Innovative precast HPFRC barriers for bridges

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Abstract

A 4-year industrial research project led by Polytechnique Montreal has conducted to the development of innovative precast bridge barriers made with High Performance Fibre Reinforced Concretes (HPFRC). The design of a 2-m long precast barrier in HPFRC anchored with U-shape rebar on a bridge slab was optimized using nonlinear finite element calculations. Specimens were produced at full scale in a precast plant and tested in laboratory under various experimental conditions. Phase 1 of the project included application of static and impact loadings on the barrier. Phase 2 concerned the mechanical behavior of overhang bridge slabs with precast barriers (with or without longitudinal continuity) and cast-in-place barriers. Experimental results demonstrated that the bridge slab and barrier exceed the CSA static design load requirements with all configurations tested, and utilization of precast barriers with longitudinal continuity improve the ultimate load. Numerical models reproduced accurately the various experimental conditions studied, then they were used to provide information on the impact of barrier length.

Keywords

Precast barrier, fiber reinforced concrete, static loading, impact loading, barrier length and continuity.