Underground Utility Detection
& Inspection Services

"It's A Jungle Out There!"

Limitations of Non-Metallic Utilities Detection

As part of our commitment to accuracy, transparency, and safety, this memo outlines the known limitations associated with the detection of non-metallic utilities. These limitations should be thoroughly documented and clearly communicated during site evaluations, project planning, and client discussions.

Overview

Non-metallic pipe detection relies on the insertion of a traceable device (e.g., sonde, flexrod, flexitrace, fish tape, or tracer wire) into a pipe or conduit and the use of an electromagnetic receiver to detect its location. Due to the inability to transmit electromagnetic radio frequencies through non-metallic or non-conductive utilities, successful detection relies on specific conditions and designated access points.

Key Limitations

1. Access Point Required

Detection is only possible when there is an accessible point such as a cleanout, catch basin, manhole, handhole, or conduit stub. Without these, it is not feasible to insert a traceable device.

2. Limited Push Distance

Traceable/Insertion tools have a limited range due to mechanical resistance:

- Flexitrace: typically up to ~300 feet
- Flexrod: typically up to ~500 feet

Sharp bends, 90° turns, tight radii, pipe material, and the condition of the pipe can dramatically shorten these distances.

3. Limited by Pipe Condition and Integrity

Obstructions inside the pipe—such as roots, debris, collapsed sections, or buildup—will prevent the device from advancing, thus limiting the effective range of detection.

4. Depth Constraints

Signal detection becomes unreliable beyond approximately 8–15 feet deep, depending on soil conditions, signal strength, and electromagnetic interference.

5. Pipe Diameter Challenges

- Small-diameter pipes may restrict device movement and limit turning through bends.
- Large-diameter pipes may cause the device to buckle, coil, or lose directional stability, resulting in inaccurate locates.

6. Discontinuous or Damaged Tracer Systems

Signal continuity is lost if there are breaks in the tracer wire or damage to the traceable line, making accurate location difficult or impossible.

7. Material Limitations

Some pipes, such as those made from cast iron or ductile iron, may shield or attenuate the signal from internal transmitters, significantly reducing detectability.

8. Signal Interference

Nearby metallic objects—such as rebar, steel structures, or high-voltage lines—may distort or overwhelm the transmitted signal, affecting locate precision and accuracy.

9. Cannot Traverse Steep or Vertical Angles

Traceable and insertion tools may encounter limitations in their ability to traverse pipes with significant inclines or vertical drops.

Conclusion

These limitations must be factored into pre-job planning and client expectations. Where feasible, recommend alternative solutions or note potential accuracy constraints in your reports. Proper documentation of all site conditions and known limitations is essential to maintaining quality and minimizing risk.