ADOPTING THE FUTURE MORE FOR LESS

Desmond Scrimgeour - Capacity Infrastructure Operations

ABSTRACT

Many Councils are now in the process of ensuring core infrastructure at the heart of its decision making, and it will be a continuing focus for any foreseeable future. In terms of renewing infrastructure, Capacity as network managers for the water services for the 5 Wellington Councils, are required to ensure it remains at the fore front of advancing technology and that its customers are getting the best value in terms of infrastructure renewal for rate payers 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 Aqua Pipe installed by ANZEL Ltd (Aqua Pipe New Zealand Environment Limited).
This has resulted in many benefits including, reduced overall costs, reduce construction time frames, reduced disruption to residents and commercial businesses, reduced design in finding alternative routes, reduced chance of utility strikes, but most importantly, it has given us a cost effective alternative and ability to renew ageing and critical infrastructure in places where conventional methods would have struggled.

KEYWORDS

Southern Water Main Renewal Project, Water main Rehabilitation, Structural Water Main Reliner, Anzel Ltd, Aquapipe

1 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 any foreseeable future. In terms of renewing infrastructure, Capacity as network managers for water services, need to ensure it is at the fore front of technology and that it is getting the best value for rate payers 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 Aqua Pipe installed by ANZEL Ltd (Aqua Pipe New Zealand Environment Limited)

2 SOUTHERN WATER MAIN RENEWAL PROJECT

2.1 BACKGROUND

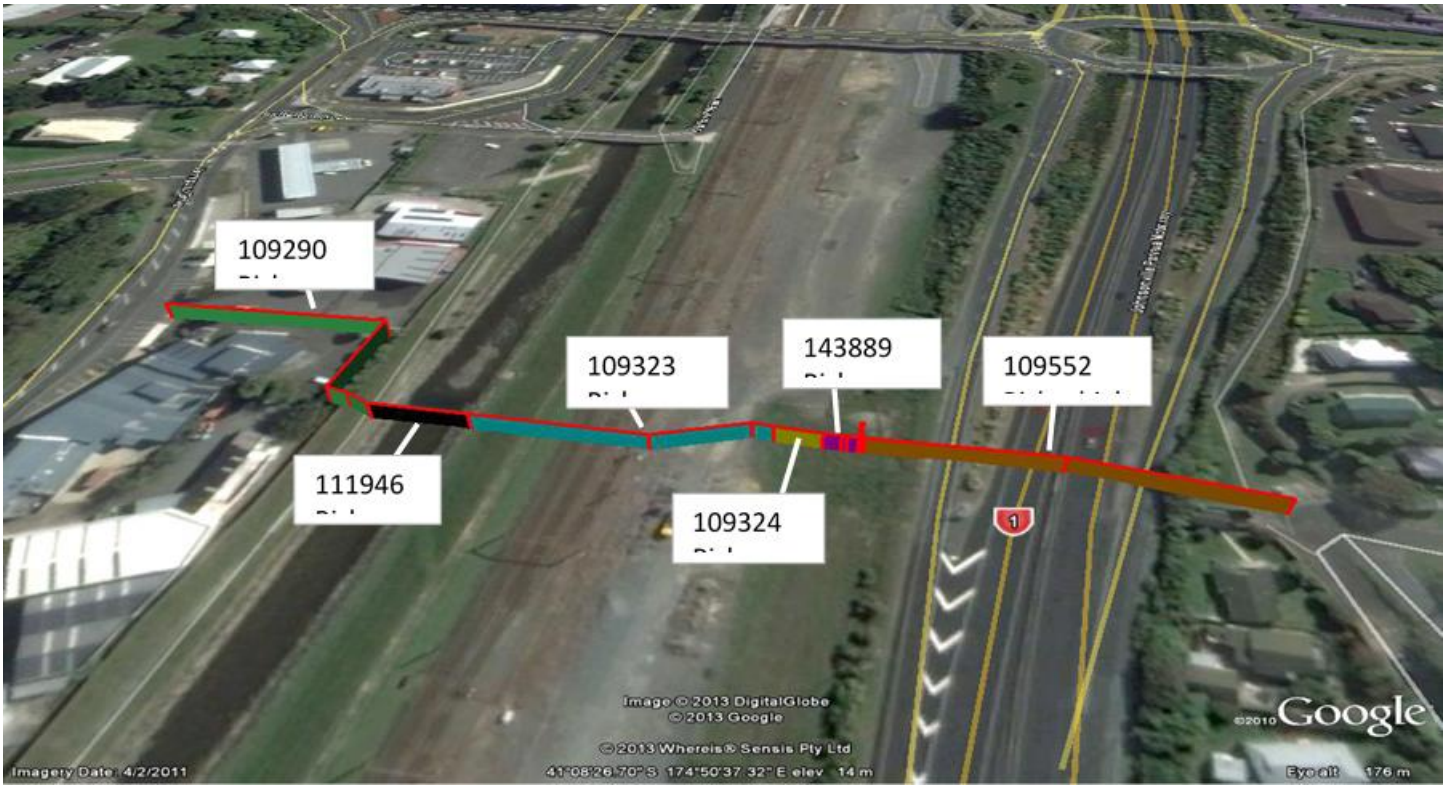
The original water main being relined was laid in the 1950's, from Arawhata St on the eastern side of the State highway where the Photo was taken, to Kenepuru Drive on the Western side. This 250mm line is one of the main water lines to the CBD and Western side of the city. As time has marched on, it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

