

Southern Watermain Renewal Project Porirua City

Adopting the Future - More for Less

Introduction

Porirua City Council like many Councils, has had the renewal of core infrastructure at the heart of its decision making, and it will be a continuing focus for the foreseeable future. In terms of renewing infrastructure, Capacity as network managers for water services, need to ensure it is at the forefront of technology and that it is getting the best value for rate payer's dollar.

This has resulted in Capacity, who manage the Water Assets for Porirua City, being the first in NZ to introduce a Structural water main re-liner. The product was Aquapipe installed by ANZEL Ltd (Aqua Pipe New Zealand Environment Limited).

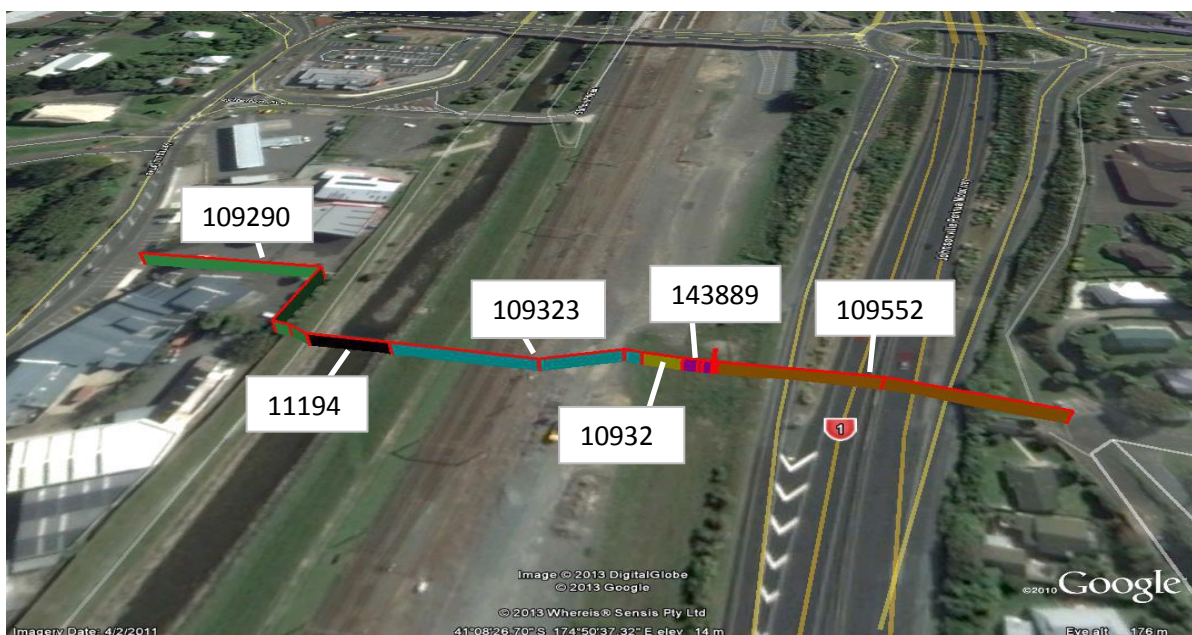
Background

The original watermain being relined was laid in the 1950's from Arawhata Street on the eastern side of the highway where the Photo was taken, to Kenepuru Drive on the Western side. This 250mm line is one of the main water lines to the CBD and Western side of the city. As time has marched on, it is a far different place now in terms of access availability than in the 50's.

Today the water main crosses underneath a much larger and busier State Highway 1, beneath Kiwi Rail Ontrack land and the railway lines, through the Regional Council stop banks, underneath the Porirua stream and back out on to Kenepuru Dr, and is now a vital water feed to the Western side of the city and Kenepuru Hospital.

The Southern main was a mixture of old 250mm asbestos cement pipe, cast iron bends, and 250mm concrete lined steel pipe.

A portion of the watermain within the stop banks ruptured in late December 2011, and this is where the journey began to find an alternative, cost effective structural repair method that did not involve dig and lay.



Stretch of pipeline to be relined: *The Photo shows the reline underneath the state Highway 1 before it continues on under the rail lines, the Regional Council stop banks and Porirua Stream*

New Technology Replacing Old Methods

The conventional methods of dig and lay are now fast becoming a redundant form of renewal due to the ever increasing costs and time associated with the following:

- Resource Consent approvals
- Design costs
- Unacceptable disruption with the digging up of roads and carriageways
- Reinstatement and maintenance period costs
- Difficulty finding alternative routes in already congested streets
- Locating and possibility of hitting other utilities
- Traffic and site management
- Overall disruption of services to residents and commercial businesses
- Overall conventional extended construction timeframes

Watermain relining has been used extensively in over 350 cities worldwide during the last 2 decades, is one of the most acceptable and economical forms of water main renewal developed. Capacity, with Porirua City adopted and introduced the structural Aquapipe liner as the only economic answer to its future renewals program.

