any equipment required to maintain operation of the AFO System as per the unit rate costs herein. A Pure AFO Technician is required to perform all maintenance and repairs of the AFO System. After troubleshooting has occurred, Pure shall notify the Customer of the required repairs and provide a cost estimate to be reviewed and approved in writing prior to commencing any work.

Prices for components and parts not listed below, including fiber optic cable, will be provided as required.

Mobilization to Site .....Cost + 15%
Includes cost for hotel, rental car, flights and per diems

Onsite Technician Daily Rate $1,760/day
Remote Support Daily Rate.....$1,540/day

Component	Price*
Acoustic Locator RSU Assembly for Single Data Acquisition Unit (PN1022669)	$91,773
Acoustic Locator RSU Assembly for Dual Data Acquisition Unit (PN1022670)	$170,147
Acoustic Sensor SSU Assembly for Single Data Acquisition Unit (PN1022667)	$55,517
Acoustic Sensor SSU Assembly for Dual Data Acquisition Unit (PN1022668)	$106,016
Computer Assembly for Single Data Acquisition Unit (PN1022743-03)	$62,142
Computer Assembly for Dual Data Acquisition Unit (PN1022743-05)	$96,860
Site Computer, Standard Base, No cards (PN1012289)	$26,626
Spectrum OTDR Card (PN1100840)	$29,855
Data Acquisition Card PCI 16-Inputs (PN1009829)	$3,852
5A DC Power Supply Assembly (PN1022741R1)	$10,764
Power Supply UPS (PN1022929)	$3,059
PDU (PN1021875)	$1,224
Relay Box Assembly (PN1022708R1)	$4,056
SCU-TR MKIV Assembly (PN1022639R1)	$15,296
Air Conditioner (PN1007761)	$3,875
Keyboard, Monitor, Mount Drawer, Touchpad (PN1009772)	$1,654
Fiber Stretcher (PN1009820)	$8,905
Marker Box Round Style (PN1002733)	$1,371
Fiber Jumper Diamond Connectors Red (PN1009788)	$680
APC Adaptor (PN1007847)	$34
Fiber Mirror, Gold Tipped Small Pigtail (PN1009789)	$61

***Prices shown are for 2026 and shall increase annually on January 1 based on the Consumers Price Index. All prices include shipping.**

**in most cases failed units have some salvage value that will be credited to the repair cost.

IN WITNESS, WHEREOF, the duly authorized representatives of the parties refuse the extended warranty presented herein, and accept the unit rate repair costs presented above.

Executed this **Click or tap here to enter text.** day of **Click or tap here to enter text.**, 2025.

PURE TECHNOLOGIES U.S. INC.	**[Insert Name of Customer]**
By:	By:
Name: **Click or tap here to enter text.**	Name: **Click or tap here to enter text.**
Title: **Click or tap here to enter text.**	Title: **Click or tap here to enter text.**

Schedule "A" to the Pure Technologies U.S. INC.
SoundPrint® AFO Monitoring Contract dated
Click or tap to enter a date.

AFO SYSTEM STANDARD TERMS AND CONDITIONS

ARTICLE I - RISK OF LOSS

Unless otherwise specified by Seller, delivery and transfer of risk of loss for shipments to Customer will be made Ex Works (Incoterms 2020), Pure's plant or distribution center. Title will pass when risk of loss transfers.

ARTICLE II - AFO SYSTEM MAINTENANCE

The Customer shall use reasonable commercial efforts to keep the AFO System secure from vandalism, loss of power, environmental hazards (including lightning, flood, water overflow) and other damage.

The Customer shall provide Pure with such access to the AFO System as may be reasonably requested by Pure to complete the required maintenance procedures.

ARTICLE III - CONFIDENTIAL INFORMATION

The Customer acknowledges that the AFO System and associated documentation, including without limitation, all software, and the makeup and configuration of the equipment and its method of operation, and the training documents, constitutes valuable confidential information of Pure and/or its licensors. Unless otherwise required by Federal or Provincial Laws, the Customer shall maintain all confidential information as strictly confidential and neither use nor discuss any of it without Pure's written approval. The Customer acknowledges the software and all copies thereof, in whole or in part, is and shall at all times remain the sole and exclusive property of Pure and/or its licensors and that Pure has all right, title and interest therein.

The Customer agrees that wrongful disclosure of any of the confidential information may cause irreparable harm to Pure, and that Pure's remedies at law may be inadequate and, therefore, Pure shall be entitled to obtain an injunction to enforce the provisions of this agreement.

