

OPTIMAL DESIGN OF PIPE NETWORK FOR CONVERTING EXISTING NETWORK INTO 24 X 7 WATER SUPPLY SYSTEM NETWORK

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ABSTRACT

The pipes used in water distribution system are the largest investment. The design, modeling and optimization of pipes in water supply system are very important from an economic point of view. Therefore, in this paper, optimal design of pipe network for converting existing network into 24 x 7 water supply system networks is carried out for reducing the cost using Water GEMS software. Initially, analysis of existing water supply network system is carried out for one zone (Takali Zone-10) from Pandharpur region. The effect of forecasted population on the demand, head loss gradient and pressure development is studied. Further, cost optimization of pipe network is carried out for proposed 24 x 7 water supply system by using Darwin optimization approach, which is based on genetic algorithm. This analysis is carried out for immediate stage-2015, intermediate stage-2030 and final stage-2045. From the analysis, it is observed that, as population increases from year 2015 to 2045, the demand, head loss gradient and pressure development increases. From the Darwin optimization approach, it is observed that the maximum cost reduction of 33.45% is achieved.

KEYWORDS: Water Distribution Networks, Demand, Pressure; Head Loss, Cost Reduction, Optimal Design

Article History

Received: 19 Nov 2019 / Revised: 23 Nov 2019 / Accepted: 30 Nov 2019
