CIAMTIS
U.S. DOT Region 3 University Transportation Center

UTC Project Information	
Project Title	Extending the Service Life of Rigid Pavement Joints with Self-Healing Sealants
University	University of Delaware Virginia Tech
Principal Investigator	PI: Jovan Tatar, University Delaware Co-PI: Christopher Kloxin, University of Delaware Co-PI: Alexander S. Brand, Virginia Tech
PI Contact Information	jtatar@udel.edu
Funding Source(s) and Amounts Provided (by each agency or organization)	UDel Fed: $121,975, UDel Match: $121,975 VTI Fed: $53,025 VTI: Match: $53,025
Total Project Cost	$350,000
Agency ID or Contract Number	69A3551847103
Start and End Dates	Start 1/31/20 End 1/31/2022
Brief Description of Research Project	In the work proposed here, we will synthesize and characterize a range of CAN materials as potential sealants. Specifically, we will use materials that cure as a two-part epoxy resin that are subsequently capable of undergoing an exchange mechanism between polymer strands within the molecular structure of the materials. This type of rearrangement mechanism does not influence the mechanical properties, such as the Young's modulus, enabling the material to maintain its structural integrity (i.e., ability to stand up to vehicular loading); however, thermal cycling over time promotes the material to heal cracks and other material defects4 . The starting materials are readily scaled to large applications and can even be bio-sourced to enhance the sustainability of these polymers. Within this chemistry, we will incorporate silicon-based structures to impart flexibility and water resistance. Finally, we will incorporate adhesion promoting silane agents within the monomer formulation for strong concrete-sealant adhesion. Taken together, this material is hypothesized to have excellent mechanical properties with an enhanced service lifetime.
Describe Implementation of Research Outcomes (or why not implemented) Place Any Photos Here	
Impacts/Benefits of Implementation (actual, not anticipated)	
Web Links ■ Reports ■ Project Website	

Appendix A:

Region 3 UTC Budget Template

University of Delaware Budget

Category	Budgeted Amount from Federal Share	Budgeted Amount from Matching Funds	Explanatory Notes
Faculty Salaries	4,500	29,378	Tatar, PI: .26 summer research; 1.71 months academic effort Kloxin, co-PI: .12 summer research, .78 months academic effort
Staff Salaries	-	-	
Student Salaries	50,417	-	1 student for 21.6 months at $27,500/year stipend rate
Faculty/Staff Benefits	1,827	11,927	ONR Negotiated rates: 40.6% faculty/prof staff;
Student Benefits	6,000	-	11.9% grad students
Total Salaries and Benefits	**62,744**	**41,305**	
Student Tuition	13,982	55,930	As per UD policy, 20% grad tuition direct charged, 80% provided by the College of Engineering
Equipment	-	-	
Expendable Property, Supplies, and Services	3,000	-	Chemicals for self-healing sealants, materials for fabricating test fixtures & laboratory consumables
Domestic Travel	1,752	-	Funds for TRB Annual Meeting in Washington, DC and local travel for CIAMTIS meetings
Foreign Travel	-	-	
Other Direct Costs (specify)	-	-	
Total Direct Costs	**81,478**	**97,235**	
F&A (Indirect) Costs	**40,497**	**24,740**	60% 7/1/20 ONR negotiated rate
TOTAL COSTS	**121,975**	**121,975**	

Virginia Tech Budget

Category	Budgeted Amount from Federal Share	Budgeted Amount from Matching Funds	Explanatory Notes
Faculty Salaries	5,390	12,393	Person-months effort: 0.63 (Year 1) and 0.72 (Year 2) months in the academic year and 0.15 months in the summer
Staff Salaries	2,484	-	Support for laboratory technicians and a research associate at the Thomas M. Murray Structures and Materials Research Facility
Student Salaries	$13,713	$11,263	GRA funded 08/2020-12/2021
Faculty/Staff Benefits	2,181	4,199	Fringe benefits are calculated in accordance with Virginia Tech's federally negotiated fringe rate agreement, which is available online.
Student Benefits	1,246	1,026	
Total Salaries and Benefits	**25,014**	**28,881**	
Student Tuition	8,178	6,782	
Equipment	-	-	
Expendable Property, Supplies, and Services	2,000	-	Laboratory and other sample preparation consumables
Domestic Travel	1,000	-	Travel to conferences (CIAMTIS, Virginia Concrete Conference, etc.)
Foreign Travel	-	-	
Other Direct Costs (specify)	-	-	
Total Direct Costs	**36,192**	**35,663**	
F&A (Indirect) Costs	**16,833**	**17,362**	The indirect rates applied have been negotiated and approved by Virginia Tech's Federal Cognizant Agency, ONR. A copy of VT's current federally negotiated indirect rate agreement can be found online.
TOTAL COSTS	**53,025**	**53,025**	