**AN ALIGNMENT OF OPTIMIZATION MODEL FOR A SIMPLE HIGHWAY NETWORK**

**ABSTRACT**

A new highway addition to an existing road network is typically considered for improving traffic performance in that road network. However, finding the new highway that best improves the existing network is a very complex problem since many factors affect the road construction. Besides changes in traffic flow patterns due to the new highway, various costs associated with highway construction as well as design specifications, safety, environmental, and political issues affect such a project. Until recently, many studies have dealt separately with the problems of highway alignment optimization and network design. However, no models have been found that integrate these problems comprehensively and effectively. This dissertation seeks to find a realistic three-dimensional highway alignment that best improves an existing network, while considering its costs, geometric design, and environmental impacts on the study area. To fulfill this objective, an effective network model is developed that can simultaneously optimize (i) highway alignments and (ii) junction points with existing roads. In addition, the model's optimization process considers traffic impacts due to the highway addition as well as factors associated with its construction.