STATEMENT OF WORK

Developmental HW & SW (Template #1)

**Warning:**

The Statement of Work (SOW) paragraphs, Contract Data Requirements List (CDRL) items, and Data Item Descriptions (DIDs) identified for your type of acquisition are recommendations only. You are expected to modify or add SOW paragraphs, CDRLs, or DIDs to address the specific requirements of your program.

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# 1 Overview

This Statement of Work (SOW) describes the effort required for the design, development, fabrication, and test of [*insert system name*]. The SOW includes provisions for program management, systems, engineering, system test and evaluation, training, integrated logistics support, and operational support.

## 1.1 Conferences

A. Preconstruction Conference: there will be a preconstruction conference held to discuss phasing and facility/contractor concerns before construction begins onsite.

### 1.1.1 Special Requirements for Work at [Name] Airport

* Preconstruction Conference - The Contractor must attend a preconstruction conference with the Contracting Officer or designated representative, the Resident Engineer, a [*Name*] System Service Center (SSC) representative and the [*Name*] Airport representatives to determine the operating procedures that the Contractor must comply with to meet FAA and Airport requirements.
* Airport Security - During the course of the contract, the Contractor must be responsible for maintaining security against unauthorized access to the airport. The Contractor will be held responsible for any fines, damages or civil penalties filed against the City of Eugene for the Contractor's failure to comply with the regulations set forth herein. The Contractor must be fully responsible for compliance by himself and all of his employees and subcontractors with the airport security program and following regulations and orders of the Airport management. These regulations may affect identification of employees, movement around the airport, parking, entry and other circumstances affecting the safety or protection of persons or property.
* Access - Workers must be badged as required by the Airport Authority. The Contractor's vehicles and equipment must enter the airport or construction areas only over authorized routes. Deliveries to work sites must be controlled by the Contractor's security/gate guard. The use of runways, aprons, taxiways and ramps will not be permitted unless specifically approved by the Airport Representative and coordinated with the Resident Engineer. The haul routes and staging areas will be determined at the preconstruction conference; any changes require the approval of the Resident Engineer and the Airport. The Contractor must keep the gates locked and secured at all times when not in use.
* All vehicles and motorized equipment must be marked with a flashing yellow beacon (day or night) and/or an international orange and white checkerboard flag (day only) during all construction activities. All construction work must be in accordance with [*your document*]
* Air Operations Area - For the purpose and intent of these regulations, air operations area is construed to mean any area used or intended to be used for take-offs, landing, or surface maneuvering of aircraft, and all other areas restricted to public access on the field. Only Contractor's employees are permitted in the work sites.
* Runway and Taxiway Safety Areas - The Runway Safety Area (RSA) is a designated area including the runway or taxiway and areas immediately adjacent to them and is intended to reduce the risk of damage to an aircraft inadvertently leaving the runway. In the case of [*Runways XX-XX and XX-XX*], the RSA includes an area 250 feet on either side of the runway centerline for a total of 500 feet and extends 1000 feet beyond the runway ends. The Taxiway Safety Area (TSA) includes an area 85.5 feet each side from the taxiway centerline for a total of 171 feet. The Contractor must not work in Runway Safety Area or Taxiway Safety Area as long as the associated runway or taxiway is operational.
* All trenches and excavations for foundations within the Safety Areas must be backfilled or covered prior to the runway or taxiway being reopened. Trenches and excavations must be filled to within 3 inches of the surrounding grade or covered by steel plate sufficient to support the aircraft in use at the airport. Objects within the Safety Area must not project more than 3 inches above the surrounding grade.
* Runway XX-XX Safety Area - All work in this area must be done at night when closure of the runway to aircraft traffic is possible. Work may only proceed between the hours of [*time*]. At [*time*] (or after the last arrival of commercial flight needing the runway if delayed), following radio communication with the control tower, the runway will be closed to traffic and the contractor will be allowed to travel to this area to begin work. The contractor should schedule so that work must be completed by [time], and so that cleanup may be completed by [*time*]. The Resident Engineer will inspect the work areas for the removal of all materials and equipment, closing of excavations, and for cleanliness of paved surfaces. Any work required by the inspection must be done by the Contractor such that all work must be complete and all personnel, materials, and equipment must be removed from the runway safety area by [*time*].
* Runway XX-XX Safety Area and Taxiway Safety Areas - Work in these areas may not be done while the runway or taxiway is open to aircraft operations. Because of the relatively small amount of work in these areas, it is anticipated that Runway XX-XX, Taxiways [X] will be closed to aircraft traffic for planned periods during daylight hours. The closures will require close coordination by the Contractor with the Resident Engineer and the Airport, and sufficient notice must be given to allow approval by the airport and issuance of NOTAMs.
* Helicopter Landing Pads - There are [X] helipads in the vicinity of the ASR. Work in the vicinity of a helipad may not be done while it is open to aircraft operations. Work in these areas may be performed after the helipad has been closed to aircraft traffic for planned periods during daylight hours. The closures will require close coordination by the Contractor with the Resident Engineer and the Airport, and sufficient notice must be given to allow approval by the airport and issuance of NOTAMs. Access to RVR sites will require crossing over helipad [X], which does not require a closure, but may be done only after radio contact with and approval from the control tower for each crossing.
* Working and Storage Near Active Airport Surfaces - The Contractor must not allow men, equipment or materials to be located, stored or stocked within 500 feet of any runway centerline or within 107 feet of any taxiway centerline during the entire period of this contract. Contractor must confine storage of equipment and materials to the Contractor Staging Area as determined at the preconstruction conference.
* Driver Training Certification - The FAA requires those individuals who drive on aircraft operations areas to have read and understood A Guide to Ground Vehicle Operations on the Airport. The Guide will be sent to the Contractor within five (5) calendar days after the contract award. The Contractor will be responsible to ensure that each of his/her employees who will be driving on an airport has complied with this directive and has read the guide. After reading and understanding the Guide, the Contractor must complete the attached "FAA Order 5200.7, FAA Driver Training Certification" and return it to the Contracting Officer at the pre-construction conference. The Contractor must provide a certified driver to escort equipment and delivery vehicles.
* Radio Communications - The Contractor's superintendent and all crews must be equipped with a transceiver radio and required to monitor the ground control frequency. The tower must be contacted and permission received prior to any movement while within the aircraft movement area, including the helicopter landing pads. Such radios must be used so that any unusual occurrence of approaching, departing, taxiing aircraft can be acknowledged by all concerned parties.
* Final Cleanup and Site Restoration - Immediately prior to the contract final inspection at the site, the Contractor must clean all areas of the construction site. All access roads used by the contractor during construction must be restored to the condition existing at the start of the contract. For all damaged portions, apply a new layer of surface course, compact, and grade smooth.

## 1.1 Permits

The Contractor must be responsible for obtaining all permits and inspections required for the work in this contract.

## 1.2 Conduct of work

Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.

# 2 Applicable Documents

The following specifications, handbooks, orders, standards, and drawings form a part of this SOW and are applicable to the extent specified herein. The latest version of these documents as of the contract date must apply. In the event of conflict between this SOW and any of the applicable documents cited below, the provisions of this SOW must apply.

* Copies of FAA specifications and interface documents may be obtained from the Federal Aviation Administration, Headquarters Public Inquiry Center APA-230, 800 Independence Avenue SW, Washington, DC 20591, 202-267-3484. Requests should fully identify material desired and cite the solicitation or contract number.
* Requests for copies of documents not covered in the preceding paragraph should be addressed to the Contracting Officer. Requests should fully identify material desired and cite the solicitation or contract number.
* Military Standards and Specifications can be ordered from the Department of Defense Single Stock Point (DODSSP), Building 4/Section D, 700 Robbins Avenue, Philadelphia, PA 19111-5098. Information is available at their website http://www.dodssp.daps.mil.
* Copies of ANSI/ASQC-Q-9001-1994 and ISO 9000-3 can be obtained from the following source: American Society for Quality Control 611 East Wisconsin Avenue P.O. Box 3005; Milwaukee, Wisconsin 53201-3005. Phones: (414) 272-8575 or (800) 248-1946. The Fax is: (414) 272-1734.
* Copies of the Acquisition Management System Test and Evaluation Process Guidelines are available in the FAA Acquisition System Toolset (FAST). The on-line internet address of FAST is: <http://FAST.faa.gov>

## 2.1 Military Standards

DOD-STD-100G Engineering Drawing Practices (1997)

DOD-STD-1700 Data Management Program

MIL-HDBK-217F Reliability Prediction of Electronic Equipment

MIL-STD-498 Software Development and Documentation, dated December 5, 1994

MIL-STD-499 Engineering Management, dated May 1, 1974 (canceled)

MIL-STD-756B/w Reliability Modeling and Prediction, dated Notice 1 August 31, 1982

MIL-STD-785B Reliability Program for System and Equipment Development and Production

MIL-HDBK-881 Work Breakdown Structures dated 2 Jan 1998

MIL-STD-1388-1A Logistics Support Analysis

MIL-STD-1388-2B Logistics Support Analysis Record

MIL-STD-1472E Human Engineering Design Criteria for Military Systems, Equipment, and Systems

MIL-STD-1521B Technical Reviews and Audits for Systems, Equipment, and Computer Software, dated June 4, 1985

MIL-HDBK-46855 Human Engineering Requirements for Military Systems, Equipment and Facilities

## 2.2 Military Specifications

MIL-PRF-28000A Digital Representation for Communication of Product Amend. 1Data: IGES Application Subsets and IGES Application Protocols

MIL-DTL-31000A Technical Data Packages

## 2.3 FAA Standards

FAA-STD-028B Contract Training Programs, May 1, 1993[*this standard has been canceled without replacement*]

## 2.4 FAA Specifications and Orders

FAA-D-2706 Theory of Operations Examinations, Preparation and Validation of

FAA-D-2781 Airways Facilities Performance Examinations, Preparation and validation of

FAA-G-2100F General Requirements for Electronic Equipment

FAA Order 1380.40C Airway Facilities Sector Level Staffing Standard System

FAA Order 1800.58 National Airspace Integrated Logistics Support Policy

FAA Order 1810.4b FAA Test and Evaluation Policy

FAA Order 6000.30 Policy for Maintenance of the National Airspace System (NAS) Through the Year 2000

## 2.5 Other Publications

AFSCR 84-2 Production Readiness Review

ANSI/ASQC American National Standard, Quality System-Model for Q9001-1994 Quality Assurance in Design, Development, Production, Installation and Servicing

ANSI/ISO Quality Management Guidelines for Configuration Management ASQC 10007-1995

ASTM-D-3951 Standard Practices for Commercial Packaging ISO 9000-3 International Standard, Quality Management and Quality Assurance Standards – Part 3: Guidelines for the Application of ISO 9001 to the Development, Supply and Maintenance of Software.

# 3 Requirements

The Contractor must furnish the necessary personnel, plant, equipment, facilities, materials, and other necessary resources to produce, test, and deliver the items described in this Statement of Work (SOW). All such items must be supplied in conformance with the terms and conditions of the contract.

## 3.1 Inspection of Site by Contractor

The contractor must have carefully examined the premises to determine the extent of the work and the conditions under which it must be done. A pre-bid conference at the facility with a tour of the construction area will be scheduled.

## 3.2 Program Management

The Contractor must establish and maintain a formal organization to manage this contract and subcontracts. The use of Integrated Product Teams (IPT) is encouraged in the performance of this contract. The Contractor must assign a dedicated Program Manager (PM) to organize, plan, schedule, implement, control, analyze, and report on all elements of the contract. The PM must have sufficient corporate authority to direct, execute, and control all elements of the program. The types of tasks include: technical, business and administrative planning, organizing, directing, coordinating, controlling and approval actions (e.g., cost/schedule/ performance measurement, contract management, time-phased staffing profile by functional specialty or organization, data management, subcontract management). The PM must be prepared, at all times, given reasonable notice, to present and discuss the current status of the contract.

### 3.2.1 Program Management Plan

The Contractor must develop and implement an integrated Program Management Plan (PMP). The PMP must integrate all functional areas (e.g., System Engineering, engineering data and specifications, software engineering, configuration management, product assurance, integrated logistics support, etc.) and articulate the specific objectives to be accomplished. The PMP should specify the work tasks, at an overview level, required to meet the objectives. The PMP should also discuss the staffing and other resources required to meet contract requirements. The PMP must include the Program Schedule.

CDRL A001 Program Management Plan

### 3.2.2 Performance Analysis and Reporting

The Contractor must utilize an Earned Value Management System (EVMS) to provide visibility into its performance of this contract. The intent of the EVMS is to facilitate:

* Thorough planning
* Timely baseline establishment and control
* Information broken down by product as well as by organization or function
* Objective measurement of accomplishment against the plan at levels where the work is being performed
* Summarized reporting to higher management for use in decision making
* Reporting discipline
* Analysis of significant variances
* The implementation of management actions to mitigate risk and manage cost and schedule performance

The Contractor must prepare and submit Contract Funds Status Reports (CFSR) utilizing the EVMS system. The Contractor must provide a monthly written analysis that examines the actual expenditures measured against the plan.

The Contractor and major subcontractors must support an informal Government implementation review and baseline review of their EVMS. The Contractor must be prepared for the implementation review within 60 days after contract award, and be prepared for the baseline review not more than 90 days after contract award.

CDRL A002 Contract Funds Status Report

#### 3.2.2.1 Program Schedule

The Contractor must develop and maintain an integrated program schedule to support its management needs and for reporting purposes. The program schedule must present an integrated schedule plan for the design, development, and test, of the [*insert system name*] System. The initial program schedule must be delivered with the Program Management Plan, and subsequent versions, Program Schedule Updates, must be submitted as part of the Program Management Review packages. Any changes or delays to the program schedule must be discussed at the Program Management Review.

CDRL A003 Program Schedule Updates

#### 3.2.2.2 Program Management Status Reports

The Contractor must develop and submit Program Management Status Reports (PMSR) to the Government. The Status Reports must, at a minimum, include the following:

* Summary of contract achievements
* Actual Program status versus the program plan
* Schedule status
* Cost performance versus the budget
* Status of open actions items
* Status of required Government Furnished Property (GFP)
* Anticipated problems and recommended resolutions

CDRL A004 Program Management Status Report

### 3.2.3 Technical Meetings, Program Reviews and Conferences

The Contractor must host and participate in joint Contractor/FAA System Baseline Reviews (SBRs). The Contractor must notify the CO of its readiness to conduct the SBRs at least [*insert number of days*] calendar days prior to the planned start of each review. If contractual prerequisites to holding the technical review have not been fulfilled, the Government must retain the option of postponement without prejudice to other contractual requirements.

