



PREMIER-PIPE

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LINING IN THE WORLD DIAMOND CAPITAL

Antwerp, Belgium is renowned as the worlds diamond dealing centre. Set largely in a small, busy street near the citys main railway station, most of the worlds diamonds are traded in one form or another. As with any international trading centre, tens of thousands of people work in this relatively small area and the streets are always congested. There is of course another aspect to such a dealing centre, security. With incoming and outgoing diamond shipments, close access to the dealing houses is essential.

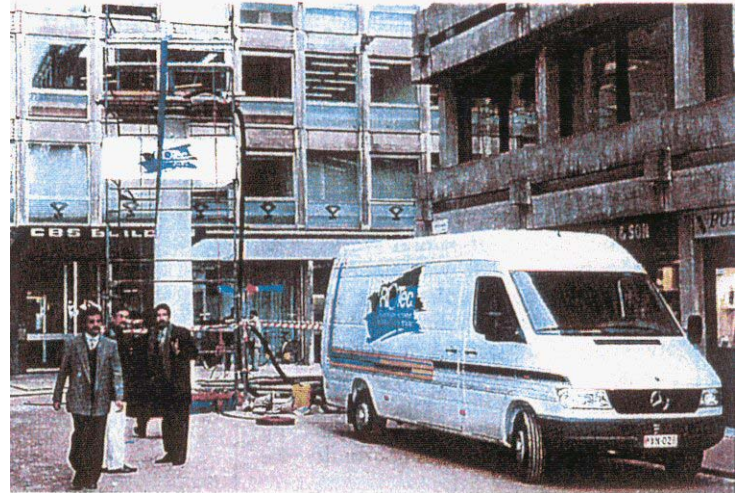
When, therefore, the city decided to upgrade the main road through the dia□ diamond centre, and at the same time upgrade the local sewer system, a prime opportunity for the use of trenchless technology presented itself.

The City of Antwerps municipal budget for 1997 totalled some BF3.5 billion (£58 million) of which about BF1.0 billion (£17 million) covered the roads and sewer bud□ get, the largest amount ever spent by the city on its roads and sewer infrastructure. As part of the efforts being put into road and sewer improvements it was decided to improve the area around and in the diamond centre.

TENDER

After about a year in planning the design of the new road was established and the

Typical inversion tower set-up the middle of Antwerp's diamond centre.



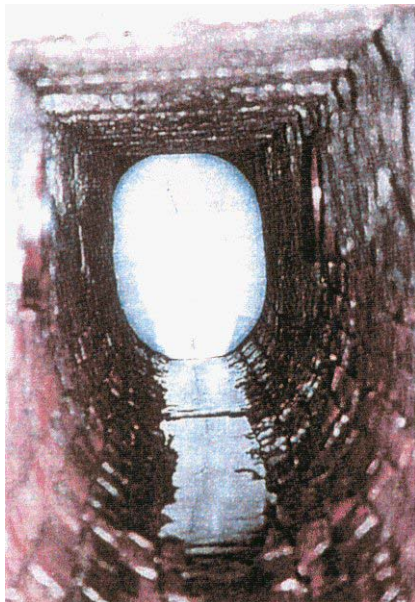
work put out to tender amongst several contractors. All of the contractors returned bids which not only included the road works and new security entry and exit barriers but a section which covered the open cut replacement of the existing U□ shaped, brick built sewer with a flat bluestone cap running beneath the centre of it. The sewer was first constructed at the end of the last century around 1887.

Generally, the City and in particular the Diamond Centre do not like trenching as an option for works, yet despite this only two contractors put in an alternate bid which included the use of trenchless technology to rehabilitate the existing 0.5 m wide x 0.7 in high combination foul and stormwater sewer. Of the two, DCA proved to be the cheapest bidder using conventional techniques for the road and sewer works with a bid of BF14.3 million (£238,000). The alternate bid using a trenchless solution totaling BF18.5 million (£308,000) also proved to be the cheapest. The other main difference between the two bids was the working schedule, 105 days by conventional means and just 75 days using trenchless techniques which not only reflected on the speed with which the lining work could be done but also the amount of time that would have been added by having to trench through ground very heavily congested with other utilities. Despite the no□ dig solution being almost 30% more expensive the local authority decided that the reduced working time, about 40% less, the reduced traffic management costs and other social cost reductions using trenchless technology more than outweighed the apparent basic cost

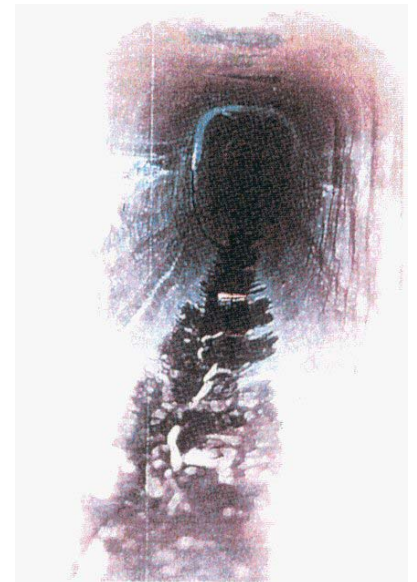
increase and so chose DCAs alternate bid for the contract.

