POST INSTALLATION INSPECTION OF CONCRETE PIPES

ASSET MANAGEMENT FOCUS

James Burgess
Policy and Research Officer –
Client Services, Civil Contractors
Federation (CCF) QLD

Andrew Ruffles
Executive Director of the
Concrete Pipes Association of
Australasia (CPAA)

RISK OF INCREASED COST PRESSURE ON LIVING & HOUSING:

Local Government Stormwater Policies on Post Installation Inspection

Background

The Civil Contractors Federation (CCF) QLD is the peak industry body for the civil construction industry in Queensland. CCF QLD prides itself on being the voice of the civil construction industry and advocates for the interests of the industry to all levels of government. CCF QLD understands the local, state and national issues facing the civil construction industry.

The Concrete Pipe Association of Australasia (CPAA) represents manufacturers of steel reinforced concrete pipe and associated products who are committed to the use of the relevant Australian Standards as the benchmarks in industry. The Association promotes excellence in design, manufacture, application, and technology of steel-reinforced concrete pipe and associated products.

CCF QLD and CPAA have identified industry concerns regarding local government post installation inspection and defects categorisation procedures with reinforced concrete pipes during and after the construction of stormwater drains. Regrettably, these trends have resulted in increasing cost pressures on building materials, infrastructure construction, and property development which will impact on Queenslander’s cost of living.

Local Government Regulations – Australian Standards and Harmonisation

Standards Australia maintains evidence-based industry standards for the manufacture and installation of reinforced concrete pipe in the form of AS/NZS 4058-2007 — Precast concrete pipes (pressure and non-pressure) and AS/NZS 3725-2007 — Design for installation of buried concrete pipes. Adherence to these standards ensures product durability for the life of the asset. In addition, by setting standards for design, manufacture and installation it ensures installation techniques which prevent damage and provide support for the life of the asset.

By contrast, Queensland’s Local Government authorities adhere to their own specifications and regulatory processes which can substantially differ from the appropriate Australian Standards, noted above. As such, the inconsistencies between the authority and Australian Standard lead to installation practices which undermine Stormwater infrastructure quality. Additionally, civil contractors are required to follow an array of local government specifications during the construction of Stormwater infrastructure further complicating the process.

“No Cracks” Policy – Arbitrary and ineffectual

Specific industry concerns have been identified regarding local
government authorities who employ so-called ‘no crack’ policies in their respective specifications covering Stormwater Drainage installation. ‘No crack’ policies include caveats which allow for hairline, crazing and shrinkage cracks. However, these ambiguous statements are often open to subjective interpretation by local government officials who undertake the post-installation review process.

In contrast to the individual local government specifications, the Australian Standard AS/NZS4058:2007 – Precast Concrete Pipes (Pressure and non-Pressure) addresses reinforced concrete pipe quality and defects classification. The Standard is performance based and requires the pipe manufacturer to carry out a number of tests to demonstrate compliance. The acceptable design crack width within Australian Standards is 0.15 millimetres measured as set out in the Standard. In addition, evidence shows acceptable design cracks have no significant effect on the performance of an installed pipeline. ¹

Cracking in concrete pipes can be caused by a number of factors during the construction and installation process. The CPAA provides guidance on the assessment, categorisation and remedy for such cases.² Hairline and circumferential cracks do not threaten the structural integrity of the pipe and often repair themselves. This self-repair process is known as autogenous healing and is well documented worldwide.³

Local government authorities often misdiagnose localised hairline cracks as those which undermine a pipes long term structural integrity. As such, the disqualification of all cracks now occurs due to a failure by local governments to accept evidence and through inflexible and arbitrary criteria such as a “no cracks” policies. This makes no sense when the pipe is designed to limit cracking to 0.15 millimetres under its design or service load. Inflexible and arbitrary judgements; lacking evidence, lead to the imposition of demands on

¹ CPAA, Engineering Guideline. The facts about cracking in steel reinforced concrete pipes.
³ CPAA - Technical Brief. Autogenous Healing.
⁴ CPAA, Technical Notes, Crack Measurement by CCTV – The Facts, and American Pipe Association video
local civil contractors such as the requirement for unnecessary and costly repair or removal of newly installed pipe.

