PIPE BURSTING - WHAT COULD GO WRONG?

By Tonia Jurbin

The Regional District of the North Okanagan (RDNO) in British Columbia, Canada, recently completed a bundle of three rehabilitation projects all of which used trenchless construction methods.

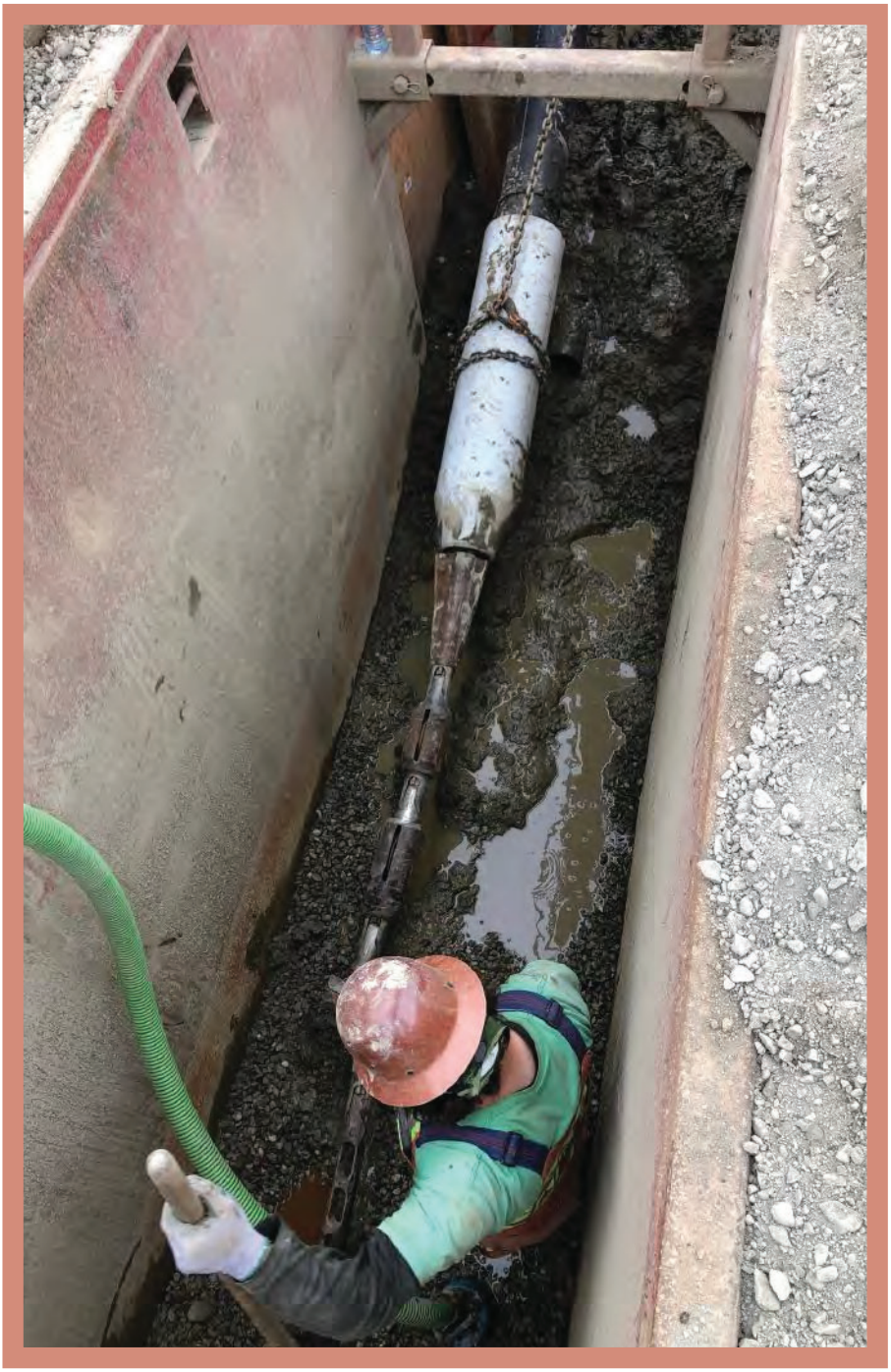
Until recently municipal work in the region had been done using traditional open-cut techniques, this time RDNO wanted a viable alternative. The challenge is that trenchless contractors, being specialists, do not typically provide a complete package that includes the installation of the water services required.