The Customer acknowledges that all data generated by the AFO System is subject of copyright protection. The data shall be owned jointly by Pure and the Customer. The Customer shall have an irrevocable right and license to retain and use a copy of data generated from the AFO System for the Customer's application in regards to the operation and maintenance of the Customer's buildings in which the equipment is situated, which right and license shall include the right to disclose such information and results to its agents, and employees.

The obligations of the parties with respect to confidentiality shall survive the termination of this Agreement.

ARTICLE IV - WARRANTY

Pure warrants any new AFO System components which it supplies and installs for a period of one (1) year commencing on the date of commissioning as follows:

1. All components contained inside of the DAQ under standard power conditions defined in the initial purchase and sale agreement.

2. All Air Conditioning units and associated components under manufacturer's specified operating conditions.
3. All junction boxes and associated hardware and conduit exposed to conditions as presented to Pure at the time of commissioning.
4. All pipeline fittings and associated components.
5. All K2 jacketed fiber optic cable that has been damaged during normal pipeline operating conditions.
6. All labor costs to repair or replace damaged or defective parts.
7. All labor costs associated with commissioning, remapping and software adjustments following the repair of any fiber optic cable.

This Warranty requires that suitable and timely access be provided to Pure by the Client to the AFO System, and that a Client representative can be contacted and available to be present on site within one business day.

Under the Warranty, Pure agrees to, at its option and at the Customer's sole and exclusive discretion, either replace or repair defective Equipment or, in case of defective service, to repeat the agreed service. The express warranty granted above shall extend only to the Customer and not to the Customer's agents or representatives. All other warranties are hereby specifically disclaimed by Pure. Pure shall not be responsible for any incidental or consequential damages arising from any breach of warranty. Any misuse, improper installation, or tampering with the AFO System shall void this warranty.

This Warranty is not transferable, except upon the written approval of Pure, in its sole discretion. This Warranty does not cover and shall be void for (a) defects or damages resulting from fire or theft, (b) defects, damages, or loss resulting from intentional misuse, abuse, neglect, or alterations by, or directed by, the Customer, and (c) defects or damages resulting from service or repair by anyone other than Pure.

The parties hereto acknowledge and agree that this Warranty is not and will not be a warranty on the fitness of any pipeline or structure monitored by the AFO System.

Warranty Exclusions: Pure's warranty does not apply to the following:

1. Damage to the fiber optic cable sustained during pipeline operating condition outside standard operating conditions. This would include but not be limited to; pipeline inspections or assessments by vendors other than Pure, valve throttling, sediment flushing, chemical treatment of lines, or increase in flow velocity beyond the potential maximum velocities presented to Pure at the time of commissioning.
2. Damage to the fiber optic cable as a result of human intervention or error by the Customer's staff or third party contractors. Any act of vandalism to the DAQ, junction boxes, pipeline fittings or fiber optic cable.
3. Any atmospheric or corrosive environments outside of standard operating norms not presented to Pure at the time of commissioning.
4. Fiber optic cable that is not K2 jacket.
5. Pure is not responsible for the costs associated with dewatering, ventilating or preparing a pipeline for shutdown to repair any damage to the fiber optic cable or associated hardware inside of the pipeline.
6. Pure is not responsible for the costs associated with confined space permitting and top support staffing as well as any traffic control associated with a shutdown to repair any damage to the fiber optic cable or associated hardware.

ARTICLE V - LIMITATION OF MONITORING

The parties acknowledge that some forms of background or other noises, or any continuous noise generation may affect the ability of the AFO System to detect and/or classify events and may mask wire breaks so that they cannot be detected or recorded by the AFO System.

These noises may be caused by events such as impacts directly on the pipeline, pipeline appurtenance, or other pipeline feature which will temporarily cause the AFO System to be unable to detect and/or classify events. The data must be monitored and processed to provide meaningful information to the Customer. The parties acknowledge that the placement of the fiber optic cable required by the AFO System is crucial to the AFO System's functionality and any movement or interference with the fiber optic cable without Pure's written consent may affect the ability of the AFO System to record, identify and locate wire failures or other acoustic events. If the Customer engages unqualified personnel to repair or maintain the AFO System or uses unsuitable parts or if anyone or anything moves, obstructs or interferes with the placement of the fiber optic cable, the AFO System performance may be affected and the warranty in Article IV shall not be applicable to the extent and for such time as such activities adversely affect the performance of the AFO System or render the AFO System inoperative. Where such movement, obstruction or interference occurs and if requested by the Customer Pure shall use reasonable commercial efforts to repair the AFO System at the Customer's expense. Pure acknowledges that various monitoring agencies may provide monitoring services under their own terms and if any such agencies are used, the Customer acknowledges that Pure is not responsible for the services provided by any such monitoring agency. Pure is not providing engineering services under this agreement. Pure suggests the Customer have the Customer's professional engineering advisors available to review any reports provided from the AFO System and other issues concerning the structural integrity of the site.