At each baseline review, the Contractor must present its design and system/subsystem engineering efforts related to the end items. The Contractor must be prepared to provide back-up data on assumptions made and methodologies used in arriving at specific recommendations or conclusions for the design, test, and manufacturing approaches. The following technical data must be made available for Government review at the baseline reviews: engineering data, specifications, drawings, schematics, design and test documentation, software development files, schedules, working papers, and results of studies and analyses. The Contractor must make all key Contractor personnel available to respond to Government questions.

SBR I for the [*insert system name*] first article configurations must be conducted [*insert number of days*] days after contract award. The Contractor must use MIL-STD-1521B, as applicable to Critical Design Reviews, as guidance for the conduct of SBR I. During this review, the Contractor and FAA will jointly review the Contract Award Configuration (CAC) and the results of any development effort necessary to satisfy the [*insert specification number*] functional and performance requirements for the first article configuration.

The approved system baseline established at SBR I must become the system baseline for the Development Test and Evaluation (DT&E) effort specified in Section 3.4 of this SOW. Accordingly, approval of the system baseline presented in the SBR, or conditional approval with agreement on the resolution of all outstanding issues, must be required prior to the Contractor initiating the Development Test & Evaluation (DT&E) effort. The Contractor must manage all configuration changes to the SBR I baseline in accordance with the approved Configuration Management Plan (CMP).

The [*insert system name*] SBR II must be conducted upon completion of the DT&E test program and the Physical and Functional Configuration Audits (P/FCA's). The Contractor must use AFSCR 84-2, Production Readiness Reviews, as guidance for the preparation and participation in the SBR II review. During the SBR II review, the Contractor and FAA will jointly review the results of the DT&E test program and the results of the P/FCA's to identify and resolve any issues potentially impacting delivery and the establishment of the product baseline. The product baseline must be established at SBR II for each end item. All subsequent data deliveries must reflect the SBR II product baseline. The Contractor must manage changes to the product baselines in accordance with the approved CMP.

CDRL A005 Meeting Agenda

CDRL A006 Meeting Minutes

#### 3.2.3.1Post Award Conference

The Contractor must plan for, host, support, and participate in a Post Award Conference to be held at the Contractor's site within one month after contract award. The FAA will determine the specific date within two (2) weeks after contract award. At this conference, the Contractor must address the plans and schedules for the [*insert system name*] work efforts.

#### 3.2.3.2 Program Management Reviews

The Contractor must conduct and administratively support Program Management Reviews (PMRs) on a [insert appropriate interval, e.g., monthly or quarterly] basis during the period of performance of this contract. The PMRs will be conducted at the Contractor's facility, unless otherwise directed by the Government. The intent of the PMRs is to provide a forum for the presentation and discussion of the Contractor's technical progress, program planning, and overall management approach. The Contractor should review the status of action items, cost, schedule and the overall performance at each PMR. The Contractor should be prepared to discuss significant problems and/or discrepancies in detail.

#### 3.2.3.3 System Baseline Reviews

The Contractor must host and participate in joint Contractor/FAA System Baseline Reviews (SBRs). The Contractor must notify the CO of its readiness to conduct the SBRs at least [*insert number of days*] calendar days prior to the planned start of each review. If contractual prerequisites to holding the technical review have not been fulfilled, the Government must retain the option of postponement without prejudice to other contractual requirements.

At each baseline review, the contractor must present its design and system/subsystem-engineering efforts related to the end items. The Contractor must be prepared to provide backup data on assumptions made and methodologies used in arriving at specific recommendations or conclusions for the design, test, and manufacturing approaches. The following technical data must be made available for Government review at the baseline reviews: engineering data, specifications, drawings, schematics, design and test documentation, software development files, schedules, working papers, and results of studies and analyses. The contractor must make all key contractor personnel available to respond to Government questions.

SBR I for the [*insert system name*] first article configurations must be conducted [*insert number of days*] days after contract award. The Contractor must use MIL-STD-1521B, as applicable to Critical Design Reviews, as guidance for the conduct of SBR I. During this review, the Contractor and FAA will jointly review the Contract Award Configuration (CAC) and the results of any development effort necessary to satisfy the [insert specification number] functional and performance requirements for the first article configuration.

The Government approved system baseline established at SBR I must become the system baseline for the Development Test and Evaluation (DT&E) effort specified in Section 3.4 of this SOW. Accordingly, approval of the system baseline presented in the SBR, or conditional approval with agreement on the resolution of all outstanding issues, must be required prior to the Contractor initiating the Development Test & Evaluation (DT&E) effort. The Contractor must manage all configuration changes to the SBR I baseline in accordance with the approved Configuration Management Plan (CMP).

The [*insert system name*] SBR II must be conducted upon completion of the DT&E test program and the Physical and Functional Configuration Audits (P/FCA's). The Contractor must use AFSCR 84-2, Production Readiness Reviews, as guidance for the preparation and participation in the SBR II review. During the SBR II review, the Contractor and FAA will jointly review the results of the DT&E test program and the results of the P/FCA's to identify and resolve any issues potentially impacting delivery and the establishment of the product baseline. The product baseline must be established at SBR II for each end item. All subsequent data deliveries must reflect the SBR II product baseline. The Contractor must manage changes to the product baselines in accordance with the CMP.

#### 3.2.3.4 Technical Interchange Meetings

Technical Interchange Meetings (TIM) may be required at the Contractor or FAA facility. TIMs will be held if there is a necessity to clarify, resolve, or discuss technical issues. The Contractor must support these reviews as required.

### 3.2.4 Contract Work Breakdown Structure

The Contractor must manage and maintain the Contract Work Breakdown Structure (CWBS) and dictionary, Attachment [insert attachment number] of the contract, using MIL-HDBK-881 as guidance.

CDRL A007 Contract Work Breakdown Structure Updates

### 3.2.5 Data Management

The Contractor must establish a data management program to maintain contractually required documentation and correspondence; design, test, and production documentation, and other supporting documentation; in one logical and inclusive system using DOD-STD-1700 as guidance. This effort must include documentation involved with, but not limited to, the development, production, implementation, testing, schedule, and management of the [*insert system name*] equipment. This specifically must include a process for monitoring, reporting, status accounting, and cross-matrix of changes to, additions of, or deletions of data item deliverable contents.

The Government will review all test-related CDRL items to verify Contractor compliance with the system design as defined in the requirements specified herein, and to ensure that all requirements have been incorporated into the test documentation. The Contractor must identify and use an orderly review and comment process in order to preclude schedule delays. The Contractor must submit revised documents with revision marks and must include all changes to previous submissions. Revision marks must be removed in the final delivery of documents unless otherwise stated.

The Contractor must identify a single focal point for integrating and maintaining the total Contractor data management effort. Internal data generated in compliance with contractual tasks and subcontractor-generated data must be listed on the Data Accession List. When requested by the Government, the Contractor must make available for Government review, the internal documents used to design and manage the [*insert system name*] program.

### 3.2.6 Quality Assurance

The Contractor must provide and maintain a documented quality system as a means of assuring compliance with the hardware and software requirements of the contract. A Quality System Plan must be prepared and submitted (Ref. DID/CDRL Quality System Plan and ISO 9001/ISO 9000-3 required) as a separate bound volume and submitted with the technical proposal. All portions must be considered of equal importance. The Contractor must require of sub tier suppliers a quality system achieving control of quality of the services and supplies provided. All spare parts must be inspected and tested in plant, using the same procedures as the primary equipment components.

Note: The Government intends to use these Quality Standards as it would any other quality standards. Third party registration of ISO standards is not required nor does such registration relieve the offeror of the requirement of submitting a Quality System Plan (QSP).

CDRL A008 Quality System Plan

#### 3.2.6.1 Higher-Level Interface Data Quality Requirement for NAS Procurements

The contractor must establish and maintain a Data Quality system, and prepare and submit a Data Quality Plan (DQP). The DQP must describe the Contractor's provisions for data quality assurance, including assessment, remediation and monitoring the data quality to insure compliance with business requirements; also, inspection and test of all technical data to be provided under this contract, in accordance with the terms of this contract, including sub-contractors. The DQP must describe the Contractor's provisions for review of and alignment with DOT/FAA data management initiatives, specifically to include review of the FAA Data Registry (FDR) for standardized and certified technical data elements IAW FAA-STD-060. If the contractors systems engineering program includes the use of commonly shared interface data, the contractor's DQP must include development and delivery of a Technical Data Report (TDR).

CDRL A085 Data Quality Plan

### 3.2.7 Configuration Management

The Contractor must establish a data management program to maintain contractually required documentation and correspondence; design, test, and production documentation, and other supporting documentation; in one logical and inclusive system using DOD-STD-1700 as guidance. This effort must include documentation involved with, but not limited to, the development, production, implementation, testing, schedule, and management of the [*insert system name*] equipment. This specifically must include a process for monitoring, reporting, status accounting, and cross-matrix of changes to, additions of, or deletions of data item deliverable contents.

The Government will review all test-related CDRL items to verify Contractor compliance with the system design as defined in the requirements specified herein, and to ensure that all requirements have been incorporated into the test documentation. The Contractor must identify and use an orderly review and comment process in order to preclude schedule delays. The Contractor must submit revised documents with revision marks and must include all changes to previous submissions. Revision marks must be removed in the final delivery of documents unless otherwise stated.

The Contractor must identify a single focal point for integrating and maintaining the total Contractor data management effort. Internal data generated in compliance with contractual tasks and subcontractor-generated data must be listed on the Data Accession List. When requested by the Government, the Contractor must make available for Government review, the internal documents used to design and manage the [*insert system name*] program.

#### 3.2.7.1 Configuration Identification

The Contractor must identify, label, serialize, and mark all configuration items to maintain traceability through all levels of each item and between all representations of that item (e.g., tape, disk, and document) for the entire CM life-cycle.

#### 3.2.7.2 Configuration Control

The Contractor must implement configuration control procedures to ensure control of proposed changes; document the complete impact of the proposed changes; and control the release of approved configuration changes into configuration items (CIs) and their related configuration documentation. Configuration control must be implemented with the Contract-Award-Configuration (CAC) and continue throughout the system life cycle.

The Contractor must establish a Configuration Control Board (CCB) and develop CCB procedures to facilitate configuration management. Upon Government approval of each configuration baseline, the Contractor must maintain traceability and currency of the baselines and consistency between program documentation for hardware, software, firmware, databases, and their respective versions in accordance with the approved CMP. The Contractor must prepare and deliver Engineering Change Proposals, Deviations, and Waivers as required.

CDRL A010 Engineering Change Proposal

CDRL A009 Deviations and Waivers

#### 3.2.7.3 Configuration Audits

The Contractor must host and participate in joint Contractor/FAA configuration audits for the [*insert system name*]. The Contractor must use MIL-STD-1521B Functional Configuration Audit (FCA) requirements as guidance in preparing for and participating in the FCA for the [*insert system name*]. The Contractor must use MIL-STD-1521B Physical Configuration Audit (PCA) requirements as guidance in preparing for and participating in the PCA for the [*insert system name*]. The FCA and PCA must be conducted at the conclusion of Developmental Test and Evaluation (DT&E) and prior to SBR II. Current baseline documentation must be available to support these reviews. The Contractor must prepare Configuration Audit Reports in accordance with FAA-STD-021.

CDRL A011 Configuration Audit Reports

## 3.3 Systems Engineering Management

The Contractor must execute a systems engineering program for the definition, development, verification, integration, and testing of the [*insert system name*] System as allocated to the [*insert system name*] Computer Software Configuration Items (CSCIs) and Hardware Configuration Items (HWCIs). The systems engineering program must be documented in the System Engineering Management Plan (SEMP). System engineering efforts must consider all aspects of performance, quality, life cycle cost, maintainability, reliability, schedule, data processing reserves, and future growth requirements. The Contractor must maintain effective control over the system engineering and design development process, including subcontract items and services, to ensure that cost, performance, and schedule are met, to provide early detection of problems, and to reduce risk. The Contractor must specify a single authority that will serve as Point of Contact (POC) for system engineering tasks.

The Contractor must perform hardware prototyping as necessary to support system design development, and must designate and purchase, prior to SBR II, long lead-time hardware items necessary to implement the system design. Where applicable, the Contractor must use MIL-HDBK-46855 and MIL-STD-1472E as guidance, particularly for Contractor-designed Graphical User Interfaces (GUIs) (See Section 5.2 of MIL-STD 1472) and use-computer interfaces (Sec 5.15 of MIL-STD-1472).

CDRL A012 System Engineering Management Plan (SEMP)

### 3.3.1 System/Subsystem Description

The Contractor must develop and submit a System/Subsystem Design Description (SSDD) for the entire system. The SSDD must describe the system architectural design, the system design concept of execution, the system interface design, and decisions about the selection and design of system components. The SSDD must contain an explicit trace of each system requirement in the entire [*insert system name*] specification to the CI to which it is allocated by the Contractor.

CDRL A013 System/Subsystem Design Description (SSDD)

#### 3.3.1.1 Human Engineering Design

##### 3.3.1.1.1 Approach

An adequately staffed Human Factors Engineering (HFE) effort must be dedicated to and be an integral part of the analysis, design, and test process. The Human Engineering approach must be structured such that the program has a direct, measurable effect on system design. In the sections below a number of efforts are specified. These efforts are not to be conducted in a "stand-alone" mode, but rather must be an integral part of the design and development process. HFE must be a contributing member of the design team. Execution of the HFE process must be documented in such a way that the value of HFE can be demonstrated.

##### 3.3.1.1.2 Planning and Execution

An HFE program must be planned and implemented in accordance with MIL-HDBK-46855 as applicable. The HFE program plan should specify, at a minimum: the steps that will be taken during system development to determine user needs and functional requirements that have an impact on human performance. The plan and management approach should enable the HFE staff to have direct input to system design, specify the method or procedures that will be used to translate the analytical results into system design, and specify the testing process that will assure the user that human-in-the-loop (HITL) system performance will meet expectations. The HFE program plan must contain a schedule showing the major HFE activities such that interim or final products of the analysis are used during system design. The plan must specify the tasks the HFE staff will perform to support and be an integral part of system design. The plan must specify points in the program design cycle where HFE risks are identified. The plan must specify the major elements of the HFE test and evaluation program that will contribute to system design. The HFE program schedule must show how the results of the HFE test program will be used to influence system design.

CDRL A080 Human Engineering Program Plan

##### 3.3.1.1.3 Objective

The objective of the HFE effort must be to assure that the system design is consistent with the capabilities and limitations of the air traffic service provider and/or maintainer in the operational environment.

