

A B S T R A C T

In this work, a new proposal of composite corbels has been suggested based on incorporating a stiffened rolled steel in the RC corbel. The enhancement in response have been investigated in terms of tracking the map of crack propagation at failure, history of loading, cracking and failure load, failure mode, ductility index, toughness value, and rate of crack widening. Ten specimens have been tested experimentally with two values of shear span/depth (a/d) ratio; 0.70 and 1.0. Two RC corbels are considered as control specimens and eight encased corbels with tapered WT- or WF- rolled steel sections, without or with stiffeners. Moreover, a theoretical proposal has been suggested to estimate shear capacity of the composite encased corbels.

It is found that for $a/d = 0.7$, composite corbels with the stiffened elements yielded same cracking load as for RC corbel. For $a/d = 1.0$, stiffened composite corbels yielded relative increments of (11%–33%). Moreover, it is obtained that for $a/d = 0.7$, specimens with stiffened rolled steel yielded a relative capacity of (95–105)% to the RC corbel while for $a/d = 1.0$ the failure load ranged in (93–104)%.

Significant enhancements in ductility have been noticed. For $a/d = 0.7$, the relative values ranged in (85%–150%) with highest value with stiffened tapered WT-steel. For $a/d = 1.0$, specimen with non-stiffened rolled steel yielded relative ductility index of 152%. Regarding toughness, Relative values are (203%– 278%) have been obtained for $a/d = 0.70$, with highest value for that with stiffened tapered WT-steel. For $a/d = 1.0$, Relative values of (123%–154%) are obtained with highest value for that with non– stiffened WF-steel.
