TRANSPORTATION POOLED FUND PROGRAM
QUARTERLY PROGRESS REPORT

Date: March 31, 2021

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.e, SPR-2(XXX), SPR-3(XXX) or TPF-5(XXX)* ***TPF 5-387***	**Transportation Pooled Fund Program - Report Period:** X Quarter 1 (January 1 – March 31) ☐ Quarter 2 (April 1 – June 30) ☐ Quarter 3 (July 1 – September 30) ☐ 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 X Behind schedule

Overall Project Statistics:

Total Project Budget	Total Cost to Date for Project	Percentage of Work Completed to Date**
$575,000	**$265,709**	**60%**

Quarterly Project Statistics:

Total Project Expenses and Percentage This Quarter	Total Amount of Funds Expended This Quarter	Total Percentage of Time Used to Date**
$39,658	**6.9%**	**75%**

**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.):

- In spite of the COVID-19 pandemic, additional progress has been made this quarter, good progress is bing made on the development of the performance testing criteria for UAVs. In particular:
  - Pilot criteria skills criteria
  - Camera/sensing criteria
  - Pilot & UAV performance testing within a controlled obstacle course
- Development of the obstacle course is progressing. The course will include a variety of "real" specimens with damage, hi-resolution photographs of damage, and controlled resolution charts that will be used to evaluate camera capabilities in various positions and lighting conditions. See attached photographs of the prototype layout. It is envisioned that similar obstacle courses could be created and located around the US so that replicate testing could be performed in a consistent manor. The obstacle course would be used along with in-situ testing resulting in a two-part test of the UAS.

Anticipated work next quarter:

- Continue with the development of the testing protocols for UAS.
- Schedule Project Panel meeting for some time in the 2nd Quarter of 2021. It has been decided to push the meeting to the 2nd quarter to allow a more comprehensive project update.

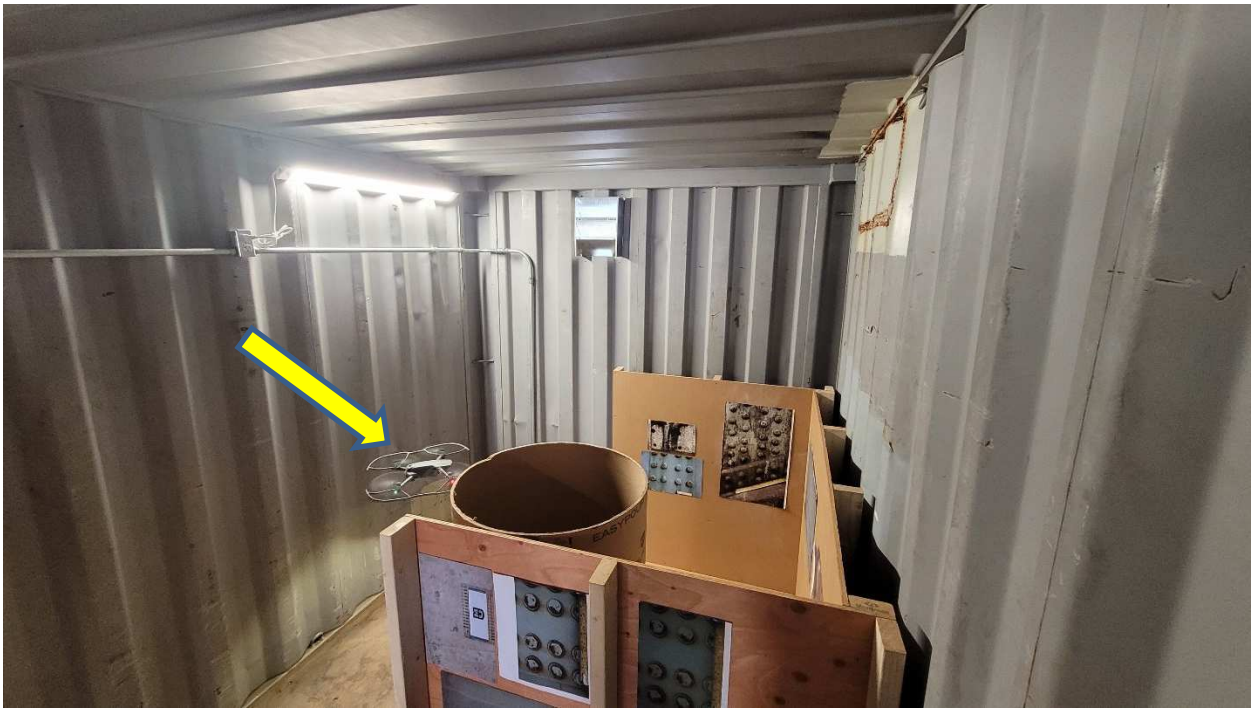
Significant Results:

1. Progress has been made regarding the development of the obstacle course, camera optic requirements, and pilot mission planning skill requirements.

