



## Multi-criteria optimization framework for road infrastructures under different scenario of climate change

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### Abstract

This paper presents an optimization framework for critical road infrastructure elements that integrates economic aspects. This optimization framework is used to determine optimal management strategies of infrastructures under scenarios of climate change and financial constraints. Optimal management strategies, based on the consequences of possible actions on the future condition of the system, are determined through an optimization process under uncertainty. The aim is to maximize the performance level of structures. Such an optimization procedure is a first step in the development of asset management tools that allow national road administrations to assess the necessary additional effort to satisfy performance constraints under different scenario of climate change. The integration of such concepts in the decision process by national roads administrations represents a step forward in management strategies.

**Keywords:** Optimization, bridge management, Markov chains, IQOA scoring system, climate change

### 1 Introduction

The transport system represents a fundamental factor for the economic and social development, as it allows the quick, safe and easy exchange of passengers and freight. For the most part, this mobility is sustained by the network of roads and highways providing high level of service and flexibility. To maintain a high quality of service, there is a significant need for tools which allow national road administrations (NRAs) to better

manage their infrastructure stock. The decision to replace or repair these infrastructures, when and how to repair each individual structure, is a common and difficult management issue for asset managers.

In this context, the goal of this paper is to present an overall approach which considers some performance aspects in the decision process for ageing structures, under different scenario of climate change. In order to be easily deployable