The pipe bursting on the largest of the three sites is described in this case study.

The existing water service under the Highway 6 site required rehabilitation of about 2,530 m of 200-mm pipe and about 30 m of each 150-mm pipe and 100-mm pipe along a busy stretch of road. Highway 6 in Coldstream, British Columbia is heavily traveled, especially during the summer and there could be no closures or delays between June 15 and Sept. 15. Just before the shutdown traffic lines were more than 1 km.

PW Trenchless of Surrey, British Columbia (PW) carried out the work using three different methods of trenchless construction. The HDD and pipe jacking portions of the work were carried out by subcontractors to PW.

As with any rehabilitation work, the lack of accurate as-builts is often an issue and on this job, a lack of information of what lay beneath was no different in that many of the obstacles



and challenges encountered were unanticipated, some of which may have been known by long time employees.

While practically useful this anecdotal information cannot be written into contract specs without exposing the owner. Some way to share this knowledge without exposing the owner could be explored in future discussions.

There were several compelling reasons why trenchless was preferred for this 2.5-km-plus pipe rehabilitation project. The existing pipe is in the Ministry of Transportation and Infrastructure (MOTI) right of way (ROW). MOTI does not easily give permits for work to be carried out along, under, or over highway ROW so this permit was for in-place pipe replacement.

To rebuild the system in a new alignment south of the MOTI ROW would have required up to 40 property acquisitions, expensive and time-consuming endeavors. The new alignment would have had to be installed in a low-lying area that often floods. Not only would open-cut installation have been extremely disruptive, but considerable dewatering would also have been required.

By working within the existing alignment, the contractor was able to work within the higher elevation road shoulders in mostly dry conditions with only minimal property acquisitions required at a new railway crossing.

One of the many advantages of pipe bursting is the pre-chlorination process. This allows for multiple sections of pipe to be tested at once in one central location before being transported to site. All the testing can be done above ground with the additional benefit of a visual inspection of the pipe.

Pressure, super chlorination and bacterial tests are carried out before the pipe hits the dirt. The pipe is then sealed so that no contaminants can enter. This above-ground testing also allows the bypass to be removed earlier. After the installation, the pipe is drained and tied into the existing infrastructure on the same day.

Trouble started with the pipe bursting right out of the gate. Turns out that the existing very uncommon 1/8-in. thin spiral steel pipes from the 1940s were very different from today's standard steel pipe and were a challenge for the pipe bursting team, at least with the standard equipment brought to the site.

Generally, when bursting a standard steel pipe, upsizing many sizes is not recommended. Steel tends to retain a "memory" and although it may split easily enough during pipe bursting, it might revert to its old form. As a result, the presence of sharp edges of the existing pipe could damage the new pipe being pulled in.

The first five bursting attempts were mostly experimental, the equipment, processes and results were carefully recorded. The standard bursting head PW brought to the site turned out to simply crumple the steel pipe in front of the bursting head rather than splitting it.

This thin-walled steel pipe needed careful attention to keep the splitting process going and not start a crumpling event.

If the head was too big (Photo on Pg. 20) the steel pipe would not split but crumple, if the head was too small the

steel pipe rebounded and gouged the new pipe. PW had to design a new "Goldie Locks" bursting head. One that was just right. It was designed and manufactured in the lower mainland.

Now, even if the steel pipe rebounded during the splitting process, the steel pipe was still far enough away from the new pipe so as not to cause damage.

Even though there were extra costs, some delays and unforeseen experiences observed on this project, most of which were not explored in this recap, RDNO reports that the trenchless work was about two-thirds the cost of open cut.

This was mostly due to maintaining the same alignment as the existing water main, resulting in minimal asphalt repairs and the already mentioned property acquisitions. This figure is based on the engineer's estimates as no open-cut bids were received.

Lessons learned by the contractor, owner, and owner's engineer will all be carried forward when planning the next challenging project in tight spaces with the potential for great disruptions where trenchless technologies might save the day or at least taxpayers' money.

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Original bursting head crumpling rather than splitting the existing pipe.