Attachment J-02

NASA ARMSTRONG FLIGHT RESEARCH CENTER

TASK ORDER 1

STATEMENT OF WORK

UAS TRAFFIC MANAGEMENT (UTM) INTEGRATION WITH FAA UAS TEST SITES

RFP No.: NND15548481R

27 MAY 2015

I. Objectives/Summary

NASA has prepared this task in order to promote all test sites individually to participate in NASA Unmanned Aerial Systems (UAS) Traffic Management (UTM) Project activities, as well as to encourage teaming across test sites to gain cost efficiencies and maximize research data that will be delivered to NASA.

This task provides minimum funding to all Test Sites, is UTM implementation related, and encourages each test site to implement the NASA UTM system to demonstrate multi-vehicle operations. The test sites will then be required to demonstrate the UTM systems across all sites by conducting individual, yet simultaneous, tests reporting data through the UTM system.

References:

1. UTM Client Interface Control Document (Attachment J-09)
2. UTM Concept of Operations (ConOps) (Attachment J-06)
3. UTM Fact Sheet (Attachment J-10)
4. Software Usage Agreement – to be provided after award
5. UTM Software Load –to be provided after award

II. Task Description

<u>UAS Traffic Management (UTM) Integration and Concept Evaluation</u>

The Test Site Operator (TSO) shall provide evidence that all activities can be completed by the identified milestones.

The TSO shall use NASA's UTM construct and/or initial system and procedures to demonstrate safe multi-vehicle operations in the vicinity. The UTM system will contain and display all constraints (real and simulated)which will include geo-fenced areas, severe wind/weather, on-going operations, etc. The users shall connect to UTM, provide an operational plan, connect trajectories, and track the progress of trajectories. NASA will provide the UTM interface control document (reference 1). NASA will make UTM system available by providing the test site with the necessary UTM software load (reference 5 – to be provided after award). The TSO shall return the signed software usage agreement (reference 4 – to be provided after award) to receive the UTM software load.

The test sites shall seek certificate of authorization or waiver (COA) and other approvals to operate, as required to demonstrate the UTM capability. The participating test sites and NASA researchers will develop scenarios and data collection together. The TSO representatives shall prepare a test plan that will include background, objectives, approach, data collection, and collaboration strategy. The Test Plan should also briefly describe the means in which they will complete the content below:

- Schedule leading up to Tests with testing periods defined

- Implementation plans for UTM
- Aircraft anticipated to perform in Flight Test
- Missions anticipated to be performed in Flight Test
- Major approval or safety challenges

Test sites shall propose the data that can be collected which will include vehicle as well as airspace operations. NASA will review the plan, and proposed data collection (e.g., vehicle performance, weather, geo-fence conformance, procedures), and provide feedback. The test shall conduct an initial demonstration test (Shakedown Test) that includes at least two vehicles operating for 30 minutes. The test sites shall identify partners (if any) to participate in the test and conduct a preparatory integration test (Shakedown) with UTM prior to flight tests, which will involve multiple vehicles. The Shakedown test is expected to occur by February 2016 (or earlier as negotiated with all test sites) to conduct preliminary examination of the scenarios, data collection activities, and test protocols.

The Final UTM Demonstration Testing period is anticipated to be during April 2016 (date to be finalized), coinciding with the anticipated period of the NASA "Initial Safe National UAS integration Campaign/Initiative". Further, the suite of scenarios shall be demonstrated over a multiple week period. The Final UTM Demonstration Test is expected to include four vehicles operating a variety of missions as described in the test plan.

The Final test report shall be delivered to NASA within 30 days of the test, and shall include the content below:

- UTM Integration (lessons learned, client interfaces, etc);
- Description of Test Performed and methods of approval (COA, etc), including total number of aircraft and mission plans;
- Discussion on technical performance of the UTM system components and interfaces including trajectory reporting, user interfaces, weather scenarios and possible mission impacts;
- Discussion on Technical performance and data collection for aircraft including missions trajectories of aircraft for entire mission;
- Discussion on impacts of simultaneously conducting tests with other test sites, if any.

III. Place of Performance

Support will primarily be provided at the Test Site Operator facilities, the NASA Armstrong Flight Research Center, and NASA Ames Research Center. Travel for this task will not be required.

IV. Period of Performance

The period of performance for this requirement will be two years from task order award.

V. DELIVERABLES/MILESTONES

Deliverable Titles	Deliverable Instructions	Due Date
Joint Kick-off Meeting	Each Test Site will plan for a joint kick-off meeting	Sept 2015
Task 1 Test Plan	Each Test Site shall submit a test plan to accomplish the goals of the task. The test Plan shall include content described in the SOW	Oct 2015
Shakedown tests	Each test site shall conduct a UTM shakedown activity with multiple aircraft as a precursor to Initial Safe National UAS integration Campaign/Initiative	Between November 2015 and February 2016
Task 1 Safe Integration Month Demo	Each test site shall conduct a UTM demo with multiple aircraft in conjunction with Initial Safe National UAS integration Campaign/Initiative	April 2016
Task 1 Final Report	Each Test Site shall submit a report on the simultaneous UTM demonstration per content described in Task 1	May 2016