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TITLE OF DIPLOMA THESIS:

Multi-criteria comparison of alternative designs of the "Underwater Road Artery of Thessaloniki"

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ABSTRACT

The large-scale project of "Thessaloniki Underwater Road Artery" provides the construction of an underwater tunnel, which is intended to bypass the congested center of Thessaloniki, by the side of Thermaic Gulf, in order to decongest it, by taking on the most of the East-West car traffic which currently has to cross the city center. The Project aims to contribute decisively to the alleviation of traffic congestion in the whole central city, to the reduction of air pollution and generally to the improvement of quality of life in the city. In the present Study two alternative design concepts of the Project, proposed in different periods, are comparatively examined. The first design concept of the Project consists of an underwater tunnel across the Thermaic Gulf, whose western end will be at the port area in West Thessaloniki, while the eastern end will be close to the "Makedonia Pallas" hotel, in Central East Thessaloniki. On the other hand, the second concept that is examined has an initial part which is quite similar to the first Project, yet it provides a significant extension of the whole project; This is achieved by an additional underwater tunnel, and by a long floating bridge, which ends up in East Thessaloniki in the district of Kalamaria, having the function of the city's peripheral ring road by the side of Thermaic Gulf. The purpose of this Study is to perform a comparative evaluation of these two alternative design concepts that have quite different concepts, targeting, sizes, costs and also different impacts for the city. The comparative evaluation takes place by performing a multi-criteria analysis, and specifically the method of Analytic Hierarchy Process (AHP). In the context of the multi-criteria analysis, the hierarchy of the problem is being structured, while suitable criteria that concern all the main aspects of impacts of large-scale road projects are inserted and afterwards are weighted. Depending on the extent of their correspondence with these weighted criteria, the two design concepts are evaluated in a systematic way and, using the algorithm of AHP, they receive their final rankings. The result of the process is that the design project with the highest ranking is the second one, which consequently is chosen for implementation. At the end of the process, a sensitivity analysis concerning the evaluation criteria is performed, in order to check up the validity of the result. Indeed, the analysis validates the dominance of the second design project.

KEYWORDS

Underwater Road Artery, Design of road infrastructure, Comparative evaluation, Multi-criteria analysis, Analytical Hierarchy Process

