

**Date of Report:** 3rd Quarterly Report Ending June 30, 2020

**Contract Number:** 693JK31910006

**Prepared for:** USDOT PHMSA

**Project Title:** Validation of Remote Sensing and Leak Detection Technologies under Realistic and Differing Conditions

**Prepared by:** GTI

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**For quarterly period ending:** June 30, 2020

## 1: Items Completed During this Quarterly Period:

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**Figure 1. Payable Milestones Completed this Quarter**

<b>Technical and Deliverable Milestone Schedule</b>						
Item #	Task #	Activity/Deliverable	Title	Federal Cost	Cost Share	Total
5	9	3rd Quarterly Status Report	Submit 3rd quarterly report	6,062	2,004.00	8,066
<b>Third Payable Milestone</b>			<b>SUBTOTAL</b>	<b>6,062</b>	<b>2,004.00</b>	<b>8,066</b>

This table was populated with Items from Attachment #3, Technical and Deliverable Payable Milestone Schedule (in the contract) that were completed during this reporting period and are the corresponding Items included on our next invoice.

## 2: Items Not-Completed During this Quarterly Period:

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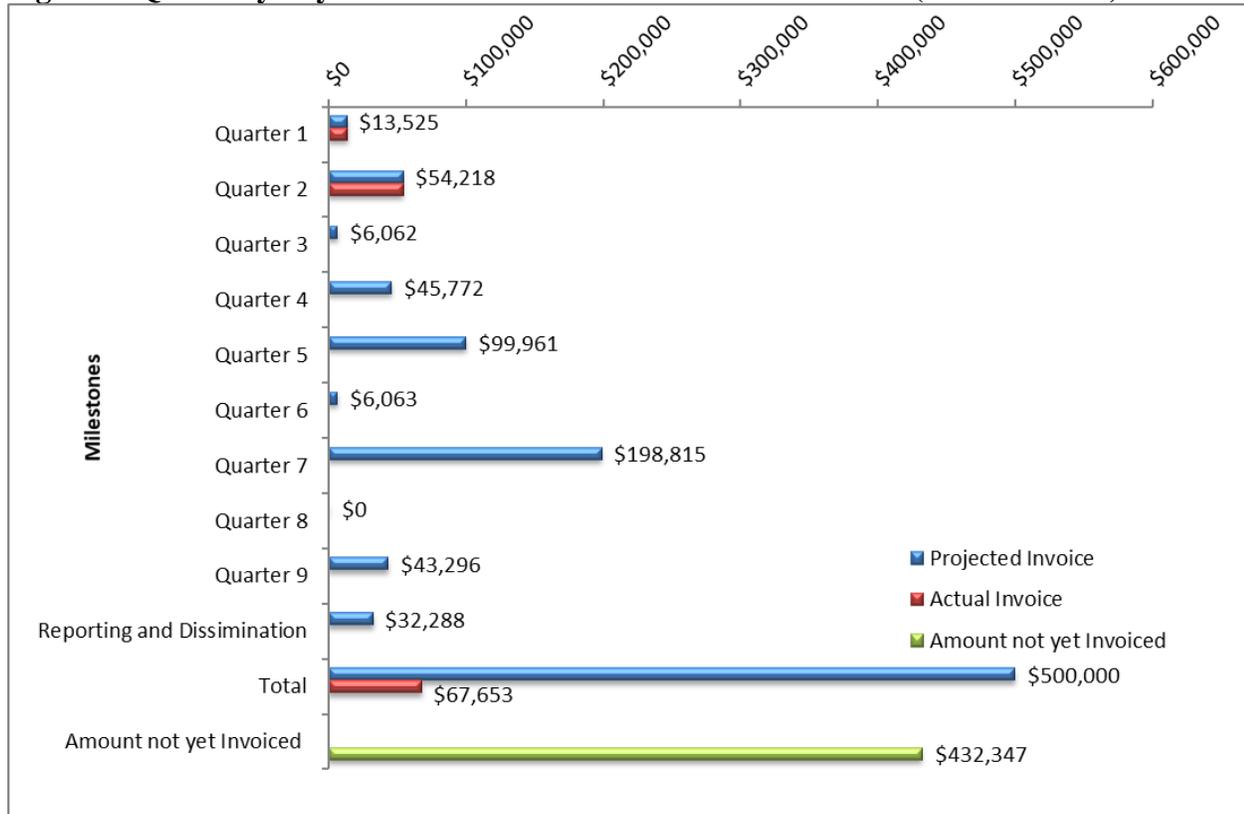
All payable milestones were completed this quarter.

