

Smart Water Main Inspection and Condition Assessment Using a Systematic Approach for Pipes Selection

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Abstract : Water infrastructure deterioration can result in increased operational costs owing to increased repair needs and non-revenue water and consequently cause a reduced level of service and customer service satisfaction. Various water main condition assessment technologies have been introduced to the market in order to evaluate the level of pipe deterioration and to develop appropriate asset management and pipe renewal plans. One of the challenges for any condition assessment and inspection program is to determine the percentage of the water network and the combination of pipe segments to be inspected in order to obtain a meaningful representation of the status of the entire water network with a desirable level of accuracy. Traditionally, condition assessment has been conducted by selecting pipes based on age or location. However, this may not necessarily offer the best approach, and it is believed that by using a smart sampling methodology, a better and more reliable estimate of the condition of a water network can be achieved. This research investigates three different sampling methodologies, including random, stratified, and systematic. It is demonstrated that selecting pipes based on the proposed clustering and sampling scheme can considerably improve the ability of the inspected subset to represent the condition of a wider network. With a smart sampling methodology, a smaller data sample can provide the same insight as a larger sample. This methodology offers increased efficiency and cost savings for condition assessment processes and projects.

Keywords : condition assessment, pipe degradation, sampling, water main

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