MODELING THE PERFORMANCE OF SUSTAINABLE SANITATION SYSTEMS USING BUILDING INFORMATION MODELING

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Abstract

Having a reliable sanitation system is one of the aims of both developed and developing countries. This goal cannot be reached effectively without handling it in a sustainable manner. Considering the fact that Egypt is the highest water consumer and sewage producer in the region makes it even more challenging to work on this quest. The main problem which faces the sanitation municipalities in Egypt is that most of the sanitation infrastructure is aging because it was built in the first half of the previous century. This research aims at presenting a framework for planning sustainable sanitation collection and treatment systems through the utilization of Building Information Modeling (BIM), Building Performance Modeling (BPM) and Computer Simulation (CS). Firstly, the procedure of using BIM and the difference between BIM workflow and drafting-centric workflow are demonstrated to ensure clear understanding of the new system, Building Performance Modeling is utilized to model an anaerobic sewage treatment plant, and then the outputs of the model are presented. Information models of a part of a sewer network and an anaerobic treatment plant are introduced to show how Building Information Modeling can improve the sustainability of the system. Also, a simulation tool is presented to model the flow in the sewer network to help in monitoring the pipeline's performance, and condition. In addition, it aids in detecting any failures in the system and in guiding the operator to the most suitable rehabilitation or replacement technique to deal with the detected failure. Finally, a solar study is introduced to replace the auxiliary electrical loads of the buildings in the wastewater treatment plant with solar energy to enforce the environmental and economical dimensions of sustainability.

Keywords: building energy performance, building information modeling, sustainable sanitation systems, solar exposure analysis

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