AEROSPACE TESTING AND FACILITIES OPERATIONS AND MAINTENANCE (ATOM-4) NNA14443194R

Statement of Work (SOW)

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National Aeronautics and Space Administration

Ames Research Center

Moffett Field, CA 94035-0001

AEROSPACE TESTING AND FACILITIES
OPERATIONS AND MAINTENANCE

STATEMENT OF WORK

1.0 Introduction 4
1.1 Mission Description and Objectives 4
1.2 Facilities 5
2.0 Scope 6
3.0 Requirements 6
3.1 Operations and Maintenance Plan 7
3.2 Testing Services 7
3.2.1 Test Planning 8
3.2.2 Test Preparation 8
3.2.3 Test Operations 9
3.2.4 Post-Test Operations 10
3.3 Development Services 10
3.3.1 Development Project Types 11
3.3.2 Development Project Requirements 12
3.3.3 Construction 12
3.3.4 Project Management 13
3.4 General Services 12
3.4.1 Operation of Support Facilities 14
3.4.2 Maintenance, Calibration, and Repair 14
3.5 Contract Management and Administration 12
3.5.1 Contract Task Order Adminstration 14
3.5.2 Resource Scheduling 14
3.5.3 Property Management 14
3.5.4 Procurement 14
3.5.5 Safety and Environmental Compliance 14
3.5.6 Contract Reporting 14
3.5.7 Configuration Management 14
3.5.8 Facility Specific Systems Adminstration 14
3.5.9 Training and Certifications 14
3.5.10 Other Direct Cost 14

3.6 Phase-In/Phase-out 19
3.6.1 Phase-In 14
3.6.2 Phase-Out 14
4.0 Abreviations and Acronyms 20

1.0 Introduction

This statement of work describes the requirement for contract services to be provided to the Exploration Technology and the Aeronautics Directorates at NASA Ames Research Center (ARC). The work to be performed includes testing and facility operation, development projects, and operation of support facilities, performance of maintenance and repairs, and administration. The contract is structured as follows:

Section	Services
3.1	Operations and Maintenance Plan
3.2	Testing Services
3.3	Development Services (IDIQ task orders will be issued for these requirements)
3.4	General Services
3.5	Contract Management and Administration
3.6	Phase-In/Phase-out

If additional support services are required in 3.2 and 3.4, then an Indefinite Delivery/Indefinite Quantity (IDIQ) task order will be awarded.

The purpose of this contract is to meet the mission objectives of the aerospace facilities to satisfy research, development, and commercial needs for programs that utilize the Ames testing facilities. The success of these activities at ARC depends on the successful completion of the work described herein.

1.1 Mission Description and Objectives

The ground-based, aerospace test facilities at ARC; which include wind tunnels and high-enthalpy, high-speed Arc Jet facilities, support a vast variety and number of experiments. Researchers from ARC, other NASA Centers, other Federal agencies, and from the commercial community utilize these facilities for their testing programs. Virtually every commercially produced aircraft in the United States has been tested in these facilities. In addition, the Arc Jet facilities have provided test data for many NASA spacecraft, including Orion Multi-purpose Crew Vehicle (MPCV).

The mission of the facility operation organizations is to provide research, development, and commercial customers the use of the facilities and ensure that their test objectives are met. This mission goes beyond just conducting high quality test programs and operating facilities and includes the development of models, new data systems, sensors and instrumentations, and other test techniques. The long-range goal of these organizations is to continually improve the capability of these facilities to better meet customer needs.

Successful completion of the mission requires that services are provided safely and in compliance with environmental requirements. The need for safety in carrying out these services cannot be overemphasized. The testing facilities utilize high-energy sources that present potential risk to personnel and the facilities. The operating organizations maintain documented operations procedures to ensure that the facilities are operated safely and in compliance with environmental requirements.

The facility operation organizations are also committed to providing services in an economical manner. Facility testing is accomplished in an integrated team approach that includes membership from the customer as well as a mix of NASA employees and contract personnel. This allows the organizations to best utilize available resources. While this teaming approach is intended to be transparent to the customer, the distinct roles and responsibilities of NASA and the Contractor can be defined.

The NASA/Contractor team share common mission objectives. Together, NASA and contract personnel must collaborate to successfully conduct research, development, and commercial tests and to improve the testing capabilities at ARC. NASA is committed to provide the Contractor sufficient information and guidance to meet the mission objectives. The Contractor is committed to provide the professional services required for meeting mission objectives.

1.2 Facilities

The facilities covered in this Statement of Work include wind tunnels, Arc Jets, gas guns, shock tubes, laboratories, and support facilities at Ames Research Center. NASA operates these facilities solely on demand for research and development. Use of these facilities changes with the needs of industry and the research community. The types of facilities covered under this Statement of Work can be categorized as follows:

Test Facilities include, but are not limited to, test chambers, operating systems, drive systems, instrumentation, data acquisition systems, and model mounts. Support facilities are the auxiliaries, model preparation areas, and other support systems devoted to one or more facilities. In some cases, several smaller facilities share drive systems, other support systems, or are housed in a single complex or laboratory. Some facilities have been decommissioned if they are no longer needed or if they are no longer cost effective for the research customers. These facilities may require some minimal ongoing maintenance. Also there are no current plans to reactivate these facilities.

