

Assessing the performance of a transportation lifeline in the Philippines, the Light Rail Transit (LRT) System, under a large magnitude earthquake

Michael B. BAYLON

Graduate Student
De La Salle University
2401 Taft Avenue, Manila,
Philippines
michael_baylon@dlsu.ph

Michael Baylon, born 1976, received his civil engineering degree from De La Salle University – Manila, Philippines. He is currently a graduate student, majoring in Structural Engineering

Lessandro Estelito O. GARCIANO

Associate Professor
De La Salle University
2401 Taft Avenue, Manila,
Philippines
lessandro.garciano@dlsu.edu.ph

Lessandro Estelito Garciano, born 1968, is an associate professor of De La Salle University, Manila, Philippines

Takeshi KOIKE

Professor
Kyoto University
C cluster, Kyotodaigaku-
katsura, Nishikyo-ku,
Kyoto, 615-8540, Japan
koike.takeshi.7n@kyoto-u.ac.jp

Takeshi Koike, born 1947, is a Professor at the Dept. of Civil and Earth Resources Engineering, Faculty of Engineering, Graduate School of Engineering, Kyoto University

Summary

This paper therefore investigates the reliability index of the columns of the LRT under a Level 1 (El Centro) earthquake and Level 2 (Tohoku-Kanto) earthquake using ordinary Monte Carlo Simulation. Based from the maiden structural plans of LRT, the slenderness ratio of columns based from the ACI 318 was observed and checked for buckling failure. The reliability indices of the light railway transit, specifically in one of its reinforced concrete pier, is 3.06 (unconfined, NSCP 2010) and 3.67 (confined, NSCP 2001) when it was simulated under a Tohoku-Kanto Earthquake. A similar scenario was also computed for the simulation of El Centro Earthquake, that is, 3.50 (unconfined, NSCP 2010) and 4.10 (confined, NSCP 2010). This can be attributed to the effectiveness of the confinement model used in this simulation, that is, a maximum of 92% improvement of confinement in the reinforced concrete pier.

Keywords: light rail transit system, Tohoku-Kanto earthquake, reliability index, Monte Carlo simulation