Pure and the Customer acknowledge that component or software failure may interrupt operation of the AFO System. Where such component or software belongs to Pure, or Pure and Customer have a maintenance agreement regarding it, Pure agrees to make reasonable commercial efforts to resume operations as soon as possible.

ARTICLE VI - LIMIT OF LIABILITY

Notwithstanding anything to the contrary contained herein, in no event shall Pure be liable to the Customer for any lost profits, lost savings or other incidental, special or consequential damages arising out of the use, misuse or inability to use the AFO System, including without limitation the software or equipment, whether such damages are sought by the Customer or any other party, even if Pure has been advised of the possibility of such damages.

Pure's liability to the Customer in respect of any and all claims which arise from any act or omission of Pure following the expiration of the insurable period shall be limited to an amount no greater than the annual Technical Support and Monitoring fee, if applicable.

Internet communications for the AFO System are critical to the monitoring operation and are provided and maintained by the Customer. The parties acknowledge without the ability for Pure to communicate with the AFO System through the internet, it can affect the ability of the AFO System to detect and/or classify events.

ARTICLE VII - GOVERNING LAW

This Agreement shall be construed in accordance with, and the rights of the parties governed by, the laws in force in the State of Maryland and the parties agree to irrevocably attorn to the jurisdiction of the courts of the State of Maryland and further agree that any proceedings shall only be taken in respect of this Agreement in

such courts.

ARTICLE VIII - FORCE MAJEURE

Neither party hereto shall be liable to the other, for any failure of or delay in the performance of its obligations hereunder nor be deemed to be in breach of this Agreement, if such failure or delay has arisen from "Force Majeure". For the purpose of this Agreement "Force Majeure" shall mean any cause not reasonably in the control of Pure or the Customer as the case may be, including, without limitation, acts of God, strikes, lockouts, or other industrial disturbances, acts of the public enemy, wars, blockades, insurrections, riots, pandemics, epidemics, landslides, earthquakes, fires, storms, floods, high water, wash outs, inclement weather, power failure, telecommunications disruption or failure, orders or acts of civil or military authorities, civil disturbances, or explosions.

Where either party hereto is prevented from carrying out its obligations hereunder due to Force Majeure, such obligations so far as they are affected by Force Majeure shall be suspended during the operation of any such event of Force Majeure. The party prevented from carrying out its obligations hereunder due to Force Majeure shall where practical, make reasonable efforts to give notice of the occurrence of such Force Majeure to the other party hereto.

ARTICLE IX - ASSIGNMENT AND AMENDMENT

Pure shall have a right to assign this contract subject to the Customer's written consent, which consent shall not be unreasonably withheld. This Agreement is assignable by the Customer providing that the Customer has previously secured Pure's written consent, which consent shall not be unreasonably withheld. This Agreement will in all other respects be binding upon the parties and their respective successors and assigns.

Only a written instrument signed by both of the parties may amend this Agreement.

ARTICLE X - INDEMNIFICATION

Subject to Limits of Liability, Pure will defend the Customer against a claim that the entire system, as furnished, and, if used strictly in accordance with the written instructions provided by Pure, infringes a valid, enforceable Canadian or United States patent or copyright and Pure will pay resulting costs, damages and attorney's fees finally awarded, provided that:

(a) the Customer promptly notifies Pure in writing of the claim or threatened claim.

(b) the claim is solely based on the Customer’s use of the AFO System as furnished and used strictly in accordance with Pure’s written instructions;

(c) the Customer provides all assistance and co-operation Pure may reasonably require in the defense of the action or claim; and

(d) Pure has sole control of the defense and all related settlement negotiations.

If such a claim occurs, Pure may, at its sole option, either: (a) attempt to make the AFO System non-infringing; or (b) attempt to obtain a license to use the rights from the party complaining of the unauthorized or unlawful use; or (c) provide the Customer with a generally similar system; or (d) refund to the Customer the charges or fees attributable to the module in relation to which the infringement is complained of and require the Customer to cease use of the infringing module and return the infringing module to Pure.