The Aerospace Testing Facilities supported by this contract include, but are not limited to:

Test Facilities

- Unitary Plan Wind Tunnels (UPWT)
  - Transonic Wind Tunnel
  - Supersonic Wind Tunnel
- Subsonic Pressure Wind Tunnel
- Fluid Mechanics Laboratory
- Anechoic Test Chamber/Acoustics Laboratory
- Arc Jet Complex
  - Interaction Heating Facility (IHF)
  - Panel Test Facility (PTF)
  - Aerodynamic Heating Facility (AHF)
  - Turbulent Flow Duct (TFD)
- Ballistic Range Complex
  - Hypervelocity Free-Flight Facility (HFFF)
  - Ames Vertical Gun Range (AVGR)
  - Electric Arc Shock Tube (EAST) Facility
  - Gun Development Range (GDR)
- Sensor and Thermal Protection System Advanced Research Lab (STAR Lab)

Support Facilities

- Steam Vacuum System (SVS)
- Arc Jet Air System (AJAS)
- High Pressure Air Distribution System (HPADS)
- High Voltage Electrical Systems
- Blade Inspection/Storage Facility (BISF)
- Sting Assembly and Storage Area (SASF)
- Balance Calibration Laboratory (BalCal)
- Reverse Osmosis Plant (ROP)

2.0 Scope

This Statement of Work describes the services required: to plan, prepare, and conduct tests, to plan and implement development projects, to operate, maintain, and repair the facilities, and the support required to administer the preceding. This Statement of Work does not define the quantity of work to be performed; however, this contract is structured so that the Contractor will be able to determine the required services.

The services available under this contract can be provided to any customer as approved by the Contracting Officer if in the best interest of the Government. These services may also be provided to other facilities at Ames Research Center, or other installations if needed, in order to support program or mission objectives. In general, however, the services provided under this contract will pertain to the facilities listed in Section 1.2.

3.0 Requirements

The requirements of this contract are organized into five Performance Areas: Testing, Development, General Services, Contract Management and Administration, and Phase-In/Phase-Out. These Performance Areas are further divided as follows:

- Testing Services:
  - Test Planning
  - Test Preparation
  - Test Operations
  - Post-test Operations
- Development Services:
  - Development Project Types
  - Development Project Requirements
  - Construction
  - Project Management
- General Services:
  - Operation of Support Facilities
  - Maintenance, Repairs, and Calibrations
- Contract Management and Administration
  - Contract Management
  - Resource Scheduling
  - Property Management
  - Procurement
  - Safety and Environmental Compliance
  - Contract Reporting
  - Configuration Management
  - Facility Specific Systems Administration
  - Training and Certifications
  - Other Direct Cost
- Phase-In/Phase-Out

Within this Statement of Work, service descriptions include bulleted lists. Although not comprehensive, these lists describe some of the major activities within the service area.

3.1 Operations and Maintenance Plan (OMP)

The Contractor shall provide an OMP, which defines and integrates contract work activities and requirements across the contract as defined below. The OMP is a cross-functional guide for the annual performance requirements based on the current and near-term projected needs of NASA and ARC. The contractor shall develop the OMP, and changes thereto, in coordination and collaboration with the appropriate NASA personnel associated with the contract including, but not limited to, the CO, COR, and other Points of Contact (e.g., Resource Managers) to ensure focus is placed on defining the requirements and matching those requirements to projected funding levels. The OMP is intended to be flexible working document, incorporating changes throughout the year (as approved by the CO) to achieve flexibility and adaptability in meeting the evolving mission requirements, needs, and business environment changes at NASA and ARC. The Contractor shall maintain the OMP as a contract deliverable and continuously update the OMP based on fluctuations in the Government's requirements.

Summary of Operations and Maintenance Plan: The Contractor shall develop a top-level summary covering each individual functional area (i.e., Testing and General Services) and correlate it with the applicable Contract Line Item Number (CLIN) and funding organization. Each functional area has its own individual requirements as defined below.

The Contractor shall develop its approach to meet the requirements as defined in SOW Sections 3.2 and 3.4, for the upcoming performance period considering the operational and budgetary parameters provided by the Government. The purposes of this section of the OMP are to:

- Define the annual SOW Sections 3.2 and 3.4 requirements and activities expected at each of the facilities for the upcoming performance period

- Develop an approach that optimizes performance consistent with the operational parameters (e.g., workforce, schedule, budget, capacity)

- Define and effectively support a blended workforce consisting of Government and Contractor employees to implement the strategic objectives and priorities formulated by the Government.

3.2 Testing Services

The primary objective of Aerospace testing at ARC is to safely meet the research, development, or commercial customer's requirements on time at the lowest possible cost. Therefore constant communication is required at all times between NASA, the customer, and the Contractor.

