VIDEO INSPECTION OF BURIED PIPE

SUMMARY
All pipelines should be video inspected right after installation and again about one year after installation. The video operators and those interpreting the video should be trained and certified. All of the video inspection material should be retained as benchmarks.

Description of “open joint” by NASSCO PACP is incorrect and misleading.

CCTV inspection of pipe is a useful method of assessing the interior condition of a buried pipe. The interiors are inspected for many reasons: initial acceptance, periodic assessment, investigations of excessive leaks, and failures. However, the wrong procedure and the wrong interpretation of the results can result in unnecessary repairs or replacement. A video on the National Clay Pipe Institute website, (ncpi.org) “Knowing Your Limitations,” discusses how video can be misinterpreted and why operators should be trained.

For larger pipe sizes, man-entry inspections provide a more reliable and quantifiable method. Personnel entering the pipe must be OSHA Confined Spaces certified. For information on man-entry inspections see Howard (2009).

Here are some examples of misinterpreted video:

1. Figure 1 is a photo from a videotape and the operator states that the bottom of the pipe is gone and the pipe must be replaced. However, a personal inspection showed that a crust had formed on the bottom of the pipe and the “break” is in the crust. Looking at the circumference at the end of the pipe should have been an indication that the break was not in the pipe wall.
Figure 1  Video operator misinterprets broken crust

2 Another common misinterpretation is hairline cracks in concrete pipe. In this photo (Figure 2), a hairline crack remained wet due to capillary action. The operator described the crack as serious and said the pipe had failed. In actuality, it was a hairline crack that was within acceptable limits.

Figure 2  Hairline crack in invert of concrete pipe
CERTIFICATION

The National Association of Sewer Service Companies (NASSCO) has adopted and is promoting a Pipeline Assessment and Certification Program (PACP) for companies doing CCTV inspections (NASSCO 2001). NASSCO has devised a system for describing the interior condition of a pipeline and assessing its status. For the most part, the descriptive terminology is appropriate for evaluation of a buried pipeline. NASSCO trains and certifies video operators under the PACP, which has a standard terminology for observations, uses a standardized database, and has a condition rating system. The NASSCO website (nassco.org) has sample specifications and contracts for inspection services.

With some exceptions, the PACP terminology should be used by personnel doing a man-entry inspection; there is no accepted standard for man-entry assessment terminology. Howard (2009) gives some other recommended terms for man-entry inspections.

EQUIPMENT

At a minimum, the CCTV system should have the capability to observe defects from both the upstream and downstream. The camera should be able to rotate, pan, and tilt to view the entire circumference. The camera lens should be able to be positioned looking down the center of the pipe.

Because of possible distortion looking down the pipe barrel, any serious defect should be viewed directly on, that is perpendicular to the axis of the pipe. The size of defects cannot be easily judged because there are no references. The Department of Transportation for Delaware (DelDOT) requires that the video system be calibrated to estimate size. This involves viewing a ruler on the wall of a dummy pipe with the same diameter and marking a size scale on the video screen. The details of the requirements can be found on the DelDOT website (2008 Storm Sewer CCTV Manual for Sewer Assessment and Acceptance).

FREQUENCY

Many agencies have a requirement to videotape new sanitary sewers within the first 30 days after final backfilling. However, storm drains should also be checked. The potential for sink holes forming over storm drains is greater because they are usually at a higher elevation and have a larger diameter.

New water lines should also be video inspected. While pressure testing should also be required, visual inspection will find sags and alignment variations that would be indicative of the quality of construction.
In addition to the “30 day” inspections, a follow-up visual inspection should be done about one year after construction, or just before the end of the warranty period. The backfill load on a pipe increases over the first three to six month. The load increase may not be as much with backfill that is compacted over the pipe, but pipe with compacted backfill are usually under roads. Sinkholes over these pipe can have more serious consequences.

TERMINOLOGY

Open Joint

The terminology used by PACP for a space in the joint is misleading, as follows:

Separated (open) Joint – PACP - A separated joint has a visible gap between the ends of adjacent pipe. A separated joint can be described as:

Medium - The separation is greater than 1.0 pipe wall thickness up to 1.5 pipe wall thickness.

Large - The separation is greater than 1.5 pipe wall thickness

However, most pipe will have a gap between the bell and the spigot end. A gap is desirable so the joint can move as the ground shifts. If there is no gap and one pipe moves, one side of the joint gets crushed. “Separated” or “open” sounds like a defect. There can be a separation and the seal provided by the gasket is still intact. The term “open” should only refer to a joint where there is evidence of infiltration or exfiltration. The space between the ends of the pipe should be referred to as a “gap” and should be measured if the gap seems excessive. Before inspecting the pipe, the allowable gap between the ends should be determined from manufacturer or manufacturer’s literature. If the pipe was pulled to make a vertical or horizontal curve, the allowable gap due to pulling should be ascertained.

REFERENCES


NCPI has video “Knowing Your Limitations” available for viewing and download at their website, ncpi.org, that addresses poor video inspection interpretation.