UTC Project Information	
Project Title	MPC-583 – Composite Repair for Concrete Bridges Subjected to Alkali-Silica Reaction
University	University of Colorado Denver
Principal Investigator	Yail Jimmy Kim
PI Contact Information	Professor University of Colorado Denver Phone: (303) 315-7497 Email: jimmy.kim@ucdenver.edu ORCID: 0000-0002-4286-1461
Funding Source(s) and Amounts Provided (by each agency or organization)	USDOT, Research and Innovative Technology Administration $50,000 Faculty time and possible external scholarship/support awarded to participating individuals $50,000
Total Project Cost	$100,000
Agency ID or Contract Number	69A3551747108
Start and End Dates	December 14, 2018 to July 31, 2022
Brief Description of Research Project	This research aims to quantify the deleterious effects of alkali-silica reaction (ASR) on the behavior of concrete bridges, to examine the efficacy of composite-based repair to improve the capacity of ASR-damaged concrete members, to develop a theoretical model which can predict the performance of ASR-damaged and composite-repaired concrete members, and to propose design/practice recommendations for the implementation of the proposed composite repair method.
Describe Implementation of Research Outcomes (or why not implemented) Place Any Photos Here	The assessment of the present ACI 440.2R-17 equation revealed its limitation in predicting the confined strength of ASR-damaged concrete members. The efficiency factors resulting from the formulated analytical model are recommended to implement performance-based design for ASR-affected concrete confined with CFRP sheets.
Impacts/Benefits of Implementation (actual, not anticipated)	The structural responses of the plain and confined concrete specimens were examined with an emphasis on load-carrying capacity, toughness, and failure characteristics. An analytical model was developed to complement the experimental findings and to propose design recommendations.
Web Links • Reports • Project Website	• MPC Research Report – Composite Repair for Concrete Bridges Subjected to Alkali-Silica Reaction

	• Journal Paper – Thermal and Energy Characteristics of Composite Structural Insulated Panels Consisting of Glass Fiber Reinforced Polymer and Cementitious Materials • Journal Paper – Basalt Fiber-Reinforced Polymer and Hybrid Grid-Confined Concrete with Organic/Inorganic Resins • Journal Paper – Strengthening of Reinforced Concrete Beams Using Embedded Carbon Fiber-Reinforced Polymer with Polyester-Silica • Journal Paper – Post-Peak Crack Control of Concrete with Basalt Fiber-Reinforced Polymer Grids • Journal Paper – Out-of-Plane Peeling of Carbon Fiber-Reinforced Polymer- Concrete Interface at Elevated Temperatures • Journal Paper – Stochasticity on Long-Term Behavior of Steel-/Carbon Fiber-Reinforced Polymer Prestressed Girders • Journal Paper – Infiltration of H2SO4 through Concrete with and without Carbon Fiber-Reinforced Polymer Confinement • Journal Paper – Performance Characterization of Plain and CFRP-Bonded Concrete Subjected to Sulfuric Acid • Journal Paper – Splice of Glass Fiber-Reinforced Polymer-Reinforced Concrete Mixed with Superabsorbent Polymer • Journal Paper – Debonding Mitigation of Carbon Fiber-Reinforced Polymer-Strengthened Reinforced Concrete Beams with Grooved Bonding • Journal Paper - Alkali-Silica Reaction for Concrete Confined with Carbon Fiber-Reinforced Polymer Sheet • Journal Paper – Hollow Concrete Cylinders Confined with CFRP: Strength and Size Effect • Journal Paper - Thermomechanical-Coupled Distress for Reinforced Concrete Beams Strengthened with Carbon Fiber-Reinforced Polymer • Journal Paper – Splitting of Concrete with Steel, Glass Fiber-Reinforced Polymer, and Basalt Fiber-Reinforced Polymer Bars Exposed to MgSO4 • Journal Paper – Chaos Expansion for Long-Term Behavior of Carbon Fiber- Reinforced Polymer-Strengthened Reinforced Concrete Beams • Journal Paper – Grid U-Wrap Anchorage for Reinforced Concrete Beams Strengthened with Carbon Fiber-Reinforced Polymer Sheets

	• Journal Paper – Uncertainty Modeling of Carbon Fiber-Reinforced Polymer-Confined Concrete in Acid-Induced Damage • Journal Paper – Continuous Reinforced Concrete Beams with Various Carbon Fiber-Reinforced Polymer Systems under Soil Settlement • Journal Paper – Durability Investigations into CFRP-confined Concrete in H2SO4 • Journal Paper – Corrosion Mitigation of CFRP-Steel Interface with Sacrificial Anodes