Optimum post-tensioning for three-span continuous slab-type bridge decks

Azad A.K., Qureshi M.A.

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Abstract: An optimization procedure is prescribed in this paper to find the minimum prestressing force and the corresponding tendon profile required for three-span continuous slab-type bridge decks using a combination of both long and short tendons. The constrained nonlinear problem is solved by first transforming it into a linear one with the introduction of a new design variable which defines the proportion of long and short tendons. The problem is then solved iteratively by linear programming in conjunction with a gradient search technique. The results show that for a three-span continuous bridge deck with the interior span longer than the exterior one, the optimum prestressing consists of a combination of both long and short tendons. For the three-span bridge of a prescribed length, the procedure determines the optimal ratio of the interior to the exterior span for which the required prestressing force is minimum.