##### 3.3.1.1.4 Scope

To attain the above objective, the scope of the HFE analytical, design, and test activities must include accountability for the variations in site operational conditions and workload variations. The impact of equipment, software, and procedures on personnel availability, skill levels, proficiency, and operation and maintenance under various levels of stress must be assessed to assure that the demands on personnel resources are consistent with requirements.

##### 3.3.1.1.5 Human Factors Engineering Program Emphasis Areas

Within the context of the above considerations, the human factors engineering program must include as a minimum, the following emphasis areas:

* Studies and Analyses - Human Factors Engineering studies and analyses of the system must be performed as applicable to the objectives of the contract in the areas outlined by MIL-HDBK-46855 (as tailored) in general and the following system functions and issues in particular:
* Operations. Effectiveness of user control/ display/ communication/ environment integration for accomplishment of operator tasks including display legibility, decision-making, fault isolation using system BITE, capability of handling high workload levels, compatibility with required communication links, control-display dynamics for information acquisition and insertion, etc. Operations under degraded and emergency conditions must be analyzed and tracked throughout the life cycle of the system to assure that safe operation under these conditions is maintained.
* Maintainer Interface. Suitability of maintainer/hardware/procedures to facilitate the meeting of system performance requirements including accomplishing maintenance involving fault isolation, manipulation, access, removal, replacement, and repair; manual operations involving pulling, pushing, lifting, or carrying; and compatibility of tools with tasks, handwear, and environment.

* Critical Tasks. Analysis of critical tasks must include consideration of methods and procedures, communications, and system queries that may be used to perform operator and maintainer tasks. Analyses of the capability of integrated hardware/software/personnel/procedures to perform the specified air traffic services consistent with system performance requirements must be conducted in conjunction with the critical task analysis.
* Design and Application - Human engineering applications to design must be governed by that human performance necessary to meet or exceed system requirements as stated by the system specification and conformance to applicable provisions of MIL-HDBK-46855. Analytical findings must be applied to system design.

* Mock-ups and Models - At the earliest practical point in the development program (preferably before Preliminary Design Review and in no case later than Critical Design Review) and well before completion of system prototypes, full-scale three-dimensional mock-ups of equipment involving critical human performance must be constructed. The Human Engineering Program Plan must specify mock-ups requiring procuring activity approval. These mockups and models must provide a basis for resolving access, workspace and related human engineering issues, and incorporating these solutions into systems design. In those design areas where systems/equipment involves critical human performance and where human performance measurements are necessary, functional mockups must be provided.

* Computer Human Interface (CHI) and Software Rapid Prototypes - For systems that have a reliance on software for the human interface, the Human Engineering Program Plan must specify the process by which the CHI will be designed. CHI must include the workstation, computer hardware, and software aspects of the system. The program plan must specify the conventions, style guides, and design constraints that will be applied to system design. The impact of legacy systems, other software in the workstation, and transfer of training from predecessor systems must be addressed. Rapid prototypes (i.e.: software mockups) must be used as design aids and as tools in the design process. Rapid prototypes must be used in the test and evaluation process during the design phase as a means to assess the impact of design decisions on human performance and user acceptance.
* Test and Evaluation - Human factors engineering requirements must be integrated into system test and evaluation to demonstrate the capability of the human-system interface to attain required system performance characteristics. Testing and evaluation must include: reaction times, ability to perform visual search tasks, performance of tracking and monitoring tasks, maintenance of situational awareness, ability to perceive the development of potential problems in the tactical situation, data insertion, adequacy of operating and maintenance procedures, and other tasks that the requirements documents and human engineering analyses have determined are critical. Testing must thoroughly assess human performance and human engineering design of each personnel position. HFE tests may be integrated into other system tests. However, dedicated HFE tests must be performed when validation of critical task accomplishments is necessary. Examples of such tasks are those where reaction time and accuracy requirements are primary determinants of mission accomplishment.

* HFE Reviews - Conduct of the following reviews does not obviate the requirements for HFE participation in other reviews such as program reviews, technical review, PDRs, CDRs, etc.
* HFE Program Planning Reviews. An HFE program planning review scheduled by the contractor must be scheduled as soon as practicable after contract go-ahead. The purposes of this program planning meeting are to:
* Insure mutual understanding of the proposed HFE Program Plan to be submitted in accordance with the requirements of this SOW
* Insure consistency of HFE program planning with the objectives of the contract and applicable provisions of MIL-HDBK-46855
* Discuss any tailoring of applicable human engineering design criteria which the contractor anticipates proposing in the HFE program plan
* Review general approach, assumptions, guidelines, schedule, and level of effort
* Surface problems and/or needs for contractor access to technical information for requirements clarification
* HFE Design Reviews. Two HFE design reviews must be scheduled and conducted by the contractor. The first HFE Review must be conducted not later than 30 days prior to the PDR; the second HFE review must be conducted not later than 30 days prior to the CDR. Each HFE review must cover at least the following:
* Program Accomplishments. The human factors engineering program must be described in sufficient detail to provide a clear understanding of progress, status, and plans pursuant to implementing the approved HFE program
* System Integration and Interactions. Evidence must be presented to insure that the system will work effectively with other systems with which it interfaces and that human performance requirements for such integrated operations and maintenance are consistent with planned human resources
* Human Performance Requirements. System operation and maintenance requirements (e.g., reaction times, accuracy, time to repair/replace) which depend on human performance must be summarized. Critical tasks upon which satisfactory performance and/or the system's effectiveness depend must be identified. Review of such critical tasks must therefore include:

a) System performance requirements

b) Critical tasks driving such performance

c) Human performance requirements of these critical tasks

d) Equipment/software involved with the critical tasks

e) The range of operational and environmental conditions anticipated during performance of the critical tasks.

* Human Engineering Design. Compliance of items having an operator, controller, or maintainer interface must be presented in terms of compliance with human performance and human engineering design requirements.
* Manpower, Personnel, and Training (MPT), Health Hazard or Safety Implications. MPT, health hazard or safety implications for design and, conversely, design implications for MPT, health hazards or safety, must be described. Risks and planned corrective action must be identified. Absence of risk, if applicable and supporting rationale must be stated.

CDRL A081 Human Engineering Design Approach Doc-Operator

CDRL A082 Human Engineering Design Approach Doc-Maintainer

CDRL A083 Critical Task Analysis Report

CDRL A084 Human Engineering Simulation Concept

### 3.2.2 Product Engineering

#### 3.2.2.1 Hardware

The Contractor must maintain commercial drawings and associated lists for all Contract Award Configuration (CAC) hardware and must prepare product drawings and associated lists for all hardware resulting from development activity associated with modifying the CAC to satisfy first article configuration.

The basic elements required for the commercial drawings and associated lists must include:

* Drawing Index by part number and drawing tree of line replaceable units (LRUs)
* The drawing package must include the following:
  + Detail drawing of part and/or assembly
  + Performance data of part and/or assembly
  + Dimensions and tolerance data
  + Input and output parameters Schematics (provide detail, not merely block diagram)
  + Mechanical and electrical connections
  + Reference to next higher assembly
  + Test setup and equipment used to perform testing
  + Test data sheet, calibration information, and quality control information
  + Detail parts list for part and/or assembly identifying each part of the assembly
  + Original Equipment Manufacturer (OEM) information including name, part number address, phone number, etc.
    - Field Programmable Logic Array (FPLA), EPROM, PROM data, as applicable including blank chip information, source code, and a master programmed device
  + Cable drawings with a complete part break down and wiring run list
* Wiring list for wire wrapped printed circuit boards (to from list) and media for generating program (paper tape, IBM cards, etc.)

The basic elements required for the product drawings and associated lists must include:

* Drawing index by part number and drawing tree of LRUs.
* The drawing package must include the following:
* Detail drawing of part and/or assembly
* Performance data of part and/or assembly
* Dimensions and tolerance data
* Input and output parameters
* Schematics (provide detail, not merely block diagram)
* Mechanical and electrical connections
* Reference to next higher assembly
* Detail parts list for part and/or assembly (the parts list may be attached to the drawing and need not be integral to it and the parts lists do not have to meet Initial Graphics Exchange Specification (IGES) requirements)
* Details of materials used, form and finish
* Test setup and equipment used to do testing
* Test data sheet, calibration information, and quality control information
* Camera ready art work for silk screen printed wiring boards, nameplates, etc.
* Drilling schedule for printed wiring boards or sheet metal layout and drilling tapes
* Detail parts list for part and/or assembly identifying each part of the assembly
* Original Equipment Manufacturer (OEM) information including name, part number, address, phone number, etc.
* Field Programmable Logic Array (FPLA), EPROM, PROM data, as applicable, including blank chip information, source code, and a master programmed device
* Cable drawings with a complete part break down and wiring run list
* Wiring list for wire wrapped printed circuit boards (to from list) and media for generating program (paper tape, IBM cards, etc.)

The Contractor must utilize commercial item hardware to meet the requirements of [insert specification number]. The Contractor must request Government approval to use non-commercial item hardware, or to make a change in commercial item hardware. The Contractor may utilize existing commercial drawings and associated lists in lieu of developing production drawings and associated lists for an unmodified commercial item only after the FAA has evaluated the Contractor's drawing package and engineering documentation practices, and determined that the data is satisfactory for the intended use.

The Contractor must propose all hardware changes to the initial hardware configuration necessary to satisfy the requirements of [insert specification number] as Class II hardware changes, and present these proposed changes to the Government for review prior to the SBR I. After Government review and concurrence of the proposed changes, the Contractor must incorporate the hardware changes into the [insert system/assembly name] commercial drawings and associated lists. The Contractor must also incorporate the changes into the status accounting system, and continue to maintain this package in accordance with the approved CMP. All hardware changes proposed by the Contractor subsequent to the SBR I and prior to completion of the Development Test and Evaluation (DT&E) must be processed in accordance with the Government approved CMP.

CDRL A014 Commercial Drawings and Associated Lists

CDRL A015 Product Drawings and Associated Lists

##### 3.2.2.1.1 Parts Control

The Contractor must implement a parts control program in accordance with the Government approved Quality System Plan.

##### 3.2.2.1.2 Manufacturing

The Contractor must implement the problem reporting system in accordance with the Government approved Quality System Plan (refer to paragraph 3.1.6 of this SOW).

##### 3.2.2.1.3 Reliability

###### 3.2.2.1.3.1 Reliability Prediction

The Contractor must prepare and submit a Reliability Prediction Report for the [*insert system name*] system configuration established at the SBR I in accordance with task 203 of MIL-STD-785B to verify that the [*insert system name*] system satisfies the requirements of MIL-STD-756B for a type III prediction, and the requirements of [insert specification name and number]. All analysis data must be made available for Government review. The data should include the results of the thermal design analysis that verifies the reliability predictions are based upon a ground-fixed environment at component ambient temperatures. MIL-HDBK-217F must be utilized as the source of failure rate data for electronic parts. The Contractor must select a source for failure rates of non-electronic parts as part of this prediction. The Contractor should be prepared to provide rationale for its selection.

The Contractor may present, for FAA approval, substitute failure rate data, which satisfies the intent of these requirements. All such data must reflect the SBR I configuration baseline, must be certified by an independent third party and/or the Government, and must be permitted only upon FAA approval. In any case, the failure rates utilized must reflect the measured or calculated stresses on the components while operating in the SBR I baseline system within its design ratings.

CDRL A016 Reliability Prediction Report

###### 3.2.2.1.3.2 Total Logistic Prediction

The Contractor must prepare and submit a Total Logistic Reliability Prediction Report for the [*insert system name*] system configuration established at the SBR I. The total logistic failure rate prediction must be performed to the same conditions as the reliability prediction. However, the total logistic reliability prediction must include all failures, not just those considered to be critical failures resulting in performance degradation. The logistic prediction must reflect failure rates of all equipment and hardware included in the system. All reliability predictions must be based on a ground-fixed environment at component ambient temperatures and must utilize the same analytical source data (component failure rate and thermal analysis) that the Contractor utilized for the reliability prediction.

CDRL A017 Total Logistic Reliability Prediction Report

#### 3.2.2.2 Software

The Contractor must prepare a Software Requirements Specification (SRS) for each Computer Software Configuration Item (CSCI) contained in the [*insert system name*]. The Contractor must also prepare a Database Design Description (DBDD) for the [add any other appropriate components such as Local Maintenance and Remote System Control Maintenance Terminals]. In the DBDD, the Contractor must illustrate the design traceability to the [add appropriate components]. The Contractor must process changes to baseline documents in accordance with the Government approved CMP.

The Contractor must provide a Software Version Description (SVD) for each CSCI. The SVD must be used by the Contractor to release CSCI versions to the Government. The SVD must accompany the shipment of each CSCI to the Government. The Contractor must use and maintain a system that ensures that each CSCI change is accounted for, following approval by the Government. The SVD must describe all changes to any CSCI version delivered subsequent to the initial CSCI delivery. The Contractor must process changes to the SVD documents in accordance with the Government approved CMP.

CDRL A018 Software Requirements Specification (SRS)

CDRL A021 Database Design Description (DBDD)

CDRL A019 Software Version Description (SVD)

CDRL A020 (SRS) Non-Developmental Item Software

##### 3.2.2.2.1 Software Development Planning

The Contractor must prepare, update, and maintain a Software Development Plan (SDP). This plan will apply to all new and/or modified software as defined in [insert specification name and number] or included in CR/LOE task order requirements. The plan must detail the products, processes, methodologies, milestones, and measurements to be used in conducting software development activities.

CDRL A022 Software Development Plan (SDP)

##### 3.2.2.2.2 Software Documentation

The Contractor must prepare documentation relating to the requirements, design, test, quality assurance, delivery, and operation of [*insert system name*] computer software. The Contractor must maintain the software documentation baseline in accordance with the approved Configuration Management Plan. In addition, the Contractor must prepare and maintain Software Product Specifications.

CDRL A023 Software Product Specification

### 3.2.3 Interface Requirements

The Contractor must develop and submit an Interface Design Document (IDD) for each of the system interfaces specified in [insert specification name and number]. These IDDs must reflect the interface design included in the baseline configuration presented at SBR I. Subsequent to SBR I, the Contractor must process all proposed IDD changes in accordance with the approved CMP.

CDRL A024 Interface Design Description

#### 3.2.3.1 Technical Data Report Document

The contractor must provide a Technical Data Report (TDR) for all commonly shared interface data specified in the Interface Control Document (ICD). The contractor is required to collect and compile the metadata for each technical data element that meets the commonly shared interface definition. The metadata descriptions are found on the FAA Data Registry (FDR) at http:/fdr.faa.gov/ and in FAA-STD-060, Data Standard for the National Airspace System. Delivery to the government must be by creating the Technical Data Report Document and submitting it to the government.

