

June 15, 2010

TO: 126/Contracting Officer, Office of Procurement

FROM: 190/REDACTED, AST

SUBJECT: Justification for Other than Full and Open Competition (JOFOC) for Lunar Surface Manipulator System

1. Recommendation

This document is a justification for other than full and open competition prepared by the NASA Langley Research Center, Research and Technology Directorate, Structural Mechanics and Concepts Branch. It is recommended NASA Langley Research Center negotiate with Alliance Spacesystems, LLC, for design and fabrication work to support the continued development of modular systems and devices in support of the Lunar Surface Manipulator Systems (LSMS) and Mars Surface Manipulator System (MS)² initiatives.

This recommendation is based on NASA's requirement to find a solution to the problem of unloading large structures, bulky cargo, equipment, and supply pods from landers on Mars and elsewhere in the Solar System. A possible solution to this problem is the Lunar Surface Manipulator System (LSMS). The current LSMS resulted from work done under a proposal selected and funded under NASA's Human and Robotic Technology (H&RT) Program Intramural Call for Proposals. The current LSMS developmental product resulting from a partnering between NASA Langley Research Center, Johnson Space Center (JSC), Goddard Space Flight Center (GSFC), Jet Propulsion Laboratory (JPL), REDACTED, Alliance Spacesystems, and REDACTED. The LSMS is a lightweight crane that can be used to unload the lander and have other uses in lunar logistics, construction, inspection and repair. The LSMS has the potential to become a versatile tool for off-Earth human exploration and development.

2. Nature of the Action

Initial development of the LSMS focused on mechanical design of the test-bed with an eye toward automated operations in the future. Having successfully demonstrated the LSMS in the field in June of 08 the focus of future efforts is the development of a sensing system for the joint angles of the LSMS as well as development of the forward and inverse kinematics in preparation for automated control.

The work planned for this action focuses on the expansion of existing modular design concepts and approaches that will raise the technology readiness level (TRL) and expand the

SUBJECT: Justification for Other than Full and Open Competition (JOFOC) for Lunar Surface Manipulator System

LSMS to operate with automated controls using modular actuator and drive electronic systems.

3. Description of the Supplies or Services

LaRC is currently developing the concept for and designing a second-generation Lunar Surface Manipulation System (LSMS) test-bed. The key objective of the second-generation device will be to demonstrate the capability to off-load itself from a lunar lander onto the lunar surface or a lunar transport vehicle. Concurrently, the second-generation device will be designed to have increased load carrying capability, longer reach and be more mass efficient. Similar to the first generation device, LaRC will concentrate on designing and developing the structural and mechanical systems and Alliance SpaceSystems will develop of a second generation LSMS test-bed with more robust capabilities utilizing its modular concepts and techniques originally developed from 2004-2009 when Alliance SpaceSystems developed the first generation LSMS test-bed.

The estimated price for the procurements associated with this effort is \$REDACTED inclusive of \$REDACTED for the design, \$REDACTED for fabrication and delivery, and options of \$REDACTED to extend the modular design philosophy to tools and developmental spares for the LSMS.

4. Statutory Authority

Authority for the Justification for Other Than Full and Open Competition is provided by 10 U.S.C. 2304(c)(1) as implemented by FAR 6.302-1, “ Only One Responsible Source and No Other Supplies or Services will Satisfy Agency Requirements.” Pursuant to FAR 6.302-1(a)(2)(iii)(A) and (B), this development effort represents a continuation of the design and fabrication of the LSMS test bed to a 2nd generation configuration and an extension of the design philosophy to tools and developmental spares for LSMS.

5. Contractor’s Unique Qualifications

Background & Unique Qualifications

Alliance Spacesystems was one of the partners on a proposal titled “Advanced Materials and Structures for the Modular Assembly of Large Space Platforms” selected for funding under the LaRC 2004 Human and Robotic Technology Intramural Call For Proposals. The proposal effort was led by REDACTED (Principal Investigator) and REDACTED (Co-Investigator) from the Langley Research Center. A total of 136 proposals were submitted in response to

the call and only a small subset (approximately 5 percent), including the Advanced Materials and

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Structures for the Modular Assembly of Large Space Platforms proposal, were selected for award. This bid and proposal process served as the competitive process under which Alliance began work with LaRC to develop the first -generation Lunar Surface Manipulation System (LSMS) test-bed