Testing services are comprised of the four phases of a test in ARC's facilities: Test Planning, Test Preparation, Test Operations, and Post-test Operations. The sections describing these phases include the objectives, a general description of the process, and work requirements to successfully carry out a test. During these phases, the schedule, cost, test requirements, and data accuracy need to be continually reviewed and balanced.

NASA and Contractor management will agree on the lead responsibility for a given test. This will occur when a test is approved by NASA (with inputs from its Contractor). Either a NASA or Contractor Test Manager/Engineer will then be assigned. The Test Manager/Engineer is responsible for overall project success and will be expected to:

- Manage available resources, budget, and consent to changes
- Ensure compliance with Safety, Environmental, and Mission Assurance process
- Facilitate completion of work performed by other disciplines
- Facilitate coordination between disciplines
- Facilitate resolution of problems
- Report to customer, Contractor and NASA Management on status
- Provide a single point of contact for test matters

- Facilitate system integration and testing activities

3.2.1 Test Planning

Specific requirements for the testing phases are as follows:

- Preliminary Test Planning (feasibility, which facility, availability, test objectives and requirements)
- Official Test Request from customer to NASA – holds test date(s)
- Customer submits test plan to NASA
- Test Readiness Review (TRR) minimum 2 weeks before test commences

The main goal of test planning is for NASA, the Customer, and the Contractor to agree on test requirements, schedule, and the responsibility for tasks and deliverables. Test planning begins after the test request has been approved by NASA management and ends when a Customer Agreement and an Inter-Agency Agreement or a Space Act Agreement, if applicable, are generated by NASA, the Contractor, and the Customer and are signed by NASA management and the Customer. The Customer Agreement is based on the Customer's technical requirements and indicates the agreed upon roles and responsibilities of the NASA test team and the Customer.

An additional goal of test planning is to develop tasks, schedules, milestones, and associated cost estimates for all work so that the test can be carried out effectively. This planning supports the subsequent test preparation, test operations, and post-test phases of the test, but does not include detailed implementation plans/designs/documents, which are developed during test preparation. This phase may include planning for model modifications, minor facility changes, and other engineering activities. Major facility changes or model development will typically be executed under Section 3.2, Development Services.

Initially, the test team may consist of only the Test Manager/Engineer and Customer representatives. As needed, technical leads from other disciplines will support the effort to develop the Customer Agreement.

The Contractor shall:

3.2.1.1 Prepare customer agreements

- Review and optimize customer requirements
- Conduct Initial Test Planning Meeting
- Define approach to meeting customer requirements necessary to meet the required objectives
- Obtain NASA and Customer approval

3.2.1.2 Generate a Task and Resource Plan which outlines the approach to meeting the technical objectives throughout the test phases. The Task and Resource Plan requires Government approval. The Task and Resource Plan shall:

- Include plans for calibration and checkout of instrumentation, programming and checkout of software, design, procurement, fabrication, assembly, and checkout of subsystems to meet customer requirements
- Include estimates for costs, labor, schedule, equipment and material by task
- Identify and address special matters pertaining to Safety, Environmental, and Mission Assurance, configuration management, maintenance, facilities integrity, and Injury Prevention
- Identify and address known technical and cost risks associated with the Contractor's proposed approach and offer alternatives for consideration by NASA and the customer

3.2.2 Test Preparation

The goal of Test Preparation is to bring all required systems and documents to a state of readiness for the agreed-upon test date. Test preparation begins with an approved Customer Agreement and includes all

detailed preparation through the Test Readiness Review (TRR) and end-to-end check-out of test-related model and facility systems.

NASA and the customer must be kept updated on the test team's progress and will be involved in resolving issues. Since some evolution of requirements is unavoidable, the Customer and the test team will work to accommodate changes to the requirements. It is a joint responsibility of the Customer and the NASA/Contractor team to iterate on those requirements that either 1) were difficult to determine in the planning phase of the test or 2) prove difficult to achieve during test preparation. The objective of this iteration should be that test requirements are satisfied with the optimum balance between accuracy/scope and impacts to cost/schedule. During this phase, all parties will agree to revised requirements.

The Contractor shall:

3.2.2.1 Complete all design and test documentation as defined in the Test Process Manual

- Complete test plan, test safety analysis report, and quality assurance plan
- Complete an Instrumentation Test Plan
- Complete Software and Hardware Design Documents
- Complete Facility Design Documents
- Complete Data Systems User Guide
- Complete Model Controls Design Documents

3.2.2.2 Complete development, fabrication, installation and end-to-end functionality checks for all new or modified model and facility systems; including, but not limited to:

- Instrumentation
- Data-acquisition and specialized model system software including test-dependent or user-supplied software
- Data systems including user-supplied hardware
- Model controls including user-supplied model controls
- Model and associated mounting hardware
- Facility modifications

3.2.2.3 Conduct Test Readiness Review and Test Safety Review

Close all action items resulting from reviews.

