SHEAR CAPACITY OF HOLLOW CIRCULAR REINFORCED CONCRETE MEMBERS WITHOUT STIRRUPS

THESIS

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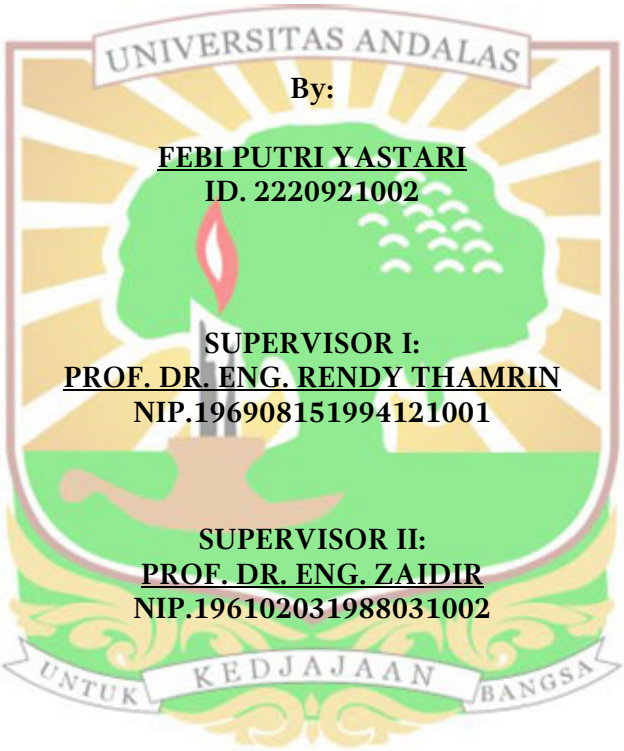

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ABSTRACT

The shear capacity of hollow circular reinforced concrete members is investigated experimentally. The test was carried out on 12 circular specimens without stirrups, consisting of three without holes as the specimen control, and nine with holes. The variations of the holes (2.3%; 6.5%; 9.3%) and the longitudinal reinforcement diameters (13mm, 16mm, 19mm) were used as the test variables. Hollow reinforced concrete has a channel of holes and is typically made by joining pipes used for installing electricity channels and pipelines. The use of holes reduces the amount of material used in columns as well as self-weight, resulting in a more efficient construction system. Hollow columns behave significantly differently than solid columns because of the lack of a concrete core. The use of holes reduces its cross-sectional area, making the elements more critical and influencing the structure's strength. SNI 03-2847-2002 stated that channels and pipes, together with their hooks, must not exceed 4% of the cross-sectional area required for strength. The shear force in the building structure is caused by earthquake, wind, gravitational, and vehicle loads and the failure caused by the shear occurs suddenly without any signs and is brittle. The purpose of this study was to determine the effect of the hole percentage, analyze the effect of the longitudinal reinforcement ratio, and identify the crack pattern and failure mode. The test indicated that the 1.5-inch diameter hole (less than 4%) in reinforced concrete structural elements had no effect on the shear capacity which means still safe to use because the effect on shear strength and deflection is not significant when compared to solid elements. However, for holes larger than 4%, the shear capacity decreased by 8%-38%. The theoretical shear strength of the shear capacity for the hollow section was calculated using geometric assumptions from ACI 318-19 and then compared to the experimental result. The comparison shows that the equation extremely conservatively estimates the shear strength of the specimens.

Keywords: Reinforced Concrete, Shear Capacity, Circular Section, Hollow Circular, Shear Failure.