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Decision-making framework for sewer pipeline maintenance based on social and environmental changes

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Many serious problems such as sinkhole, inundation, water pollution occurred because of the deteriorated sewer pipelines are all over the world. Climate change, furthermore, makes the problems worse. The American Society of Civil Engineers announced that the USA earned a grade of 'D' in sewer pipelines in its 2013 Report Card for America's Infrastructure. According to Seoul of the South Korea, almost 80% of the entire sinkholes occurred because of the deteriorated sewer pipelines and 48% of the 5,023 km sewer pipelines are over 30 years old. Especially the serious problems occurred because of the deteriorated pipelines. However, there is a budget deficit for repairing the sewer pipelines which are needed to be treated immediately. Additionally, social impact measurement has received most attention recently. This paper presents decision-making framework for asset management of sewer pipelines in regard of social return on investment. First, this paper identifies the factors in line with technical, environmental, social and economic level of service. Second, analyzing the condition of sewer pipelines are conducted using the GIS database of Seoul. Third, the priority of asset investment for sewer pipelines is determined using a genetic algorithm. It is anticipated that when one need to decide the asset investment, overall efficient division of asset can be possible as a result of considering the social impact.

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An Experimental Study on Ammonia Removal Characteristics of Zeolite-amended Porous Concrete

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Water treatment plants often suffer a great deal due to high concentration of ammonia in raw water. Previous studies on water purification characteristics of Porous Concrete lack information on its ability in reducing ammonia concentration in water. Adsorption property of Porous Concrete under different flow rate of water was focused in this study to evaluate its ammonia reduction capacity in synthetic wastewater. Improvement of adsorption property of Porous Concrete was tried to achieve by using different percentages of zeolite partly instead of cement. Under lower loading flow rate, Porous Concrete containing 25% zeolite reduced initial ammonia concentration by 97% whereas Porous Concrete without zeolite reduced ammonia concentration by 41%. For Porous Concrete containing 5% and 15% zeolite, initial ammonia concentration was reduced to 72% and 82% respectively. At the end of 24 hour of experimental run, 31%, 37%, 51% and 60% reduction of initial ammonia concentration was achieved for Porous Concrete with 0%, 5%, 15% and 25% zeolite respectively. Ammonia reduction capacity reduced to 89% and 39% for Porous Concrete containing 25% and 0% zeolite under higher loading flow rate of water. Initial ammonia concentration reduction under higher loading flow rate were 37%, 33%, 38% and 48% for Porous Concrete containing 0%, 5%, 15% and 25% zeolite respectively. A minor variation of pH was observed during both experimental runs. It is evident from the result that adsorption property of Porous Concrete is effective enough in reducing ammonia concentration in water.

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