3.2.2.4 Train test and facility personnel, as applicable, on model and facility hardware, software, and operations

- Develop test specific operation procedures
- Provide test specific operations training

3.2.3 Test Operations

The main purpose of Test Operations is to utilize the available facility time to safely and productively satisfy the customer's research, development, and commercial objectives. This phase begins after completion of end-to-end checkout of required model and facility systems and ends with completion of the last data run. During this phase the test team must continually balance the following competing factors: data quality and repeatability, model and other configuration changes, unforeseen problems, trouble shooting, and changes in run schedule and objectives. The test team continually optimizes the run schedule as the test evolves to maximize value from the available facility time. Additionally, facilities allow for concurrent test operations. The test team must coordinate with other test teams concerning use of the shared facility systems. Finally, the test team must also communicate the status of test operations to NASA management. Tests may be extended to recover lost facility time or changes in test objectives.

The Contractor is responsible for operating each facility, and its plants or auxiliary systems, as applicable, in accordance with Standard Operating Procedures (SOPs). The Contractor's Facility Operators and Shift Engineers shall be certified according to the organization's training and certification plan.

The Contractor shall:

3.2.3.1 Operate facilities and conduct test runs to meet customer test objectives

- Complete monitoring checks necessary to assure model and facility systems remain functional and data is accurate
- Follow written plans and procedures for facility operation
- Achieve target test productivity, in balance with meeting test objectives

3.2.3.2 Complete test operations safely

3.2.3.3 Complete and document repairs and changes to test related hardware and software

3.2.3.4 Collect and archive raw data and provide reduced data to customer during test operations

3.2.4 Post-Test Operations

The main objectives of Post-Test Operations are to deliver the final data set to the customer and restore the facility systems to their baseline configuration and to document lessons learned and recommendations from the test team. This phase begins after completion of the last data run and ends with the delivery of the data and the test debriefing of the customer and test team.

The Contractor shall:

3.2.4.1 Transmit final data to customer per Customer Agreement

3.2.4.2 Complete final Test Documentation, including documents describing modifications to facility made to support the test

3.2.4.3 Document lessons learned, and propose changes to procedures

3.2.4.4 Return facility to the base-line configuration

- Remove instrumentation and return to inventory or customer
- Remove and return model-related hardware to inventory

3.2.4.5 Conduct test debriefing

3.3 Development Services

The main purpose of Developmental Services is to enhance NASA's ability to successfully carry out tests in a cost effective and safe manner. This work may be associated with specific tests or may be tied to overall improvement of aerospace testing or a facility. Project types include:

- Test/Diagnostic Techniques Development
- Data Systems Development
- Facility Development
- Model/Test Apparatus Development
- Sensor and Model Development

Test/Diagnostic Techniques and Data Systems development projects satisfy the need to acquire more data and more accurate data to meet changing research, development, and commercial requirements. Facility development projects are generally focused on improving the capabilities of the facilities. Model/Test

Apparatus development projects are associated with test models and apparatus and typically support a testing program. Sensor and Model Development involves developing, designing, and fabricating of instrumentation, test articles, and/or instrumentation packages for Thermal Protection System (TPS) models and/or TPS flight hardware.

Like Testing Services, project teams will be assembled from Government and Contractor personnel from the relevant disciplines required to complete the project. In addition these teams may include other NASA contractors depending on the nature of the project.

Development projects consist of three phases: Planning and Design, Implementation, and Checkout.

The Planning and Design phase includes

- Development of a safe and high quality design that meets test/project, Customer, or facility requirements
- Performing studies, developing project plans, conceptual, preliminary, and final designs, and developing prototypes
- Developing requirements documents, managing and participating in design reviews, and developing cost estimates for all stages of design

The Implementation phase includes

- Procurement, fabrication, in-process inspections, assembly, and installation needed to satisfy the design requirements
- Preparing and implementing design changes (if applicable), coordinating the review process, and documenting these changes

The checkout phase includes

- Ensuring that implementation is complete and requirements have been met including acquisition and/or reduction of data to validate the design (if applicable)
- Subsystem checks, final inspections, Integrated Systems Tests (IST), training, and documentation, and the planning of these activities
- On occasion, checkout may require specialized expertise, e.g., ultrasonic testing, radiographic inspections, chemical engineering, materials engineering, aerodynamicist, etc...
- For complex projects checkout includes formal planning and implementation with adherence to formal, documented procedures
- For less complex projects, checkout consists of subsystem operational checks

During all project phases, the schedule, cost, and project requirements are continually reviewed and adjusted. Therefore a high degree of communication is required at all times between NASA, the customer, and the Contractor.

Configuration management is crucial to project success. The configuration management process currently in use is defined in “Configuration Management Procedures Document Number A027-9391-XB4” and the Thermo physics Facilities Configuration Management Plan.

3.3.1 Development Project Types

Development Services will be used to complete Test/Diagnostic Techniques Development, Facility Development, Data Systems Development, Model/Test Apparatus Development projects.

