

Lifecycle Analysis and Capital Planning using Asset Condition and Deterioration

Geoff Linschoten – Senior Project Director

Earth Tech Inc.

105 Commerce Valley Drive West, Markham, ON L3T 7W3

Situation

With the onset of aging infrastructure, strict regulations and limited budgets, the task of managing municipal infrastructure and maintaining the expected quality of service, is becoming an onerous responsibility. However, the ability for municipalities to provide a quality level of service with limited resources is greatly enhanced with the understanding of how linear assets are managed throughout their life cycle.

The methods that organizations use to manage infrastructure assets follows a natural progression that ranges from a gut feel of the re-investment levels for the infrastructure network, to fully integrated asset management tools. As an organization moves from reactive “best guess” systems at one side of the asset management spectrum to more predictive approaches, incremental “wins” can be realized.

As knowledge of the condition and performance of the infrastructure network expands, the vast amounts of data being collected can be utilized ensuring that we move closer towards the objective of developing a sustainable and reliable water and wastewater system in the most efficient way.

Action

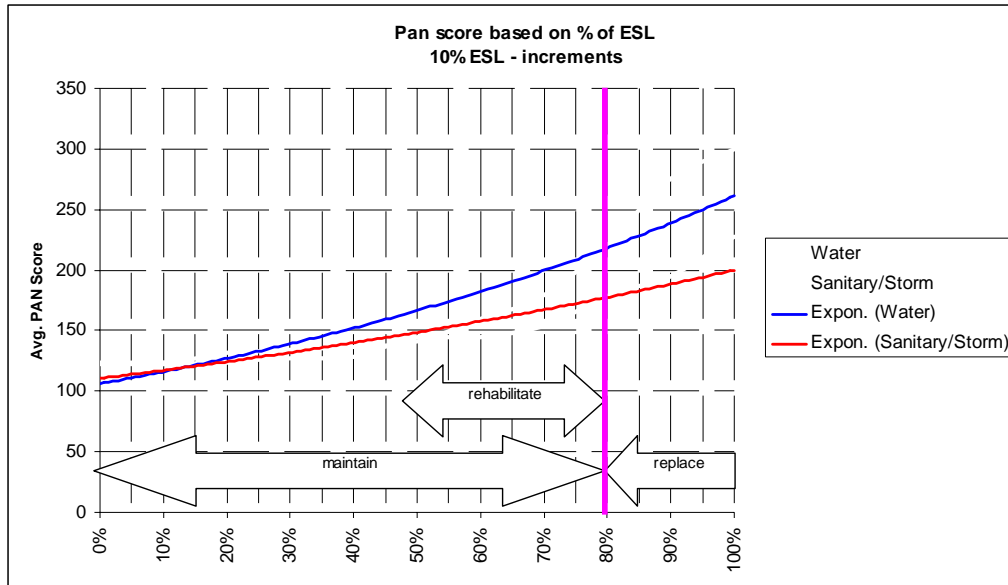
A capital replacement/rehabilitation prioritization tool (Capital Asset Prioritization System - CAPS), has been developed by Earth Tech Canada to assist water and wastewater agencies with the capital planning, prioritization and forecasting of projects,

This application is currently being utilized by numerous municipalities across Southern Ontario.

The application, methodology and database were developed in an open ended application, MS Access. The application is used to evaluate and rank linear infrastructure assets by developing a prioritized list of mains for rehabilitation or replacement. The application uses existing water and wastewater system inventories managed within GIS or other inventory systems in conjunction with operational databases such as hydraulic models or CCTV. Through the development of a customizable algorithm that is tailored to meet the current and/or future capital planning/budgeting processes of the organization, data relating to asset structural condition (break records, pipe samples), performance condition (hydraulics, customer complaints), and criticality or risk criteria (impact of failure) for the water and wastewater systems is captured and analyzed. Each pipe segment within the system is then given a Priority Action Number (PAN) that describes the current condition of the main and helps determine the priority for corrective action. Information can be linked to GIS for visual representation, or can be exported to other systems for further analysis.

With the generation of pan numbers and by comparing the PAN numbers against an Agencies operational practices or philosophies, trigger points can be established that will indicate when a main will or could require maintenance, rehabilitation or replacement.

Refer to the graph below.



Results

The development of the methodologies and use of systems such as CAPS will help organizations meet the following objective: Ensuring that infrastructure is optimized through its overall life cycle through clear definitions of how assets will be managed; Ensuring funds are identified and adequate financial reserves are accumulated to support the rehabilitation and replacement needs of infrastructure; Ensuring asset management practices result in effective management of infrastructure; and appropriately leverage existing technology, tools, and data used by the organization.

The purpose of this paper will illustrate a progression toward an asset prioritization methodology and describe how data currently available can be analyzed. The paper will also focus on the development of the scoring algorithms and the CAPS application, and will discuss key data input parameters such as GIS databases, hydraulic modeling, condition assessment, prediction tools, macro-micro level financial analysis tools, while highlighting the lessons learnt along the way.