

Using the pipe-bursting method in the Tshwane area to upgrade existing water reticulation

by Annaline Cronjé, City of Tshwane

Introduction

The Water Distribution Section, of the Water and Sanitation Division, Public Works and Infrastructure Department of the City of Tshwane has started to use the pipe-bursting method to replace and upgrade existing water-reticulation systems in the city.

A tender was advertised as part of the "three-year as-and-when" contract, in which the conventional construction method and pipe-bursting method were combined. The City of Tshwane required the contractor to do both conventional and pipe bursting because of the lack of information on existing infrastructure. Tenderers could tender for the two methodologies, separately or combined.

The tender was awarded to Pangane Pipelines and Batho-con Construction. Arcadia and Valhalla were identified as the first two networks on which the pipe-bursting technology would be used.

For Arcadia the deciding factor was minimising the damage to pavements by using the pipe-bursting method. For Valhalla the dolomite geology was the deciding factor because blasting in the existing residential area would not be necessary when using pipe bursting.

Advantages and risks of pipe bursting

At the time the city called for tenders, the most-important perceived advantages of pipe bursting could be summarised as follows:

- Reducing secondary costs on projects, viz for repairs resulting from replacements in the network; as well as paving and bitumen repairs
- Eliminating the resulting lack of pavement space for pedestrians when network replacement is done in established residential areas
- Reducing interference to traffic when roads are closed to install pipes across roads
- Fewer trench excavations which cause inconvenience to residents.

At the time the perceived risks and disadvantages included:

- Information about the existing infrastructure was not accurate
- Information on the depth of pipes and the materials of existing pipes was not always available
- Upsizing may cause ground disturbance
- The type of fittings and materials to be used needed to be established
- Information on pressure testing of polyethylene pipes was vague and had to be adapted to arrive at a practical solution
- Experience about water-pipe replacement was lacking because in Tshwane the method had been used mainly for sewer replacements

- Unit rates of construction were uncertain and appeared to be on the high side.

Peculiarities of trenchless construction

A number of issues which were peculiar to trenchless construction had to be addressed, viz

- Temporary pipes had to be made safe at pedestrian and vehicle crossings. Temporary bridges were used to safeguard the site
- All welds and fittings had to be open for inspection, resulting in many open spot-excavations
- Many steel pipes were encountered and the cutting heads of the pipe-bursting machines had to be strengthened
- The pipes in Valhalla were very shallow and therefore the minimum required cover over pipes could not be maintained. The number of test holes had to be increased to establish in which blocks the water reticulation would be replaced or upgraded by the conventional method and which by means of pipe bursting
- The minimum required cover was changed in the Valhalla area because of the dolomitic conditions. This resulted in some paving being damaged by ground displacement.

Lessons learnt in Tshwane

Because trenchless methods are new to the Water Distribution Section and there is a lack of available information on it for water networks, there is still a great deal to learn and each day improvements are made. There have been many technical problems so far, but at this stage all of these problems have been solved and we have increased the production rate. This has also improved the unit rate which was high because of preliminary-and-general and health-and-safety costs that were spread over a low production rate. This should now improve because of the increased production rate.

Nevertheless, a lot has been learnt about the pipe-bursting method for water-network replacement. A new tender document and specifications will be compiled by early 2009 in which all these improvements will be incorporated, and the next contract will surely have fewer problems. There is definitely a need for this method in our environment and the section is improving the specifications for pipe bursting. This method may in fact replace a major portion of conventional pipe-replacement work in the future.

The length of pipes burst with diameters of between 110 and 355 mm diameter is 12,6 km. Funds spent on these projects to date have been approximately R 5 million.

Standards for trenchless technology

Comments invited

SASTT has received a communication from Ron Watermeyer of Soderlund & Schutte (Pty) Ltd, who draws attention to two draft standards on which he invites comments, viz

SANS 2001-DP3:2008: *Cable ducts* and SANS 2001-DP7:2008: *Pipe jacking*.

SANS 2001- DP7 is intended to cancel and replace SABS 1200-LG: *Standardized specification for civil engineering construction Section LG: Pipe jacking*.

He would appreciate comments from members of SASTT by 12 May 2008. There will, however, be further opportunity for comment. "I merely want to come out of the starting blocks with something that provides a sound basis for the future rounds of comment," says Watermeyer.

Anybody who would like to peruse the draft standards is welcome to contact the honorary director of SASTT at director@sastt.org.za or Watermeyer at watermeyer@ssinc.co.za.

Measurement and payment

Watermeyer also remarks that no measurement and payment is associated with these standards. The CESSM3 system of the Institution of Civil Engineers of the UK, *Civil Engineering Standard Method of Measurement* will be introduced into South Africa. The Joint Civils Division is working on a publication to assist with the conversion to this system of measurement. It is currently developing a guide to the application of the third edition of the CESMM3 in southern Africa. This guide will:

- introduce the reader to the philosophy and thinking behind CESMM3
- highlight the differences between the current system as embodied in *Civil Engineering Quantities 1990* and the SABS 1200 standardised specifications; and
- make recommendations regarding the adaptations that should be made to successfully apply it in the South African contracting environment.

This publication will not replace CESMM3 in any way; nor will it purport to be a handbook on the subject. It will merely serve as a guide to the application of CESMM3 in the South African context to facilitate the adoption of CESMM3.

More information on this development is available from the honorary director.

A new executive director for the ISTT

Members may recall a recent call for applications for the position of executive director of the ISTT.

This post has now been filled. The ISTT has announced the appointment of John Hemphill as executive director from 1 June 2008.



John Hemphill

Hemphill currently serves as executive director of the North American Society for Trenchless Technology, a position he has held since 2000. With an eye on further growth in the civil-engineering utilities-sector, he has expanded the educational services which NASTT provides and has established the annual *North American No-Dig Show* as the major trenchless event of the year for the underground-utility community of North America.

Hemphill has over 35 years' experience in management and policy analysis in the fields of engineering and energy. He was executive director of the Business Council for Sustainable Energy. At the International Energy Agency in Paris, France, he served as assistant director for energy policy, where he worked with energy officials of member countries to promote sound energy policies.

Hemphill is a member of the American Society of Civil Engineers. He holds degrees in civil engineering from the Universities of Oklahoma and Maryland. He resides in Alexandria, Virginia, USA.

Hemphill replaces John Castle who retires after 10 years as the ISTT's executive secretary. Hemphill will join the ISTT full time in June at the ISTT international board meeting in Moscow. Castle will continue with the ISTT through August to assist in the transition.