SERVICE LATERAL INSPECTION STANDARDS

WHAT ARE THEY
AND
WHY ARE THEY NEEDED?

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I want to start by having you to use your imagination. Picture yourself sitting in your office on a Friday afternoon, diligently working on that project that's due for Monday. I did say, use your imagination, right. OK, maybe just sitting back and thinking ahead to the weekend, when the phone rings. Now, everyone who works in water and sewer knows that for some unknown reason, most of those phone calls on a Friday afternoon usually spell trouble of some sort. Somebody has a problem!

You pick up the phone, and on the other end of the line is a homeowner who, to put it mildly, is a little bit upset with you and the city, town or whoever you are working for. They proceed to tell you, in no uncertain terms, that you are responsible for the sewer backup they just had. They want you to send someone over to clean up the mess, they want you to fix the problem so it doesn't happen again and of course, they want you to pay for everything.

Being a little bit curious, you'd like to find out what happened, when it happened, what was done and most importantly, how do they know what the problem is. Most often their response is that the plumber or the Roto Rooter guy told them that the problem is on city property. It usually falls into one of two categories. The line is collapsed, or it's roots from those damn city trees. Either way the city should be responsible and fix it.

During your discussion with the customer, you might want to ask if the line has been inspected using closed circuit TV. Sometimes it has, most often it hasn't. If it has, the next question is, by whom. Which contractor is it? Can you get a copy of the report? Is it on videotape and if it is can you see it? You would like to get the answer to these and a few other questions before any decision is made on what happens next.

Now it all depends on where your responsibilities lie as to how far you take this. The ownership of the service lateral and therefore the responsibilities for it run from one extreme to the other. The city may be totally responsible or the homeowner can be depending on how it has been set up. You can also have everything in between. Let's assume, for argument sake, that the city is to some extent responsible. What should be done, is that an inspection of the service lateral be undertaken by knowledgeable personnel to evaluate and report on its condition.

Closed circuit TV inspections have provided huge benefits to those responsible for the inspection, maintenance and rehabilitation of the underground infrastructure. We have been looking at the main lines for years and have seen major improvements in the quality of the industry through improved equipment, through training and standardization. Service laterals are quickly becoming more and more important in the overall picture.

With the availability of reasonably priced quality equipment on the market today, many contractors and plumbers are adding TV inspections to the list of services they offer. In addition, there are several public works or operations divisions that are also involved. When you buy a piece of equipment, training on how to use that equipment is usually included, or at least it should be. But what about knowing what to look for, why things happen the way they do and how do you report it. Don't get me wrong, there are good

quality people out there who know what they're doing, but more often than not, you will get poor quality information, inconclusive videotape and even conflicting reports on the condition of that lateral. Lack of training and knowledge in actually doing the inspections as well as in the identification and formation of defects are the typical causes for these inconsistencies. If you are the one making the decision on what is to be done next, wouldn't it be nice that if the reports you were relying on, regardless of who did them, were of a consistent quality, in a standard format and prepared by trained personnel.

What needs to be done and what I am proposing is that a standard be developed for the closed circuit TV inspection of service laterals. By setting a standard, and also developing training programs, all personnel involved will be able to communicate on a consistent and knowledgeable basis. This would go a long way in being able to provide an informed response to a customer concern, and a greater degree of confidence in the information being provided when contemplating maintenance and rehabilitation programs.

Now having said all that, I want to let you know that this standard is currently in the process of being developed. It is based on a similar standard that is being promoted for main lines across Canada, by NAAPI, the North American Association of Pipeline Inspectors. The standard is the WRc Manual of Sewer Condition Classification. By applying the concepts used for the inspection of main lines, it was felt that a measure of consistency would be provided for those involved in the inspection and management of the infrastructure. Once completed, it will be presented to NAAPI for review and support. Why you may ask? The focus of their programs and the emphasis on the operators assuring the quality, consistency and integrity of inspections and reports, as well as the similarity between the two standards appears to be a natural combination.

