



ACADEMIC YEAR 2017 – 2018

TITLE OF DIPLOMA THESIS:

Risk analysis of technical projects: Application to flood protection works.

AUTHOR: Valentina Vakouftsi

ABSTRACT

In this diploma thesis is studied the reliability of technical works that their main purpose is protection of the landside against flooding. The analysis done is primarily focused on levee systems. A decisive role in designing and constructing a levee plays the proper identification of the risk factors in which the construction will be exposed, that in our case is flooding. Flooding is a constant threat to such technical projects, and it will be worse in the future as the rates of occurrence of this phenomenon become more and more intense. The difficulty in this case lies in determining in a precise way the maximum flood water elevation, which appears to have a direct impact on the levees' strength, as well as on its failure mode, and consequently on its effectiveness in protecting the downstream areas from imminent floods. In view of the above difficulties, and given that climate change is a phenomenon that is difficult to reverse, an attempt is made to formulate a methodology with concrete steps that lead to the estimation of the reliability of a levee system by calculating the probability of failure at any given flood water elevation. The application of this probabilistic analysis to civil engineering is still an emerging technology, particularly in geotechnical engineering and even more in the implementation of levees. Much experience remains to be gained and the appropriate form and shape of probability distributions for most of the relevant parameters is not known for certain. The methods described below should not be expected to provide the exact value of probability of failure, but they can provide information on relative reliability if reasonable assumptions are made.

KEYWORDS

levees, dams, dykes, failure modes, levee system evaluation, probability of failure function, natural disasters, flood, reliability of levee systems, New Orleans