Strengthening Using Type-V Bracing for Structural Integrity of Reinforced Concrete Frame Resists Earthquake Loads

Made Sukrawa[1,1,] *I Gede Adi* Susila[2] , and *Aditya Permana* Putra[3]

[1]Udayana University, Enginering Faculty, Kampus Bukit Jimbaran, 80361 Badung, Bali Indonesia

Abstract. Relatively new seismic code has been introduced in Indonesia (SNI 1726-2012) which affects old structures. Mostly, the existing structures does not meet the requirement of new regulation: overstressed. Therefore, it is important to strengthen reinforced concrete (RC) structure in order to meet the performance level and structural behaviour satisfied. In this study, the retrofitting method was performed by using a type V steel braces both external and internal settlement. Clearly, the advantage of braces is significantly increases lateral capacity where small amount of mass also invoked into the structures. Computer simulation using SAP2000 found that most of the structures have been over-stress on its components, indeed reinforcement is necessary with braces. Nonlinear pushover analysis was performed on type-V braces with and without perimeter frames which reviewed structural performances. Evaluation of 3, 5, 8 and 10 storey structures designed under previous code and failures of structural components found after the most recent code to be implemented. Lateral load capacity and structural performance were observed to determine the capability dissipate earthquake energy that occurred in structural components with plastic joints distribution. Results of study provides comparison of behaviour and performance of each model. It found that the ultimate capacity of each model produced can increase base shear up to ± 150% larger compared to the existing structures. From pushover analysis, the curve of each model measured for performance level and it found to be set of the Operational (O), Immediate Occupancy (IO) and it has not been exceeded the Live Safety level (LS) as the result of structural strengthening using bracing. The bracing applied will provide a higher lateral capacity and minimum level of damage.

Keywords: Steel braces, RC frame elements, reinforced concrete, pushover analysis

[1] Corresponding author: author@email.org