

Public Abstract

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Title: Precast Prestressed Bridge Approach Slab- Cost Effective Designs

Bridge approach slabs (BAS) are transition slabs used to connect the roadway with the bridge. Among the various problems bridge approach slabs experience, differential settlement is the found to be the major cause leading to approach slab distress. The approach slab design currently in use by the Missouri Department of Transportation (MoDOT) is a simply supported doubly reinforced concrete slab resting on the abutment on the bridge side and the embankment on the roadway side. The two suggested alternatives are also effective for rapid replacement/repair operations on bridge approach slabs. Both the precast prestressed design alternatives are designed for service limit states and are successfully verified for ultimate moments. A life cycle analysis (LCCA) was completed to study comparative costs for urban and rural traffic patterns and to investigate the economic effectiveness of the precast prestressed slab designs. The MoDOT BAS design along with another design alternative called BAS incorporating elastic support (BAS-ES) were included in the LCCA procedure to study the effectiveness of the precast prestressed alternatives. When present value of total costs are considered, the Fully Precast Prestressed - BAS design is the most cost-effective when AADT counts are high, such as with urban traffic demands. Both agency and user costs decreased with an increase in the discount rate. In the sensitivity analysis results, higher correlation values were obtained for work zone durations during initial construction. Other significant inputs include value of time for trucks and passenger cars, discount rate and work zone capacity.