

Abstract

Evidence from recent reports suggests that overloading of vehicles, above the statutory weight limits, is prevalent in Sri Lanka and that there is a lack of weight limit enforcement procedures. It has not been formally established whether the load-effects on bridges due to these heavy vehicles are adequately represented by the design load-effects used for bridges in the country. Furthermore, it is also not known as to how the load-effects from vehicles complying with the statutory regulations compare with the design load-effects. It is therefore not known whether the load model used for design is adequate for the actual traffic in the country or whether enforcing the regulations will ensure compliance with the design loading. Given this background, questions have been raised regarding the safety of bridges in Sri Lanka. This study was aimed at addressing these issues.

The study compared the maximum load-effects on bridges from actual vehicles, which have unrestricted access to the Sri Lankan roads, with the load-effects considered in design. In addition, the load-effects from vehicles complying with the statutory regulations were also evaluated and compared to the design load-effects.

Simply supported bridges with spans less than 30m, which form the majority of the bridge stock in Sri Lanka, were considered in the study. The mid-span bending moment and end-shear of a single 2.5m wide lane were used for comparison of the load-effects.

Axle load data from surveys undertaken in Sri Lanka, representative of actual vehicles running on the road network, have been used to calculate load-effects. Since the dimensions of each vehicle surveyed had not been measured, typical vehicle dimensions were assumed for the calculations. Load-effects from individual vehicles and convoys of vehicles were considered.

The maximum load-effects from surveyed vehicles were found to be greater than those considered in design for spans less than 14m. The maximum level of overstress with respect to the design load-effects was 46%. Based on these findings, it was recommended that the design loading used in Sri Lanka be revised to take into account the actual levels of traffic loading in the country.

The load-effects from vehicles complying with the statutory regulations were less severe than the design load-effects. Therefore, it was ascertained that enforcement of the statutory regulations would ensure compliance with the current design loading.

However, it was found that a large percentage of surveyed laden vehicles were loaded over the permitted limits in the regulations. For some vehicle types up to 92% of measured laden vehicles were overloaded and even the mean laden gross vehicle weight was above the limit specified in the regulations. Therefore even though enforcing the current regulations would ensure compliance with the current design loading this change in practice would have economic consequences as it would affect the current transport of goods around the country.

It was concluded that the design loading and the regulations should be revised concurrently to obtain realistic and enforceable limits given the current highway traffic of the country, and that improvements be made in the enforcement of the statutory regulations in order to enhance the safety of bridges built in Sri Lanka.