

Prediction of Bearing Lifetime Demands by Considering the Bridge Design and Location Parameters

Minesh K. PATEL

PhD Candidate

McMaster University

Hamilton, ON, Canada

patelm91@mcmaster.ca

Mr. Patel is a current PhD candidate at McMaster University. He graduated from University College London and worked for three years as a bridge designer.



Georgios P. BALOMENOS

Assistant Professor

McMaster University

Hamilton, ON, Canada

balomeng@mcmaster.ca

Dr. Balomenos' research focuses on multi-hazard risk and resilience of infrastructure in a changing climate.



Tracy C. BECKER

Assistant Professor

University of California, Berkeley

California, United States

tcbecker@berkeley.edu

Dr. Becker is an expert in isolation bearings. Prior to UC Berkeley she was an assistant professor at McMaster University.

Contact: patelm91@mcmaster.ca

1 Abstract

The long-term performance and safety of bridges is of paramount importance. Researchers have placed significant focus on the degradation and deterioration of bridge materials such as steel and concrete, but significantly less is known about the long-term behavior of bridge bearings. Uncertainty in the bearing behavior over time leads to challenges about when the bearings should be inspected and potentially replaced. However, bearing demands vary greatly based on the design of the bridge (e.g. differences in bridge material, girder type, span, height, and location). This paper finds trends in lifetime bearing demands from seismic, thermal, and traffic loading when the bridge design and location parameters are considered. These results can be used to identify which of the parameters have the greatest influence on the lifetime bearing demands which can then be used, in turn, to evaluate bearing long-term performance.

Keywords: Reinforced concrete bridges, Bridge bearings, Lifetime loading.

2 Introduction

Bridge bearings are critical components which accommodate translational and rotational

displacements and consequently provide a reduced transfer of forces to bridge piers and abutments. When bridge bearings perform inadequately, larger displacement and force transfer throughout the

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