

Research & Development Highlights

Linear Infrastructure Renewal

Introduction

Linear infrastructure describes the facilities and pipelines for water supply distribution, and wastewater collection and disposal. This includes water intake apparatus, treatment plants, water lines, valves, pumps and house connections, and all stormwater and sanitary sewage collection, impoundment and treatment systems.

In Canada the average age of water mains and sanitary sewers is estimated at thirty-seven years. The life span of sewers is between fifty and one-hundred years. Water supply and sewer systems have reached a point where maintenance and renewal is imperative. In the past, municipalities implemented short-term solutions for failing linear infrastructure with little regard for the life of system. There is now a need to optimize performance and extend the lifespan of existing facilities

Description of Publication

This publication examines the history and state of presents infrastructure systems. Innovative and cost-effective technologies, materials, equipment and management strategies are explored in relation to maintenance, upgrading, replacement and funding of water and sewer systems. The role of government, municipalities, and the private sector is discussed, along with the potential for development of an information base of available technology.

Urban growth requires the continual linear expansion of traditional water and sewer systems. Although existing technology will not be rejected, the continued application of traditional approaches will require large

capital investment.

Existing facilities and systems are deteriorating. The present estimated cost across Canada for infrastructure renewal and rehabilitation is at least \$15 billion. Planning for this renewal has been inadequate and the need for renewal comes during a period of fiscal restraint, inadequate utility pricing and lack of information on cost-effective technical improvements.

Future urban development may be influenced by technological advancement. New types of materials, construction, retrofit, and monitoring used in other industries need to be explored and adapted for water and sewer systems. While Federal agencies set guidelines for drink water quality, municipalities, the end users of water and wastewater systems, could adopt and apply research to the design, construction and management of infrastructure.

Even though the new technologies exist, there are a number of barriers to change. Utilities have traditionally been operated by public entities with an emphasis on cost control - there is an interest in keeping the system operating with tried and true methodology. Contracts for maintenance or replacement work are tendered competitively

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and are generally awarded based on experience and lowest cost rather than on innovation in installation. Effort is aimed at minimizing risk. The contractor who has the equipment and who has done it before has the advantage.

Funding for municipal infrastructure operation is another issue to which consideration should be given. Alliances between Canadian municipalities and the private sector could be formed, as has been in place in Europe for years, to implement innovation in linear infrastructure.

Canadian companies involved in the

refurbishment or replacement of linear infrastructure systems must meet demanding conditions for their products and services. Once this industry has become viable and innovative at home, these companies can enter major foreign markets for infrastructure development. Proven experience at home with new technology will assist with acceptance and application to other rapidly growing and urbanizing countries.

Impact to the Housing Industry

Cities cannot afford to expand outward, but must grow inward and upward. A winning design of the 1992 CMHC Healthy Housing Design Competition was an urban infill home requiring no support from municipal energy or infrastructure grid systems. These needs were met instead through a number of innovative technologies requiring changes to both current building codes and homeowner lifestyles. It is expected that this trend will continue to grow in the future calling for changes to the industry mindset of today.

Project Manager: Alvin J. Houston

Research Report: A Synthesis of Technical Research and its Potential for Application in Linear Infrastructure Renewal (1994)

Research Consultants: CH2M HILL Engineering Ltd.

A full report on this research project is available from the Canadian Housing Information Centre at the address below.

Housing Research at CMHC

Under Part IX of the National Housing Act, the Government of Canada provides funds to CMHC to conduct research into the social, economic and technical aspects of housing and related fields, and to undertake the publishing and distribution of the results of this research.

This factsheet is one of a series intended to inform you of the nature and scope of CMHC's technical research program.

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