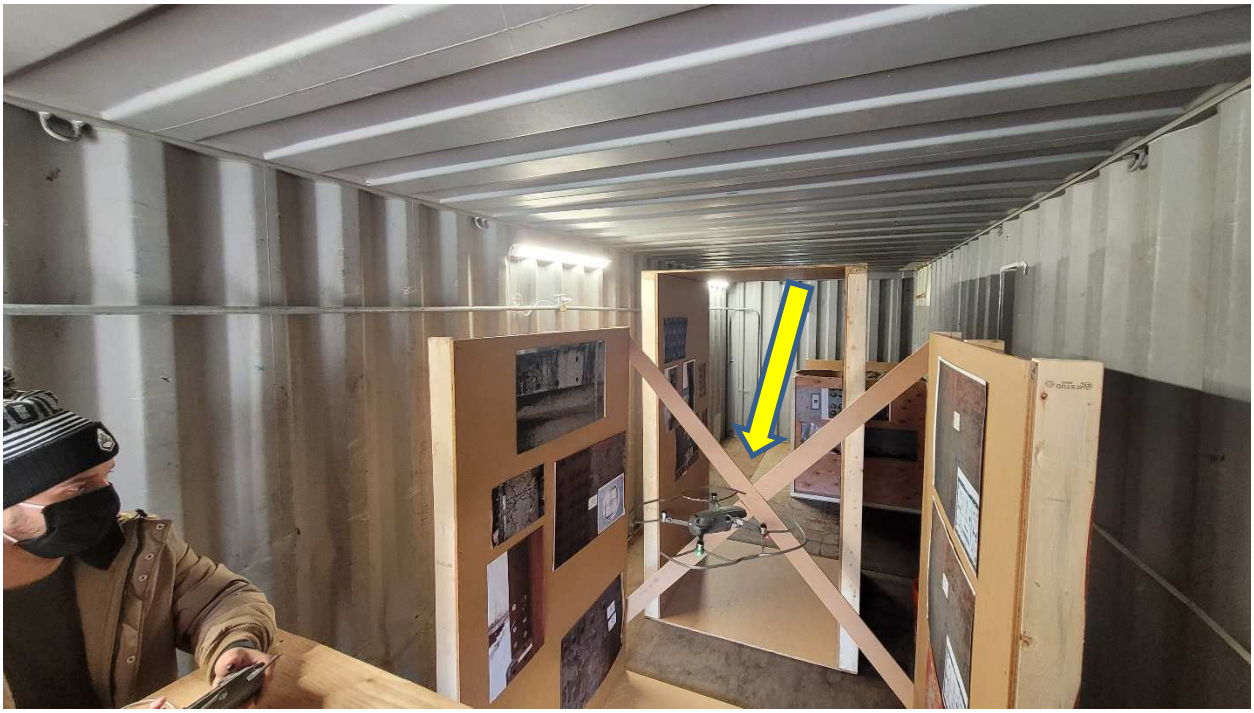
Circumstance affecting project or budget. (Please describe any challenges encountered or anticipated that might affect the completion of the project within the time, scope and fiscal constraints set forth in the Agreement, along with recommended solutions to those problems).

1. The COVID-19 restrictions resulted in Purdue University shutting down entirely in Mid-march 2020. All access to laboratory facilities were halted effectively bringing all research to a standstill. In mid-June 2020, standard Operating Procedures were being developed for review by the University to begin safe operations. Bowen Laboratory and the S-BRITE Center were cleared to allow research to re-start in mid-July of 2020. Clearly, COVID has been a major impact on this and other research projects. The Research Team continues to try and work hard to try and make up for lost time due to the laboratory shut downs while still working as safely as possible and within the confines of Purdue's COVID-19 operation procedures.

Potential Implementation:
None to date



Photograph 1 showing UAV within obstacle course.



Photograph 2 showing UAV within obstacle course.

Example of some of the “real” specimens within the obstacle course