INTI INTERNATIONAL UNIVERSITY

Faculty of Engineering and Quantity Surveying

Effect of cross-sectional area of reinforcement on ultimate shear strength of RC deep beams

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SUPERVISOR'S DECLARATION

This project report entitled (Effect of cross-sectional area of reinforcement on ultimate shear strength of RC deep beams) is prepared and submitted by (Farooq Mustafa Al-Obaidi, I12001919) as partial fulfillment of the requirement for Bachelor of Engineering (HONS) in Civil Engineering, INTI International University.

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.... Date: Dec 16, 2016

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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

The behavior of RC deep beams in shear failure is different from convention beams, and consequently, the design methods and analysis of these beams are different. Strut-and-tie Model (STM) is used to model the compression flow within the concrete strut. A series of simply supported deep beam were analyzed to seek how the shear span-to-effective-depth ratio (a/d), transverse reinforcement, longitudinal reinforcement as well as the size of cross-sectional reinforcement affect the ultimate shear strength of reinforced concrete deep beam. A free-licensed software called "CAST" is used to draw and analyze the (STM) of RC deep beam. Based on the results, when the shear span-to-effective-depth ratio (a/d) increase, the ultimate shear strength decreases; and observed that increasing in concrete compressive strength effect more on the ultimate shear strength when (a/d > 1) compare to (a/d < 1) which has a lesser effect. Furthermore, an increment in the ultimate shear strength occurs when the amount of reinforcement, bar designation and the number of bars are increasing. However, shear strength ratio slightly decreases for (a/d < 0.5) and this is due to large effective transverse compression. The results obtained that by increasing the amount of shear reinforcement after a certain level, the shear strength of deep beam will be ineffective, and when the transverse reinforcement ratio exceeds a certain value, the ultimate shear strength of RC deep beams does not increase.

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ρ_v	Reinforcement ratio of transverse steel
ρ_h	Ratio of total horizontal tensile steel
R	Reaction
s	Spacing of transverse reinforcement
T	Tensile force
v	Shear stress
V	Shear force on the cross section
V_{ay}	Aggregate interlock across the crack zone
V_d	Dowel action of the tension reinforcement
w_s	The width of strut,
w_t	The effective width of the tie
z	Lever arm