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## Development of an exposure model for bridge structures in Northern Algeria

Andrés Abarca, Ricardo Monteiro

University School for Advanced Studies (IUSS) of Pavia - Piazza della Vittoria n.15, 27100 Pavia (Italy)

Contact: [andres.abarca@iusspavia.it](mailto:andres.abarca@iusspavia.it)

### Abstract

In recent years, the use of large scale seismic risk assessment has become increasingly popular to evaluate the fragility of a specific region to an earthquake event, through the convolution of hazard, exposure and vulnerability. These studies tend to focus on the building stock of the region and sometimes neglect the evaluation of the infrastructure, which has great importance when determining the ability of a social group to attend to a disaster and to eventually resume normal activities. This study, developed within the scope of the EU-funded project ITERATE (Improved Tools for Disaster Risk Mitigation in Algeria), focuses on the proposal of an exposure model for bridge structures in Northern Algeria. The proposed model was developed using existing national data surveys, as well as satellite information and field observations. As a result, the location and detailed characterization of a significant share of the Algeria roadway bridge inventory was developed, as well as the definition of a taxonomy that is able to classify the most common structural systems used in Algerian bridge construction. The outcome of this study serves as input to estimate the fragility of the bridge infrastructure inventory and, furthermore, to the overall risk assessment of the Northern Algerian region. Such fragility model will, in turn, enable the evaluation of earthquake scenarios at a regional scale and provide valuable information to decision makers for the implementation of risk mitigation measures.

**Keywords:** Exposure; Algeria; Seismic Risk; Hazard; Vulnerability; Bridges; Infrastructure

### 1 Introduction

In recent years, the use of large scale seismic risk assessment has become increasingly popular to evaluate the fragility of a specific region to an earthquake event, through the convolution of hazard, exposure and vulnerability. These studies tend to focus on the building stock of the region and not always on the evaluation of the infrastructure, which has great importance when determining the ability of a social group to attend to a disaster and to eventually resume normal activities.

The main objective of this report is to process statistical information on the Algerian bridge

inventory, which includes number of bridges, their spatial distribution, construction characteristics and typology, which are fundamental to reliably evaluate physical vulnerability and economic losses due to earthquake hazard on these elements.

For this purpose, a thorough review of available information has been made, which includes inputs from open sources like OpenStreetMap, as well as a more detailed account of the bridge inventory, obtained from local Algerian sources.

The processing of the information has led to the definition of construction taxonomies to represent the probable behaviour of Algerian bridges according to specific parameters, as well as an