

## Life Liners: Performance and Design of Cured in Place and Sprayed Liners for Rehabilitation of Municipal Pipe Systems



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**Queen's University, Kingston, Canada**

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12:00 pm to 1:00 pm

Lecture Theatre E14, Engineering Core, UC, Croyke Rd

University of Canterbury

**Abstract:** Over the past forty years, a variety of new liner systems have been developed and used to rehabilitate municipal pipe infrastructure such as sewers, culverts, water pipes and maintenance holes. Unfortunately, with only a few exceptions, rational design methods have not yet been developed for most liner products, and few have been tested up to their strength limits. This presentation presents an overview of recent research aimed at resolving these issues for four different liner systems:

1. The shortcomings of design methods for cured in place pipe (CIPP) sewer and culvert liners are outlined, and then illustrated using a recent experiment on a cured in place pipe liner installed within an elliptical corrugated steel culvert.
2. The performance of CIPP liners within cast iron water pipes is then discussed for cases when the liner is intended to protect the water pipe against permanent ground movements. A new closed form solution is presented, permitting strains to be estimated where the liner spans between pipe segments or across ring fractures.
3. Full scale testing to measure the strength of sprayed cementitious sewer and culvert liners is described. A new design procedure for selection of liner thickness is then outlined.

The presentation works to explain the strength limit states controlling each of these liner applications, and is illustrated with new experimental measurements and design procedures.

**Bio:** Trained in Australia, Dr Moore has been Canada Research Chair in Infrastructure Engineering at Queen's University since 2001. His more than 300 publications examine conventional and trenchless construction of new and deteriorated municipal and energy pipelines, contributing to North American and other international codes of practice. Research includes work clarifying the strength of new, deteriorated and repaired pipes, contributions to behaviour of pipe pipes pulled into place using slip lining, pipe bursting and horizontal directional drilling, and studies of culverts, sewers, water pipes and maintenance holes. Ian recently started a five year term as Head of the Department of Civil Engineering at Queen's, and is also the Executive Director of the GeoEngineering Centre at Queen's – RMC, North America's most productive group of geoenvironmental scholars.

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