As with any standard there are general rules and requirements, especially for the inspection of these normally smaller diameter sewers. The most basic rule is that any inspection or survey of a service lateral be undertaken after a blockage is cleared. Most services are designed with good grade and therefore there should be no water in the line at the time of inspection. Any water should only be related to a subsidence or backgrade and not to a blockage. Water levels, when presents, are recorded as a percentage of the pipes diameter and in increments of 10%.

Should cleaning be required to remove roots, grease and debris, a second or subsequent inspection should be undertaken. This brings up the differences by what is meant between clearing a line and cleaning. Clearing of the service lateral is undertaken to relieve a blockage. Cleaning is undertaken in an attempt to remove all impediments to the flow and restore the pipe's original capacity. This is one area where a lot of confusion occurs with the homeowners or contractors and may need to be addressed in your discussions with them. You may have to ask was it cleaned or did they just clear the blockage.

ABC INSPECTION COMPANY *230 Future Road* *Somewhere, World* *1Z1 2Z2*		*Phone: 555-555-5555* *Fax: 555-555-6666*	
Operator: *Bill Smith*		Date: *January 1, 2005*	Time Start: *8:00 AM*
A. CUSTOMER INFORMATION			
Contact name: *Frank Right*		Owner name: *George & Mary Billings*	
Service address: *75 Future Drive*		Owner address: *24532 – Range Road 480*	
Somewhere, World		*Nowhere, World*	
1Z1 2Z2		*5X2 4P1*	
Home phone:*555-4321*	Business:*555-9876*	Home phone:*555-5678*	Business:
B. SURVEY INFORMATION			
Pipe Size: *100 mm*		Pipe Material: *ABS / VCT /*	
Type of Access: *FCO*		Direction: Downstream ☒ Upstream ☐	
Location of Access: *Family room*		Pipe Cleaned: Yes ☒ No ☐	
Joint Length for External Piping: *1.2 m*		Measurements recorded in: ☒ Meters ☐ Feet	
Pipe Change from Internal to External Piping at: *0.9 m*			
Video Tape ID #: *21-A*	Video # Start: *01*	Video # Finish: *234*	
Additional Remarks: *Found cable had been cored through service. Owner will contact cable company to make repair. Had to abandon survey.*			

C. SURVEY DETAILS

Distance	C/D	Code	%	Position	Remarks
00		*ST*			*Start of run – 45 bend at Floor Cleanout*
0.9		*MC*			*Material changes to VCT*
3.4		*RMJ*	*30*		*Roots on face of minor joint displacement*
4.6		*JDM*		*3 – 8*	*Joint displacement medium*
4.6	***S1***	*RFJ*			*Start of trace roots at the joints.*
6.2		*OJM*			*Open joint medium*
7.8	*F1*	*RFJ*			*End of trace roots at the joints*
7.8		*OB*	*30*		*Appears to be cable through service*
7.8		*SA*			*Can proceed no farther – survey abandoned*
7.8		*FH*			*Finish of survey*

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Figure 1

In providing the inspection information, a form of some type needs to be filled out. We need to know who did the inspection, the location, when it was done, the name and address of the owner as well as any other information pertinent to the report. We also need a place to enter the inspection data itself.

There are of course a lot of similarities between inspections for main lines and those for laterals, as well as some basic fundamental differences. The pipe material for instance, can often change several times from that recorded at the start of the survey. Access points for the inspections can vary from toilet drains, cleanouts, inspection chambers and even the main line with some of the new equipment that is available today.

Also, depending on the type of equipment your using, or your reporting requirements, you need to indicate which units of measurement are being used. Is it feet or is it meters. The pipe change location needs to be recorded. This refers to the location near the foundation wall where the pipe material may change from that used for the internal piping to that of the external piping. All this information is entered on the header section of the report and can be very significant when someone is planning for maintenance or repairs.

The Survey Details section of the report form is, of course used to record the details of the inspection.

The distance of each observed defect, condition or feature is entered in column 1 in either meters or feet. The second column, C/D is used for the identification of any continuous defects that are noted during the inspection. We'll deal with continuous defects a little later on.

