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High Strength Steel in the Reinforced Concrete Structures: Serviceability

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ABSTRACT

The use of high-strength steel (yield stress larger than 100 ksi) in reinforced concrete structures can provide an effective alternative to using conventional steel (yield stress up to 80 ksi). The goal of this study is to investigate if slabs with reduced quantities of high-strength steel reinforcement meet the serviceability criteria. Instantaneous and long-term deflections in slab specimens with conventional steel and reduced amounts of high-strength steel (as compared with conventional steel) were studied. Two sets of two reinforced concrete slabs, each 14 ft. long, 30 in. wide, were built. The depth, quantity, and type of longitudinal reinforcement were varied between specimens in each set. The first set of slabs consisted of a 4 in. thick specimen with conventional steel (Gr. 60) and a 6 in. thick specimen with high-strength steel (Gr. 120). The longitudinal reinforcement ratios were 0.7% and 0.2% respectively. The second set consisted of a 5 in. thick specimen with Gr. 60 steel and an 8 in. thick specimen with Gr. 120 steel. The longitudinal reinforcement ratios were 0.5% and 0.1% respectively. The slabs were designed such that the theoretical deflections at service loads were similar for the specimens within each set. The slabs will be loaded until the working strains are reached in the reinforcement, and then will be tested under this constant service-load.

KEYWORDS

High strength steel, reinforced concrete, serviceability, deflection, slabs