**TRANSPORTATION POOLED FUND PROGRAM**

**QUARTERLY PROGRESS REPORT**

**Lead Agency: Utah Department of Transportation**

**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.*

|  |  |  |  |
| --- | --- | --- | --- |
| **Transportation Pooled Fund Program Project #**  **TPF-5(433)** | | **Transportation Pooled Fund Program - Report Period:**  \_ Quarter 1 (January 1 – March 31, 2019)  \_ Quarter 2 (April 1 – June 30, 2019)  **x Quarter 3 (July 1 – September 30, 2019)**  \_ Quarter 4 (October 1 – December 31, 2019) | |
| **Project Title:**  Behavior of Reinforced and Unreinforced Lightweight Cellular Concrete for Retaining Walls | | | |
| **Name of Project Manager(s):**  David Stevens | **Phone Number:**  801-589-8340 | | **E-Mail**  [davidstevens@utah.gov](mailto:davidstevens@utah.gov) |
| **Lead Agency Project ID:**  FINET 42096, ePM PIN 17824  UDOT PIC No. UT18.404 | **Other Project ID (i.e., contract #):**  UDOT Contract No. (pending) | | **Project Start Date:**  October 2019 |
| **Original Project End Date:**  September 2021 | **Current Project End Date:**  September 2021 | | **Number of Extensions:** |

Project schedule status:

**X** On schedule \_ On revised schedule \_ Ahead of schedule \_ Behind schedule

Overall Project Statistics:

|  |  |  |
| --- | --- | --- |
| **Total Project Budget** | **Total Cost to Date for Project** | **Percentage of Work**  **Completed to Date** |
| $285,000.00 = total commitments including unlisted FHWA amount  $80,000.00 = obligated to date  (contract pending) | $0.00 | 0% |

***Quarterly*** Project Statistics:

|  |  |  |
| --- | --- | --- |
| **Total Project Expenses**  **and Percentage This Quarter** | **Total Amount of Funds**  **Expended This Quarter** | **Total Percentage of**  **Time Used to Date** |
| 0% | $0.00 | 0% |

|  |
| --- |
| **Project Description**:  Roadway widening over existing walls and embankments, conflicts with settlement sensitive utilities, and accelerated schedule delivery have increased demands for alternative lightweight fill materials. Although engineers and contractors are increasingly considering Lightweight Cellular Concrete (LCC) backfills for abutments, embankments and MSE walls; the absence of a consistent design methodology has led to a wide range of design approaches with no consensus standard. LCC is available in multiple classes separated by unit weight and unconfined compressive strength. The most common class used in previous highway projects, with a unit weight of 30 lb/ft3 and an unconfined compressive strength of 50 to 80 psi, does not strictly behave like a soil or like concrete and must be investigated as a new material for engineering applications. Benefits of using LCC include low unit weight, reduced settlements/impacts to existing structures and utilities, reduced active earth pressures on retaining walls, significant post-peak ductility, rapid construction without compaction requirements, ability to pump materials to areas that are limited or dangerous for large equipment to access, and in many cases significant cost, schedule, and overall project risk reduction. Unfortunately, controversy exists within the industry regarding whether LCC should be modeled as a frictional or a cementitious (cohesive) material. In addition, earth pressures for retaining wall design and potential failure mechanisms are poorly understood for retaining wall applications. Specific to Mechanically Stabilized Earth (MSE) applications, there also remains uncertainty in LCC interaction with internal wall reinforcement.  Objective: Measure engineering design parameters and failure mechanisms for unreinforced and reinforced LCC backfills based on large-scale laboratory tests. Specific objectives are:  (1) Determine and characterize the nature of strength criteria based on failure in large-scale laboratory tests.  (2) Determine the failure mechanism for unreinforced LCC backfill behind conventional reinforced concrete walls along with wall pressures and deflections.  (3) Determine the failure mechanism for MSE walls with LCC backfill along with wall pressures, required inextensible (steel) reinforcement length, and wall displacements.  (4) Measure pull-out resistance of inextensible reinforcements at large-scale and under variable applied vertical pressures.  Tasks for this study will be listed once the initial research contract is executed.  The Principal Investigators for this research project are Dr. Kyle Rollins of Brigham Young University (BYU) and Ryan Maw of Gerhart-Cole, Inc. The technical advisory committee (TAC) for the study currently includes representatives from UT, CA, LA, MI, NY, OR, and WA state DOTs and FHWA. |

|  |
| --- |
| **Progress this Quarter (includes meetings, work plan status, contract status, significant progress, etc.):**  **Tasks** – These are being reviewed and finalized for the initial contract.  **Contract** – Dr. Rollins shared an updated work plan with UDOT for review, and UDOT provided feedback and suggested edits. |
| **Anticipated work next quarter**:  **Tasks** – These will be updated and finalized for the initial contract. Plan on having a TAC web conference to discuss the planned work tasks prior to beginning the work.  **Contract** – Dr. Rollins will share an updated work plan with the TAC for review and incorporate the TAC feedback in the work plan. The initial contract will be executed and work will begin.  **Funding** – Participating state DOTs are requested to transfer their 2019 and 2020 funding commitments to UDOT to fund the research contracts. |

|  |
| --- |
| **Significant Results:**  None yet. |
| **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).**  None. |

|  |
| --- |
| **Potential Implementation:** |