Minimum Longitudinal Reinforcement Requirements for Boundary Elements of Limited Ductile Walls for AS 3600

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ABSTRACT: Observations of poor performance of reinforced concrete walls in recent earthquake events have been associated with a light amount of longitudinal reinforcement. In particular, single-crack failures have been observed for reinforced concrete walls that have an insufficient amount of longitudinal reinforcement to allow secondary cracking. It has been proposed that the next revision of the Concrete Structures code in Australia (AS 3600) increase the current minimum longitudinal reinforcement required for limited ductile reinforced concrete walls to mitigate against this type of failure in the event of a large earthquake. This research investigates the current and proposed longitudinal reinforcement requirements of AS 3600. A reinforced concrete wall is analysed using a state-of-the-art finite element modelling program for a range of different longitudinal reinforcement configurations. The wall detailed to the minimum longitudinal reinforcement requirements proposed for the next revision of AS 3600, which requires boundary elements, was found to allow secondary cracking and using less bars than a wall with distributed reinforcement. The displacement capacities of the walls that formed secondary cracks are found to be limited unless transverse reinforcement is used to confine the longitudinal reinforcement in the boundary ends of the wall.

Keywords: secondary cracking, unconfined, lumped, distributed, steel, concrete.