

## **ABSTRACT**

Any malfunction in sewage collection and transport may deteriorate the life of the society. Today the problem is most severe in developing country because of globalization and urbanization. The need of increase in the effectiveness and reliability of the sewage collection and disposal makes it vital to design the sewer lines and with the optimal cost of construction and operation.

Cost optimization now is becoming critical for better service. As a result, it has become an increasingly more complex task to intelligently and efficiently manage sewerage system design in ways that maximize a system's reliability and minimize its operational and management cost.

Recently, a most of the research has focused on the optimal design or upgrade of the sewerage system. It is started by a simple model linear programming, nonlinear programming, up to a slightly sophisticated Genetic Algorithm and so on, However, much of the recent, Ant Colony Optimization for the determination of low-cost sewerage system designs has been shown to have several advantages over more traditional optimization methods.

The objective of this thesis is to demonstrate that the ant colony optimization algorithm can be used successfully in the design of sewerage system based on fixed layout to minimize the overall cost of the scheme and at the same time provide a reliable and better service to users. In this thesis, a powerful and new intelligent evolution methods, called ant colony optimization (ACO) is adopted for solving the optimization problem. The proposed method was inspired by the natural behavior of the ant colonies. How they find the food source and bring them back to their nest by building the unique trail formation. The algorithm required for carrying out the steps of the ACO is not unique. In this research, a new algorithm for ACO has been proposed. The proposed algorithm is programmed in FORTRAN language and then, the Ant Colony Optimization algorithm is applied to the sewerage system design through the optimization of the objective function.