Paradigm

Satellite Leak Detection

Leak Detection Field Procedure

1. Overview of Investigation Site

Drive around the area and look for any obvious leak signatures.

- Signs of Possible Leak:
  - Broken and/or sunken asphalt
  - Overgrown grass or bushes with dry surrounding areas
  - Standing water at the surface

Figure 1: Example of sunken asphalt created by leaking underlying water main.

Figure 2: Example of fire hydrant leaking at the seat for an extended period.

Figure 3: Example of standing water due to service line leak.

2. Initial Acoustic Investigation

Test acoustic equipment before every leak detection survey. Ensure the listening device cords are connected properly and no loose wires or wire frays are present.

- Listen:
  - Valves
  - Services/Meters
  - Hydrants

Figure 4: Example of Leak Detection Survey. Leak technicians will listen to each valve, hydrant, and customer meter for leak sounds.

Typical leak sounds may display a loud hissing. On large diameter infrastructure it may sound more like a shallow humming or bellow (i.e, sound of a jacuzzi/hot tub jet underwater).

Note: Be aware of electrical overhead and ground boxes as they will make a ringing sound. These may show false positive signals of a leak being present. To ensure you are not picking up an electrical signal, you can put your acoustic device directly on the electrical pole to get a gauge on what the sound is.

3. Leak Sound Present

Hydrant

- Flush the hydrant and verify leak sound is still present.
    - If leak sound disappears, the hydrant may have not been seated properly.
    - If sound is still present, leak may be on the hydrant or the hydrant lateral.
- Replace the hydrant or the stem depending on the damage and determine if the leak sound disappears.
    - If the leak sound is still present, the leak may be located on the hydrant lateral.

Service

- Ensure the customer meter is properly attached to the service line and there is no gasket leak present.
    - Gasket leaks will cause a very loud hissing sound at the customer meter that may be mistaken for a leak.
    - Service line leaks most commonly occur at the corporation directly tying to the main or near the customer meter as they are the most rigid points on the service line.
- Shut the meter off to determine if leak noise is still present.
    - If the leak noise disappears, the leak is on the customer side.
    - If the leak noise is still present, the leak is on the utility side.
- If customer side leaks are ruled out, acoustic correlation or data logger deployment may begin to pinpoint the leak.
    - Ideally, place loggers or correlators on the main line valves closest to the approximate leak location with the leak being centered between the two valves. If no valves are nearby, you may place the correlators/loggers on the customer meter shutoff (using a binder clip to create a magnetic and secure connection) with the leak being centered between the two devices. This approach may not yield the best results as it is not placed directly on the main and will require additional adjustments in the acoustic software to account for the diameter of the service line to the main, material change, and distance from the customer meter to the main.

    - Correlators/loggers should not be placed directly adjacent to the leak as it may distort the reading. They should be placed approximately 100-500 feet away from the leak location in each direction.

Valves

- Exercise the valve to ensure it is seated properly.
    - If leak sound disappears, the valve was not seated properly.
    - If leak sound is still present, the valve will need to be replaced or excavated to determine the exact leak location.
    - After valve is replaced, revisit the area to ensure no leak sounds are present.

Main

- After each of the services lines, customer meters, hydrants, and valves have been ruled out, the final leak location will be on the water main.
- Acoustic correlation or data logger deployment may begin to pinpoint the leak.
    - Place loggers or correlators on the main line valves closest to the approximate leak location with the leak being centered between the two valves. If no valves are nearby, you may place the correlators/loggers on the customer meter shutoff (using a binder clip to create a magnetic and secure connection) with the leak being centered between the two devices. This approach may not yield the best results as it is not placed directly on the main and will require additional adjustments in the acoustic software to account for the diameter of the service line to the main, material change, and distance from the customer meter to the main.
    - Correlators/loggers should not be placed directly adjacent to the leak as it may distort the reading. They should be placed approximately 100-500 feet away from the leak location in each direction.

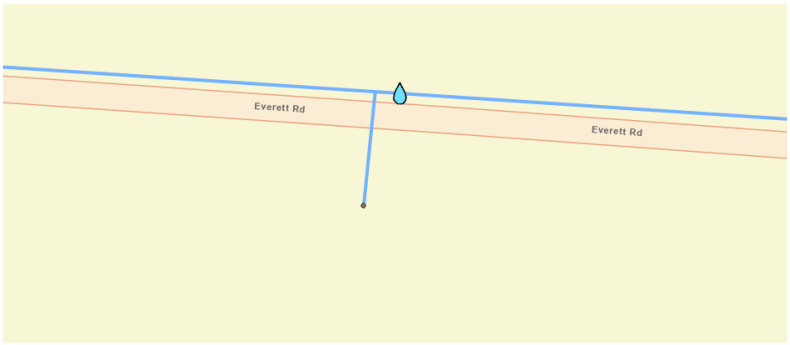

Figure 5: Example of leak found near the corporation on a water main. In this case, the leak sound will be loudest on the customer meter closest to the leak.

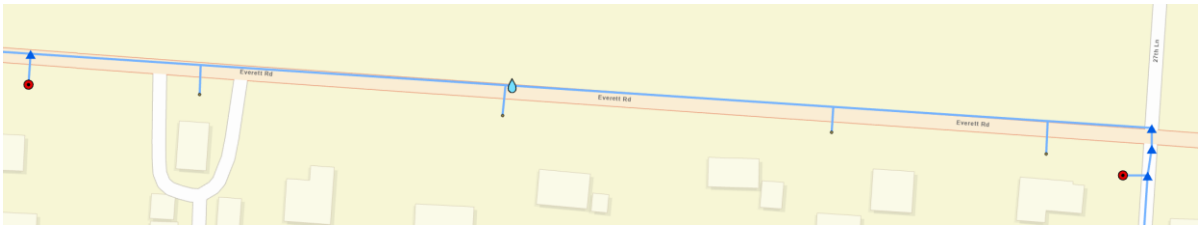

Figure 6: Example of acoustic correlation to verify the leak location after it was heard on the customer meter. Leak technicians will verify the closest mainline valves and run a correlation with the identified leak near the center of the two correlators.

4. Repair the Leak

Repair crews are now able to excavate the site to expose the leak location.

Note: If excavations are complete but leak is not present, you can place a direct tap on the exposed main to obtain better contact for acoustic equipment. At this point, you can determine if the leak sound is still present and which direction excavations should continue.

5. Leak Repair Follow-Up

A few days after the leak has been repaired, revisit the excavation site to ensure the leak sound disappears and no new leaks have developed.