

Mogden to Perry Oaks

highly innovative solution for twin 12" sludge mains replacement

by
Andrew Gosling CEng, MIMechE

This project utilised a highly innovative solution for the replacement of 4km of twin 12" sludge mains, fixed to the soffit of a 9' diameter London sewer. The solution presented many challenges involving restricted working in a live sewer, providing safe access for men and machinery, selection of a suitable pipe system, and development of a unique method for the removal and replacement of pipes within a confined and difficult environment. Over 1400 No. 6m long pipes were successfully installed using specially built vehicles and pipe handling equipment. The work was carried out over a three year period and was completed at the end of 2005.



Unique tracked vehicles designed for removing old pipes and fitting new

Photo: Courtesy Thames Water

Background

The sludge pipeline between Mogden Sewage Treatment Works and the processing site at Perry Oaks had to be extended to a new site to make way for Heathrow Terminal 5. The increased pipeline pressures necessitated upgrade of the original 1935 twin 12" mains. A long section of the pipeline was fixed to the soffit of one of the main sewers feeding Mogden. This was straightforward, when originally constructed, but presented many challenges for the removal and replacement in a live system. A highly innovative solution was developed for this section of the pipeline.

Challenges

Traditional pipeline techniques were evaluated and rejected due to the built-up urban environment along the entire route. Pipe relining was considered but would have produced an unacceptable restriction whilst not avoiding need for access into the sewer.

The chosen option was to provide access points into the sewer and develop a special mechanised system for the removal and replacement of the pipeline.



Putting finishing touches to the newly installed piping

Photo: Courtesy Thames Water

The following problems has to be solved by the project team:

- * controlling flow in the sewer to allow work to be carried out;
- * access into the sewer for men and machinery;
- * transport of pipes in and out of the sewer;
- * removal and installation of pipes;
- * ensuring high levels of safety were always maintained.

Solution

A spigot and socket pipe system was chosen with anchor joints to simplify the installation (Fuchs Rohr DKM pipe). Access would only be possible at night (low flow) therefore, sophisticated level monitoring and computer modelling was used to set the access and exit times.

Constructing two large shaft entries provided access into the sewer; one directly over the sewer and the other incorporating specially built addit for side entry. Heavy duty ventilation at the shafts ensured that the atmosphere within the sewer remained safe.

At the heart of the successful project was the design of the pipe transport solution based on machines originally manufactured as tracked dumper units. This new concept involved reuse of the basic chassis but heavily modified for use in the sewer and equipped to transport pipes, with unique designed facilities for removing old and fitting new pipes. Five vehicles were built incorporating support equipment for the operatives to work safely within the sewer environment.

The hydraulically driven tracks were angled to drive against the curved walls of the tunnel. The working platform included a driver's area, room for two other operatives and a cassette that could hold three old or new pipes. The cassette was designed to rotate, as well as lift, enabling the old pipes to be removed and the new ones positioned without manual lifting.

The machines were developed and trialled in a mock-up tunnel which was essential to ensuring the concept worked prior to arrival at the site. Enhancements were incorporated to facilitate rescue in the event of a breakdown within the sewer.

Implementation

Following successful trials, the work was carried out over three seasons and was completed in November 2005. This testing project brought together skills of design, construction and project management to deliver a difficult and challenging pipeline solution.

This project addressed a very specific need but provided a safe and environmentally friendly solution to overcome a very difficult problem by challenging existing methods and technologies.

The team involved in this highly innovative Project was made up of Thames Water Utilities Ltd., Costain Ltd (Principal Contractor), Enterprise Ltd., and Black & Veatch. ■

Note: *The author of this article, Andrew Gosling, is a Principal Project Manager with Thames Water.*