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Seismic Risk Assessment of Bridges in Jakarta Transportation Networks using Incremental Dynamic Analysis

Mutiara Puspahati Cripstyani
PT. Wiratman, Jakarta, Indonesia

Ireng Guntorojati, Dimas Pramudya
PT. Wiratman, Jakarta, Indonesia

S.A. Kristiawan, Senot Sangadji
Sebelas Maret University, Surakarta, Indonesia

Contact: mutiarapuspahati@gmail.com

Abstract

Jakarta is known as the most populated as well as most traffic-congested among capital cities in the world. The development of infrastructure facilities, such as bridge, is carried out to meet the high demand. Since the latest Indonesian Seismic Code has been released, retrofitting of existing bridges becomes an issue therefore it is important to investigate the performance of existing bridges under seismic catastrophe compared to corresponding design earthquake. To mitigate the condition and seismic risk of some vital bridges of Jakarta transportation, a simple procedure developed based on probabilistic approach. Incremental Dynamic Analysis is performed to have nonlinear response history by using artificial site-specific earthquake ground motion. The post-earthquake response is utilized to determine bridge damage level under various ground motion intensities. Seismic risk map is developed to classify the most critical bridge under earthquake and priorities the rehabilitation program according to its performance level.

Keywords: earthquake; incremental dynamic analysis; bridge; risk assessment.

1 Introduction

Indonesia is struggling in working on massive Infrastructure projects across the country realizing that inter-regional connectivity becomes key factor in reducing economic gaps and bringing equitable development into reality. The construction of seaport, airport, railway, highway and other projects is done simultaneously in many islands. The increasing of traffic in several big city in Indonesia such as Jakarta is raising another problem such as traffic jams. Jakarta as the capital city also has its own infrastructure projects to address the growing of traffic jams that cause economic loss. The on going infrastructure project are Elevated and underground MRT projects, Elevated LRT Project, Elevated toll road and several bridges projects. As dense city, Elevated structure is possibly the feasible way to solve the traffic jam issue in Jakarta. It is important to build

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