

One-meter diameter pipe, 600 meters long installed under the Mighty Wanganui River.

They pushed from one end and pulled from the other, threading a one meter diameter pipe into another that wasn't much bigger. It was a delicate chapter in Wanganui's multi-million dollar wastewater scheme that involved replacing the pipeline underneath the Wanganui River+ (Wanganui Chronicle 04/04/07)

By utilising the space inside the old pipe rather than building a new pipeline under the river, \$2.5 million was saved on the project.

There was only one fly in the ointment; for its size the new pipe was the largest to have been pulled through another over such a distance. This presented many design unknowns such as; friction values, floatation, bending capability and pulling loads.

Consensus of the pulling power required to install the pipe could not be reached by the project consultants and as no similar project could be found for comparison there was much anticipation for the results on the day.

Pulling power

For the job of pulling the pipe under the river directional drilling was best suited for its

- Ability to gauge the pipeline by rotating a reamer through the existing pipe, taking out any pipe misalignment steps and grinding up any debris lying in the existing pipe
- Delivery of lubricant right to the face of the pipe for the entire installation
- Ability to push as well as pull, certainly an advantage in getting an initial pulling mechanism through the pipe but also if the towing head became jammed or caught on exposed host pipe reinforcing

Pre-pull

A surface mounted Vermeer D80 x 100 directional drill was pinned down on the city side of the river. Avoiding existing underground utilities a string of rods were drilled down into a sheet-piled excavation and then into and through the existing pipe to an excavation on the other side of the river. A single 15m length of 1m-diameter PE pipe was connected and pulled back through the host pipe to provide assurance that the pipe could be installed unobstructed. The host pipe was then flooded with seawater and it was ready for insertion.

The big day

The pre-tested 116 ton PE pipe string was carefully guided down to the launch MH with the coordination and support by four excavators and two bulldozers in order to overcome the friction created by the pipe when in contact with the ground.

Once the pipe was safely started on its journey through the host pipe the drill provided the grunt required to pull the pipe through whilst the bulldozers pushed from the rear.

The new pipe needed to negotiate four bends in the existing pipe; although the bends were gradual it was difficult to calculate the additional friction that would be generated.

Ironically, as the pipe was slowly installed, less pulling force was required. This was a result of the polyethylene pipes neutral buoyancy inside the flooded host pipe reducing the total friction.

10 hours later the pipe arrived at the drill.

Community interest

This project was unique in that the 600m long pipeline was visible in its entirety before installation whereas most pipe projects involve installing the pipe in a piece meal process and so don't have the same visual impact.

The river crossing was a ratepayer funded public project and located close to the city so there was a high level of interest shown, certainly it wasn't all in a days work for the guys on the ground to be fronting up to media cameras and microphones!

Conclusions

- Much can be gained by Involving specialist contractors early in the design process
- Specialist contractors working together is essential for success
- Utilising existing infrastructure can produce big savings
- Plastic pipe, in a state of neutral buoyancy drastically reduces friction
- Contractors with innovation and experience are essential for success

Smythe Contractors supplied the drill and undertook the pull as a sub-contractor to Inframax Construction Wanaganui Ltd.

Story by Neil Vanner