

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
LYNDON B. JOHNSON SPACE CENTER

JUSTIFICATION FOR OTHER THAN FULL AND OPEN COMPETITION
PURSUANT TO 10 U.S.C. 2304(c)(1) and
FEDERAL ACQUISITION REGULATION 6.302-1

1. **This document is a justification for other than full and open competition prepared by the NASA Lyndon B. Johnson Space Center (JSC).**

2. **The nature and/or description of the action being approved:**

JSC proposes to contract with the Aerothermal/Aero-optic Evaluation Center (AAEC) at the Calspan University of Buffalo Research Center (CUBRC), by other than full and open competition, for aerothermodynamic ground testing and data analysis with a 6-month total contract Period of Performance (POP). This POP will enable the Aerothermodynamic Wind Tunnel Testing and Data Analysis activities to support Constellation Program development activities. This action will be awarded as a new fixed-price Aerothermodynamic Wind Tunnel Testing and Data Analysis Purchase Order.

3. **Description of the supplies or services required, include an estimated value:**

This aerothermodynamic ground testing effort consists of planning and conducting experiments to simulate vehicles in-flight and to understand the environments imposed on flight vehicles. CUBRC will provide tunnel test time to satisfy test requirements that JSC issues. These requirements include (1) design and modification of the conical nozzle installation on the LENS XX facility at CUBRC and (2) the construction and testing of a Crew Exploration Vehicle (CEV) capsule configuration. CUBRC will also supply the necessary personnel required to operate the tunnel. This includes installation of the test model, data acquisition, data reduction, and removal of the test model from the tunnel. In addition, CUBRC will submit a final report that will consist of the data acquired during the test.

The work can be classified as an environment simulation CEV re-entry.

The estimated cost of the 6-month POP is not to exceed \$198,095.

4. **Statutory authority permitting other than full and open competition:**

The statutory authority permitting other than full and open competition is 10 U.S.C 2304(c)(1). As contemplated by the provisions of Federal Acquisition Regulation 6.302-1(b)(1)(ii), unique supplies or services may be deemed to be available from only one or a limited number of sources or suppliers with unique capabilities.

5. A demonstration that the proposed contractor's unique qualifications or the nature of the acquisition requires use of the authority cited:

The AAEC at CUBRC possesses capabilities that make it unique from other wind tunnel testing facilities. These capabilities include (1) the ability to instrument test models with very small and densely spaced instrumentation to measure heat transfer rates, (2) the ability to test at enthalpy levels most representative for a wind tunnel test facility, (3) the ability to test at free-stream Mach numbers up to Mach 30.

One of the challenges in predicting heat transfer rates on supersonic and hypersonic vehicles is gaining an understanding of the large heating magnitudes and gradients introduced in the region of geometry changes. These large magnitudes of heat transfer have the potential to drive the thermal protection system design on re-entry vehicles. Due to the unique capabilities of the instrumentation and experimental facilities, CUBRC will construct models of a unique design which require sophisticated machining and equally unique miniature delicate instrumentation. There is currently no other instrumentation of this type produced. The AAEC at CUBRC can meet this unique requirement for small and densely populated instrumentation development. For example, during the Manned Heating-13 Orbiter heating test, CUBRC instrumented the model with thin-film "button" heat transfer gauges as small as .05 inch. Other thin-film "ladder" gauges had lengths of approximately .028 inch and widths of .003 inch. A total of 315 gauges were placed on the 1.8 percent model, including 222 gauges on the Orbiter wing leading edge, with 182 of these being located within a 4 inches long region. This dense instrumentation was required in order to capture shock-shock interactions on the leading edge. As a point of reference, the smallest thin-film gauges fabricated at NASA Langley Research Center are approximately .04 inch wide and .08 inch long. Facility selection activities for a multitude of other test programs have also come to the same conclusion, Integrated Heating-108 Shuttle test and X-38, for example. In investigating the proper test facility for the test, it was determined that the AAEC at CUBRC was the only facility that could provide this level of instrumentation. The Constellation program requires this level of instrumentation in order to capture strong gradients induced by fluid dynamic and geometry effects.

The free-stream Mach number is a measure of the speed of the vehicle in relation to the speed of sound. The facilities at CUBRC represent the only facilities in the nation able to test at free-stream Mach numbers up to 30. Testing at Mach numbers up to 30 meets Constellation requirements to obtain, for example, gas-radiation measurements to obtain data needed for ensuring safe flight through the Earth's atmosphere at very high speeds as well as characterization of other planetary atmospheres at similar or higher speeds.

Enthalpy is a property that serves as a measure of energy within the flow field surrounding a vehicle in-flight. It becomes an important property to consider for re-entry vehicles because of the effects of flow chemistry on the surface heat transfer rates. As the enthalpy is increased, flow chemistry becomes more important. Conventional wind tunnels throughout the country are "cold flow" tunnels, meaning they have low enthalpy within the flow. However, the AAEC at CUBRC includes facilities that can match or

closely match a larger portion of a re-entry vehicle trajectory than any other conventional facility.

6. Description of the efforts made to ensure that offers are solicited from as many potential sources as practicable:

A synopsis for this effort was issued on the NASA Acquisition Internet Service on TBD, to notify industries of this action. The synopsis closed on TBD, and no responses were received.

7. Description of the market survey conducted, and the results, or a statement of the reasons a market survey was not conducted:

Representatives supporting the Contracting Officer's Technical Representative (COTR) have been involved with or managing the aerothermal efforts for the Space Shuttle Orbiter for the last 6 years. During this timeframe, they have been in contact with numerous testing facilities. In addition, they have attended several technical conferences and have performed Internet research in an attempt to understand available capabilities at other testing facilities around the country. In reviewing their capabilities, they have not found any facilities that meet all of the requirements previously identified. Through this market research, no other companies have been identified that can meet the requirements.

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

Any course of action other than awarding to CUBRC, Inc., would not fulfill the Agency's requirements, and therefore, is not in the best interest to the Government.

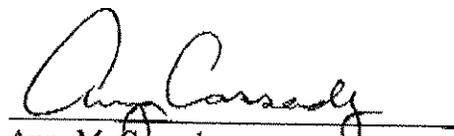
9. Sources, if any, that expressed an interest in writing the acquisition:

No responses were received prior to the close date of the synopsis.

10. The actions, if any, the Agency may take to remove or overcome any barriers to competition before any subsequent acquisition for the supplies or services required:

This Agency will continue to remove or overcome any barriers to competition before any subsequent acquisition for these services are required. To do so, the procurement offices will coordinate with the COTR to ensure any needs for publicizing formal RFIs and sources sought synopses are met. These postings will enable the COTR and technical community to gather crucial information regarding the options and available sources for the future testing needs of the Agency. The technical offices and COTR will continue to monitor industry capabilities by attending related seminars and industry forums. The COTR will also continue to review relevant technical journals, Government and commercial data bases, and internet resources for relevant information.

Technical Officer: I certify that the supporting data presented in this justification are accurate and complete.



Amy M. Cassidy
Contracting Officer's Technical Representative

7/7/10
Date

Contracting Officer: I hereby determine that the anticipated cost to the Government will be fair and reasonable and certify that this justification is accurate and complete to the best of my knowledge and belief.



P. Lamar Mueller
Contracting Officer

8-4-10
Date