

TRANSPORTATION POOLED FUND PROGRAM QUARTERLY PROGRESS REPORT

Date: Dec. 31, 2019

Lead Agency (FHWA or State DOT): Indiana 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.

Transportation Pooled Fund Program Project # <i>(i.e., SPR-2(XXX), SPR-3(XXX) or TPF-5(XXX))</i> <u>TPF 5-387</u>	Transportation Pooled Fund Program - Report Period: <input type="checkbox"/> Quarter 1 (January 1 – March 31) <input type="checkbox"/> Quarter 2 (April 1 – June 30) <input type="checkbox"/> Quarter 3 (July 1 – September 30) <input checked="" type="checkbox"/> Quarter 4 (October 1 – December 31)	
Project Title: Development of an Integrated Unmanned Aerial Systems (UAS) Validation Center		
Name of Project Manager(s): Tommy E. Nantung	Phone Number: (765) 463-1521 ext. 248	E-Mail tnantung@indot.in.gov
Lead Agency Project ID:	Other Project ID (i.e., contract #):	Project Start Date: 1/1/2019
Original Project End Date: 12/31/2022	Current Project End Date: 12/31/2022	Number of Extensions: None

Project schedule status:

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**
\$575,000	\$72,967	35%

Quarterly Project Statistics:

Total Project Expenses and Percentage This Quarter	Total Amount of Funds Expended This Quarter	Total Percentage of Time Used to Date**
\$28,217	4.9%	50%

**Since end date has been extended, project percentages have been updated (estimates)

Project Description:

This study proposes to develop the basic standards, protocols, and testing requirements that a given UAS must meet and demonstrate for a particular application.

Progress this quarter (includes meetings, work plan status, contract status, significant progress, etc.):

- The development initial development of evaluation criteria for UAS based on the kick-off meeting held in January of 2019 is well underway. Several specific performance tests and site specific evaluation criteria are being developed. Specific progress has been made in the following areas:
 - Computational fluid dynamics (CFD) models have revealed areas on bridge structures where significant turbulence can be expected adjacent to some bridge structures. For example, adjacent to a girder or near a pier. In such turbulence, a UAV can become very unstable due to the local wind speed variations. While an experience pilot may be able to navigate these sudden changes in wind speed, some may not, which could result in catastrophic consequences to the device and potential the public. The Research Team believes that the pilot should perform a basic assessment of each structure and environment to identify and document where such turbulence may occur or be expected for each inspection. This would not require CFD analysis, but rather raise the awareness of where such problems could occur. This would be similar to a basic safety briefing that occurs on all construction sites where a job hazard analysis is conducted. The research team will analyze a few more common bridge configurations and document the results to provide guidance to pilots as to where areas of concern may exist under various wind conditions.
 - The environmental testing protocols focused on UAV performance under cold temperature is approximately 90% complete. Final verbiage of the test protocol and method are in preparation and will be share with the partner states for review soon.
 - Testing protocols to evaluate UAS performance in various environments with “obstacles” is still be developed. The challenges are related to developing universal tests that reflect both the sizes of the UAV that may be used and the specific application. For example, a UAS that is focused on deck inspection may not need to be subjected to the same performance tests that a UAS used to inspect a deck truss or between plate girders may need to be subjected.
 - The protocols to evaluate and specify the requirements associated with various camera systems continues.
- The research team had planned to have “real world” concrete deck panels obtained from a local Interstate bridge placed at the S-BRITE center in the late fall. However, the construction project from which these panels would be obtained has been delayed a few months. However, the panels should be removed in late February or early March and transported to S-BRITE. The panels will be documented and ready for use for the project.

Anticipated work next quarter:

- Continue with the development of testing protocols
- Schedule Project Panel meeting for some time in the 1st Quarter of 2020.

Significant Results:

1. None to date

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).

1. As discussed in previous report, the loss of two graduate students on the project has placed the work about 3-5 months behind schedule. The research team continues to take steps to regain this loss of progress.

Potential Implementation:

None to date