The relining process results in a new high quality structural pipe inside the old pipe

Some of the benefits associated with internally relining old mains with a structural liner compared with the old dig and lay method are listed below:

- Lining pipes that are ever increasingly difficult to access
- Minimal requirements and costs associated with resource consents if required at all
- Minimal traffic management and disruption
- No future maintenance required with joints
- Little excavation when compared to traditional open cut
- Adjacent infrastructures or utilities not disturbed by work
- Utilising existing infrastructure rather than having abandoned mains everywhere
- Large sections of Roads not compromised
- Less disruptions and complaints from residents and commuters during work period. Little to no disruptions to retail businesses
- Work time frames dramatically reduced
- Cost can be as much as 70% cheaper than traditional methods
- Increased pressure and flow capacity
- Corrosion resistance
- Regained structural capacity
- Life span of 50+ years guaranteed, with an expected life of 80 +
- Little loss of Internal diameter, with the liner 4.5 and 6mm thick



In the photo below: *Desmond Scrimgeour who manages the Water and Stormwater networks for Porirua, with the Mayor Nick Legget, explaining, "some of the ever increasing challenges facing the city in terms of renewing its ageing infrastructure."*

The mayor, Nick Leggett stated that “the end result by introducing this technology means, we can do a lot more, for a lot less money, quicker and with less disruptions and end up with a high quality renewed water infrastructure“

Costings

An independent consultancy MWH, was engaged to evaluate the cost of a conventional method of dig and lay and find a new route where possible by thrusting, slip lining, pipe cracking and directional drilling, plus evaluate the resource consents and access permissions that would be needed from the 3 main parties, NZTA, Ontrack Kiwi Rail, and Regional Council compared with a relining option.

The conventional method was costed out at approximately \$1.2million, with a 2 year planning time frame to gain all required resource consents and find a new alignment route, with an estimated 4 month construction period. This did not include any additional longer term costs that would be binding with any conditions of resource consent.

The structural relining was tendered out with 4 expressions of interest, and 3 parties tendering, with the winning tender and contract being awarded to ANZEL Ltd at \$324,000, (less than a 1/3) with a construction time frame of 3 weeks for all preparation and being completely offsite.

Construction

Construction started in early April 2014 and was complete in May.

The Porirua Works Business Unit, which carries out the day to day maintenance of the networks were also heavily involved in the project, first to learn and understand the process, secondly to access the valve sets and create the access pits for the liner and oversee the day to day servicing requirements to residents.

The main section of liner was pulled through in 2 sections. First was the Highway section from the Eastern side to the middle access pit and then under the railway line, stop banks and stream.

The liner was pulled, formed and cured in 1 day. The main was camered and disinfected, and brought back into service without any hitches. The lining and the process proved incredibly successful.



Relining Pit: ‘Pig Catcher’ in action, catching the forming swabs as they are propelled though the line during the forming and curing process

Conclusions and Learnings

As with the application of any new technology or technique, there were steep learning curves all along the way. These learnings will provide further time and external cost savings for future projects.

Preparation was the key, ensuring everything and everyone was ready and knew their specific roles. The process of continuing to provide an uninterrupted service to customers through the works proved problematic at times, but was worked through and overcome by the Works unit.

The learning process involved, first finding a cost effective and long lasting new structural pipe alternative to conventional methods. Finding and fully evaluating the pros and cons of a number of available proposed structural Watermain liners available worldwide, and then the process of accessing it in NZ and working through the full preparation and construction process with all its twists and turns.

Working within the water industry at the time for Porirua City and now Capacity, as Wellington amalgamates its water services, there is always a keen interest from myself and the much wider industry, in getting more for less in tackling the really difficult jobs. Utilising innovative technologies that helps us renew a critical and ageing services whilst reducing costs of resource consents, disruption to services for residential & commercial customers, disruption to roads & carriageways, reducing the costs of traffic management makes good sense.

After being through this, I am of the belief that this technology is a proven method of structural watermain pipeline renewal and will become the mainstream renewal method very quickly in NZ.

Desmond Scrimgeour

Principle Engineer Water and Drainage Services

