

Asset management and life cycle cost analyses combine to abate water main failures

By David Beck

A sset management, a time-honored tool for decision-making in the business sector, has more recently found its way into public works management. Quite likely the most effective way to improve the cost-efficiency of virtually every expenditure, the relevance of asset management for public works infrastructure was revealed in the most recently revised government accounting standards which now consider infrastructure elements (water and sewer service, roads, bridges and such) as manageable assets. This new paradigm and the subsequent use of asset management practices has resulted in substantial economic benefits to municipal governments across Canada, the United States, Australia and many others.

Asset management benefits in public works management

The significance of asset management in public works administration became evident when the US General Accounting Standards Bureau issued its Statement No. 34, *Basic Financial Statements – and Management's Discussion and Analysis – for State and Local Governments* in late 1999. One of its requisite items required municipal governments to financially account for capital assets in a manner equivalent to private industry practices. Given the historical absence of particulars, public works managers were then poorly equipped to accurately plan future needs and budget expenses.

Asset management techniques promote more astute decision-making for new and/or rehabilitation projects so that they provide the most favorable long-term economic benefits. Consider this definition of asset management by the US Federal Highway Administration: "... a systematic process of maintaining, upgrading, and operating physical assets cost-effectively. It combines engineering principles with sound business practices and economic theory, and it provides tools to facilitate a more organized, logical approach to decision-



making. Asset management provides a framework for handling both short and long-range planning."

The asset management philosophy views infrastructure elements as community investments and, as such, efficient use of capital is elemental. Whether in government or industry, good business practice always involves evaluating alternatives to determine which will meet the intended service requirements for the least cost over its expected service life.

"Life Cycle Cost Analysis", "Life Cycle Costing" and "Value Analysis"—all introduced some five decades ago—

are worthwhile evaluation techniques for estimating the total ownership cost (initial cost plus predictable operating/maintenance expenses) for the life of a system, thereby assisting with decisions about how to invest limited resources. As a component of asset management practices, these are the highly effective ways to evaluate alternative products/systems. In the course of such analyses, historical data for the various life-cycle elements – such as maintenance costs, repair frequencies and longevity – for systems in similar operating conditions are essential points.

The maintenance cost of old water mains

The asset management viewpoint is especially important for underground infrastructure such as sewer and water services. Repairing water main failures usually involves substantial emergency attention, extensive excavation and equipment. Moreover, these almost always result in traffic disruption and significant lost water revenues.

About a decade ago, the National Research Council of Canada (NRCC) attempted to survey over 30 major Canadian municipalities in order to quantify the types and consequences of water main breaks. Perhaps not surprisingly, nearly one-third did not keep records of the number of water line failures nor the repair costs. Nearly two-dozen cities did respond, however, and provided enough information to develop a reasonably good estimate of the nationwide effects of water line failures.

The data showed that water line breaks were costing Canadian municipalities \$82 million annually (based on an estimated labour and material cost of \$2,500 per failure in 1995 dollars). Furthermore, the Federation of Canadian Municipalities estimated that these resulted in some \$650 million dollars in lost water revenues nationwide.

More recent information is available from the City of Winnipeg (www.winnipeg.ca/waterandwaste/water/main-breaks.stm#10). They report that their current cost for repairing a water main break is approximately \$4,000 per instance. By applying this repair cost to the foregoing analysis, the estimated annual present-day cost of water main breaks increases to about \$1.3 trillion nationally. Further, by estimating that water values increase proportionally with cost of living indices, lost water revenues associated with these breaks rise to \$910 million. By these estimates, water main breaks are costing Canadian municipalities over \$2 trillion dollars annually.

An alternative technology

PVC pipe technology was introduced to North America in the late 1940s and was certified by the National Sanitation Foundation (now NSF International) as suitable for potable water systems in the 1950s. The use of PVC pressure pipe in municipal environments has become so prevalent that the Uni-Bell PVC Pipe

Association estimates that PVC pipe currently accounts for approximately 70 per cent of the footage installed for buried potable water distribution and transmission systems. Municipalities worldwide have reduced their water line operating and maintenance costs with PVC pressure pipe.

Managing your infrastructure

The most efficient public utilities are quite often those that embrace newer managerial practices and modern technologies. Increasingly, public works de-

partments are discovering that combining proven business-oriented programs with more cost-efficient materials and operating techniques can substantially improve their overall proficiency. This leads to lower operating costs, enhanced services, lower construction and maintenance expenses, and, best of all, a better community.

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