UTC Project Information	
Project Title	MPC-663 – Impacts of Vehicle Fires on Polymer Concrete Bridge Deck Overlays
University	Utah State University
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Brief Description of Research Project	Polymer concrete (PC) has become a popular choice for deck overlays on new and existing bridges. However, PC's high sensitivity to elevated temperatures, and the significant difference between its thermal expansion coefficient and that of the concrete substrate, have prompted concerns that vehicle fires may degrade or even completely destroy PC bridge deck overlays. With the wider aim of enhancing such overlays' vehicle-fire resistance, the proposed research will investigate such fires' specific impacts on them, both through a real vehicle-fire test on a large reinforced concrete (RC) panel protected by a PC overlay, and through overlay-performance tests before and after the vehicle-fire test. Then, based on the test data, effective preventive design/construction methods and post-fire repair strategies for PC bridge deck overlays will be proposed, and tested on medium-sized RC panels under controlled heating-cooling conditions. It is expected that applying the resulting recommendations in real projects will enhance the vehicle-fire

	resistance of PC bridge deck overlays, and thus reduce transportation interruptions due to vehicle fires.
Describe Implementation of Research Outcomes (or why not implemented) Place Any Photos Here	The degradation of PC overlays under extreme temperatures highlights the need for better fire resistance methods. Traditional approaches typically involve adding fire-resistant materials into the PC mix before casting. However, these methods cannot be utilized in already installed PC overlays and modifying PC's intrinsic properties could make it less appealing for certain uses. To tackle this, this project developed an intumescent coating that can be applied directly to existing PC overlays. The coating is a blend of fire-retardant materials mixed into polyester binder resin. The coating acts as a protective barrier, insulating the PC from intense heat during vehicle fires and reducing degradation risk. To test this coating's effectiveness, extensive evaluations were conducted on both treated and untreated PC slab samples, simulating the thermal exposure of a typical vehicle fire. These tests assessed critical performance aspects including skid resistance, surface hardness, resistance to water penetration, abrasion resistance and resistance to chloride penetration. Results showed that treated PC overlays maintained better performance under heat up to 500°C, exhibiting less degradation compared to untreated overlays. This underscores the coating's potential to significantly enhance the durability of existing PC overlays exposed to high temperatures.
Impacts/Benefits of Implementation (actual, not anticipated)	This project developed an intumescent coating that can be applied directly to existing PC overlays with potential to significantly enhance the durability of existing PC overlays exposed to high temperatures.
Web Links • Reports • Project Website	MPC Final Report – Impact of Vehicle Fires on Polymer Concrete Bridge Deck Overlays