Test/Diagnostic Techniques Development consists of developing, and supporting the ongoing evolution of new test methods for the research, development, and commercial community, such as developing and validating new instrumentation types, data collection concepts, and diagnostic techniques, flow visualization

Facility Development consists of facility enhancements to better meet customer needs.

Data Systems Development consists of design and implementation of hardware and software systems for new data acquisition and reduction capabilities that enhance testing.

Model/Test Apparatus Development consists of the design, fabrication oversight, and testing necessary for models and test apparatus development, such as mounting hardware, test platforms, and test specific auxiliary systems that meets customer requirements.

Sensor and Model Development consists of design, development, fabrication, and installation of instrumentation, test articles, and/or instrumentation packages for TPS models and/or TPS flight hardware.

3.3.2 Development Project Requirements

In accordance with CTOs, the Contractor shall:

3.3.2.1 Complete Project Plans and Designs.

- Develop Project Requirements Document with detailed cost estimate and schedule
- Produce Project Plan detailing work breakdown structure, resource requirements and their allocation
- Complete Studies, Conceptual Design, Design Reviews, and Final Design in accordance with Configuration Management procedures
- Complete Safety, Environmental, and Mission Assurance analysis

3.3.2.2 Complete the Project Implementation/Installation

- Complete fabrication, software programming, assembly, and installation
- Complete required Quality Assurance / Quality Control activities ensuring documentation is in accordance with Configuration Management procedures
- Complete personnel training

3.3.2.3 Complete the Project Checkout.

- Complete and document repairs and changes
- Ensure that project results are consistent with project requirements
- Plan and perform an integrated systems test and participate in final reviews necessary to qualify system readiness
- Develop project documentation and update facility information documents, including as-built drawings, in accordance with Configuration Management procedures
- Conduct closeout activities

3.3.3 Construction

Perform construction services in support in of ATOM testing and support facilities in accordance with the APD 8829.1, Construction Permit Process, APR 8715.1, NPR 8715.3, NASA General Safety Program Requirements, Chapter 27: Construction Safety Management, and all appropriate and applicable building and construction codes and standards.

3.3.3.1 Construction Work

Complete construction projects in accordance with final designs and applicable standards. Work will include, but is not limited to:

- Purchasing of materials, components, and subsystems; machining of structural and mechanical components; assembly of all components needed for system validation; and modifications to design drawings and affected facility drawings to reflect as-built conditions.
- Coordinating with the NASA Project Manager (PM) during the pre-construction and construction phases by reviewing and making appropriate recommendations regarding specifications and

contract drawings, shop drawings, submittals, schedules, cost estimates, safety plans, engineering changes, and tests.

- IDIQ Task Orders will be issued as Firm Fixed Price.

3.3.3.2 Installation

Complete installation projects in accordance with specified designs and standard industry practices. The Contractor shall provide all technical support and project coordination necessary to complete installations.

3.3.3.3 Component/Sub-System Verification

Verify the operation of the installed equipment and related system components or sub-systems and prepare the necessary materials required for presentations at Integrated System Safety Reviews (ISSR).

3.3.3.4 System Integration and Activation

Perform integration, testing, and activation of systems and components. The Contractor shall plan, conduct, and document integrated system tests. The Contractor shall prepare the necessary materials required for presentations at Operational Readiness Reviews (ORR). The Contractor shall complete all documentation requirements, including completion of as-built drawings, operations and maintenance manuals and test reports. The Contractor shall enter all new equipment data and maintenance instructions into the Computerized Maintenance Management System (CMMS) database.

3.3.3.5 Demolition

Perform demolition and removal of selected facilities and/or equipment.

3.3.4 Project Management

The Project Manager is responsible for overall project success and will be expected to:

- Manage available resources, budget, and approve changes
- Facilitate completion of work performed by other disciplines
- Facilitate coordination between disciplines
- Facilitate resolution of problems
- Report to customer and NASA Management on status
- Oversee Safety Environmental, and Mission Assurance process including risk management
- Provide a single point of contact for project matters
- Facilitate system integration and testing activities
- Process new technology, licensing, technology transfer, and patents

3.3.4.1 Technical Project Management Support

The Contractor shall develop program and project plans, provide expertise in team building, and provide planning, organizing, coordinating, monitoring, and managing projects including, but not limited to, the following:

3.3.4.2 Project Development

- Proposal development
- Project implementation planning
- Assessment of project feasibility
- Assessment of technology readiness

3.3.4.3 Project Implementation

- Trade studies and analyses

- Requirements analysis
- System architecture, design, and development
- Refinement of project requirements and specifications
- Refinement of cost and schedule estimates and basis of estimates
- Refinement of implementation plans
- Development of risk assessment and management plan

3.3.4.4 Project Monitoring

- Configuration management
- Tracking milestones, schedules, budgets, and performance measurements
- Support to cost control and resource allocations

3.4 General Services

This section describes work that supports testing and development services, maintains the facilities at an operational status, and provides overall contract administration. Services include: Operation of Support Facilities, Maintenance and Repair, and Management and Administration. Operation of Support Facilities includes services needed to provide utility support to the aerospace test facilities. Maintenance, Repair, and Calibration is performed to keep aerospace and support facilities and their subsystems operationally ready. Management and Administration activities include a wide-range of management and logistical services that are required for the execution of this contract.