## 3: Project Financial Tracking During this Quarterly Period:

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The nature of the contract for this research effort is fixed price, with clearly defined milestone/deliverable payments. **Figure 2** below outlines projected invoicing, as well the invoice submitted upon delivery of the first quarter payable milestone. **Figure 3** outlines invoicing to our cost share partners.

**Figure 2. Quarterly Payable Milestones/Invoices - 693JK31910006 (Federal Costs)**



#### 4: Project Technical Status

##### ACTIVITY: DRONE SYSTEM INTEGRATION HAS BEGUN

**Item Title:** Summary Table of Testing Criteria

**Item Number:** 11

**Task Number:** 3

During this quarter, the initial system approach for a dual sensor UAV has been completed with the system components listed below. The DJI M300 RTK was selected as it is the most recent and most advanced UAV intended for commercial inspection and survey use. Initial discussions with the TAP indicated that project focus will be on survey of hazardous or difficult-to-access sections of pipeline.

Assessing performance of systems while surveying pipeline sections located on steep slopes, water crossings, swampy or sensitive lands will be priority. Long distance survey (beyond visual line of site) is less of a priority for this phase of the project. With that in mind, a quad UAV was chosen over a VTOL (Vertical Take Off and Landing) fixed wing aircraft, to enable close survey of pipe sections with tree coverage, steep slopes or swampy/water sections due to its ability to provide better terrain following. With the DJI M300, it also has the ability to demonstrate long range missions and flight speeds that would adequately demonstrate a fixed wing method. Thus, allowing the study of difficult pipe sections as well as open corridors. The DJI M300 RTK is the latest and most advance system offering, with heavy payload capacity and 55 minutes of max endurance (w/o payload) – approximately 40-45 minutes with expected payload. It has an extended range of operation up to 15 km, with coordinated flight control and allowance of multiple operators. Finally, the DJI M300 possesses advanced obstacle avoidance technology (Figure 4). The sensors are SeekOps SeekIR methane sensor coupled with an open path mid-IR laser.

**Figure 3. DJI M300 Quad Copter Drone**



**Figure 4. SeekIR for Unmanned Air Systems**



Two different cameras were selected that enable the evaluation of cost vs functionality. One camera only provides high definition video, while the other camera is able to capture high definition video with the addition of high quality thermal imagery. The HD20 high definition video and still camera is shown in Figure 6 and the HD20T high definition visual and IR video is shown in Figure 7.

**Figure 5. DJI H20 - High Definition Visual**



**Figure 6. DJI H20T - High Definition Visual and Thermal**



Threat detection and video imagery process was investigated. The University of Dayton, Professor Asari was contacted who had previously developed pipeline threat detection image processing under a PRCI grant. GTI and SeekOps will continue to explore the possibility of using this system contingent on level of effort and cost to the project.

### **ACTIVITY: COMPLETION OF PAYABLE MILESTONE: SUBMIT 3RD QUARTERLY STATUS REPORT**

**Item Title:** Submit 3rd Quarterly Status Report

**Item Number:** 5

**Task Number:** 9

The third quarterly status report (this report) will be completed and submitted on schedule (on or before June 30, 2020).

### **ACTIVITY: PROJECT MANAGEMENT**

**Item Title:** N/A

**Item Number:** N/A

**Task Number:** 9

During this quarter, GTI conducted project scheduling, budgeting, establishment of data management strategies, preparation of reports, and organization of required meetings. Drone system integration is currently underway.

## **5: Project Schedule**

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The project schedule through March 31, 2022 is shown below. The project is ahead of schedule SeekOps and who have experienced delays with contracting. A no-cost extension of 3 months has been submitted to DOT PHMSA for review.

If approved, this should put the Drone System Integration task with SeekOps back on schedule. Note that a payable milestone for Task 3 is not due until the end of next quarter. However, GTI and OTD feel its important to mitigate before it becomes too much of a delay.

Progress on payable milestones (delineated by Item and Task number) are linked to the schedule and are also shown below for completeness.