Pure shall have no obligation to defend the Customer or to pay costs, damages or attorney's fees for any claim

based on any acts of the Customer which exceed the terms of the license granted to the Customer by this Agreement or are based upon modifications created by the Customer or on its behalf or, from combination of the AFO System or any part thereof with any equipment, software, processes or technology of others or from use of the AFO System other than in strict accordance with Pure's written instructions therefore.

The provisions set out in this section, state the entire obligation of Pure with respect to infringement of any industrial or intellectual property rights.

ARTICLE XI - LIMITATION OF ACTIONS

Pure and the Customer agree that if a dispute resolution mechanism is not successful in resolving a dispute under this Agreement or any Schedule, any legal action must be commenced within two years of the date of the cause of action complained of.

ARTICLE XII - NOTICES

All notices provided for hereunder shall be in writing and shall be deemed to be given: (a) when delivered to the individual, or to an officer of the relevant party to which the notice is directed, or (b) five (5) days after the same has been deposited in the Canada Post or United States Postal Service mail, sent certified or registered mail with return receipt requested, postage prepaid and addressed as provided in this Section, or (c) when delivered by an overnight delivery service with receipt acknowledged and with all charges prepaid by the sender addressed as provided in this Section, or (d) when sent by facsimile on the next business day following the day the facsimile is sent, provided an electronic confirmation of complete transmission to the recipient's facsimile number is received by the sender. Notices shall be directed as follows: (a) If to Pure, at the address for Pure noted at the commencement of this Agreement, (b) If to the Customer, at the address of the Customer noted at the commencement of this Agreement, or at such other place or places or to such other person or persons as shall be designated by notice by any party hereto.

ARTICLE XIII - EFFECT OF WAIVER

No delay or omission to exercise any right or remedy accruing to either party upon any breach or default of the other party will impair any such right or remedy or be construed to be a waiver of any such breach of default, nor will a waiver of any single breach or default be deemed a waiver of any other breach or default theretofore or thereafter occurring. Any waiver, permit, consent or approval on the part of either party of any breach or default under this Agreement or of any provision or condition hereof, must be in writing and will effect only to the extent in such specifically set forth. All remedies, either under this Agreement, under any agreement entered into in conjunction with this Agreement, or at law or in equity or otherwise afforded to either party, are cumulative and not alternate.

ARTICLE XIV - CUSTOMER'S WAIVER

To the extent not prohibited by law or statute, the Customer hereby waives the benefit of all provisions of all applicable conditional sales, regulatory credit, seizure, personal property security and other statutes and regulations made thereunder in any and all jurisdictions of the U.S. and Canada, which would in any manner, affect, restrict or limit the rights of Pure hereunder. The Customer also waives and assigns to Pure the right of any statutory exemption from execution or otherwise and further waives any right to demand security for costs in the event of litigation, for the purpose of repossessing the system.

ARTICLE XV - MISCELLANEOUS

Subject to the terms hereof, this Agreement shall enure to the benefit of and be binding upon the parties hereto and their respective heirs, executors, administrators, successors, assigns and legal representatives.

It is agreed by and between the parties hereto that whenever the context of this Agreement so requires, the singular number shall include the plural and vice versa, and that words importing the masculine gender shall include the feminine and neuter genders, and that in case more than one person or entity is named as the Customer, the liability of such persons or entities shall be joint and several.

The Customer agrees that upon commencement of this Agreement, Pure shall have the right to publish advertisements stating that the Customer is a customer of Pure.

The Customer agrees to do all things and execute all documents as may reasonably be required by Pure in order to give effect to this Agreement including but not limited to the execution of financing statements in order to effect such registration as may be necessary in order to protect Pure's interest.

Pure and Customer intend the security interests granted hereby to attach upon execution of this Agreement. The Customer acknowledges that value has been given and that Pure has ownership rights in the Equipment.

The Customer acknowledges receipt of an executed copy of this Agreement.

Any provision hereof contrary to applicable law or unenforceable under applicable law shall be deemed to be ineffective and shall be severable from and not invalidate any other provision of this Agreement or any Schedule, provided, however, that to the extent that the provisions of any such applicable law can be waived, they are hereby waived by the Customer.

This Agreement may be terminated by either party hereto by providing the other party with three (3) months prior written notice. Upon such termination, all unbilled monitoring funds of the Customer will be refunded by Pure to the Customer on a pro-rated basis. Thereafter, Customer will retain ownership of all the monitoring equipment purchased under the Agreement.