

# Advanced Condition Assessment & Pipe Failure Prediction Project

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### Progress on Activity 1 - Field instrumentation of Sydney test bed

#### Objectives

In Activity 1, we try to answer the question how, where and when pipes fail in a network. Therefore, prediction of pipe failure is central considering internal/external factors. Pressures induced by traffic and ground can have substantial contribution to overall factors that cause pipe failure. In order to examine the behaviour of pipe due to these loadings, field instrumentation is undertaken in Sydney Water (SW) test pipe bed at Strathfield, Sydney Australia. The test pipe is a decommissioned spun cast iron pipe with a diameter of 660 mm, installed in 1922.

#### Site layout

Instrumentation is undertaken on the pipe sections in two pits, a pit located under the road and the other pit in the nature strip. (Figure 1). The data acquisition units are located in a secured cabinet on the nature strip.

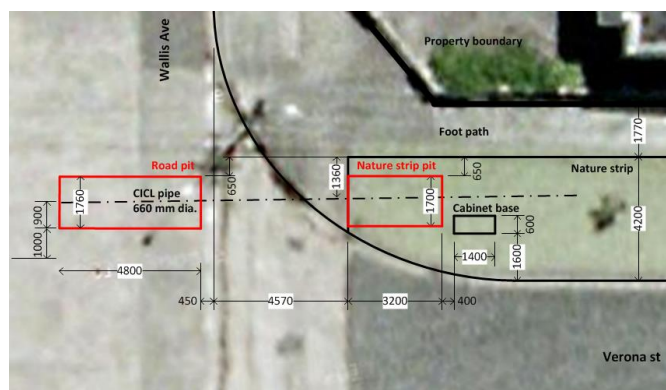


Figure 1. Layout of the site

Measurements from the instrumentation included pipe strain, pipe joint displacement, soil pressure, soil moisture content, and soil temperature. High speed data logging is triggered by traffic events such as a passing truck.

#### Instrumentation procedure

The field instrumentation was completed in a two week period and the process included excavation, installation, backfilling and testing.

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## Truck tests

After instrumentation was completed, the pipe response was measured using the sensor system as pre-weighted trucks were driven at slow speed over the instrumented pipe. Two trucks of different weights were used for the tests on a compacted road base (simulating construction loading conditions) and on a hot mix bitumen surface. Figure 2. shows a truck test in progress.



Figure 2. Truck test in progress

## Preliminary results

The test results showed that the pressure at 100 mm above the pipe crown increased by 90% when the test truck passed over, showing that the pipe can be subjected to substantial pressure under various traffic events.

## Concluding remarks

The field instrumentation at Strathfield in SW Test Bed was completed successfully and sensors are responding to traffic loads. Preliminary results show that pressures induced by traffic and ground are significant. Monitoring of the instrumented pipe will be on-going to study the behaviour of the pipe due to traffic loading and ground movement to assist pipe failure prediction.

## Partners

The partners in this research project include Sydney Water Corporation, UK Water Industry Research Ltd, Water Research Foundation of the USA, Water Corporation (WA), City West Water, Melbourne Water, South Australia Water Corporation, South East Water Ltd, Hunter Water Corporation and Water Environment Research Foundation. Monash University leads the research supported by University of Technology Sydney and the University of Newcastle. Other collaborators include Dr Balvant Rajani from Canada.

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