Unlike Testing and Development Services that may be performed by either NASA or the Contractor General Services will be primarily provided by the Contractor.

3.4.1 Operation of Support Facilities

Operation of support facilities consists of the operation and management of utilities or other support functions required for testing in the aerospace facilities. These facilities are high-energy sources that have potential for serious hazards. Therefore, the Contractor shall adhere to existing and future safety programs and procedures.

Other support facilities are operated as test laboratories, are used for preparing for aerospace tests, or for the treatment of industrial wastewater from the test facilities. These facilities perform various functions to allow the actual aerospace tests to be conducted.

The Contractor shall:

3.4.1.1 Operate the Support Facilities to ensure that utilities or functionality is available to the aerospace facilities when needed.

3.4.1.2 Coordinate the demand for the utilities or functions with aerospace facility operational personnel and NASA management to ensure that utilities will be available to the aerospace facilities when needed.

3.4.1.3 Restore Support Facilities to operational status in the event of unforeseen circumstances or emergencies.

3.4.1.4 Ensure that no safety or environmental regulation violations occur during performance of this work.

3.4.1.5 Coordinate maintenance, repair, and calibration of the Support Facilities provided under Section 3.4.2 to ensure that utilities or functionality will be available to the aerospace facilities when needed.

3.4.2 Maintenance, Calibration, and Repair

Maintenance, Calibration, and Repair activities ensure that the facilities covered under this contract are operationally ready when required. Calibration is considered to be part of maintenance services and is performed in accordance with NPD 8730.1, Metrology and Calibration, and APR 8730.1, reflecting ANSI Standard Z540.3-2006. Services under this section apply to facility systems, sub-systems, equipment and components. This includes structural, electrical, mechanical, and controls aspects of the facilities as well as data acquisition and reduction systems and computers.

Currently some maintenance and repair activities are performed by other ARC organizations. The Contractor shall request services from, and schedule with, these other organizations as required. The Contractor shall coordinate maintenance and repair work with these other organizations to avoid redundant facility shutdowns for maintenance purposes. These services include, but are not limited to the maintenance, calibration, and repair of precision tools, electro-mechanical protective devices, pressure relief/control devices, overhead cranes, rigging hardware, scale systems, and spare parts and tools that are kept in storage.

The Contractor is expected to perform maintenance and repair services on equipment according to the design specifications, manufacturer's recommendations, and relevant ARC manuals unless the Contracting Officer Representative (COR) approves an alternate approach.

Specific maintenance-related information is contained in the SOP documents developed for each aerospace test and support facility (e.g. gun ranges). An example of these documents, for aerospace facility maintenance, is the Wind Tunnels Maintenance Manual (Doc. No. A027-9391-XB5). As part of the continuing improvement of the maintenance and repair programs **during performance of the contract**, the Contractor may propose a new CMMS or changes to existing procedures. Included in these documents are descriptions and specific requirements for the following:

- A CMMS is used to schedule and track facility maintenance and repair. The database currently used is the MAXIMO® Maintenance System.
- A Reliability Centered Maintenance (RCM) program including the following types:
  - Predictive Testing and Inspection (PT&I)
  - Condition Based Maintenance (CBM)
  - Preventive Maintenance (PM)
  - Corrective Maintenance (repairs and minor improvements)

The Contractor shall:

3.4.2.1 Ensure that Test and Support Facilities are operationally ready.

- Make efficient use of Maintenance and Repair shutdowns
- Perform Maintenance and Repairs to avoid unscheduled facility shutdowns
- Respond to unforeseen events/emergencies to restore facilities to operational status
- Identify and communicate to NASA the root cause(s) for facility failures

3.4.2.2 Develop Long Term Maintenance, Calibration, and Repair Plans.

- Perform Condition based analysis and studies
- Develop RCM based Long term Maintenance, Calibration, and Repair Program strategy
- Develop, maintain, and communicate to NASA a prioritized list of repair needs with justifications
- Develop schedules for calibration of instrumentation 0

3.4.2.3 Implement a RCM-based Maintenance and Repair Program.

- Implement improved Maintenance techniques
- Implement notification schedules for instrumentation calibration
- Design, install and operate Diagnostic Maintenance Systems
- Update CMMS maintenance procedures
- Train personnel on maintenance techniques and procedures

3.4.2.4 Complete Maintenance, Calibration, and Repair Work.

- Operate CMMS to schedule maintenance work
- Coordinate and schedule maintenance and repair work to be performed by others
- Perform maintenance, calibration, and repair work to standards
- Check out systems prior to reactivation
- Perform maintenance, calibration, and repair work in accordance with safety, environmental, and other applicable regulations

3.4.2.5 Document Maintenance, Calibration, and Repair work.

- Maintain accurate and up-to-date CMMS history
- Maintain accurate and up-to-date field-located log books
- Update facility configuration changes per established procedures

3.5 Contract Management and Administration

The purpose of Contract Management and Administration is to ensure that the following services are effectively managed and implemented to support all activities covered in this Statement of Work. These services include, but are not limited to: Resource Scheduling, Property Management, Procurement, Safety, Environmental, and Mission Assurance, Contract Reporting, Configuration Management, and IT System Administration.

