IABSE SYMPOSIUM
7-9 October 2020
Synergy of Culture and Civil Engineering
- History and Challenges
IABSE 2020
WROCŁAW POLAND

ENHANCING OF BRIDGE MANAGEMENT GIVEN FAILURES DATA

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SUMMARY

It has been observed a tendency towards an increasing in the number of failures of road and pedestrian bridges worldwide, as well as growing of their consequences for human life and health in the past decades. Some results of these collapses analysis, performed by the IABSE task group TG1.5, are given in the article. Growing of the share of failures that occurred during the operation of bridges in the presence of traffic on the carriageway and/or under the spans that collapsed was noted. At the same time, the most part of operated bridges failures occurred due to presence of unrecognized hidden defects. The main principles of new method developed to enhance monitoring and rehabilitation measures prioritizing are described in the article as an example for a risk group including a big sample of simple pre-stressed main girders from the bridge stock with limited budget. The relevant actual hazards, warning signs, triggers, defects, failure modes and fault tree are given. Some results of the new method implementation enhancing the BMS activities are presented.

Keywords: *Bridge, Failure, Fault Tree, BMS, Risk Analysis.*

1. INTRODUCTION

More than 50 years have passed since the catastrophic collapse of the Silver Bridge in the United States. 46 lives were lost. This well-known event became a textbook for engineers of the second half of the twentieth century. Since 1967, a dozen more collapses of road bridges occurred, where the number of victims exceeded the results of the Silver Bridge tragedy, but the main reasons for these cases were scours, construction errors, ship and train collisions. In this series, the Silver Bridge for a long time remained the only one of the major road bridges that underwent such a deadly collapse during normal operation due to a hidden defect that was not detected in time.

The lessons of the Silver Bridge disaster were mainly taken into account, for example, in terms of fatigue phenomena, improving the quality of bridge inspections, etc. [1]. However, bridge collapses periodically occur around worldwide, which, as a rule, becomes noticeable to the world community either in the event of the collapse of a major bridge and/or with especially catastrophic consequences.

Over the past two decades, such events have begun to repeat more and more, falling into the category of social media news. However, the professional engineering community began to notice a certain increase of frequency of extreme failures also for ordinary bridges, often having "insignificant", at first glance, consequences, information about which is not so sensational and is not widely covered by the press. Meanwhile, society is put up with the inevitability of future bridge collapses, actually including them in the "acceptable" risks without having full statistical data. At the same time, a dangerous tendency of bridge failure frequency was revealed by the Task Group 1.5 (TG 1.5) IABSE, which demands to improve some activities of Bridge Management Systems (BMS).

https://doi.org/10.2749/wroclaw.2020.1173