EUROCODE LOADS AND ITS IMPLICATIONS TO DESIGN OF BOX CULVERTS IN SRI LANKA

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Thesis submitted in partial fulfilment of the requirement for the degree of Master of Science in Structural Engineering

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Declaration

I declare that this is my own work, and this thesis does not incorporate without acknowledgement any material previously submitted for Degree or Diploma in any other University or institute of higher learning and to the best of my knowledge and belief it does not contain any material previously published or written by another person except where the acknowledgement is made in the text.

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Name of Supervisor : Professor M.T.R.Jayasinghe

Signature of the Supervisor Date

Abstract

The Box Culverts are drainage structures that allow to cross, small to medium scale water paths. They generally founded in soil where scouring is not an issue. The advantage of the box culvert is that it can be rested on the soil where low bearing pressures exists. Box culverts are also often used in expressway construction when underpasses are needed for the traffic of by-roads that crosses the expressway embankment. The present highway structure design practice in Sri Lanka is based on the British Standards of BS 5400 that was published by British Standard Institution (BSI) in 1978 and then amended a number of times subsequently and along with the Bridge Design Manual (1991), Published by Road Development Authority, the apex body of managing A & B class of road in Sri Lanka. Since the BS codes have been superseded by BS EN (the English version of Euro Codes) in March, 2010, it is now opportune to adopt the recommendations of BS EN for the structural design of highway structures and hence box culvert design will also need updating. In the research presented, a detailed study has been carried out as a comparative study by considering number of possible arrangements of Box Culverts that are typically used in Sri Lanka. The reason is that BS EN allows a loading regime from which different values can be selected in contrast to the current BS based practice. The detailed analysis, with finite element method (FEM) , have been carried out for different types of loading specified in the BS EN; the results have been compared with the resulting forces due to the currently adopted standards to find suitable loading levels that can be recommended for the adoption of Sri Lanka. The results are presented in graphical form to allow the selection of different levels of loading based on the effects on the main design parameters.

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