CDRL A086 Technical Data Report

## 3.3 End Items

The Contractor must deliver the following end items as specified in this contract.

### 3.3.1 Prime Mission Equipment

The [*insert system name*] Prime Mission Equipment (PME) must consist of:

* Hardware manufactured in accordance with Specification [insert specification name and number]
* Software satisfying the requirements of Specification [insert specification name and number]
* FAA qualified antennas

The Contractor must integrate this PME hardware and software such that the performance requirements [insert specification name and number] and the functional requirements of [insert specification name and number] are satisfied.

#### 3.3.1.1 First Article Systems

The Contractor must deliver [insert quantity] [*insert system name*] systems consisting of product baseline PME which satisfy the interface requirements specified in [insert specification name and number]. The Contractor must deliver these systems in accordance with the delivery schedule specified in Section F of the Contract.

##### 3.3.1.1.1 Configuration 1: Insert Description of Other Configuration

[Describe configuration requirements. One or more paragraphs may be used for each configuration.]

##### 3.3.1.1.2 Configuration 2: Insert Description of Other Configuration

[Describe configuration requirements. One or more paragraphs may be used for each configuration.]

#### 3.3.1.2 Follow-On Production Systems

The Contractor must deliver [*insert system name*] systems in accordance with the product baseline. The follow-on production systems must comply with all interface requirements specified in [insert specification name and number]. The Contractor must deliver these systems in accordance with the delivery schedule specified in Section F of the Contract.

### 3.3.2 Support and Test Equipment

The Contractor must deliver the following support and test equipment.

#### 3.3.2.1 Program Support Facility

The Contractor must deliver one (1) Program Support Facility (PSF). The PSF must satisfy the requirements of [insert specification name and number].

#### 3.3.2.2 Special Tools [Provisioning Item Order (PIO)]

The Contractor must provide special tools in accordance with PIOs issued by the CO.

#### 3.3.2.3 Other Support and Test Equipment (PIO)

The Contractor must provide support and test equipment in accordance with PIOs issued by the CO.

### 3.3.3 Spares and Piece Parts

#### 3.3.3.1 Site Spares

The Contractor must provide one (1) set of site spares for each [*insert system name*] System. The site spares must satisfy the requirements of [insert specification name and number].

#### 3.3.3.2 Depot Spares (PIO)

The Contractor must provide one (1) lot of depot spares to the FAALC for depot repair in accordance with PIOs issued by the CO.

#### 3.3.3.3 Piece Parts (PIO)

The Contractor must provide piece parts in accordance with PIOs issued by the CO.

## 3.4 System Test and Evaluation

### 3.4.1 Test and Evaluation Program

The Contractor must plan, conduct, and document an integrated test and evaluation program, in conformance with this SOW and the Government approved Master Test Plan (MTP) using the Acquisition Management System Test & Evaluation Process Guidelines (AMST&EPG) and MIL-STD-498 as guidance. The test program must verify that the [*insert system name*] system and its support elements meet the physical, functional, interface, and performance requirements, as stated in the [*insert system name*] specification, in the intended environment, and with the intended users.

The MTP must describe the Contractor's overall test philosophy, define the test program, and serve as the controlling document for the test program once approved. The Contractor must ensure that all testable requirements from the specifications and other requirement documents are allocated to at least one MTP test or inspection. Individual test plans, procedures, and reports for MTP required tests/inspections must clearly indicate where the particular MTP "mapped" requirements are being met within the individual test plan/procedure. Upon approval, the Contractor must maintain the MTP, which must serve as the overall test control document for the Contractor's [*insert system name*] Test Program.

The Contractor must develop test schedules, test plans, and test procedures to meet the requirements of this SOW. The Contractor must conduct tests and generate test reports, as required by this SOW. The Contractor must integrate test schedules into the overall program schedule. The Government reserves the right to witness, on a non-interference basis, Contractor testing during any test phase or level. Upon completion of each test or series of tests, the Contractor must conduct a TIM Test De-briefing to discuss System Problem Reports (SPRs), log book entries, and test results with the Government. The Contractor must publish minutes for each TIM Test De-briefing.

The Contractor must furnish equipment, space, and personnel required to perform Contractor-conducted factory tests. The Contractor must coordinate testing to be performed, and ensure that there is a minimal redundancy of effort or data. The Contractor must be responsible for the integration, control, and coordination of Contractor and subcontractor testing and support of Government testing. The Contractor must designate in the Contractor's PMP a single Test Manager who must be responsible for testing and testing support items. The Contractor must notify the Government, by Notification of Test Letter, of testing schedules at least five (5) working days prior to the start of each test. Contractor-proposed test tools, documentation, and test-support hardware and software must be approved by the FAA prior to the start of testing. The Contractor must provide facilities and equipment required for successful completion of required test.

CDRL A025 Master Test Plan

CDRL A026 System Problem Reports

CDRL A027 Test/Inspection Plans

CDRL A028 Test/Inspection Procedures

CDRL A029 Test/Inspection Reports

CDRL A030 Notification of Test Letter

### 3.4.2 Test and Evaluation Management

The Contractor designated Test Manager must be responsible for integration, control, oversight, and coordination of all Contractor and subcontractor testing. The Test Manager must also support FAA site tests. The Test Manager must coordinate all Contractors testing and ensure that there are no redundant data collection or test efforts. The FAA may require in-process quality inspections (Ref. 3.4.3.1.1.) to be conducted in accordance with 3.4.2.1.a. requirements at any time. The in-process quality inspections will be performed on a non-interference basis with the Contractor's fabrication and assembly operations. These inspections may be initiated through informal Technical Interchange Meetings (TIMs) and must not require the preparation of formal inspection plans or procedures. However, a Test/Inspection Report must be required upon conclusion of any inspections. Any non-compliance or unexplained anomaly must be entered into the Contractor's problem reporting system (ref. 3.4.2.1.4.) as a System Problem Report and must be formally tracked until resolution.

CDRL A031 Test/Inspection Report

CDRL A026 System Problem Report

#### 3.4.2.1 Test Conduct

The Contractor must conduct the Developmental Test and Evaluation (DT&E) and Production Acceptance Test and Evaluation (PAT&E) portions of the overall test program. The test and inspection program must be designed to verify the requirements specified in the [insert functional specification name and number] and the Contractor's specifications/standards. All formal testing must be conducted on test articles which conform to the applicable configuration baselines established in SBR I and SBR II. The Contractor's minimum testing requirements must include the following tests for all NDI equipment and interfaces.

**TEST OR INSPECTION DT&E:** **SPEC. PARA. REFERENCE:**

* Quality Control Inspections [insert reference paragraph]
* Contractor Preliminary Tests (CPTs) [insert reference paragraph]
* First Article (FA) Inspections (FAIs) [insert reference paragraph]
* FA Design Verification- H/W Test [insert reference paragraph]
* FA Design Verification- S/W Test [insert reference paragraph]
* FA System Test- Performance [insert reference paragraph]
* FA System Test- Status & Control [insert reference paragraph]
* FA System Test- Maintainability [insert reference paragraph]
* FA System Test- Fault Injection [insert reference paragraph]

And Recovery

* FA System Test- Interface [insert reference paragraph]
* FA System Test- Environmental [insert reference paragraph]
* FA System Test- Stability [insert reference paragraph]
* FA System Test- EMI [insert reference paragraph]

##### 3.4.2.1.1 Test Program Requirement Verification

At the SBR I, the Contractor must present a preliminary mapping of the following requirements to each unique test or inspection as identified in paragraph 3.4.2.1 above. The final mapping of requirements must be included with the MTP for Government approval.

* Functional Specification and test requirements contained in the Government furnished, Test Verification Requirements Traceability Matrix (TVRTM)
* The Contractor's own specification requirements and standards

This attachment (mapped matrix) to the MTP must identify the section 3.4.2.1. tests or inspections, wherein each requirement is projected for verification, and the method by which it is intended to verify each requirement from the methods listed below:

**Inspection:**

Requirements verification by inspection must determine specification compliance through visual observation, mechanical measurements of equipment, physical location, or examination of/comparison to engineering documents, standards, etc. and requiring inspection procedures, data collection, and pre-defined success criteria.

**Analysis:**

Requirements verification by analysis must determine specification compliance by comparing the applicable aspects of the Subsystem design with known, established, and certified (or certifiable) technical data, scientific/technical principles, procedures and/or practices which validate the requirement and require analysis procedures and pre-defined success criteria.

**Test:**

Requirements verification by test must determine specification compliance by: the measurement of the Subsystem performance under specific configuration and load conditions with controlled application of known input stimuli, resulting in the measurement of quantitative data, which may be subject to reduction and analysis in order to validate the results against a predefined success criteria, and resulting in a determination of degree of compliance that is expressed in the terms or units of the specification, and requiring the employment of procedures, data collection, reduction, analysis; and, the employment of a pre-defined, quantitative, success criteria also expressed in terms of the specification. Data which may be accepted from prior testing must conform to the following conditions:

* Data was obtained from an equivalent system as base lined for the [*insert system name*] System test program (this is determined by the FAA examination of system configuration data for the current and prior system)
* Data submitted is verified by an independent agent, company or Government (FAA will determine if the data is independent based on substantiation provided by the Contractor)
* Data is sufficient to fully satisfy the requirements of the contract
* [*Insert system name*] System requirements which are verified by prior test data must be clearly indicated in the Master Test Plan and the TVRTM and are subject to FAA approval

The Contractor's TVRTM must also allocate requirements to Site Tests which are unique to that particular [*insert system name*] operational environment (e.g., stress, loading, live interfaces), and tests for those site specific requirements identified by the Government's TVRTM (e.g., site adaptation data, meteorological adaptation data).

The draft MTP, including the preliminary Contractor's TVRTM, must be submitted to the Government no later than seven (7) working days prior to the planned conduct of the SBR I meeting. This draft MTP must include the initial allocation of all TVRTM requirements and their verification method.

Thirty days after SBR I the Contractor must submit the final MTP to the Government for review and approval. As part of this final MTP, and in accordance with MTP requirements (Ref. 3.4.1), the Contractor must perform a final mapping of the MTP TVRTM requirement.

##### 3.4.2.1.2 Test Support

The Contractor must provide all operational and maintenance support required throughout the entire Developmental Test and Evaluation, Production Acceptance Tests, and Operational Test and Evaluation periods. The Contractor must provide test support through [*insert system name*] System baseline and field acceptance for all Contractor equipment.

##### 3.4.2.1.3 Test Readiness Reviews

The Contractor must conduct Test Readiness Reviews (TRRs) prior to each preliminary and formal test to ensure readiness to begin formal testing (Ref. 3.4.2.1.b.- o.). The TRRs must, at a minimum, consist of a review of the following:

* Applicable Test Configuration Review (TCR) Packages which includes all applicable test documentation (i.e., plans, procedures, test tool certification results, test bed configuration diagrams, etc.)
* Availability of Contractor/Government resources and personnel
* The configuration control/validation of test tools and test items (both hardware and software), and any other items deemed necessary to the successful conduct of testing

The planned TRR Review Agendas must be submitted to the Government no later than five (5) working days prior to the planned TRR meeting date and, at minimum, must address the contents of the proposed TCR packages.

The Contractor must conduct the CPT no later than 15 days prior to the scheduled Formal Test, and must conduct the formal test only after successful completion of the TRRs, CPT, and an approved set of CPT, TIM-Test De-briefing Minutes.

CDRL A031 TCR Packages/CPT & Formal Test

##### 3.4.2.1.4 Problem Reporting System

The Contractor must develop a system level, Problem Reporting System (PRS), as part of the test and evaluation program. The Contractor must enter each discrepancy into the Problem Reporting System. All identified discrepancy must be assigned a unique identification number. The Contractor must submit the planned corrective action for each discrepancy and identify the proposed regression testing, or future modification(s) (Ref. 3.4.2.1.5) to the testing program required to validate the successful corrective action. If component fails during formal test, the Contractor must perform failure analysis to identify the cause of failure. This is in addition to the required System Problem Report (SPR). The cause of failure and the SPR information must be utilized to prepare the Failure Analysis Report. The Contractor is responsible for any corrective actions necessary to ensure full specification compliance. The Contractor must complete all repair or rework prior to submission for regression testing.

CDRL A032 Failure Analysis Report

##### 3.4.2.1.5 Regression Testing

The Contractor must correct all discrepancies and verify, through regression testing, that the corrections are effective and do not alter system performance or functions outside the discrepancy correction area. The Contractor must recommend the level of regression testing as part of the recommended corrective action. It should be based on the level of complexity of the deficiency and its degree of involvement with other system components. This Contractor must not proceed with the regression testing until receiving Government concurrence on the regression test plan. The Government reserves the right to witness the regression testing on a non-interference basis.

### 3.4.3 System Test Program

The Contractor must conduct a [*insert system name*] System testing program to qualify the engineering design by determining through incremental tests the degree to which MTP Functional Specification and Contractor specification requirements are met. Verifications must proceed from the "bottom-up", to the integrated verification of functional areas and interfaces within the complete system, in accordance with the test requirements for operational configurations and environments as defined in 3.4.1. Each formal CPT and test must not be considered successfully completed until:

* The Contractor has received written Government approval of the final test plan and procedures
* The Government representative has witnessed the actual test
* The test is conducted to the Government's satisfaction in accordance with the Government approved plans, procedures; and, if necessary, regression test objectives satisfied
* The test report, including all data analysis, all test results, and corrective actions, have been completed to the satisfaction of the Government representative

#### 3.4.3.1 Development, Test & Evaluation

##### 3.4.3.1.1 Quality Control Inspections (ref. 3.4.1.A.)

As part of its Quality Control program, the Contractor must perform random quality inspections and/or tests in accordance with the ISO standards referenced in 3.4.2.1.a. The Government reserves the right to request and witness random quality inspections and/or test.

CDRL A006 Meeting Minutes

##### 3.4.3.1.2 Contractor's Preliminary Test (CPT)

The Contractor must conduct a Contractor's Preliminary Test (CPT), which is a dry run test, for each test listed in section 3.4.2.1.c. through 3.4.2.1.o. in accordance with FAA-G-2100F, the requirements of this SOW, the [*insert system name*] System Functional Specification, contractor specifications as identified in the MTP, and the applicable approved test plans and procedures. Upon completion of CPT, the Contractor must prepare and deliver CPT Meeting Minutes.

CDRL A006 Meeting Minutes

##### 3.4.3.1.3 First Article Inspections

The Contractor must conduct the required formal First Article Inspections (FAIs) in accordance with 3.4.2.1.c and the [*insert system name*] System Functional Specification. These inspections must be performed upon the first build unit, module, or assembly to be produced under this contract. The inspections (and/or sub-inspections, if any) must be conducted in accordance with approved inspection plans and procedures.

