



EXHIBIT A

TECHNICAL SPECIFICATIONS

Non-invasive Acoustic Pipeline Condition Assessment

1.0 SCOPE

This Section specifies requirements for non-invasive acoustic condition assessment of buried, pressurized water mains, producing spatially-resolved estimates of remaining wall thickness along each assessed pipeline segment for use in capital renewal prioritization and risk modeling.

2.0 INTENT

The Owner requires a method that:

- Provides quantitative, spatially-continuous condition data along each assessed segment, not merely a segment-average value or a series of point measurements
- Uses an analytical method with documented applicability to buried, fluid-filled, restrained pipe of the materials and bedding conditions encountered, including pipelines composed of more than one pipe material within a single test span
- Effectively assesses the quality of various watermain pipe materials; including Cast Iron, Ductile Iron, PVC, C-900, and HDPE
- Is non-disruptive to customers and does not require pipe coupon removal, in-line tool insertion, isolation, or changes to normal operating conditions as a prerequisite for assessment
- Achieves all of the above while completing a minimum of two (2) miles of watermain pipe assessment each year of this contract. The Village retains the right to add additional length of watermain to the scope of work each year as budget allows

3.0 METHOD REQUIREMENTS

3.1 Excitation Source

The Contractor shall employ a deterministic, excitation source meeting all of the following:

- Characterized acoustic spectrum at the point of injection, with documented usable energy extending to at least 800 Hz. Higher upper-frequency content is desirable for improved along-pipe resolution.
- Repeatability of $\pm 10\%$ peak amplitude across at least twenty (20) successive activations.
- Water hammer at the valve face (not in the main) shall be less than 35% of the ambient line pressure.



3.2 Sensing

A minimum of two (2) sensors shall be deployed at separated access points along the segment under test. Acceptable sensor types are:

- Hydrophones or dynamic pressure transducers in direct fluid contact with the water column, deployed via hydrants, air-release valves, or other fluid-coupled access; or
- Accelerometers in direct mechanical contact with the pipe wall, surface-accessible pipe fittings, or valve stems and extensions.

Sampling rate shall be ≥ 8 kHz per channel with a minimum bandwidth of 1.5 kHz.

3.3 Required Outputs and Performance

For each assessed segment, the Contractor shall deliver, at minimum, the following results:

- **Wall thickness:** Spatially-resolved effective remaining wall thickness (in. or mm) and percent of nominal. The Contractor shall document how the wall-thickness estimate is derived and shall demonstrate that the underlying physical model is valid for buried, fluid-filled, restrained pipe of the materials and bedding conditions encountered.
- **Feature and anomaly mapping:** Identified features along the assessed length, including changes in diameter, material, or wall condition, branches, blockages, leaks, tuberculation, and other defects.
- **Spatial resolution of wall properties:** Resolution shall not exceed 12 ft (3.7 m) for test spans of 650 ft or less, 20 ft (6.1 m) for spans greater than 650 ft and up to 1,300 ft, or 25 ft (7.6 m) for spans greater than 1,300 ft.
- **Uncertainty:** 95% confidence interval reported on the wall-thickness estimate, with the basis of the uncertainty estimate documented.
- **Wall stiffness:** When requested by the Owner, an estimate of effective pipe-wall stiffness, with units and basis stated shall be provided

4.0 FIELD DEPLOYMENT

- Access shall be via standard fire-hydrant ports (2½ in. NST), air-release valves, or other pipe fittings (surface-accessible or exposed by excavation as required). Tapping or cutting of the pressurized main shall not be required.
- Customer service shall not be interrupted.



5.0 DELIVERABLES

- A GIS-compatible layer of assessed segments, attributed with estimated remaining wall thickness or stiffness.
- A per-segment condition assessment report including the wall-thickness profile, identified anomalies, and field notes.
- An interactive summary with each segment ranked by remaining-wall percentage, and with sample audio files.

6.0 CONTRACTOR REQUIREMENTS

To be considered for award of this contract, the Contractor shall:

- Provide a fixed cost per linear foot of watermain scanned, then multiply this per-foot cost to provide a total cost for the two (2) miles of pipe scanned.
- Have an office within seventy-five (75) miles of the Village of Orland Park.
- Provide 24/7 emergency service availability for the duration of the project.