Trenchless Sewer Rehabilitation

BY STEVE DAY AND GURJIT SANGHA

Preparing CIPP liner for installation.

The City of New Westminster has one of the largest and longest running municipal trenchless sewer rehabilitation programs in B.C. This program has allowed the city to effectively address the condition of its aging sewer system infrastructure with rehabilitation of about one per cent of the city's total sewer system per year. The program was initiated in 1999 and includes trenchless relining and bursting of about 2 km of sewer pipe per year.

The city's sewer system is approximately 65 per cent combined, composed primarily of vitrified clay pipe and concrete pipe. Sewers range in depth from about 1.5 metres to 4 metres. Parts of the city sewer system were constructed in the late 1800s. Some of these older sewers have experienced abrasion damage, which is common for older concrete pipe. Severe abrasion damage can lead to loss of pipe below spring line. Many of the vitrified clay sewers have problems with root infiltration and circumferential cracks, most noticeable where sewers were constructed within boulevards where trees were later planted.

The city has committed to a trenchless sewer rehabilitation program, the benefits of which include shorter construction period with minimal disruption to the public and minimal impact to older trees.

The city has divided the program on a neighbourhood basis typically beginning with initial CCTV inspection. CCTV inspection allows for assessment of the structural integrity of the pipe, which is based on the Water Research Center (WRc) rating system. This system assigns structural points to defects and allows the city to prioritize defects based on the extent of deterioration, while identifying major structural defects at specific locations. Using this data, the city develops its annual sewer rehabilitation program for the following year.

Relining of sewers has been carried out using both cured in place pipe (CIPP) and fold and form pipe (FFP) liners. Installation of both liner systems requires access to upstream and downstream manholes of a sewer. The process includes either curing resin impregnated pipe liner (in the case of CIPP) or heating, pressurizing and reshaping a plastic liner pipe (in the case of FFP) onsite. The liner is inserted through the host pipe using a winch system or under pressure, followed by reshaping of the new structural liner pipe tight against the host pipe Total installation time typically takes about five hours. Once installation has been completed, a router and CCTV camera are inserted into the liner and services connections are cut out remotely. Service interfaces are then sealed using chemical grouting and a service interface grout packer.

Pipe bursting typically includes upsizing sewers one or more pipe diameters. Pipe bursting can be done with the use of either pneumatic or static bursting heads. Although pipe bursting itself is very quick, there is a longer set up period as compared to relining. This set up includes locating and reconnection of each service connection by open cut excavation. Services ar typically exposed with a small open excavatio and left open during the bursting period. Th additional open cut work for service connec tion typically takes several days to complete.

Since the program was initiated, the city ha used these trenchless technologies effectively an efficiently. The city estimates a cost savings c about 10 to 30 per cent using trenchless rehabil tation of sewers in comparison to open cut insta lation along with social and environmental ber efits. Trenchless technologies have allowed fc successful rehabilitation of sewer mains beneat busy traffic locations such as Royal Avenue i addition to quiet residential streets. The benef of reduced neighbourhood impacts during cor struction has made this a very attractive optio to the city. Most residents are typically unawar of the significant rehabilitation effort complete for the sewer on their street.

It has been the city's experience that engagir engineering consultants with a working know edge of rehabilitation system design and insta lation methods is an essential part of compl tion of a successful rehabilitation project. Th application of pipeline rehabilitation to sewe systems is an ever changing and evolving an accepted construction methodology that car not be taken lightly or for granted, and whe experience gained from past experience ofte assists in addressing new challenges that aris with each and every new project. CB

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