##### 3.4.3.1.4 First Article Design Verification

The Contractor must perform the hardware and software design verification tests in accordance with the [*insert system name*] Functional Specification and SOW paragraph 3.4.2.1.d. & e. as defined in the approved MTP specified test categories (and/or sub-categories, if any). The design verification tests must address all of the [*insert system name*] System Functional Specification requirements.

##### 3.4.3.1.5 First Article System Test

The Contractor must conduct the paragraph 3.4.1.f through m. required First Article System Test categories as defined in the [*insert system name*] Functional Specification. These tests must employ only the complete First Article (Production) final assembly and only the baselined (Production) software image as resident and operational for all production units.

#### 3.4.3.2 Production Acceptance Test & Evaluation

##### 3.4.3.2.1 Production Test

The Contractor must perform Production Acceptance Test and Evaluation (PAT&E) of the first production unit after successful formal dry-run (CPT) using the Government approved Production Test Procedures. The Contractor must not proceed with the PAT&E until Government acceptance of the First Article, Government approval of the Formal Test/inspection Reports for the tests and inspections performed in accordance with the paragraphs 3.4.2.1.(a) through (m), and Government approval of the Production Test Procedures. Unique system configurations requiring different Production Test procedures must require additional CPTs for those configurations. These tests must be conducted on production baseline hardware and software (system image) systems only. The Contractor must conduct succeeding formal Production Test(s) on follow-on production units after acceptance of the first Production Unit's Test Report and successful conduct of succeeding TRRs in accordance with test requirements of the [*insert system name*] Functional Specification, the Contractor's specification, and any other applicable requirements.

##### 3.4.3.2.2 Site Acceptance Test (SAT)

The Contractor must perform a Site Acceptance Test (SAT) for the First Article systems configured in accordance with the configuration baseline established at the SBR II. The SAT must be conducted at the FAA Technical Center and the FAA key site identified in Section F of the contract. The Contractor must ensure that the [*insert system name*] System installed at each site successfully passed Production Test and is certified by a Government approved Test Report. After completion of site installation and optimization of the [*insert system name*] System, the Contractor must perform the site test procedures in accordance with the Government approved Site Acceptance Test Plan and Procedures, beginning with one successful formal dry-run (CPT) of the site test procedures as applicable to each post-Production Tested, site-installed, unit. The formal testing must proceed after approval of the CPT meeting minutes.

CDRL A006 Meeting Minutes

##### 3.4.3.2.3 Test Equipment

The Contractor must provide all necessary test equipment to satisfy the requirements of the test program. The Contractor must ensure that all necessary test equipment is available, properly calibrated, and fully operational in time to support all required testing. Unless otherwise approved by the Government, all test equipment used by the Contractor during FATs or SATs must be standard commercial equipment and must operate in the manner specified by the test equipment manufacturer. The Contractor may solicit Government approval to use custom test equipment by submitting a written request, with justification, to the Contracting Officer. All ancillary equipment required by the Contractor for test purposes must be furnished by the Contractor for the duration of the tests. Under the following conditions, the Government may require the Contractor to re-calibrate Contractor provided test equipment:

* The test equipment is removed from the test set-up for unrelated purposes; or
* The test equipment fails, is damaged, or appears to be operating in a faulty manner based on Government evaluation of equipment operation or test results.

## 3.5 National Airspace Integrated Logistics Support

The Contractor must plan, manage, and execute a National Airspace Integrated Logistics Support (NAILS) program that addresses all elements of logistics identified in FAA Order 1800.58, National Airspace Integrated Logistics Support Policy and this SOW.

### 3.5.1 NAILS Program

NAILS is an interrelated, unified, and iterative approach to support the National Airspace System (NAS). The analyses associated with NAILS influences system configuration to minimize the life cycle cost. Through NAILS, support requirements are identified and acquired.

#### 3.5.1.1 NAILS Management Team

A joint Government/Contractor sponsored NAILS Management Team (NAILSMT) for the [*insert system name*] System must be established and must serve as the primary management vehicle for monitoring the status of the NAILS program. The Contractor must fully support and participate in the NAILSMT. The chairperson of the NAILSMT is the FAA Associate Program Manager for Logistics (APML). The NAILSMT provides a means for coordinating and monitoring logistics related schedules and contract performance, and reviews the adequacy of, timeliness of, and compliance with contract requirements.

The NAILSMT must meet semi-annually or when requested by the APML, not to exceed four meetings per year. NAILSMTs must be conducted at the Contractor's facility or at mutually convenient locations. Contractor and Government members of the NAILSMT must submit proposed agenda items for each meeting to the chairperson. The Contractor must brief the status of the logistics elements and address support issues identified on the agenda as contained in a NAILSMT Briefing Package. The agenda must provide for status reporting and analysis of problem areas.

CDRL A033 NAILSMT Briefing Package

#### 3.5.1.2 NAILS Program Planning

The Contractor must implement the NAILS program in accordance with the Integrated Support Plan (ISP) and this SOW. The Contractor must maintain the ISP to reflect current program status and must update and deliver the ISP Updates to reflect approved changes emanating from program changes, reviews, and other actions affecting the logistics aspects of the program.

CDRL A034 Integrated Support Plan Updates

#### 3.5.1.3 Logistics Guidance Conference

The Contractor must plan for, host, and support a Logistics Guidance Conference (LGC), not to exceed two days, to be convened at the Contractor's facility within 30 days after Production Decision. The Contractor must co-chair the meeting with the FAA APML. The Contractor must prepare a LGC Briefing Package and present its approach to accomplishing logistics tasks. The Contractor must support the conference with the required resources (e.g., briefings, vu-graphs, and manpower) necessary to discuss in detail all support considerations. The LGC must also clarify provisioning requirements and issues (e.g., provisioning deliverables, data requirements, technical documentation, and data for provisioning). The following subjects, at a minimum, must be included:

* Maintenance Planning
* Manpower and Personnel
* Supply Support
* Support Equipment
* Technical Data
* Training and Training Support
* Computer Resources Support
* Packaging, Handling, Storage and Transportation
* Facilities
* NAILS Management

CDRL A035 LGC Briefing Package

#### 3.5.1.4 Site Maintenance Staffing Values File Update

The Contractor must determine the projected site direct maintenance workload in total annual employee hours and fractions thereof, based on the current version of FAA Order 1380.40, Chapter Three, and document this in a Logistics Support Direct Work Maintenance Staffing Requirements document.

CDRL A036 Log. Support Direct Work Maint. Staffing Req. Doc.

#### 3.5.1.5 Logistics Support Analysis Records

The Government will provide to the Contractor within twenty 20 calendar days after Production Decision an automated data system and documentation for Contractor use to meet the FAA requirements for Logistics Support Analysis Records (LSAR). The Contractor must be responsible to load the data elements into the Government provided database. The Government-provided LSAR software will be a self-contained relational database. It will run on any IBM-compatible personal computer using the MS-DOS version 3.1 or higher. The Government will then import this data into a validated MIL-STD-1388-2B database that will be used to generate ad hoc reports.

The Government will accept previously developed MIL-STD-1388 data provided that all SOW data element requirements are met or exceeded. The Government reserves the right to have Government members of the NAILSMT periodically review and examine, on a non-interference basis, Contractor-produced LSAR data (e.g., drawings, mockups, specifications, and photographic reproductions), to evaluate the Contractor's compliance with, and satisfactory progress toward, satisfying the [*insert system name*] System LSAR requirements. The Government will provide the Contractor with five (5) calendar days advance notice of anticipated access requirement.

##### 3.5.1.5.1 LSAR Data Candidates

The Contractor must provide an LSA Candidates List for input into the LSAR database. Candidates for inclusion are those data items for which the Government does not have existing documented maintenance information and which require the documentation of operational and logistical support parameters and requirements.

CDRL A037 LSA Candidates List

###### 3.5.1.5.1.1 Data Candidates for LSAR Database

Possible candidates include, but are not limited to, the following:

* Systems
* Subsystems
* End items
* Components
* Assemblies
* Subassemblies
* Support and test equipment
* Training equipment
* Recording/cleaning media
* Test Tool provided by the Contractor

###### 3.5.1.5.1.2 Maintenance Information

Maintenance information, as used in this context, includes, but is not limited to, a requirement for;

* Trained personnel
* Transportation and handling
* Logistics technical data
* Support and test equipment
* Supply support and facilities

##### 3.5.1.5.2 LSAR Data Selection Criteria for Developed Items

The Contractor must provide a Logistics Support Analysis Record Data Table Delivery for the following types of equipment:

* Contractor-furnished equipment that must be inspected, tested, repaired, maintained, or overhauled as part of [*insert system name*] System on-site maintenance
* All Contractor-furnished support, test, and training equipment
* Installed and non-installed GFE items when such data is required to interface GFE with Contractor-furnished equipment or when usage/environment must be different and/or to determine total support requirements of the [*insert system name*] System
* GFE items, installed and non-installed, for which the Government-Furnished Data (GFD) are inadequate or incompatible and where such data is necessary to document [*insert system name*] System requirements. In the event the Contractor does identify that such inadequacies or incompatibilities exist, the Contractor must submit analyses and findings with recommended actions to overcome such inadequacies or incompatibilities to the Government for review and direction where appropriate.

The Contractor must not consider as candidates any equipment of a temporary nature (e.g., special installation switches, temporary ports that may be removed within the Contract maintenance period, and transition switches). The Government must retain the right for final determination of candidates for selection or non-selection.

CDRL A038 Log. Support Analysis Record Data Table Delivery

#### 3.5.1.6 Provisioning

The Contractor must provision spares to support maintenance. The Contractor prepares and submits provisioning data in accordance with the Spares Requirements List under a top-down breakdown listing to each Line Replaceable Unit (LRU) in the [*insert system name*] System design. The Contractor must modify the provisioning data as required to document changes resulting from the test program design changes or to correct errors or omissions. All developed items will be included in the top-down breakdown listing and will be detailed to the piece part level.

The Contractor must:

* Request assignment of a Government nomenclature for the [*insert system name*] System and its subassemblies. Discussions will be conducted regarding the appropriate levels of nomenclature during the Logistics Guidance Conference;
* Mark all [*insert system name*] System LRUs, including LRU spares, and provide an LRU Bar Code Identification Report;
* Mark all LRUs and LRU spares with bar code symbols that is consistent with commercial product identification and clearly and visually identifies the LRU and the contents of the LRU package; and
* Identify and recommend a list of required spares, annotated for site use and/or for depot stockage, to include assemblies and consumables (e.g., fuses, Light Emitting Diodes (LEDs), etc.) for the [*insert system name*] System. The list must be tailored to indicate sparing for each configuration. The list must be subject to review, modification and approval by the Government.

For the purpose of this SOW, "Spares" is defined herein to include, at a minimum, LRUs, components, and consumables such as fuses and LEDs.

CDRL A039 Spares Requirements List

CDRL A040 LRU Bar Code Identification Report

##### 3.5.1.6.1 Provisioning Guidance Conference

The Contractor must host and support a Provisioning Guidance Conference commensurate with the Logistics Guidance Conference at the Contractor's facility not later than thirty (30) days after Production Decision. The Contractor will host an initial comprehensive provisioning conference fifteen (15) days after receipt of official Government comments on provisioning data. Subsequent Provisioning Conferences, not to exceed eight (8), must be conducted when ordered by the Government. The Contractor and subcontractor/vendors, as determined by the Government, must attend, participate and contribute expertise to the Government in resolution of provisioning and supply support problems or issues. Peculiar spare parts may be procured as a result of provisioning conferences under provisioning procedures.

#### 3.5.1.7 Tools, Test and Support Equipment

The Contractor must update the common and special tools, test and support equipment data required for site and depot maintenance.

##### 3.5.1.7.1 Selection Criteria Priorities

The Contractor must use the following selection criteria priorities:

* Equipment presently in the Government inventory
* Equipment defined in current Government inventory for which procurement data is available
* Other commercial off-the-shelf or modified equipment
* Equipment that must be specifically designed to support [*insert system name*] System, i.e., peculiar equipment. This category must not be used until all other means of support equipment investigations have been exhausted and approval has been granted by the Government.

##### 3.5.1.7.2 Common Support Equipment

The Contractor must identify the common tools and test equipment and document this list in the Common Support Equipment Recommendation List. Common support equipment is support equipment used to support more than one manufacturer's system, subsystem, or item of equipment. The Common Support Equipment Recommendation List must include all test cables, connectors, extender kits, adapters, software, and all other items required to maintain [*insert system name*] System hardware, software, and firmware.

CDRL A041 Common Support Equipment Recommendation List

##### 3.5.1.7.3 Special Tools, Support and Test Equipment

The Contractor must identify special tools, support and test equipment required for site, depot and PSF maintenance in a Support Equipment Recommendation Data, or on a Software Support Tools List, as applicable. This must include special tools, support and test equipment that are not an integral part of the end item. Special tools, support and test equipment is applicable only to the [*insert system name*] system, its components and subsystems.

CDRL A042 Support Equipment Recommendation Data

CDRL A043 Software Support Tools List

#### 3.5.1.8 Technical Manuals

The Contractor must provide all technical manuals necessary to support testing, operations, maintenance, and training for all operational, test, and support equipment and software. The Contractor must be responsible for coordinating the identification and assignment of Government technical manual identification numbers for any newly developed and/or existing technical manuals provided in support of the [*insert system name*] System. This effort includes all NDI technical manuals for all NDI delivered with, or as a part of, the [*insert system name*] System. The Contractor must provide and incorporate supplemental data, in the form of Equipment Instruction Books (EIBs) for NDI manuals when the Government's minimum criteria for the NDI manuals are not met.

##### 3.5.1.8.1Technical Manual Development Plan

The Contractor must prepare and submit a Technical Manual Development Plan (TMDP) that identifies all Contractors provided technical manuals, their purpose, the audience the manuals are intended to support, and a description of manual contents for both site and depot level operations and maintenance. The TMDP must include all Contractor developed and modified technical manuals and a listing of all commercial manuals. The listing must include identification of those COTS/Commercially Available Software manuals currently available in electronic format. The TMDP must expand in greater detail on any information provided by the Integrated Support Plan (ISP) and will not be a duplication of ISP information previously provided. The TMDP must:

* Include a Plan of Action and Milestones (POA&M) Chart that details the Contractor's planned development schedule for new manuals
* Provide for informal reviews of new/developed/modified manuals at the 30, 60, and 90 stages of completion
* Include a schedule for formal in-process reviews for developed technical manuals at first draft, second draft and final scheduled completion deadlines
* Recommend or propose additional/new technical manuals (to include EIBs) to support [*insert system name*] System functions at the ARTCCs, TRACONs, ATCTs, the FAALC, the FAATC, the PSF, and the FAA Academy
* Provide, as an attachment, an illustration showing how the manuals work together in accomplishing maintenance at the system level and at lower levels in accordance with the [*insert system name*] System maintenance concept.