The codes, used for the identification of defects are entered in column 3, while any required percentage values are entered into column # 4.

Clock reference points are used to describe the position of a defect, condition or feature and are entered in column 5. Clock reference points are given clockwise, as you can see from these examples.

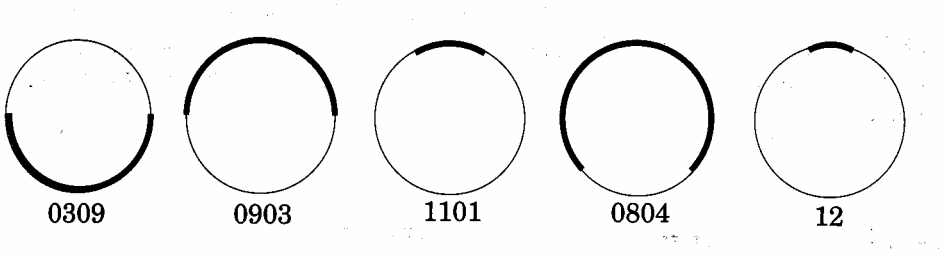

Figure 2

Finally, the remarks column can be used in conjunction with the information entered into the first 5 columns to provide additional information of value to the report.

For easy and consistent entry of inspection details, coding becomes very important. Each code is associated with a specific description or definition for a defect, condition or feature.

Quite often more than one code and its associated definition is needed to describe what is viewed at a single point. A pipe, for instance at 7.8 meters as shown here, may have a longitudinal crack at 12 o'clock, be deformed 10% and have fine roots coming in at that same location. It is important to code all that is seen and not just the worst defect at any given spot.

Distance	C/D	Code	%	Position	Remarks
7.8		**CL**		**12**	
7.8		**D**	**10**		
7.8		**RF**			**Fine roots coming in through longitudinal crack**

Figure 3

When conducting an inspection, quite often there is a lot of confusion and error in the identification and recording of cracks and fractures as well as broken pipe? More often than not they are all just lumped together and referred to as cracked pipe. The benefit of having this standard, are the very specific definitions associated with each of these defects. As you can see from these slides, the differences are specifically outlined.

In short, cracks are defined as lines that are visible on the pipe walls. Quite often they were referred to and sometimes still are as hairline cracks. Fractures, are cracks that have become visibly open but with the pieces of pipe still in place?

Broken refers to fractured pipe where the pieces are noticeably shifted or displaced.

Cracks and fractures can also be defined as longitudinal, circumferential or multiple. Longitudinal requires 1 clock reference to indicate it position in the pipe while circumferential or multiple require 2 clock references. For broken pipe, coded B, you can use either 1 or 2 clock references depending on the extent of the break.

This slide gives you a good picture of the differences even though it is taken from a main line inspection. As I said before there are a lot of similarities between mains and services and this is one of them. A crack or fracture is the same no matter which type of pipe it is located in.

Other structural defect codes include those for collapsed pipe, deformation, holes, surface damage and joint defects.

Joint defects can have a significant impact on the serviceability of a service lateral.

Jump joints, drop joints and offset joints are all referred to as joint displacement and are coded JDM or JDL, depending on severity. Joint displacement medium refers to those joints that are displaced enough so that 20 to 30% of the cross-sectional area has been lost and greater than 30% are referred to as joint displacement large. Two clock references are required due to the fact that flows in these smaller diameter pipes can be adversely affected by the position of the displacement. It goes with out saying that one that affects the bottom or invert of the pipe would have a greater affect of the serviceability of the line than one located across the crown.

Service conditions are those that affect the ability of the service lateral to operate properly. Included are everyone's favorite cause of sewer backups, roots. It doesn't matter where you are, if there are trees in the area, it's an almost forgone conclusion that there will be roots. They start at fine trace roots, coded RF and can grow into a mass that will stop any flow. Root masses are coded as RM, and the size of the mass is relative to the cross sectional area loss of pipe capacity and is recorded in increments of 10%. By adding a J after the code for roots, you can further indicate that the roots are coming in from the joint. The J or joint notation can also be used with several other codes as well.

