

Title: Technology for Expansion Joint-Free Bridge Deck System Using Engineered Cementitious Composites (FTT040502)

Duration: April 2024 to March 2026

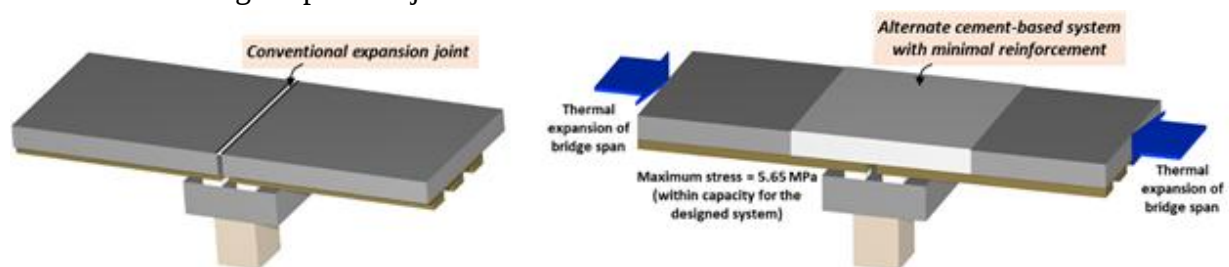
Deliverable

Development of an engineered cementitious composite based technology as an alternative to conventional bridge expansion joints

Significant Achievements

- Designed the proposed ECC link slab system for representative simply supported steel-concrete composite bridge spans using minimal reinforcement to facilitate practical implementation.
- Demonstrated the structural performance of the proposed technology through full-scale static loading experiments, which confirmed high flexural capacity, excellent deformability, and controlled multiple micro-cracking with crack widths well within permissible limits.
- Performed detailed nonlinear numerical simulations to investigate the force-flow mechanism within the composite bridge system and evaluated the influence of material properties and interface interactions on the global structural response.
- Experimentally evaluated the high-cycle fatigue performance of the ECC link slab under loading corresponding to the maximum permissible end rotation in simply supported bridges, confirming satisfactory fatigue resistance.
- Assessed the behaviour of the proposed system under thermal expansion and contraction using numerical simulations considering uniform and temperature-gradient loading conditions, and verified that the induced stresses and deflections remained within the structural capacity of the link slab.

The proposed technology performs satisfactorily under static, fatigue, and thermal loading conditions, demonstrating its potential as a durable and low-maintenance alternative to conventional bridge expansion joints.



Schematic representation of the developed technology

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