The TMDP must include, at a minimum, a discussion of system equipment EIBs and the following MIL-STD-498 required technical manuals: Computer Programmer's Manuals; Computer Operator's Manuals; and Firmware Support Manual.

CDRL A044 Technical Manual Development Plan

##### 3.5.1.8.2 Non-Developmental Item Technical Manuals

The Contractor must deliver to the Government all Non-Developmental Item (NDI) Technical Manuals necessary to maintain and support the [*insert system name*] System for OT&E testing.

CDRL A045 NDI Technical Manuals

##### 3.5.1.8.3 Contractor Developed Technical Manuals

###### 3.5.1.8.3.1 Manuals

The Contractor must provide technical manuals in accordance with the approved TMDP. The Contractor must provide, at a minimum, the following manuals: [*insert system name*] System COTS Manuals Cross Reference Book; [*insert system name*] System Technical Instruction Books; System Software User's Manual; Software Programmer's Manual; Firmware Support Manual; Computer Operations Manual; and a Computer Programmer's Manual.

The Contractor must propose the content and format for any Contractor-developed manuals. Government approval of the content and format of Contractor-developed manuals will be required.

CDRL A048 System COTS Manuals Cross Reference Book

CDRL A049 System Technical Instruction Books

CDRL A046 System Software User's Manual

CDRL A047 Software Programmer's Manual

CDRL A050 Firmware Support Manual

CDRL A051 Computer Operations Manual

CDRL A052 Computer Programmer's Manual

###### 3.5.1.8.3.2 Manual Validation and Verification

The Contractor must validate all developed manuals and support Government verification of these manuals.

3.5.1.8.3.2.1 Validation

The Contractor must validate all technical manuals. Validation must be accomplished by actual performance unless written authority is obtained from the Government to use simulation for selected procedures. The Contractor's validation methodology must encompass the actual performance by Contractor personnel of operation and maintenance procedures including checkout, calibration, alignment, scheduled/unscheduled removal and replacement instructions, and associated checklists. All disassembly and reassembly instructions must be validated by actual performance unless otherwise approved by the Government. Each procedure must be witnessed by the Government's designated representative. Upon completion of the technical manual validation, the Contractor must prepare and submit a Validation Completion Certificate.

CDRL A053 Validation Completion Certificate

3.5.1.8.3.2.2 Verification

The Government will verify all Contractor developed technical manuals. Verification is the responsibility of the Government and will be accomplished by trained Government personnel assisted by the Contractor as required. The verification event will be performed after successful validation and prior to OT&E. Verified preliminary draft technical manuals must be available to support OT&E. The Contractor must be responsible for providing engineering and technical assistance during the verification process.

### 3.5.2 Training and Training Support

The Contractor must develop and conduct a training program to provide training for the [*insert system name*] System in accordance with the requirements set forth in the paragraphs below. The Contractor must use commercially available training material to the maximum extent possible.

#### 3.5.2.1 Training Planning and Management

The Contractor must plan and manage the [*insert system name*] System training program in accordance with the requirements of this SOW and the Government approved ISP. All training and training material must be free from any encumbrance that would prohibit the reproduction or use by the Government for additional training purposes. This includes but is not limited to copyrighted, registered documentation and software in accordance with pertinent regulations. The Contractor must provide a fully paid-up, nonexclusive, irrevocable license permitting to reproduce copyrighted materials for Government purposes. All material developed for the Government by Contractors must be the sole property of the Government and must not be used by the Contractor for any purpose other than those in the contract unless approved by the Government. The Contractor must provide a letter of release for copyrighted materials which permits Government reproduction “For Training Purposes Only."

##### 3.5.2.1.1 Training Guidance Conference

The Contractor must plan, support, participate in, and host a Training Guidance Conference to be held at the Contractor's facility in conjunction with the Logistic Guidance Conference. The Contractor must ensure participation of the appropriate training personnel responsible for satisfying [*insert system name*] System training requirements. The Contractor must prepare for Government review and approval, the agenda and minutes for the conference. During the Training Guidance Conference, the Contractor must be prepared to discuss the Task and Skills Analysis Report and the Contractor's Proposal for Training Update and each of the types of training required.

CDRL A005 Meeting Agenda

CDRL A006 Meeting Minutes

CDRL A054 Contractor's Proposal For Training Update(s)

##### 3.5.2.1.2 Contracting Officer's Training Representative

The training representative for the services and materials provided by the Contractor to meet the training requirements of this SOW will be:

Federal Aviation Administration

New Equipment Training Program Manager, AFZ-100

800 Independence Ave, S.W.

Washington D.C. 20591

The alternate training representative for the maintenance services and materials provided by the Contractor to meet the training requirements of this SOW will be:

Mike Monroney Aeronautical Center

PO Box 25082 6500 S MacArthur Blvd.

Attn: AMA-440 Radar Branch

Oklahoma City, Oklahoma 73125

The Air Traffic training representative for the services and materials provided by the Contractor to meet the training requirements of this SOW is:

Mike Monroney Aeronautical Center

6500 S MacArthur Blvd.

Attn: Air Traffic Training, ATX-120

Oklahoma City, Oklahoma 73125

#### 3.5.2.2 Training Program Requirements

The Contractor must provide the following training:

* System Software Maintenance Training
* Hardware Maintenance Training
* Test Team Training
* Technical On-site Representative (TOR) Training
* Air Traffic Control (ATC) Cadre Training
* Second Level Engineering Training
* Depot Level Training

All contractor provided training must comply with the student prerequisite(s), training description, training objectives and training materials specified below. Information specific to a particular training program is included within that course requirement paragraph. When necessary, a fourth category entitled 'Special Requirements' has been added.

The Contractor must fulfill the following requirements when providing all training curricula unless otherwise directed in the specific requirements:

* Training must be developed in modules. Each module must address a single major topic, or several closely-related topics, which provide a logical training sequence.
* The Contractor must use commercially available training materials to the maximum extent possible to deliver training programs.
* The courses must be designed to make maximum use of appropriate Assembly [*insert system name*] manuals during the instruction. The use of the manuals should encompass a "how to" approach and work in concert with the Instructor lesson plans.
* The Contractor must furnish, revise, and maintain all course management materials, curriculum materials, and courseware until all Contractor conducted training has been completed. Government comments to the course material will be provided upon conclusion of the first iteration of each class. In addition to incorporating Government comments, the Contractor must correct any errors, omissions, and deficiencies in the revised course materials that are discovered while conducting the first class. Subsequent classes must not commence until all corrections have been entered and approved by the Government.
* The Contractor must comply with FAA-STD-028B, Chapter 3, paragraphs 3-10 and 3-11 for the use of Training Equipment.
* Federal holidays must not be class days and must not be absorbed in the overall training course length.
* Contractor personnel selected for course development and class conduct should have prior training and experience in training course development and conduct. The Contractor must submit for Government review and acceptance a resume of experience and training for each person assigned to develop courseware and conduct classes under this contract.
* Final training materials must be delivered in paper copy form and on electronic media, agreed to at the Logistics Guidance Conference, that is compatible with and operable on FAA platforms.
* Certificate of training. The Contractor must provide a certificate of training to each course graduate and a class roster to the Contracting Officer's Technical Officer Representative at the end of each class of instruction. The certificate must contain at a minimum:
  + Course title and FAA course number if applicable
  + Hours of training completed
  + Location of training
* Class start and end dates
  + Student name and SSN
  + Course grade (numerical or pass/fail)
* The Contractor must provide each student with a complete set of student materials.

#### 3.5.2.3 Access to Contractor's Facilities and Data

The Contractor must permit Government training personnel and/or their designated representative’s full access to the Contractor's training and facilities, for training development review purposes, upon prior notification. The Contractor must provide Government personnel or their designated representative’s access to any data that will become property of the Government. This access includes data on system or equipment hardware, software, and firmware.

#### 3.5.2.4 System Orientation Manual

The Contractor must develop a System Orientation Manual for the use of site management and field personnel preparing to attend [*insert system name*] System training. Contents must include, but not be limited to, system overview, system block diagrams, general system parameters, subsystem interface, and impact within the NAS.

#### 3.5.2.5 Performance Examinations

The Contractor must develop concept examinations in accordance with FAA-D-2706, and performance examinations in accordance with FAA-D-2781.

CDRL A055 Concepts Examination

CDRL A056 Performance Examination

#### 3.5.2.6 Training Subject Areas

##### 3.5.2.6.1 System Software Maintenance Training

The Contractor must develop training for experienced FAA software engineers and support personnel to assume the responsibility of system life cycle maintenance for all [*insert system name*] System software. Best commercial practices must be followed in accordance with FAA-STD-028B, DID-1, Paragraph 10.3.6. The training must be for a maximum class size of ten (10) students. Software training must be supported by the use of the [*insert system name*] System PSF as much as possible.

###### 3.5.2.6.1.1 Student Prerequisites

The Contractor must design this training for personnel with the following capabilities:

* A working knowledge of "C", and a lower level language such as assembly language
* An understanding of the software development and documentation process and their application to software maintenance support
* A working knowledge of the UNIX system

###### 3.5.2.6.1.2 Training Description

The training must include training on all PSF tools provided for software development and software maintenance. At a minimum, the course must include the following:

* All CASE tools used for requirements analysis, requirements decomposition, design, coding, configuration management, testing, documentation, and reverse engineering;
* All documentation tools used for automatic documentation revision, production of documentation, and publishing;
* Configuration management and requirements traceability tools, including data bases and reports, problem tracking systems, source code tools and any custom or special application tool(s);
* Models, simulators, and emulators including interfaces, requirements analysis, and performance measuring/testing tools

###### 3.5.2.6.1.3 Training Objectives

At the completion of contractor training, the students must be able to demonstrate the following at a minimum:

* Demonstrate knowledge of the software development system and its environment, tools, procedures, and processes
* Demonstrate familiarization with all of the software documentation
* Demonstrate familiarization with the software maintenance manual, firmware support manual, and all other documentation intended for life-cycle maintenance of the [*insert system name*] System
* Demonstrate the ability to modify authorized system software, including but not limited to design modifications, code changes, debugging, rebuild, integration and testing, documentation changes, configuration control, and releases of software

###### 3.5.2.6.1.4 Training Materials

The Contractor must provide training materials listed below for use during the instruction. The Contractor must provide to the PSF Manager at least one copy of the instructor lesson plans and one copy of the vu graphs for use in recurrent and new-hire training. The Contractor must provide any applicable technical manuals for student use during the instruction. The use of the technical manuals should encompass a "how to" approach and work in concert with the instructor lesson plans.

CDRL A063 First Course Conduct and Course Report

CDRL A058 Task and Skills Analysis Report

CDRL A064 Course Design Guide

CDRL A059 Student Achievement Test

CDRL A057 Lesson Plan

CDRL A060 Student Materials

CDRL A061 Course Walk-Through

CDRL A062 Developmental Tryout

###### 3.5.2.6.1.5 Special Software Maintenance Training Requirements

FAA representatives will attend the first training course. The FAA representatives will evaluate the technical accuracy and the instructional effectiveness of the course, using the lesson plans and the course evaluation checklist. During each course, the Contractor must supply each student with a set of Student Materials that will become the property of the student after the training is completed.

The Contractor must submit a course report after the first course conduct. The course report must document the extent to which the students achieved the objectives, the deficiencies in the instruction, and the accuracy of the time allocations. Before conducting subsequent classes, the Contractor must incorporate the required revisions identified during the first course conduct.

The Contractor must submit the End of Course Evaluation Questionnaire in accordance with FAA STD-028B after each class using figure 27-4 in FAA-STD-028B for guidance. The results from the questionnaire will be provided in the comments section of the Course Report after the first course conduct. The results from questionnaires administered after subsequent courses must be forwarded to the COR.

CDRL A063 First Course Conduct and Course Report

CDRL A060 Student Materials

##### 3.5.2.6.2 Second Level Engineering Training

The Contractor must develop Program Support Facility (PSF) software training for experienced FAA software engineers to insure their understanding of the operation of the [*insert system name*] System operational/application software. The Contractor must perform the software training using Best Commercial Practices. The training must be for a maximum class size of five (5) students.

###### 3.5.2.6.2.1 Student Prerequisites

The Contractor must design this training for personnel with the following capabilities:

* An excellent knowledge of "C", and a lower level language such as assembly language
* An understanding of the PSF software maintenance process

###### 3.5.2.6.2.2 Training Description

The training must include training on all PSF equipment, software, and firmware to ensure a complete understanding and skill in maintaining and supporting the [*insert system name*] software and firmware. At a minimum, the course must include the following:

* System overview to include system specifications, Software Requirements Specification (SRS) and documentation including
* All software tools and utilities used for editing, configuration management, debugging, diagnostics, software development, BIT/FIT and compiler, assembler, and linkers;
* All documentation required for the design, description, development, maintenance, test, analysis, editing, operation, and debugging of all [*insert system name*] MSSR operational software.
* PSF hardware equipment operation and maintenance including: display terminals, PSF Computer, printer/plotters, work station, PROM/PAL Programmer, and test equipment.
* Software analysis operations and systems, including: the operating system; system software operation, COTS Software, data extraction, and data reduction.
* Methods of identifying software deficiencies including analyzing and modifying operating systems and system software; and the use of Contractor developed software tools.
* Methods of performing software enhancement and corrections including: modifying operating systems, modifying system software, modifying Contractor developed software tools, loading modified software, and updating the documentation for modified software.
* Methods to revalidate modified software, including validation of corrections to: operating systems, system software, and Contractor developed software tools.

###### 3.5.2.6.2.3 Training Objectives

At the completion of contractor training, the students must be able to demonstrate the following at a minimum:

* Demonstrate knowledge of the software system and its environment, tools, procedures, and processes
* Demonstrate an understanding of the complexity of the PSF
* Demonstrate an ability to operate the PSF
* Demonstrate the ability to maintain and support (repair and service) the PSF

###### 3.5.2.6.2.4 Training Materials

The Contractor must provide all required training materials for use during instruction. The Contractor must provide the PSF Manager at least one copy of the instructor lesson plans and one copy of the vu graphs for use in recurrent and new-hire training. The Contractor must utilize the appropriate [*insert system name*] during instruction. The use of the manuals should encompass a "how to" approach and work in concert with the instructor lesson plans.