Other service conditions include infiltration, encrustation or mineral buildup, debris, grease and obstructions. Each has a specific definition, code and reporting requirement.

Construction and miscellaneous features also have their codes and definitions.

As we have seen, the inspection of a service lateral can be recorded with the use of a number of codes. Now, during the inspection, it is noted that the same defect runs along the pipe or is repeated at every joint. The standard refers to these as continuous defects. Truly continuous defects run continuously along the sewer without interruption of more than one meter or one pipe segment. Examples would include such defects as longitudinal cracks and fractures, debris or encrustation. Repeated continuous defects occur at regular intervals, quite often at pipe joints. Examples include roots, encrustation and infiltration. Specific rules have been developed for the use of the continuous defect facility and emphasis is placed on their correct use.

One rule for continuous defects is that, in order to score them properly, knowing the pipe segment length is very important and is recorded on the header section of the report form.

With the mention of the word scoring, this brings up the concept of evaluation. It must be noted, that when a defect is identified, it is scored for a one meter or one pipe segment length. These scores or weighting factors are what is used in the evaluation process. Each defect is assigned a numerical value based on the type of defect and its severity. For example a longitudinal crack may be assigned a value of 8 while a longitudinal fracture a value of 15. A root mass of 20% may have a value of 2, with a root mass of 80% being given a value of 20, joint displacement medium from 3 to 9, or across the invert given a value of 30 while one from 9 to 3, a value of 10. It all depends on the severity and type.

If you are going to use an evaluation process, it can be done either manually or by using a computer program to handle the amount and complexity of the data. By calculating the total score for a service lateral, as well as the peak score for a one-meter segment, a condition grade can be determined by comparing the final score to a pre-set value. Local conditions may require the modification of these values by experienced and knowledgeable personnel. These results can then be used in determining what needs to be done and when.

A suggested format for both the structural and service grades is shown here. As you can see, the higher the value the more serious the problem.

Grade	Structural	Service
1	Acceptable structural condition with no requirements for rehabilitation	Acceptable service condition with no maintenance requirements
2	Acceptable structural condition with minimal requirements for rehabilitation	Acceptable service condition with minimal maintenance requirements
3	Acceptable structural condition with deterioration starting to occur	Frequent requirements for maintenance – every 2 – 3 years
4	Structural condition is questionable and may require rehabilitation in the foreseeable future	Annual requirements for maintenance. Rehabilitation or replacement recommended
5	Structural failure imminent	Constant requirements for maintenance action. Rehabilitation or replacement required

Figure 4

I would like to conclude by stating that the benefits of having a standard for the inspection of not only main lines, but service laterals as well are many. By setting standard and training personnel in both the inspection and evaluation process, the quality of the information is improved. Communication by all those involved will be consistent and knowledgeable. This will provide for a more informed response to customer concerns and a higher degree of confidence in the information provided. Combine the evaluations from your main lines with those of the service laterals and you will get a better overall picture of the condition of the infrastructure. This can only lead to an improvement in the decisions being made as well as a respect for the industry.

Biographical Notes

Allan Strachan has been working in Water and Sewer since 1983 with Strathcona County. This special municipality with a population of 62,000 is located just outside Edmonton, Alberta. In 1985, he began his involvement with the CCTV inspection of service laterals and continues to this day with training, inspection and evaluation. In 1989, his responsibilities were increased to include the inspection and evaluation of main lines as well.

Allan holds Alberta Environment Certification Level 3 in both Water Distribution and Wastewater Collection and is a graduate of the Northern Alberta Institute of Technology Water & Wastewater Technicians program. He is certified by the North American Association of Pipeline Inspectors and has become one of their instructors in CCTV Certification.

In developing the standard, Allan hopes to address the ever-increasing need for accurate information in the inspection of service laterals and to provide a medium for the training of inspection personnel.