CONTRACT

The fact that the contract already called for the road surface to be replaced anyway and that the no□ dig solution allowed the cheaper reopening of lateral connections by negating the need to open cut also added weight to the choice of the DCA alternate bid. This choice meant minimal disruption to the business centre and



Liner inversion in the 500mm wide by 700mm deep flat-topped sewer.



The U-Shaped, flat topped sewer after completion of lining.

higher security for the duration of the contract in that the 20-30 delivery/pick-ups from security vans each day would not be adversely effected as access to almost all buildings could be maintained at any one time.

SPECIALISTS

The 75 day contract required the completion of road resurfacing, fibre optic duct installation, security barriers and lateral repair or replacement as well as the main sewer lining. With the road surface open it was opportune to use open cut techniques for the shallow laid fibre optic ducts and the short lengths (maximum 5 m) of lateral works. The open cutting which was done had in each case to be completed by nightfall of the day of excavation to cover security fears with leaving trenches open. The area had several years previously been targeted in a bombing, and the City and Diamond Centre security chiefs did not wish to leave any opportunity for further attacks.

Whilst these works were completed by DCA, the work to line the main sewer was subcontracted to RioTec nv (Rioolrenovatie Technieken) of Beerse, Belgium, DCA's specialist trenchless contractor. RioTec is the licensee in Belgium, The Netherlands and Luxemburg for the Premier-Pipe lining system produced by U.K.-based Premier-Pipe Services (International) Ltd of Didcot, Oxfordshire. It was this system that the company was to use for the main sewer lining work in Antwerp.

LINING

In all four linings were required for the U-shaped sewer which had a total circumference of 1,930 mm. Using a 10.5 mm thick liners the four sections were 63 m, 88 m, 72 m and 87 m long respectively.

Prior to each section being lined it was cleaned and surveyed to establish the precise lateral entry positions. Each lining and curing operation was to be completed in a single day. On day two of the operation the lateral connections were reopened using a remote-controlled robotic cutter and returned to service. At the time of *No-Dig International's* visit to the site the last of the four liners was being installed and no problems were encountered on any of the installations.

The work commenced on August 3, 1997 and the contractor expects to be completed by early December, within the short contract period. The last of the Premier-Pipe liners was completed on November 7, 1997 much to the satisfaction of the client which, having been impressed by the final result, has indicated that it would consider the system for future work in the many similar shaped sewers it has in its area.

Preparing to launch the Premier-Pipe liner.



PREMIER PIPE

RioTecs experience with the Premier-Pipe system has been gained over the past two years with installations in round and egg-shaped sewers ranging in size from 400 to 800 mm diameter in round pipes to 300/450 mm to 400/600 mm in egg-shaped sewers with contracts varying in length from just 45 m to 950 m in length. These contracts occurred in cities such as Antwerp, Maastricht and Dendermonde. RioTec also operates the Premier-Patch localised lining system.

The Premier-Pipe lining system comprises the inversion into the defective pipe of a polyester felt tube which has a polyurethane outer coating. The liner is impregnated with a liquid resin which is chosen to suit the situation in which the liner is to operate and which is designed according to individual specification, for thickness.

Depending on accessibility of the inversion site, which is normally an existing manhole on the defective pipeline, either an inversion tower or a pressure water system is used to apply the head of water pressure needed to invert the liner tube into the pipe. At the same time as the liner is inverted a water circulation hose is installed as part of the curing operation. At points of access along the sewer, normally

manhole positions, thermocouples are positioned to monitor curing temperatures along the liner.

When the liner is fully inverted to the reception manhole, the water used to invert it and which now holds the liner tight against the defective pipes wall is circulated through a boiler which heats it to the temperature required to cure the resin. Once curing temperature is reached the water temperature is maintained for some 16 hours to ensure full curing throughout the line. The thermocouples installed during inversion indicate the temperature over the length of the liner to ensure a quality control.

Once curing is complete the ends of the liner are trimmed back to the pipe ends and sealed to prevent ingress of fluid between the old pipe wall and the liner. On day two of the operation the robot, cutter is used to reopen lateral connections at the previously surveyed positions along the pipe route.

The completed liner complies with the Type II lining specification as laid down in the Sewerage Rehabilitation Manual as published by WRc in the U.K.

by Ian Clarke

NDI Editor