CDRL A065 Second Level Engineering Support Training

##### 3.5.2.6.3 Hardware Maintenance Training

The Contractor must develop the hardware maintenance training specifically for FAA maintenance technicians and engineers.

###### 3.5.2.6.3.1 Student Prerequisites

Personnel receiving the hardware maintenance training will be FAA maintenance technicians and engineers. Student proficiency will be commensurate with the prerequisite courses:

* Course # 44415 - Microprocessors
* Course # 44013 - Introduction to Computers
* Course # 40392 - Common Principles for Radar Technicians

Outlines of prerequisite courses will be furnished to the Contractor by the Government upon request.

###### 3.5.2.6.3.2 Training Description

This training is for Government personnel assigned on-site maintenance responsibility for the [*insert system name*] System at both operational sites and sites not planned for Commissioning. It consists of hardware system configuration, system operation, and preventative and corrective maintenance. Hardware maintenance training must include normal system operation, the operation of test equipment, and the interface to software operations.

###### 3.5.2.6.3.3 Training Objectives

At the completion of contractor training, the students must be able to demonstrate the following at a minimum:

* Configure the [*insert system name*] system in accordance with manufacturer's instruction books/ specifications and FAA handbook specifications;
* Troubleshoot to the degree necessary to identify and isolate malfunctions in or to back plane wiring and to the printed circuit board/LRU;
* Perform and document all periodic maintenance activities indicating that the trainee has acquired the skills and knowledge necessary to measure system parameters with reference to applicable tolerances using the test equipment assigned as maintenance aids;
* Use the remote maintenance monitoring equipment to perform re-configuration, restoration of service, fault isolation, site adjustments, and to analyze system performance; and
* Execute those operating system commands required to maintain the [*insert system name*] system, using appropriate hardware and the selected operating system.

###### 3.5.2.6.3.4 Special Hardware Maintenance Training Requirements

The requirements of this section, unless otherwise stated, must apply to training developed and administered for Airway Facilities Hardware Maintenance. Following Contract Award, the Contractor must prepare and submit, for Government approval, a Task and Skills Analysis (TASA) in accordance with FAA-STD-028B. The TASA must separately address all task areas that require training.

When approved, the TASA will be subjected to a Government media analysis to determine the recommended delivery and media for the each iteration of training. This analysis will also include any COTS training materials submitted by the Contractor as part of the Proposal for Training. Information derived from this analysis will become part of a training program report, which will provide direction to the Contractor regarding training program development and strategy.

The Contractor must conduct a course Developmental Tryout and a Course Walk-Through. The Contractor must conduct five iterations of the Hardware Maintenance Course. The first class is the First Course Conduct. Any deficiencies or discrepancies encountered while conducting the Developmental Tryout must be resolved prior to conducting the First Course Conduct. The Contractor must prepare a Course Report at the conclusion of the First Course Conduct. Prior to the conduct of the second class, any errors in the course report must be resolved. The Contractor conducted classes must have a maximum class size of twelve students. The Contractor must provide each student with a complete set of student materials. The Government intends to transition the training to the FAA Academy after the first five conducts.

FAA representatives will attend the conduct of the first course for the training. The FAA representatives will evaluate the technical accuracy and the instructional effectiveness of the course, using the lesson plans and the course evaluation checklist. For the first course conduct, the Contractor must supply each student with a set of student materials that will become the property of the student after the training is completed.

The Contractor must submit the course report, after the first course conduct, documenting the extent to which the students achieved the objectives, the deficiencies in the instruction, and the accuracy of the time allocations. Prior to conducting subsequent classes, the Contractor must incorporate the required course revisions identified during the first course conduct.

The Contractor must prepare a Course Report at the conclusion of the first class in accordance with FAA-STD-028B. Subsequent classes must be conducted utilizing revised training material. The first five production classes must be held at the Contractor's facility. The Developmental Tryout, Course Walk Through, First Course Tryout and five production classes must not be held on any Government observed holiday.

The End of Course Evaluation Questionnaire in accordance with FAA STD-028B must be submitted to students after each class conduct using figure 27-4 in FAA-STD-028B for guidance. The results from the questionnaire will be provided in the comments section of the Course Report after the first course conduct. The results from questionnaires administered after subsequent courses must be forwarded to the COR.

In addition the Contractor must develop a concepts exam in accordance with FAA-D-2706 and a performance examination in accordance with FAA-STD-2781.

CDRL A063 First Course Conduct and Course Report

CDRL ILS23 Task and Skills Analysis Report

CDRL A064 Course Design Guide

CDRL A059 Student Achievement Test

CDRL A057 Lesson Plans

CDRL A060 Student Materials

CDRL A061 Course Walk-Through

CDRL A062 Developmental Tryout

3.5.2.6.3.4.1 Training Materials

After the media analysis by the FAA Curricula Modernization System, the FAA must recommend preferred instructional methods to be used which may include COTS, Contractor developed formal training or Contractor developed Computer-Based Instruction (CBI) or a combination thereof. If COTS training is approved by the FAA, the Contractor must provide, for Government review and approval all instruction and student materials to include but not to be limited to textbooks, workbooks, lesson plans, and training aids.

Any training items requiring development must be developed in accordance with FAA-STD-028B. If the Government does not approve the COTS training, the Government has the option to recommend either CBI or resident training. Following are all options for various training methodologies:

3.5.2.6.3.4.2 Resident Training Option

If the Contractor develops resident training courses, it must be developed in accordance with FAA-STD-028B, using the materials listed in the above paragraph.

3.5.2.6.3.4.3 Computer Based Instruction Option

If the Contractor develops Computer Based Instruction (CBI) courses, the Contractor must also develop the specifications, testing criteria and methods, and specific documentation on how to use that training.

Any CBI courseware/software submitted by the Contractor must be on a CD-ROM format that is compatible with FAA CBI CD-ROM delivery standards. The courseware will be fully compatible and operable on the standard FAA CBI student platform.

CDRL A068 CBI Lesson Specifications

CDRL A069 Plan for Computer-Based Instruction Testing

CDRL A067 CBI Validation Plan and Validation Report

CDRL A066 CBI Program Documentation

3.5.2.6.3.4.4 On-the-Job Training Option

If the On-the-Job training is developed, the Contractor must develop a handbook for the instructor to use in providing this training.

CDRL A070 On-the-Job Instructor Handbook

##### 3.5.2.6.4 Depot Repair/Support Training

The Contractor must develop a component-level training program on the system SRUs. The Contractor must follow best commercial practices using FAA-STD-028B, DID-1, Paragraph 10.3.6, as guidance. The training must include repair procedures and depot-level specifications, the use of special tools and test equipment, operational system troubleshooting and repair techniques. It must also include the operation and maintenance of peculiar test equipment, unique commercial test equipment, diagnostic test-beds and software operations in support of the repair and maintenance of the SRUs. All training materials will be provided to the Depot at the completion of Contractor-conducted training for future use in attrition training.

###### 3.5.2.6.4.1 Training Content

Training content must be:

* Theory of operation
* LRU and SRU repair
* System diagnostics
* Test verification
* Use of software tools
* Use of depot level test equipment
* Digital processor

###### 3.5.2.6.4.2 Training Materials

The Contractor must provide training manuals that reflect the theory of operation. These training manuals must be used to train personnel in depot level maintenance and repair. The prerequisite for this training is the [*insert system name*] System hardware course. The training materials must be developed using Best Commercial Practices. The Contractor must provide a Certificate of Training to each course graduate.

CDRL A071 Depot Repair/Support Training

##### 3.5.2.6.5 ATC Cadre Course

The Contractor must develop an ATC Cadre Course for training ATC Specialists, Traffic Management Coordinators, and their supervisors. The training must be developed using best commercial practices. The ATC Cadre Course must provide training in the function and operational characteristics of the [*insert system name*]. Cadre training is defined as training for potential trainers.

###### 3.5.2.6.5.1 Student Prerequisites

FAA functional specialists, who will eventually undertake the teaching of this course, will attend the course. Personnel receiving this training must be experienced ATC specialists, ATC supervisors, Traffic Management Coordinators and their supervisors.

###### 3.5.2.6.5.2 Training Description

The ATC training course must prepare the cadre to administer training to the remaining non-cadre personnel. The training must cover human interface and operations techniques associated with the [*insert system name*], utilizing hands-on methods on production equipment in a non-operation environment. The Contractor must ensure that the training does not include subjective methods, nor in any way imply how to interpret color weather graphic products or presentations.

###### 3.5.2.6.5.3 Training Objectives

At the completion of contractor training, the students must be able to demonstrate the following at a minimum:

* Knowledgeable of the [*insert system name*] mission
* List other training objectives

###### 3.5.2.6.5.4 Training Materials

The Contractor must develop instructor Lesson Plans and vu graphs for use during the instruction. The Contractor must provide at least one copy of the Instructor lesson plans and one copy of the vu graphs to the Site Manager for use in recurrent and new-hire training. The Contractor must deliver an additional set of vu graphs to the FAA Academy Air Traffic Division.

The Contractor must provide Operator's Manuals for student use during the instruction. The use of the manuals should encompass a "how to" approach and work in concert with the Instructor lesson plans. Students must retain the manuals. The Contractor must provide an additional two Operators Manuals to the facility manager for recurrent and new-hire training.

CDRL A057 Lesson Plan

##### 3.5.2.6.6 Test Team Training

The Contractor must conduct training to familiarize Government test-team with the [*insert system name*] prior to the beginning of the technical site test and evaluation. This course will enable test team personnel to properly observe and assist in the conduct of [*insert system name*] OT&E Integration, Operational and Shakedown testing. The course content must cover the same subject matter as the ATC Cadre Training, hardware maintenance and second Level Engineering training. The Contractor must present one class to up to [insert quantity] experienced FAA and support personnel at the PSF.

###### 3.5.2.6.6.1 Student Prerequisites

Students will be FAA engineers or technicians with experience in testing methodology, data collection, requirements verification, and test procedures/test reporting.

###### 3.5.2.6.6.2 Training Description

In performing the training, the Contractor must utilize the FAA Test and Evaluation Policy of FAA Order 1810.4b as guidance. The training must provide pertinent [*insert system name*] System data and information to enable Test Team personnel to perform the following:

* Verify the operational effectiveness and suitability of the [*insert system name*]
* Consider and confirm the reliability, maintainability, and availability of the [*insert system name*]
* Select and execute degraded [*insert system name*] operations and scenarios
* Stress the [*insert system name*] and all interfaces to test NAS loading, product shedding, communications, and power
* Consider and validate site adaptation parameters and human factors
* Review and verify [*insert system name*] safety, security, and supportability issues
* Consider planning for [*insert system name*] Transition/Switchover

###### 3.5.2.6.6.3 Training Objectives

At the completion of training, the Test Team Personnel must be:

* Knowledgeable of the [*insert system name*] functional design, interfaces, and major components
* Able to effectively perform [*insert system name*] Test activities
* Knowledgeable of [*insert system name*] documentation

###### 3.5.2.6.6.4 Training Materials

All training materials must be in Contractor format and provided to the FAA electronically and via paper copy.

##### 3.5.2.6.7 Technical On-Site Representative and Support Services Training

The Contractor must develop an [*insert system name*] training curriculum specifically for personnel who will serve as Technical On-site Representatives (TOR). TORs represent the Technical Officer during the equipment installation process at each site and, as such, are the point of contact for all on-site activities during installation and testing. This training must be developed using Best Commercial Practices.

###### 3.5.2.6.7.1 Student Prerequisites

TORs are usually mid-level electrical engineers or technicians.

###### 3.5.2.6.7.2 Training Description

The curriculum must cover pertinent data required to enable the TOR to:

* Verify/validate that the [*insert system name*] meets established standards and tolerances
* Evaluate system performance during acceptance testing
* Confirm the delivery and as appropriate, the satisfactory operations of the equipment and all ancillary documentation, spares, and interfaces
* Understand the requirements for FAA site activities regarding such items as telecommunications, power, facilities modifications and drawing changes, and Schedule A/B equipment

###### 3.5.2.6.7.3 Training Objectives

At the completion of training, the TORs must be:

* Knowledgeable of the [*insert system name*] functional design, interfaces, and major components;
* Able to effectively perform [*insert system name*] TOR activities to include any equipment acceptance and integration responsibilities;
* Knowledgeable of [*insert system name*]site acceptance procedures, plans, test equipment, and test data sheets.

###### 3.5.2.6.7.4 Training Materials

The Contractor must provide all training materials to the Government in Contractor format, electronically and via paper copy. At the option of the Government, the material will be either presented in person to each TOR by Government personnel or electronically transmitted to each TOR. Curriculum material must include copies of all approved site acceptance test procedures, plans, and other non-site specific acceptance/test documentation to enable the attainment of the training objectives.

#### 3.5.2.7 Training Equipment and Materials

The [*insert system name*] contract for the delivery of training services must state whether training equipment is Contractor furnished or Government furnished. Any system furnished for training must include all special tools, test equipment, and support equipment required to provide the end product or service. The system or equipment must duplicate, to the maximum extent possible, the actual operating environment.

##### 3.5.2.7.1 Contractor Furnished Training Equipment

The Contractor must provide all special tools, test equipment, and support equipment necessary to conduct training. This excludes equipment furnished as part of a standard installation. The Contractor must maintain all training equipment in an operable and usable condition during the training course, except for planned disassembly and fault isolation training exercises. The Contractor must notify the Government COR immediately by telephone if training equipment is inoperable and/or unusable. If Contractor furnished training equipment is to be returned to stock for subsequent delivery to the Government, the Contractor must keep configuration management records on the equipment in accordance with FAA-STD-021, paragraph 4.9.

The Contractor must develop instructional media materials used for training, and provide technical manuals. All audiovisual aids, illustrations, drawings, charts, and tables used for instruction must be provided to the Government. These items must be of a quality suitable for reproduction. All final training materials must be delivered in master reproducible hard copy form and on electronic media that is compatible with current FAA Academy software applications. After the last Contractor conducted course, the Contractor must provide to the Government copies of all training materials that incorporate all Government-approved revisions.

One complete set of technical instruction books per student must be made available as reference material as part of each course conduct. At the conclusion of each class, the students must retain all student course materials issued to them.

#### 3.5.2.8 Developed Training

If COTS/NDI training materials are determined to be unacceptable by the FAA, the Contractor must develop the necessary training material in accordance with FAA-STD-028E. The Contractor must prepare and submit, for FAA approval, a Contract Training Plan and a Task and Skills Analysis Report (TASA) in accordance with FAA-STD-028B. The TASA must separately address all task areas that require training.

When approved, the TASA will be subjected to an FAA media analysis to determine the recommended delivery and media for the each iteration of training. This analysis will also include any COTS training materials submitted by the Contractor as part of the Contractor's proposal. Information derived from this analysis will become part of a training program report that will provide direction to the Contractor regarding training program development and strategy.

