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(57) Abstract :
ABSTRACT OF THE INVENTION (to be given along with complete specification on separate page) ~he present invention provides an optimized design framework for gravity-based sewer networks that integrates key engineering parameters through a computational modelling approach. The system incorporates flow-related constraints (Block 1 02), material selection (Block 103), trench depth optimization and the strategicplacemen of lift pumping stations (Block 104), culminating in an optimized sewer layout (Block 1 06). Optimal flow performance is achieved by maintaining a depth-to-diameter ratio (d/0) between 0.7.and 0.8 and a velocity range of 0.8 to 1.0 m/s (Block 102). The invention evaluates alternative pipe material combinations (Block 1 03), identifying Stoneware & Concrete and uPVC & Concrete as more financially favorable options. An optimal trench depth range of 5 to 6 meters is established, beyond which lift stations are introduced to ensure system reliability (Block 104). The computational model (Block 1 05) integrates all variables including flow conditions, material selection, and pumping station requirements. Life cycle cost (LCC) analysis over a 30-year period (Block 104) supports long-term sustainability. The resulting design (Block 1 06) demonstrates a 10.28% cost reduction compared to traditional approaches without compromising performance

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