INTI INTERNATIONAL UNIVERSITY

FACULTY OF ENGINEERING AND QUANTITY SURVEYING

SEISMIC RETROFITTING OF DEFICIENT RC BEAM-COLUMN JOINT REGIONS USING PRE-TENSIONED STEEL STRAPS

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B.ENG (HONS) IN CIVIL ENGINEERING

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SUPERVISOR'S DECLARATION

This project report entitled "Seismic Retrofitting Of Deficient RC Beam-Column Joint Regions Using Pre-tensioned Steel Straps" is prepared and submitted by Kenneth Boo Beng Wee, I14006681 as partial fulfilment of the requirement for Bachelor of Engineering (HONS) in Civil Engineering, INTI International University.

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STUDENT'S DECLARATION

I hereby declare that the final year project is based on my original work except for quotations and citations, which have been duly acknowledged. I also declare that it has not been previously or concurrently submitted for any other degree at INTI INTERNATIONAL UNIVERSITY or other institutions.

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ABSTRACT

This research presents the study of the seismic performance of deficient RC L-joints confined with pre-tensioned steel straps. The main experimental result parameters investigated are the load applied-drift ratio relationship; ductility; and energy dissipation capacity. Besides, the different corresponding modes of failure of the specimens were properly understood as well. An extensive study was done to review other related journals which will help facilitate a more comprehensive understanding for the outcomes of this research (in Chapter 2). As for this research, 15 RC L-joint specimens with different volumetric ratio of confinement (control; 1 to 4 layers of steel straps) were fabricated and tested under simulated seismic loadings whereby uniaxial cyclic loadings were applied on the specimens' beam tip and column top face. The experimental findings may be summarized as follows: The highest percentage of shear strength enhancement is 40% as that shown by the specimens confined with two layers of steel straps. It was also found that the specimens with high volumetric ratio of confinement have lower rate of stiffness degradation. On the other hand, the highest average displacement ductility factor enhancement (74%) was shown by the specimen group with three layers of steel straps. The energy dissipation capacities of the specimens were found to steadily rise with the increased in volumetric ratio of confinement; the optimum volumetric ratio of confinement for maximum energy dissipation capacity (274%) is 4 layers. Besides, it was shown that with the increased in volumetric ratio of confinement, the mode of failure transitions from brittle-shear to flexural-shear; and then finally to ductile-flexural failure. In general terms, as for the retrofitted RC joint specimens, the main governing parameters behind their enhanced seismic performance are their ductility and energy dissipation capacity.

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