Management of road bridges under overweight vehicle transit

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Summary

Bridges in service in most Western Countries were built according to codes with design loads that are now inconsistent with today's traffic demands. Currently, transportation agencies do not know how to respond to transit applications on their bridges. This contribution focuses on the legal issues entailed by overweight/oversize load permits issued by transportation agencies. Indeed, correct decision-making should consider the legal liabilities involved in possible catastrophic events. In this paper we illustrate how this problem is addressed by the Department of Transportation of the Italian Autonomous Province of Trento (APT), a medium-sized agency managing approximately one thousand bridges across its territory. In their basic approach, APT does not authorize movement of overweight loads unless it is demonstrated that their effect is less than that of the nominal design load. When this condition is not satisfied, a formal evaluation is carried out in an attempt to assess a higher load rating for the bridge. If, after the reassessment, the rating is still insufficient, the bridge is classified as sub-standard and a formal evaluation of the operational risk is performed to define a priority ranking for future reinforcement or replacement. To classify those bridges that have not been assessed, an estimate of their lack of capacity is needed. For this, we introduce an index α defined as the ratio of excess live load, over the design capacity, with respect to the bridge dead load.

Keywords: overweight vehicles, bridge management, multi-level assessment

1. Introduction

Managing large infrastructure systems is a multi-disciplinary activity requiring expertise from many areas, including fields of research beyond the typical scope of the structural engineer. Structural reliability is just one of many aspects affecting decisions, while economic, social, ethical and legal issues must also be considered in a risk model reflecting the owner's perspective. This contribution focuses on the legal issues entailed by the authorization - to be issued by transportation agencies - of overweight traffic on road bridges. Indeed, correct decision-making should consider the legal liabilities involved in possible catastrophic events. Currently, transportation agencies do not know how to respond to transit applications on their bridges. Because most bridges existing were built according to design code loads that are less than today's traffic demands. In this paper we illustrate how this problem is addressed by the Department of Transportation (DoT) of the Italian Autonomous Province of Trento (APT), a medium-sized agency managing approximately one thousand bridges across its territory [1].

In recent years, the APT's DoT has focused on the problems arising from the increase of the nominal load of heavy vehicles and the increasing age and deterioration of the infrastructure. A formal re-assessment of old bridges with respect to new design codes would require analysis of the original design documents, often unavailable, and structural recalculation; and very often expensive load tests. Because of the number of old bridges, an agency cannot normally carry these cost and will seek simplified approaches.

In this paper we illustrate how APT addresses the legal issues arising from the issue of transit

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