The LaRC team focused on developing modular systems for performing lunar outpost assembly, payload handling and regolith handling operations on the lunar surface. The team invented a modular, long-reach, 3 degree-of-freedom manipulator called the Lunar Surface Manipulation System (LSMS) that could efficiently perform a large variety of operations on planetary surfaces. Under contract Alliance designed, built and delivered cable actuator systems for the first generation LSMS test-bed including hoists, motors, gear boxes, specialized fittings and interface hardware, motor drive power and control boxes and motor control software. Based on Alliance Spacesystem's experience in designing and fabricating key component of first generation test bed, it would not be practical or efficient for another source to expend the extensive effort, time and cost to become familiar with the LSMS sufficient to perform the follow-on design and fabrication work. The second generation LSMS will leverage the design and fabrication results of the first generation build; the specialized results desired cannot be obtained from another source without substantial duplication of costs, and resulting schedule delays, to gain familiarity with the equipment through training and other non-recurring activities. Any firm other than Alliance will add risk to the design and fabrication effort, the technical performance of LSMS. Alliance is also the only firm that can develop the second-generation systems with schedule to allow LaRC to meet its FY 11 HRS system demonstration milestone. Therefore, (1) award to any other source would result in a substantial duplication of cost to the Government that is not expected to be recovered through competition, and (2) unacceptable delays in fulfilling the agency's requirements.

6. Efforts Made to Solicit Offers

Because of Alliance Spacesystem's unique and intimate familiarity with the design and fabrication of LSMS, Alliance Spacesystem is the only source which could provide the required fabrication and design support needed to produce the next generation LSMS. The LSMS is a one-of-a-kind test bed that was invented for the unique purpose of unloading cargo from landers in a planetary space environment. Based on NASA's comprehensive familiarity with the limited market for these unique items, there is not a reasonable expectation that other potential offeror's could fabricate a second generation test bed based on existing technology. Following approval of the JOFOC, a Sole Source "Notice of Intent" synopsis will be posted to FEDBIZOPS for 15 days.

SUBJECT: Justification for Other than Full and Open Competition (JOFOC) for Lunar Surface Manipulator System

7. Determination of the Contracting Officer

With assistance from the NASA requiring organization, the Contracting Officer will conduct a thorough review of the proposal received to ensure that the anticipated cost to the Government will be fair and reasonable.

8. Description of the Market Research

The Research and Technology Directorate and its Structural Mechanics and Concepts Branch have significant intellectual resources in the area of modular design and structural concepts which are crucial to this effort. The Langley Research Center (LaRC) is the NASA Center of Excellence (COE) for Structures and Materials research. As part of its charter the COE builds strategic alliances/partnerships with all NASA Field Centers, other COE organizations, industry and academia, other Government agencies and international partners in order to maintain currency in this specialized area of structures and materials. The NASA structures and materials COE and COE community experts are well informed on existing and emerging industry capabilities in the structures and materials area and those specifically related to lunar transport vehicles. Experts from the community state that notwithstanding the numerous firms qualified in the area of design and fabrication, none have the comprehensive technical knowledge and expertise with LSMS necessary to build the second generation LSMS test-bed within schedule and without substantial duplication of cost. These duplicative training and non-recurring activities associated with transitioning to a new contractor are estimated at \$ REDACTED, the cost of the efforts accomplished by Alliance in the previous contract.

9. Any Other facts supporting the use of other than full and open competition:

NA

10. Listing of Sources

There are no known firms other than Alliance that can perform the follow-on design and fabrication work for second generation LSMS.

However, NASA Langley will post a notice of intent synopsis to procure the required services on a sole source basis from Alliance and will consider any interested offeror capable of meeting the requirement. Following approval of the JOFOC, a Sole Source "Notice of Intent" synopsis will be posted to FEDBIZOPS for 15 days.

11. Subsequent Competitive Acquisitions

No acquisitions beyond the second generation test-bed requirement have been identified.

SUBJECT: Justification for Other than Full and Open Competition (JOFOC) for
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12. Certifications

Technical Certification

I certify that to the best of my knowledge and belief, the data furnished above is complete and accurate.

(Name)

(Date)

Contracting Officer Certification

I hereby certify that the above justification is accurate and complete, to the best of my knowledge and belief, and the anticipated cost to the Government will be fair and reasonable.

Original signatures contained in the order file.

"Signed" Timothy P. Cannella
(Name)

(Date)