CCTV as an Inspection Method
Local Government authorities often utilise Closed Circuit Television (CCTV) technology to inspect installed pipes in order to confirm acceptable condition of the asset after the installation period. CCTV can be an effective technology for inspection of concrete pipes which provides visual evidence of circumferential, longitudinal and other cracks in addition to poor installation, obstructions, misalignment and catastrophic damage.

Local government authorities are additionally employing CCTV to assess the serviceability of concrete pipes and to measure potential cracks. However, current CCTV technology is not able to accurately measure crack width or, importantly, depth in concrete. Furthermore, engineering experts have conducted research on CCTV accuracy which resulted in the consensus view that CCTV did not produce images of the required resolution to measure cracks at the accuracy necessary.

Civil contractors, suppliers and industry groups have indicated concern over the increasing use of CCTV for crack measurement by Local Government authorities.

Education and Training
Industry stakeholders have indicated that local government staff members responsible for quality control measures following the installation of concrete pipes often make subjective arbitrary decisions regarding cracks. The combination of unclear specification and inappropriate CCTV technology leads unqualified staff members to compel civil contractors to remove or repair newly installed drainage systems. Regardless of the intent of local government ‘no cracks’ policies, staff members often impose subjective arbitrary decisions based on spurious evidence.

In addition, quality control investigators often make casual assessments of what constitutes a ‘crack’ using rough eyeball judgements. As a consequence, civil contractors are faced with prohibitively high costs to their business when directed carry out unnecessary repairs.

An improvement in contractors, sub-contractors and local government staff member’s education and knowledge is required to ensure the installation of quality Stormwater infrastructure. A lack of training has resulted in installation practices which undermine the usability to the asset which imposes an unnecessary cost burden on rate payers. As such, there should be a mandatory requirement for the provision of quality training aligned to national standards in civil construction pipe laying.

Increasing Cost Pressures
The above trends have resulted in major short and long term cost pressures on Queensland’s communities through avoidable costs on local governments, civil contractors and on property development. Queensland’s civil construction industry is negatively impacted when local governments require repairs on newly installed reinforced concrete pipes.

In addition, these trends have also resulted in delays on local government infrastructure development imposing costs on ratepayers. Industry members and local governments are also increasingly using alternative materials for storm water drainage construction which will now result in shorter asset life spans which will impose longer term cost factors on Queenslanders.

Civil contractors ultimately pass these costs onto property developers which greatly contribute to higher housing costs. Further, delayed local government infrastructure projects impact on property development timelines and consequently leads to dramatic increases in housing costs for Queenslanders. These unnecessary costs occur at a time when cost of living pressures for first home buyers are already excessively high.

Recommendations
We propose the following recommendations:

- Local Governments should revise “no crack” policies to reflect evidence-based Australian Standards and acceptance criteria. Terminology should change to ‘defects classification’ in preference to ‘crack’.

- Local Government Works Inspectors should be trained to understand the conditions

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4 CPAA, Technical Notes, Crack Measurement by CCTV – The Facts, and American Pipe Association video
regarding what constitutes a defect or ‘crack’ – as stated in the local government specifications.

- Local Government authorities should ensure a transparent evidence-based process for classifying defects and ensure this aligns with the relevant Australian Standard.

- Queensland’s local governments should begin a process of harmonisation by aligning their regulations and policies with the Standards Australia’s AS/NZS4058:2007 – Precast Concrete Pipes (Pressure and non-Pressure) and AS/NZS 3725-2007 — Design for installation of buried concrete pipes.

- CCTV should be recognised as an effective tool for identifying gross defects but also be recognised as having limitations when being used to accurately define minor crack widths.

- A mandatory requirement should be initiated for the provision of quality training aligned to national standards in civil construction pipe laying for contractors and Local Government employees.

References

- Autogenous Healing, Technical Brief. Concrete Pipe Association of Australasia.

- Circumferential Cracking, Engineering Guideline. Concrete Pipe Association of Australasia.

- Longitudinal Cracking, Engineering Guideline. Concrete Pipe Association of Australasia.

- Post Installation Inspection, American Concrete Pipe Association. Retrieved from https://www.youtube.com/watch?v=ffv1gP4LyCs.