Planning the future of regional road infrastructure: a case study

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Summary

Since 2004, the Italian Autonomous Province of Trento (APT) has been using a Bridge Management System (BMS) entirely based on reliability concepts. The system includes sections for condition state evaluation, safety assessment and network-level prioritization. During the first years of use of the BMS, the inventory and calibration phases were completed, and currently the system database contains information on the condition and reliability for almost the entire stock. This database is the main source of information used by APT in planning future development of the regional road system. Using this information we can now simulate long-term scenarios for infrastructure development, and critically compare alternative maintenance, repair and reconstruction (MR&R) strategies. This paper illustrates both current use of the APT BMS and application of the system to budget programming in a number of practical cases.

Keywords: bridge management, condition, reliability, deterioration, maintenance, repair, reconstruction, cost, budget programming.

1. Introduction

Following on a political devolution process, the Italian Autonomous Province of Trento (APT) has recently taken responsibility for a stock of roads, broader in terms of both number and types. The need for a rational approach to the management of the bridge stock led to collaboration between the University of Trento and the Department of Transportation (DoT) of the APT, resulting in the development of a Bridge Management System (BMS), which acknowledges recent advances in bridge management research [1]. The APT-BMS is reliability-based and fully operative on the web, and includes (i) a condition state (CS) assessment section, (ii) a reliability assessment section, and (iii) a prioritization section. CS is evaluated on the basis of a procedure that acknowledges the general rules of the AASHTO Commonly Recognized (CoRe) Standard Element System [2], in order to conserve compatibility with PONTIS [3] evaluation and deterioration models. Elements are characterized by up to five discrete CS, which describe the type and severity of deterioration, mostly in visual terms. Normally, the system conservatively estimated a prior reliability index β for each bridge on the basis of the inspection data. Where the condition of the bridge is cause for concern, the system foresees a formal safety evaluation based on a 5-step procedure that acknowledges the general guidelines resulting from BRIME project [4]. During the first years of use of the BMS, the inventory and calibration phases were completed, and currently the system database contains information on the condition and reliability for almost the entire stock. APT is responsible for over 967 bridges for a total 358.000 square meters of deck surface. The estimated value of the bridge stock is 536 M€. Most APT bridges were built or rebuilt post WW2, the age distribution diagram showing a peak in the 70's (Fig.1). Reinforced concrete, regular and pre-stressed, is by far the most widely utilized construction material, covering more than 74% of the

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