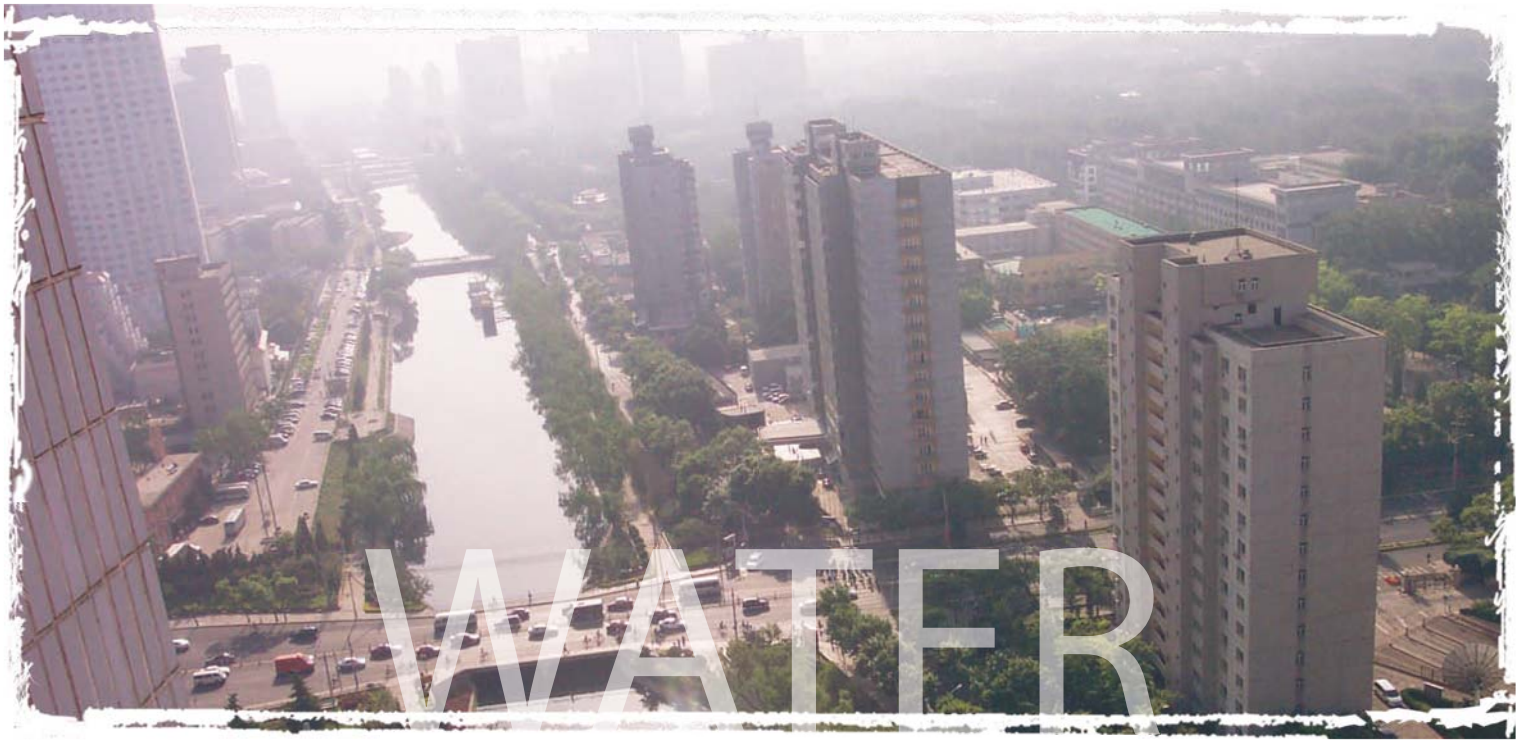

WATER IN ACTION

Partnerships | Knowledge | Solutions

Beijing reduces water losses by relining ageing mains with polyethylene pipes

Like so many of the world's major cities, Beijing faces a serious water shortage due to rapid population growth exacerbated by successive years of drought. Water losses from the ageing city water network aggravate the problem.

New pipe laying technology, first developed in Europe and using PE pipes has enabled the problem to be successfully addressed without disrupting the life of this very large and busy city. Moreover, this innovative combination can deliver a fast, economic solution to system replacement and water resource savings in virtually any urban environment.

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Beijing reduces water losses by relining ageing mains with polyethylene pipes

Many of the world's cities have ageing underground services which are in poor condition and in need of replacement. However, the costs of necessary work and its potential to seriously disrupt city life often means no action is taken. In Europe many benefits have been obtained by utilising a new installation technology together with polyethylene (PE) pipes to reline existing water and gas mains. The new technology involves a number of so called "no-dig" procedures that enable old pipes to be lined or new pipes installed using insertion or sub-surface drilling techniques. It does not require open trenches and therefore presents no major above-surface disruptions. This technology has now been successfully transferred to the streets of Beijing to help overcome the city's water scarcity problems.

Beijing's water problems

Like so many of the major cities around the world, Beijing faces a serious water shortage due to rapid population growth exacerbated by successive years of drought. Annual usage for its 16 million inhabitants is between 3.5 and 4 billion cubic meters of water per year, which is a very low level of consumption compared to international averages. Much of the water comes from dams and underground reservoirs in the neighbouring province of Hebei but these sources are now under pressure and Beijing must reduce its water losses.

A large part of the water network in Beijing was installed in the 1950's and the system's ageing iron and concrete pipes are now heavily corroded. The ever-increasing traffic loads in the city have led to the fracture of these old pipes and burst mains are now a frequent occurrence. The main challenge is to reduce this water loss at a reasonable cost and without bringing the city to a standstill.

Expanding the use of successful technique

PE pipes have many advantages over other types of pipe, including flexibility and corrosion resistance. However, perhaps one of the most important properties when it comes to relining old mains is that PE material has a memory, which means that if it is mechanically deformed, once the constraints are removed it will return to its original shape.

Therefore, if a PE pipe is folded into a U-shape and then strapped in that position it can be easily pulled through an old main. Once in-place, the pipe can be pressurised to break the holding straps, whereupon it will reform to become a snug fitting, leak-free liner inside the old main.

This "no-dig" technology was originally developed in Europe for relining old gas and water pipelines. Recently it has been pioneered in Beijing by the Beijing Waterworks Group, supported by local pipe producer Chinaust and raw material supplier Borouge.

Close partnership delivers project success

The Beijing Waterworks Group first tried this technique in the summer of 2006 with support from pipe producer Chinaust. This initial project involved lining a short section of water main between Zhongguancun Avenue and Zhichunli Road, a well-known commercial and university district in Beijing. A 795 mm diameter PE 100 pipe was used to line a 486 m section of pipeline.

Since this first success the partners have completed a further three projects:

- The rehabilitation of 2.6 km of old water main between two bridges on the city ring road using 355 mm PE 100 pipe. This project was considered so successful and innovative that it was awarded the 'Beijing New Technology Award'.
- The renovation of 3.6 km of water main, using 500 mm diameter PE100 pipe, in the old downtown area of Beijing between Changchun Street and Qian Men.
- The lining of 1.2 km of old water main with 795 mm diameter PE 100 pipe in another busy area of Beijing, between Suzhou Street and Zhongguancun Avenue.

The success of these projects will mean that many more "no-dig" projects will be carried out in the city in order to reduce water loss and help reduce future water shortages.

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