Contractors shall not incur or commit to any conference related expense resulting from NASA Direction without prior written approval of the cognizant CO or COR. Contractor expenses for conferences that are not included in or necessary for the performance of a contract or task order, and are not incurred at NASA direction, are not subject to this approval.

The contractor shall provide overall management and administrative functions to ensure that proper resources are available and allocated, that required reports and documentation are prepared, and that the overall environment supports the Testing and Facilities Operations and maintenance requirements. The contractor shall perform the following:

- Manage the contract in a fiscally responsible manner, fulfilling all requirements.
- Provide a well-defined, stable organizational structure with clear lines of authority and clearly identified interfaces for the Government.
- Provide staff with training in safety, engineering and information technologies.
- Comply with Government policies and regulations including all applicable NASA policies and procedures
- Manage the resources allocated by NASA for specific tasks in a manner to ensure objectives are reached in accordance with agreed upon milestones.
- Provide a monthly report of the state of all tasks; identifying accomplishments, publications, and major milestones reached as well problems and concerns over issues that may affect contract performance along with recommended solutions.
- Provide property management to ensure accountability for annual inventory surveys and accountability verification forms.
- Provide the risk management activities that will be used to ensure that Government has adequate insight into the risks associated with the contractor's ability to accomplish the required work.
- Make the required representation of any proposed delivery of Limited Rights Data or Restricted Computer Software in accordance with Clause H.10 when performing any of the requirements under this contract, including task order(s).

The government will provide Government Furnished Equipment that includes desktop and laptop computers.

A wide variety of skills will be required to successfully perform the services described in this Section. Further, NASA anticipates Contractor personnel will include, but are not limited to engineers and technicians of various disciplines, test and project managers, crafts-persons, managers, supervisors, safety and environmental personnel, and administrative support persons.

In order to meet NASA's objectives, the Contractor may, at times, be required to provide all or portions of these services twenty-four hours a day, including weekends and holidays. In addition, these services may be provided to other NASA facilities, installations, or other Government Agencies.

3.5.1 Contract Task Order Administration:

The Contractor shall respond to all Contract Task Orders (CTO) as required in Section H, Clause H.2 NFS 1852.216-80 Task Order Procedure and shall report Task Order financial and technical performance, as well as Conference-Related Financial Reporting, as required by Attachment J.1(a)2 Contract Data Requirements List Report Numbers 2 and 4, Monthly Financial Management Report (NF 533M) and Monthly Technical Progress Report, respectively. Contractor personnel may be required to travel for short periods of time to attend meetings, to participate in industry site visits, or to attend technical conferences.

3.5.2 Resource Scheduling:

Assist in the definition, implementation, operation and maintenance of a resource scheduling system for NASA and Contractor resources that are allocated for activities performed under this contract. This system will track the resources and assist in planning future allocation.

3.5.3 Property Management:

The Contractor shall ensure that consumables, equipment, tools, and parts required for testing, development, and maintenance and repairs are accounted for, available, and ready when needed.

The current Property Management process includes **Integrated Asset Management (IAM) Property, Plant & Equipment (PP&E) System**; and Calibration Recall System.

The Contractor's Property Management shall provide, but not be limited to:

- A property control process that satisfies requirements of the NEMS
- A calibration recall process
- A tool checkout system
- A spare parts inventory system

3.5.4 Procurement:

The Contractor shall procure subcontract services, consumables, equipment, tools, and parts, such that they meet stated specifications and are available when required for contract performance.

- Comply with applicable Federal Acquisition Regulations (FAR) and applicable NASA FAR Supplement clauses
- Comply with contract clause requirements
- Meet or exceed Subcontracting Plan Goals

3.5.5 Safety and Environmental Compliance:

The Contractor shall ensure compliance with applicable safety and environmental regulations for all performance under this contract.

- All personnel are appropriately trained in procedures, policies, and practices in accordance with current NASA, ARC, OSHA, EPA, and other applicable federal, state, and local regulatory agency standards
- All operators of equipment that are required to be licensed and/or certified have current licenses/certifications
- Participate with NASA in safety inspections and safety awareness training in accordance with Ames Safety Accountability Program

3.5.6 Contract Reporting:

The Contractor shall deliver all reports in accordance with Section J.1 (a) 2, Contract Data Requirements List, of this contract. These reports shall be current, accurate, and complete.

3.5.7 Configuration Management:

The Contractor shall administer and operate a Configuration Management system. Current processes are described in Configuration Management Procedures Document Number A027-9391-XB4.

This system identifies, tracks, audits, and provides change control for facility documents, such as: design drawings, as-built drawings, base-line design documents, operation and maintenance (O&M) manuals, standard operating procedures (SOPs), and other documentation.

