Implementation of controlled flexibility as a seismic strategy towards building sustainable infrastructure in India

Santanu Majumdar

Managing Director, mageba Bridge Products Pvt. Ltd., Kolkata, India

Pratik Sen

Key Accounts Manager, mageba Bridge Products Pvt. Ltd., Kolkata, India

Contact: smajumdar@mageba.in; psen@mageba.in

Abstract

The growing need for safer bridges and structures is stimulating the concept of adapting smarter techniques in bearing supports, reducing seismic risk and structural costs. Advanced isolation devices offer engineers with various options. An appropriate solution includes systems that provide desired flexibility, damping, and re-centering properties. Various projects of national importance are already implementing such smarter techniques, thereby laying the foundation of sustainable infrastructure.

Performance evaluation in simulated service and seismic conditions is of immense importance. Set up to support and supplement such demanding testing needs is now available in India already backing the projects as and when required.

Keywords: Isolation devices; flexibility; damping; re-centering; performance evaluation; dynamic testing

1 Introduction

The challenge posed by seismic events persists as a significant concern for engineering and society alike. Earthquakes wield a destructive force that primarily targets structures, leading to devastating consequences such as the loss of life and property, service disruption, community displacement, and enduring economic and psychological impacts. This paper introduces an integrated approach to seismic resilience, combining advanced engineering, innovative technologies, and quality control to mitigate earthquake damage. In the subsequent sections, we delve into the core principles and practical implementations of the seismic resilience strategies, offering a roadmap to fortify our communities and infrastructure against the relentless forces of seismic activity. Lastly, this paper shares insights about the test set up for performance evaluation of such seismic devices being developed in India and serving projects across the globe.

2 Background

The Indian subcontinent, due to the continuous tectonic movement of the Indian plate towards the Eurasian plate, finds itself situated within high seismic zones marked by a history of significant earthquakes. Within these seismic zones, bridges that mostly behave like an inverted pendulum with the mass lumped at the Deck level are particularly susceptible to the formidable seismic hazards that prevail. In the historical context of bridge design in India, the predominant method for addressing

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