Now days the water main crosses underneath a much larger and busier State Hwy 1, it passes beneath Kiwi Rail On track land and main railway lines, through the Regional Council Stop banks, underneath the Porirua Stream and back out on to Kenepuru Dr. This trunk main is a vital water feed to the Western side of the city and Kenepuru Hospital.

The Southern main was a mixture of old 250mm AC , Cast iron bends, and 250mm concrete lined steel.

A portion of the main within the Stop banks ruptured in late December 2011, and it's where the journey began to find an alternative and cost effective structural repair method that did not involve dig and lay.

2.1.1 STRETCH OF PIPELINE TO BE RELINED



From the access pits within the orange and white safety barriers, we can see half of the reline required. The photo shows the reline underneath the state Highway 1 before it continues on under the rail lines, the RC stop banks and Porirua Stream.

In the photo 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 aging infrastructure.

New Technology replaces 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 Resource Consent approvals in gaining site access, design costs, the unacceptable disruption of the cutting up of roads and carriageways, reinstatement costs and long maintenance period, the increasing costs incurred with finding alternative routes in already congested streets, costs associated with locating and possibility hitting other utilities, the large costs incurred with traffic and site management, and the overall disruption of services to residents and commercial businesses, due to the long conventional construction time frames. We had to find a new alternative.

With the option of the old dig and lay in many cities and places now a non-realistic approach or option, as seen in the picture, yet an ever increasing focus by Porirua City Council on renewal programmes and upgrading aging infrastructure, newer technologies and methods such as structurally relining old pipes has become widely accepted.

Water main relining, Used extensively in over 350 – 400 cities world wide, as one of the most acceptable and economical forms of water main renewal for the last 15 years or so. Capacity, with Porirua City adopted and introduced the structural Water main lining Aqua Pipe to upgrade its aging pipes.

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

Some of the overall benefits seen and 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 30 -40%** 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

The mayor, Nick Leggett stated in an earlier article, 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 drill, 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 off site.

Construction

Construction started in early April 2014 and was complete in May.
The Porirua Works Business Unit, which carriers 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 from the Eastern side to the middle access pit and then across under the railway line, stop banks and stream.
The liner was pulled, formed and cured in 1 day and left for 12 hours over night.
The main was cured, camered and disinfected, and brought back into service without any hitches. The lining and the process proved incredibly successful.

3 CONCLUSIONS

As with the application of any new technology or technic, there were learning curves for all along the way, ensuring any future installation were more stream lined, and costs and construction time frames tightened up.

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 pro's and con's of a number of available proposed structural water main liners available world wide, and then the process of accessing their merits 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 region amalgamates it's 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. A keen interest from Councils in reducing costs of resource consents, disruption to services for residential and commercial customers, disruption to roads and carriage ways, reducing the costs of traffic management and a progressive trend towards technology that helps us renew a critical and aging service.

After being through this experience, I am of the belief that this technology, a proven method of structural renewal resulting in a new pipe and used in over 350 - 400 cities though out the world for the last 15 years+, this will be seen and become, a cost effective main stream option and renewal method very quickly in NZ.

Inspection of the finished liner

ACKNOWLEDGEMENTS

ANZEL LIMITED

Desmond Scrimgeour