3.5.8 Facility Specific Systems Administration:

The Contractor shall administer various business and mission specific IT computer systems and related networks to ensure availability when required. These systems include, but are not limited to data storage and application servers, facility control systems, data acquisition systems, data analysis systems, and test dependent motion control systems. The Contractor shall perform these functions in accordance with approved IT security plans, procedures and policies. Required activities include, but are not limited to:

- Installing, repairing, and maintaining hardware and software
- Installing hardware and software upgrades
- Providing technical support and resolve hardware and software problems
- Protecting the above systems from unauthorized intrusion by foreign systems, hackers, and viruses
- Performing system backups such that no critical information or test data are lost
- Managing facility specific intranets

3.5.9 Training and Certifications

The Contractor shall ensure all employees are trained and that employee skills, qualifications, certifications and experience are commensurate with the employees' work assignment, consistent with aerospace/industry standards, and NASA requirements. The Contractor shall obtain all training and certifications required to conduct business prior to the start date of the base period of this contract. The Contractor shall keep all training and certificates up-to-date throughout the contract period and submit to the COR or CO upon request. The Contractor shall comply with the following training and certification requirements:

- Provide safety training and certifications in accordance with NASA General Safety Program Requirements, NPR 8715.3 and the Ames Health and Safety Manual, APR 8715.1.

- Provide operational training (e.g., research facilities, utilities) that includes, but is not limited to, process, procedures and institutional equipment safety training, and research facility operational training that includes, but is not limited to, facility configuration, operation, test or test technique training. The Contractor shall address facility specific technical topics that are detailed in the Standard Operating Procedures.

- Verify that individuals possess the competencies, skills, and experience pertinent to their work assignment and that those workers demonstrate a working knowledge of the laws, regulations, and NASA directives pertinent to their tasks when certifications are required.

3.5.10 Other Direct Cost

- IDIQ task orders will be issued as firm fixed price or time and materials

3.6 Phase-In/Phase-Out

This section describes requirements to be fulfilled by the Contractor in order to transition into day-to-day operations after contract award and requirements for turning over operations at the completion of the contract as described in 3.6.2.

3.6.1 Phase-In

The phase-in process shall be accomplished expeditiously and in a manner consistent with safe operation. The phase-in process shall preclude any interruption of the scheduled operation of facilities. The Contractor shall be responsible for providing a qualified staff with required certifications, or certifications in process, by the end of the phase-in period. The Contractor shall be responsible for working with NASA as described in this SOW. No later than the end of the phase-in period, the staff of the incoming Contractor shall be fully qualified and certified, or certification procedures begun, to accomplish the requirements of the contract and present a written Status Report to the COR and Contracting Officer (CO).

3.6.2 Phase-Out

The Contractor shall submit a Phase-Out Plan as required in Attachment J.1(a)2, item 12 Contract Data Requirements List. The Contractor is responsible for the orderly transfer of duties and records, including complete equipment, systems, and facility logs, to the incoming Contractor or NASA, if there is no successor contract. This shall be accomplished in an expeditious manner, consistent with the phase-in schedule, while precluding interruption of the scheduled operation of any of the facilities listed in the Statement of Work. During Phase-out, the Contractor shall have transferred all records and documentary material in an orderly manner and vacated all areas of Contractor responsibility, having left them in a clean, professional state and having completed the checkout process.

4.0 Abbreviations and Acronyms

AJAS	Arc Jet Air System
ARC	Ames Research Center
AVGR	Ames Vertical Gun range
BalCal	Balance Calibration Laboratory
BISF	Blade Inspection/Storage Facility
CBM	Condition Based Maintenance
CMMS	Computerized Maintenance Management System
CO	Contracting Officer
COR	Contracting Officer Representative
CPIF/AF	Cost-Plus-Incentive-Fee/Award-Fee
CTO	Contract Task Order
EAST	Electric Arc Shock Tube Facility
EPA	Environmental Protection Agency
FAR	Federal Acquisition Regulation
HFFF	Hypervelocity Free-Flight Facility
HPADS	High Pressure Air Distribution System
IDIQ	Indefinite Delivery/Indefinite Quantity
IST	Integrated Systems Tests
ISSR	Integrated Systems Safety Review
NASA	National Aeronautics and Space Administration
NEMS	NASA Equipment Management System
O&M	Operation and Maintenance
ORR	Operational Readiness Review
OSHA	Occupational Safety and Health Administration
PM	Preventive Maintenance
PT&I	Predictive Testing and Inspection
RCM	Reliability Centered Maintenance
ROP	Reverse Osmosis Plant
SOP	Standard Operating Procedure
SOW	Statement of Work
SASF	Sting Assembly and Storage Area
STAR Lab	Sensor and Thermal Protection System Advanced Research Lab
SVS	Steam Vacuum System
TPS	Thermal Protection System
TRR	Test Readiness Review
UPWT	Unitary Plan Wind Tunnel
VPP	Voluntary Protection Program

[END OF SECTION]