Predicting the Remaining Economic Life of Wastewater Pipes: Phase 2 Development of a Robust Wastewater Pipe Performance Index

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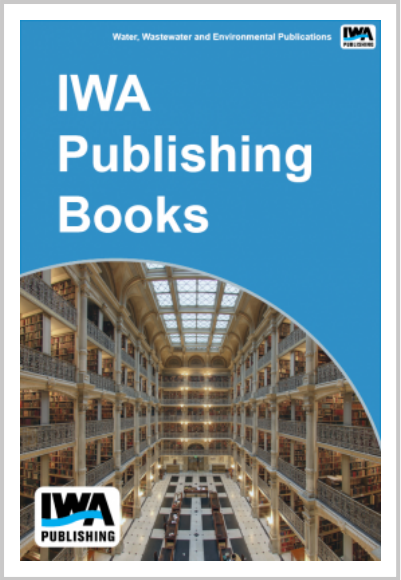

Water plays a critical role in every aspect of civilization: agriculture, industry, economy, environment, recreation, transportation, culture, and health. While clean water and sanitary conditions remain an elusive luxury in many parts of the world, we, as Americans, take them for granted. Much of America's drinking water and wastewater infrastructure; however, is old and deteriorating. A crisis looms as our demands on these systems increase. The costs associated with renewal of these aging systems are staggering. There is a critical disconnect between the methodological remedies for infrastructure renewal problems and the current sequential or isolated manner of renewal analysis and execution. This points to the need for a holistic systems perspective to address the renewal problem. Therefore, new tools are needed to provide support for water infrastructure decisions. Such decisions are necessary to sustain economic growth, environmental quality, and improved societal benefits.

Accurate prediction of wastewater pipe structural and functional deterioration plays an essential role in asset management and capital improvement planning. The key to implementing an asset management strategy is a comprehensive understanding of asset condition, performance, and risk profile. The primary objective of this research is therefore to develop protocols and methods for predicting the remaining economic life of wastewater pipes. This report presents a development of a robust performance index for wastewater pipes, including physical/structural, operational/functional, environmental and other parameters, for not only the pipe, but also the entire pipe system. An analysis of data from participating utilities was done to establish the statistical significant of each parameter. These parameters are grouped into pipe properties, internal environment and external environment. The proposed performance rating system evaluates each parameter and combines them mathematically through a weighted summation and a fuzzy inference system that reflects the importance of the various factors. The Performance Index comprises of structural and functional index, and each index evaluates pipes in scale from zero to five, in the pipe rating scale zero indicates the worst condition whereas five indicates the best condition.

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