**TRANSPORTATION POOLED FUND PROGRAM**

**QUARTERLY PROGRESS REPORT**

Lead Agency (FHWA or State DOT): Virginia DOT \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**INSTRUCTIONS:**

*Project Managers and/or research project investigators should complete a quarterly progress report for each calendar quarter during which the projects are active. Please provide a project schedule status of the research activities tied to each task that is defined in the proposal; a percentage completion of each task; a concise discussion (2 or 3 sentences) of the current status, including accomplishments and problems encountered, if any. List all tasks, even if no work was done during this period.*

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| **Transportation Pooled Fund Program Project #**  TPF-5(339) | | **Transportation Pooled Fund Program - Report Period:**  □Quarter 1 (January 1 – March 31)  XQuarter 2 (April 1 – June 30)  □Quarter 3 (July 1 – September 30)  □Quarter 4 (October 1 – December 31) | |
| **Project Title:**  Contaminant Release from Storm Water Culvert Rehabilitation Technologies: Understanding Implications to the Environment and Long-Term Material Integrity | | | |
| **Name of Project Manager(s):**  **Bridget Donaldson** | **Phone Number:**  **434-293-1922** | | **E-Mail**  Bridget.donaldson@vdot.virginia.gov |
| **Lead Agency Project ID:** | **Other Project ID (i.e., contract #):** | | **Project Start Date:**  3/2/2016 |
| **Original Project End Date:**  2/28/2018 | **Current Project End Date:**  2/28/2018 | | **Number of Extensions:**  0 |

Project schedule status:

X On schedule □ On revised schedule □ Ahead of schedule □ Behind schedule

Overall Project Statistics:

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| **Total Project Budget** | **Total Cost to Date for Project** | **Percentage of Work**  **Completed to Date** |
| $630,000 | $29,416.78 | 5% |

***Quarterly*** Project Statistics:

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| **Total Project Expenses**  **and Percentage This Quarter** | **Total Amount of Funds**  **Expended This Quarter** | **Total Percentage of**  **Time Used to Date** |
| $21,086.61 and 3% | $21,086.61 | 5% |

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| **Project Description**:   |  | | --- | | Studies by a subset of DOTs have discovered that the installation of advanced polymeric materials such as spray-on coatings and cured-in-place lining (CIPP) processes can release toxic chemicals into the water conveyed by the culverts. Numerous additional anecdotal accounts from the U.S and other countries have been reported regarding adverse effects to the environment and wastewater facilities. DOTs lack information on the degree that chemical leaching affects polymeric material long-term structural performance. Recent studies have shown some of the chemicals released into the environment by culvert rehabilitation polymeric materials are product ingredients intended to promote material strength and durability.  **Objectives:** The primary project objectives are to determine the following:  (1) The scope of the problem across DOTs (i.e., the extent of use of these technologies and the scale of their impacts to water quality);  (2)The effectiveness of existing construction specifications at minimizing contaminant release from rehabilitated culverts; and  (3) The degree to which the structural integrity and longevity of rehabilitated culverts are compromised by chemical leaching.  Results of this project will enable DOTs to make informed decisions with regard to culvert rehabilitation selection and specification development. | |  | |

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| **Progress this Quarter (includes meetings, work plan status, contract status, significant progress, etc.):**  The project team had several discussions with several participating states about field sites to monitor. Some states  provided contract language/ specifications used for their CIPP projects. Scheduling difficulties existed between the  state and project team schedules. At least two weeks advanced notice for a field project is preferred by the project team.  One state has proposed they will coordinate with their maintenance division to setup a project team field visit because existing/ongoing contracts are less flexible to scheduling or have already been scheduled and the DOT personnel find  out about them later than they desire. Discussions are ongoing between states and the project team.  Some field environmental sampling supplies were ordered.  One graduate student was paid from the contract and the Principal Investigator repurposed his salary on the project  to pay an undergraduate student to also contribute to this project during the Summer months.  Methods have been under significant development and much progress has been made.  As proof of method purpose, a styrene based uncured CIPP resin impregnated fabric was obtained and underwent  extractions using two solvents, hexane and dichloromethane [DCM]. The concentrated extracts required dilution before  GCMS analysis. Results indicate that styrene was extracted by each solvent, but other compounds were also extracted  and they were dissimilar between the solvents. VOCs and SVOCs were extracted from this uncured material. Thus, when uncured resin is examined in this study two solvents will be used for extraction to cast the widest net to determine what compounds could be released into the environment during CIPP operations.  To determine the most appropriate method for extracting chemicals from cured CIPP materials, two cured CIPP materials  onhand were ground up and also underwent extraction in hexane and DCM solvents. The grinding process was not straightforward due to the hazard posed by particulates and vapors emitted during cured CIPP handling. Some CIPP  materials had been cured many months before the laboratory extractions took place. Styrene was extracted  from all materials indicating that residual styrene monomer remained in cured CIPP materials. It was not determined if this residual mass of styrene could leach out into the environment after CIPP installation because the purpose of this  laboratory activity was to evaluate the effectiveness of laboratory analytical methods for CIPP project. However, the  presence of residual styrene months after the CIPP had been cured indicates the potential for long-term release.  Water pH meters were obtained and a headspace-solid phase microextraction method for GCMS to detect VOCs is  under development.  A review of CIPP ingredients as well as known degradation products was conducted. This material will be used to design analytical methods and interpret results.  CIPP resin manufacturer was contacted to obtain a sample of uncured resin. The company did not respond. The project  team will followup again. |
| **Anticipated work next quarter**:  The project team plans to:  Travel to California, collect uncured CIPP resin and conduct extractions on it and cured CIPP resulting from that  uncured resin. Water testing for this CIPP activity is being conducted by another contractor, California State University Sacramento, not this pooled fund project.  Further establish analytical methods for characterizing water samples collected from the field.  Setup field site visits with participating states and conduct a site visit.  Possibly, based on whether or not a site visit is conducted begin analyzing exhumed materials in the laboratory.  *It is important that the states and project team identify field visits as soon as possible so that environmental monitoring*  *and sampling collection and analysis can be conducted. Obtaining samples is critical to the successful completion*  *of this project.* |
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| **Significant Results:**  For this quarter, methods are almost established. Some preliminary data was obtained. No reportable results at this time. |
| **Circumstance affecting project or budget. (Please describe any challenges encountered or anticipated that**  **might affect the completion of the project within the time, scope and fiscal constraints set forth in the**  **agreement, along with recommended solutions to those problems).**  For this quarter, the challenge has been scheduling the site visits. It was desired site visits be conducted during the summer months, but sites were not available. Acquiring environmental samples before, during, and after CIPP installation is  critical to this project. Also important is obtaining a sample of the uncured resin fabric, excess material the contractor  cuts off and does not use. Additionally obtaining contractor specifications for the CIPP site to be monitored is important  to better prepare the project team to understand the installation conditions.  The project should be completed on time, though the ability to keep on the initial project scope will be determined by the  ability of the states and project team to coordinate site visits and opportunities for sampling. |

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| **Potential Implementation:**  The findings from this study will be used to provide DOTs two forms of guidance:  (1) a final report that will include recommended construction specifications to minimize environmental  impacts and maximize performance, and  (2) a hands-on training workshop about current and emerging culvert rehabilitation technologies,  specification considerations, and factors to consider for environmental and structural performance. |