Scope Database Link: https://sdbindex.com/documents/00000001/00001-27870
Article Link: https://iaeme.com/MasterAdmin/Journal_uploads/IJCIET/VOLUME_13_ISSUE_1/IJCIET_13_01_001.pdf

Manuscript ID : 00001-27870

Source ID : 00000001

International Journal of Civil Engineering and Technology

Volume 13, Issue 1, January 2022, Pages 1-12, Page Count - 12

Scope Database Indexed www.sdbindex.com

NUMERICAL STUDY OF STRUCTURAL RELIABILITY OF LONG SPAN BRIDGE UNDER LATERAL LOAD

Arini Novia Sari [(1)]* Nursiah Chairunnisa [(2)]

[(1)] Graduate Student of Structural Engineering, Magister Study Program of Civil Engineering, Universitas Lambung Mangkurat, Banjarmasin, Indonesia.

[(2)] Assistant professor, Master of Civil Engineering, Universitas Lambung Mangkurat, Banjarmasin, Indonesia.

*** Corresponding author**

Abstract

Indonesia is classified as an earthquake-prone area due to its location above the convergence of active tectonic plates. There are, however, two bridges, Ponulele in Palu and Wu-shi in Taiwan, reported to have collapsed due to an earthquake, thereby, indicating the need to examine their reliability. It is, therefore, possible to conduct the analysis through the use of the Pushover Analysis Method.

This research showed the comparation between ATC-40 and FEMA 356 of the pushover and performance-based evaluation for the initial model that met the design criteria and discovered to be reliable against earthquakes were followed by the analysis of the test model which is a variation of the initial model with a cross-section of pillars and piles and different reinforcement ratio. The main model which have 2,5 m pier diameter and 1 m pile diameter was varied and named with code A-P1-TP1-1-3, A-P2- TP1-2-3, A-P2-TP1-3-3, A-P1-TP2-2-2 and A-P1TP2-2-3.

The result showed that the main model was reliable to earthquake design load, with ratio 1,25. The structural performance level based on ATC-40 was IO while FEMA 356 shows it was on Operation level. As compared to the one, model A-P1-TP1-1-3 showed reliability of 10% less after pier reinforcement ratio is reduced. Model A-P2-TP1-2-3 and A-P2-TP1-3-3 showed reliability of 20% less after reducing the main model`s pier diameter, while model A-P1-TP2-2-2 and AP1-TP2-2-3 showed its reliability increased by 3?ter adding the pile diameter. Nevertheless, the pier`s diameter and reinforcement showed important result to bridge reliability under earthquake load more than the pile`s. Plastic hinge mechanism of the models showed that the failure happened on the pier at first. Based on ATC-40, the structural performance level of model which had smaller pier diameter was DC, while others were on IO level. Based on FEMA-356, all of the model performance level was IO.

Author Keywords

Pushover Analysis; Performance Based; ATC-40, FEMA-356

ISSN Print: 0976-6308
ISSN Online: 0976-6316
Source Type: Journals
Document Type: Journal Article
Publication Language: English
DOI: https://doi.org/10.17605/OSF.IO/J5UVX
Abbreviated Journal Title: IJCIET
Access Type: Open Access
Publisher Name: IAEME Publication
Resource Licence: CC BY-NC
Major Subject: Physical Sciences
Subject Area classification: Engineering and Technology
Subject area: Civil and Structural Engineering
Source: SCOPEDATABASE