Behavior of Continuously Reinforced Concrete Pavement under Environmental Loadings

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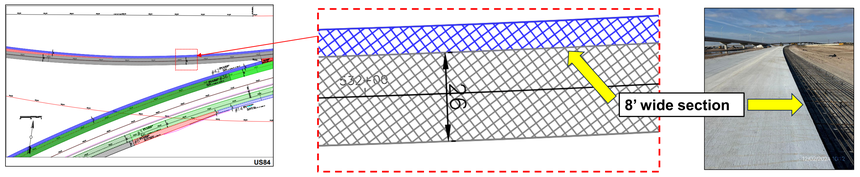
Introduction

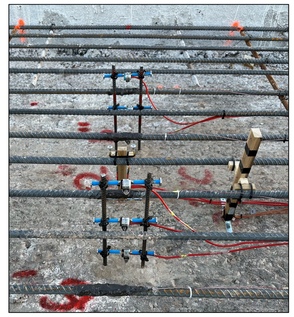
- Continuously reinforced concrete pavement (CRCP) is a portland cement concrete (PCC) structure with continuous longitudinal steel, widely used in Texas for its durability, low life-cycle cost, and easy maintenance.
- Environmental loadings, such as variations in temperature and moisture, cause slab warping and curling, influencing the behavior and performance of CRCPs.

Objective / Methodology

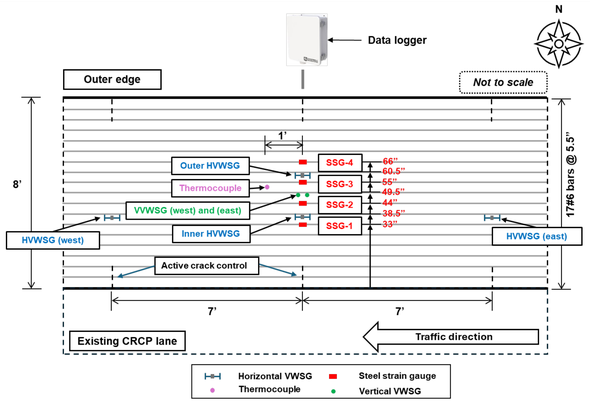
- An 8-ft wide section out of a 1,268-ft single-day constructed CRCP section was selected for sensor installation to investigate the behavior of the CRCP.
- Concrete and steel behavior were measured using vibrating wire strain gages, steel strain gages, and thermocouples.



IH-20 Project, Sweetwater, Texas



Field gage setup



Gage plan

Results / Conclusions

- A horizontal crack was observed at the steel depth with the formation of a transverse crack after 48 hours of concrete casting.
- Upon slab expansion during summer, a self-restraining effect at the crack interface was observed (Figures 1 and 2), which is attributed to the low setting temperature of the concrete for this winter-placed section.
- Concrete and steel strains at transverse cracks were influenced by the formation of adjacent transverse cracks (Figure 5 and 6).
- Transverse crack stopped propagating at the inner side of the section, resulting in a partial depth crack.
- Average crack spacing decreased significantly over the first 35 days after concrete casting (Figure 7) and then stabilized thereafter.
- These findings provide critical insights into the behavior and performance of CRCP.

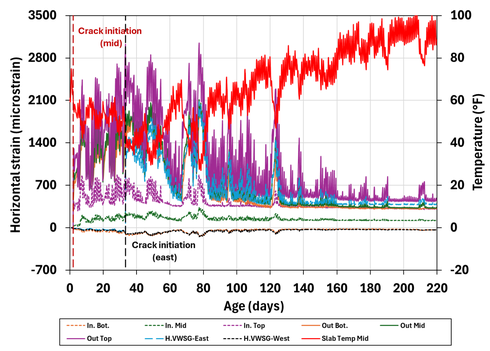


Figure 1

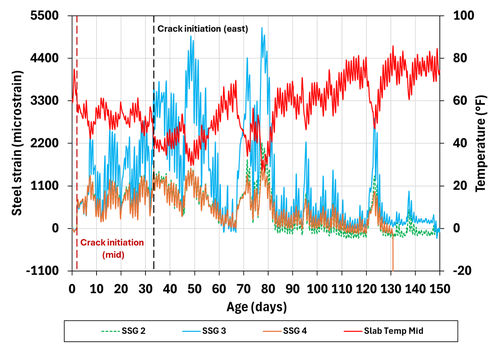


Figure 2

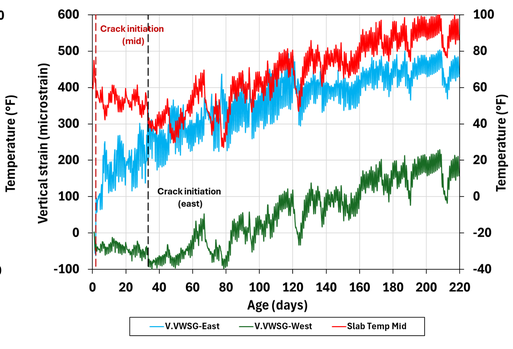


Figure 3

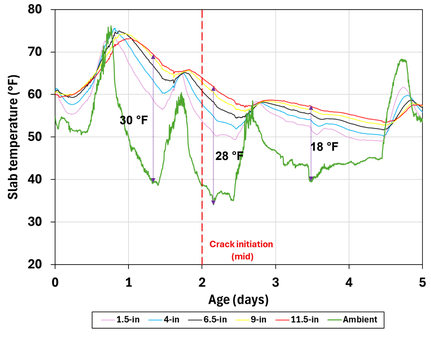


Figure 4

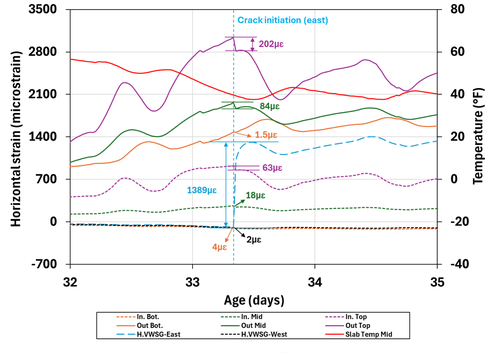


Figure 5

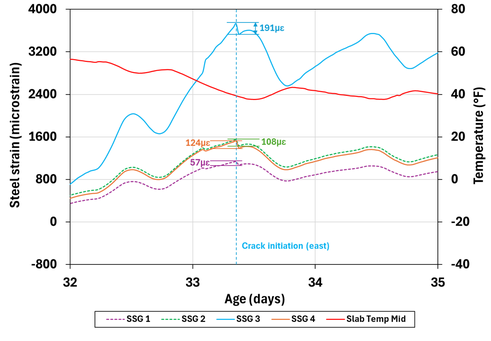


Figure 6

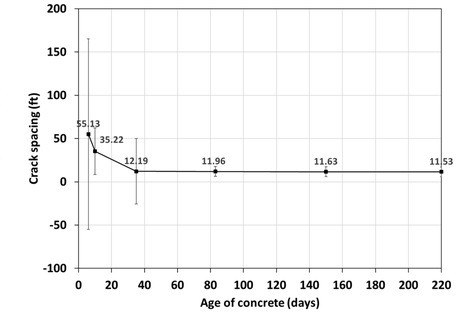


Figure 7

References / Acknowledgements

Lee, H., Koirala, N., Rouzmehr, F., Jabonero, C., & Won, M. C. (2023). *Optimizing reinforcing steel in 12-in and 13-in continuously reinforced concrete pavement (CRCP)* (No. FHWA/TX-23/0-7026-1). Texas Tech University. Center for Multidisciplinary Research in Transportation.

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