TRENCHLESS Technology

Sewer Pipe Asset Management

Municipalities in British Columbia have billions of dollars invested in their buried and aboveground infrastructure systems. Inspection and maintenance of the infrastructure is a key asset management tool that municipalities use to protect this investment.

Sewer pipe infrastructure inspection has increased in popularity in the last ten years in North America as more and more municipalities realize the importance of inspecting their sewer pipe network on a regular and systematic basis to assess its condition and implement repairs to problem areas. With improvements in technology, closed circuit television (CCTV) inspections have become an important tool in the asset management process.

CCTV inspections also locate problems of inflow and infiltration (I & I), as well as exfiltration. Locating and repairing points of ingress will reduce the cost of municipal wastewater treatment.

Project Management Services

At Levelton, we can provide the engineering expertise to assist municipalities maintain and upgrade their sewer infrastructure from the manholes to the piping network.

Critical sewers must be identified by Levelton and the municipality and divided into Categories A, B or C with Category A being the most critical sewers and Category C being non-critical. Factors that are considered when assigning sewers to categories include the location, depth, diameter, type of soil / backfill and access for remedial action. The number of sewers that fall into Categories A and B typically make up no more than 25% of the total sewer system. By adopting this strategy, the municipality can direct their funding towards the more critical sewers, which will yield the largest economic advantage. Once this is done, sewer segments can be selected for inspection. Levelton could then prepare and administer the CCTV inspection contract for the municipality.

Once the CCTV inspection contract is completed including QA, Levelton can provide the expertise required to evaluate the system in accordance with the latest edition of the Water Research Centre (WRc) Sewerage Rehabilitation Manual. For each pipe segment (manhole-to-manhole), the peak score, mean score and the total score is calculated. We predominantly use the peak and total scores to evaluate each pipe segment. This two part screening process ensures the following:

- Any sewer with a reasonable risk of collapse in the near term due to a random event such as a storm or nearby excavation, is immediately identified by its peak score value.
- Lines with significant general deterioration are quickly highlighted by a review of their total segment score.

Based on the computed peak and total scores, a preliminary Structural Internal Condition Grade (ICG) is assigned to each pipe segment. The next step in the evaluation protocol is to adjust the ICG grades to Structural Performance Grades (SPG). Adjustments take into consideration the native soil, water table and the tendency for the system to surcharge due to hydraulic loading.

The next step in the process is to formulate a rehabilitation strategy for the pipe segments based on the SPG and the category. The best management approach is to rehabilitate critical components of the system and those with SPG of 3 or higher so that problems can be addressed at an early stage in the deterioration cycle.

Trenchless rehabilitation strategies can include pipe bursting and pulling in HDPE pipe, full-length liners using CIPP or fold-and-form, point repairs and chemical grouting. Other rehabilitation techniques that can be considered for pipe repair include keyhole technologies involving hydro-excavation and point repair to minimize surface disruption.

An additional benefit of the CCTV inspection program is root control. Tree roots can cause a variety of problems including accelerated deterioration of structural damage such as cracks and fractures, loss of hydraulic capacity and blockages leading to subsequent flooding. A proactive approach through an annual root management program by the municipality can substantially reduce these problems.

WRc Grading and Digital Conversion of Video Tapes

If municipalities have libraries of valuable sewer pipe baseline condition information stored on video tapes from years gone by, Levelton can take this information and make it more useful and cost effective to municipalities by the following approach:

- Defects in the pipe segments shown on the video tapes can be classified as per the WRc classification system. This provides the owner with information on pipe condition in a standardized comprehensive readily accessible electronic report format.
- The actual video tapes can also be converted to a digital format on compact disc (CD-ROM). This reduces the municipal engineer's time significantly to review the condition of the pipes. Storage of the information on CD-ROM also greatly reduces the storage space required by tapes and increases the shelf life of the information.

Once the information is in the more useful standardized WRc format, it can be used by the municipality in the decision making process regarding the rehabilitation of defective pipe. In addition, once the information is in digital format, it is much easier for owners to prepare information packages to contractors tendering sewer repair projects. There is no longer the need to spend countless hours reviewing video tapes and preparing excerpts for the contractors.

Materials Testing

As part of Levelton Consultants Ltd., our materials engineers and technologists can offer a comprehensive approach and integrate these services with other engineering and testing services offered by our Company. This could include concrete and grout quality assurance testing by our Construction Materials Division or the testing of sewer repair materials such as Cured-In-Place (CIPP) epoxy resin impregnated woven material, Fold-and-Formed (FFP) polyethylene or PVC liners by our physical testing laboratory (see our feature sheet on this service).

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