CDRL A072 Contract Training Plan

CDRL A058 Task and Skills Analysis Report

### 3.5.3 Maintenance Support

#### 3.5.3.1 Hardware Maintenance

The Contractor must provide site level maintenance for each site through completion of site acceptance.

For a period of two years after Key Site acceptance, the Contractor must provide depot level logistics support for all delivered [*insert system name*] PME and the PSF hardware. Contractor responsibilities with respect to depot level logistics support are described in Attachment [insert attachment number].

#### 3.5.3.2 Software Maintenance

Contractor must maintain the [*insert system name*] software from delivery of First Article until FAA acceptance of the PSF. The Contractor must provide all materials required for software maintenance, including procedural documentation required for the development, generation, modification, configuration management, maintenance, testing, analysis, and debugging of [*insert system name*] software. The Contractor must prepare a Discrepancy Report to describe each software problem detected during installation, checkout, and site acceptance testing, or documentation under configuration control.

The Contractor must implement a corrective action process for handling all problems detected in the products under configuration control. The corrective action process must ensure that all detected problems are promptly reported, action is initiated on them, resolution is achieved, status is tracked and reported, and records of the problems are maintained for the period of the Contract.

CDRL A073 Discrepancy Report

#### 3.5.3.3 Support Transition

##### 3.5.3.3.1 Software Support Transition

The Contractor must prepare, and submit for Government approval, a Software Support Transition Plan. Transition of [*insert system name*] software support will occur with the assistance of the Contractor in accordance with the Software Support Transition Plan following Government acceptance of the PSF.

CDRL A074 Software Support Transition Plan

##### 3.5.3.3.2 Hardware Depot Level Transition

The Contractor must prepare and submit for Government approval, a depot-level hardware Support Transition Plan. Upon approval, the Contractor will assist the Government in the incremental transition to FAA in-house depot level hardware logistics support in accordance with the Government approved Support Transition Plan. The Support Transition Plan should allow for an incremental transition that coincides with the end of CDLS.

CDRL A075 Hardware Support Transition Plan

## 3.6 Site Implementation (CR/LOE Task Order)

The Contractor must prepare for shipment, storage, delivery, installation, checkout, and acceptance of [*insert system name*] systems in accordance with FAA issued Task Orders. All materials and associated data provided as a result of specific Task Orders under this contract must be prepared and delivered in accordance with Task Order instructions.

### 3.6.1 Site Preparation. (CR/LOE Task Order)

The Contractor must furnish all necessary personnel, facilities, equipment, licenses, permits and other materials and services to prepare each [*insert system name*] for delivery and installation of a complete [*insert system name*] system.

### 3.6.2 Implementation Task Plan (CR/LOE Task Order)

The Contractor must be responsible for developing an Implementation Task Plan for executing each Task Order issued by the FAA. This Task Plan must describe the resources necessary for performing the Task Order and the time period during which those resources are required.

CDRL A076 Implementation Task Plan

### 3.6.3 Preparation for Storage, Shipment and Delivery (CR/LOE Task Order)

Following the completion of the production test of each [*insert system name*], associated spares, and equipment the Contractor must prepare each sensor, associated spares, and equipment for shipment and /or storage. The Contractor must ensure that all equipment and spares delivered under the contract are preserved, packaged, packed, and marked in accordance with ASTM-D-3951, Standard Practices for Commercial Packaging.

The Contractor must ensure all documentation delivered is preserved, packed, packaged, and marked to guarantee arrival at the destination in a satisfactory condition. Containers and wrapping must conform to the Contractor's best commercial practices.

The Contractor must ship or arrange for temporary storage of these items in accordance with the specific Task Order. The Contractor must provide the space required to store up to [insert quantity] systems, associated spares and equipment.

### 3.6.4 Site Installation and Checkout (CR/LOE Task Order)

Site installation and checkout must include the installation and checkout of existing Government Furnished Equipment (GFE) specified in each Task Order. All on-site work must be scheduled and conducted so as to impose negligible impact on current operational activities at the site. The Contractor must provide applicable Site Installation Drawings for each [*insert system name*] and maintain a Daily Logbook throughout the installation and checkout period. The Contractor must maintain the logbook at the site on a daily basis and make this logbook available to FAA personnel daily for their review.

CDRL A077 Site Installation Drawings

CDRL A078 Daily Logbook

#### 3.6.4.1 Test Configuration Review (CR/LOE Task Order)

The Contractor must participate in a joint FAA/Contractor Test Configuration Review (TCR) prior to the start of SAT to verify that equipment and documentation reflect the system product baseline.

#### 3.6.4.2 Site Acceptance Testing (CR/LOE Task Order)

The Contractor must conduct a SAT at each [*insert system name*] site as part of the installation and checkout process. The purpose of SAT is to test the overall function of the [*insert system name*] with its associated air traffic control equipment. Provisions must be made for regression testing based upon the correction of failures occurring during SAT. At the completion of each SAT, the Contractor must prepare and deliver a SAT Report.

CDRL A079 Site Acceptance Test Report

#### 3.6.4.3 Retrofit Plan/Retrofit Kit Installation (CR/LOE Task Order)

The Contractor must perform retrofit activities in accordance with FAA approved ECRs and as specified in each Task Order.

## 3.7 Technical and Engineering Services (CR/LOE Task Order)

The Contractor must provide Technical and Engineering Services at Government sites, the Contractor's plant, or elsewhere. Technical and Engineering Services may include the following:

* Radar and other Air Traffic Control applications, planning, design, engineering, and operation
* [*insert system name*] problem investigation (e.g. , communications, hardware, software, firmware)
* Planning, logistics support, implementation, and/or update of [*insert system name*] equipment
* Review of [*insert system name*] operational modes and procedures
* Engineering studies related to alternative designs and implementation strategies for the [*insert system name*] and related systems upgrades (e.g., alternative strategy for remote maintenance monitoring requirements)
* The interfaces listed in Attachment [insert attachment number]

The Contractor must provide qualified engineering and technical personnel for these services as necessary to complete assigned tasks.

The Contractor's technical and engineering services personnel must have as a minimum, experience and knowledge in the following specific areas of the [*insert system name*] system hardware, ancillary equipment, firmware, and software:

* Capabilities (software and hardware)
* Limitations (software and hardware)
* Integration
* Software (use of software, installation of software, configuration parameters of software, and fault isolation of software problems)
* Hardware operations, hardware configuration, and hardware problem isolation
* Diagnostic software and hardware self-tests
* Interpolation diagnostic software and hardware results
* Trouble shooting techniques

### 3.7.1 FAA Test Rights (CR/LOE Task Order)

The Government reserves the right to require the contractor to perform additional tests add the negotiated CR/LOE rates, in addition to those contained in the MTP, approved test plans or by planned regression tests, to demonstrate Assembly XYZ compliance with any requirement of the MTP- Requirements Attachment, the Assembly XYZ Functional Specification, or the contractor's own specifications/standards in accordance with CR/LOE provisions.

All test provisions, stated in the other SOW sections herein, are fully applicable to the management and conduct of any CR/LOE defined tests as determined by the Government.

### 3.7.2 Labor Descriptions

The Contractor must ensure the personnel providing the Technical and Engineering Services identified in section 3.7 of this SOW meet the following minimum/general experience, functional responsibility, and minimum education requirements outlined below:

Quality Assurance

Minimum/General Experience: Experience in configuration management, verification and validation, software testing and integration, software metrics and their application to software quality assessment.

Functional Responsibility: Establish and maintain a process for evaluating software and associated documentation. Maintain the level of quality throughout the software life cycle. Conduct formal and informal reviews at pre-determined points throughout the life cycle. Ensures problem resolution and user satisfaction. Make recommendations, if needed, for approval of major system installations. Supervise configuration management.

Minimum Education: College degree in Computer Science, Information Systems, Electrical Engineering, or other related scientific or technical discipline.

Labor Category -- Job Title -- Minimum Years of Experience

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QA-01 Senior Quality Assurance Analyst 6

QA-02 Quality Assurance Analyst 4

QA-03 Associate Quality Assurance Analyst 1

Field Service Engineer

Minimum/General Experience: Experience in all aspects of field engineering support for complex hardware/software systems for both in-plant and customer sites.

Functional Responsibility: Analyze engineering problems associated with installation, operation, maintenance and integration of sophisticated hardware and software systems. Provide technical reports covering system performance, operational data, problem analysis, and recommendations for design changes. Require high school education with a BS or BA in a technical field preferred.

Labor Category -- Job Title -- Minimum Years of Experience

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FSE-01 Senior Field Service Engineer 5

FSE-02 Field Service Engineer 3

FSE-03 Associate Field Service Engineer 1

Other Positions as Applicable

Repeat format for other positions.

# 4 Acronyms

AMST&EPG Acquisition Management System Test & Evaluation Process Guidelines

APML Assistant Program Manager for Logistics

ATC Air Traffic Control

CAC Contract Award Configuration

CBI Computer Based Instruction

CCB Configuration Control Board

CDRL Contract Data Requirements List

CDROM Compact Disk Read Only Memory

CFSR Contract Funds Status Report

CI Configuration Item

CM Configuration Management

CMP Configuration Management Plan

COR Contracting Officer's Representative

COTS Commercial Off-the-Shelf

CPT Contractor Preliminary Test

CR/LOE Cost Reimbursement/Level of Effort

CSCI Computer Software Configuration Item

CWBS Contract Work Breakdown Schedule

DARC Direct Access Radar Channel

DBDD Database Design Document

DT&E Developmental Test and Evaluation

EARTS En Route Automated Radar Terminal System

EIB Equipment Instruction Book

EVMS Earned Value Management System

FAA Federal Aviation Administration

FAALC Federal Aviation Administration Logistics Center

FAATC Federal Aviation Administration Test Center

FAI First Article Inspection

FCA Functional Configuration Audit

FPLA Field Programmable Logic Memory

GFP Government Furnished Property

GUI Graphical User Interface

HWCI Hardware Configuration Item

IAW In Accordance With

IDD Interface Design Document

IGES Initial Graphics Exchange Specification

IPT Integrated Product Team

ISP Integrated Support Plan

LGC Logistics Guidance Conference

LRU Line Replaceable Unit

LSAR Logistics Support Analysis Record

MTP Master Test Plan

NAILS National Airspace Integrated Logistics Support

NAILSMT National Airspace Integrated Logistics Support Management Team

NAS National Airspace

NDI Non-developmental Item

OT&E Operational Test and Evaluation

P3I Pre-planned Product Improvement

PAT&E Production Acceptance Test and Evaluation

PCA Physical Configuration Audit

P/FCA Physical and Functional Configuration Audit

PIO Provisioning Item Order

PM Program Manager

PME Prime Mission Equipment

PMP Program Management Plan

PMR Program Management Review

PMSR Program Management Status Report

POA&M Plan of Action and Milestones

POC Point of Contact

PRS Problem Reporting System

PSA Program Support Facility

PSF Program Support Facility

QSP Quality System Plan

SAT Site Acceptance Test

SBR System Baseline Review

SDP Software Development Plan

SEMP Systems Engineering Management Plan

SOW Statement of Work

SPR System Problem Report

SRS Software Requirements Specification

SSDD System/Subsystem Design Description

SVD Software Version Description

TASA Task and Skills Analysis

TCR Test Configuration Review

TIM Technical Interchange Meeting

TMDP Technical Manual Development Plan

TOR Technical On-site Representative

TRR Test Readiness Review

TVRTM Test Verification Requirements Traceability Matrix

## 4.1 Gypsum Wallboard

* General - The Contractor must supply all materials, labor, and equipment necessary to furnish and install the gypsum wallboard, complete.
* Applicable Documents - The latest editions in effect of the following documents form a part of this section and are applicable to the extent specified herein.
* Federal Specifications

FF-B-575 Bolts, Hexagon and Square

FF-S-325 Shield, Expansion; Nail, Expansion, and Nail Screw Driver

QQ-S-698 Steel, Sheet and Strip, Low Carbon

QQ-S-700 Steel, Sheet and Strip, Medium and High Carbon

QQ-S-775 Steel, Sheets, Carbon, Zinc Coated

* American Society for Testing and Materials (ASTM) Standard

C-36 Standard Specification for Gypsum Wallboard

C-475 Joint Compound and Joint Tape for Finishing Gypsum Board

C-840 Application and Finishing of Gypsum Board

C-954 Steel Drill Screws for the Application of Gypsum Board or Metal Plaster Bases to Steel Studs from 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness

C-955 Standard Specification for Load Bearing (Transverse and Axial) Steel Studs, Runners (Track), and Bracing or Bridging for Screw Application of Gypsum Board and Metal Plaster Bases

C-1002 Steel Drill Screws for the Application of Gypsum Board or Metal Plaster Bases

C-1007 Standard Specification for Installation of Load Bearing (Transverse and Axial) Steel Studs and Related Accessories

C-1047 Accessories for Gypsum Wallboard and Gypsum Veneer Base

* Materials
* Steel Framing, Furring, and Related Items - must conform to ASTM C 955.
* Vapor Retarder - Foil-backed gypsum board or 4-mil polyethylene.
* Gypsum Wallboard - must conform to ASTM C 36; Type X (Special Fire-Resistant). Wallboard must be supplied in 48-inch widths and in such lengths as will result in a minimum of joints. The minimum thickness must be 5/8-inch.
* Joint Treatment Materials - must conform to ASTM C 475.
* Taping or Embedding Compound - Specifically formulated and manufactured for use in embedding tape at gypsum wallboard joints and fastener heads and completely compatible with tape and substrate.
* Finishing or Topping Compound - Specifically formulated and manufactured for use as a finishing compound.
* All-Purpose Compound - Specifically formulated and manufactured to serve as both a taping and a finishing compound and compatible with tape and substrate.
* Joint Tape - Reinforcing tape recommended by the manufacturer.
* Screws - must conform to ASTM C 1002, Type G for attachment of gypsum board to gypsum board, Type S for attachment to light-gauge steel members, ASTM C 954 for attachment to steel members 0.033- to 0.112-inch thick.
* Accessories - ASTM C 1047, corner beads, edge trim, and control (expansion) joints must be corrosion protective-coated steel designed for the intended use. Flanges must be free of dirt, grease, and other materials that may adversely affect the bond of joint treatment.
* Execution
* Steel Framing - Installation of steel framing must conform to ASTM C 1007, except that limiting heights must be according to manufacturer's current published data. Framing must be spaced with a maximum of 24 inches on center.
* Partition Framing System - Metal framing and furring system must be capable of carrying a transverse load of 5 psf without exceeding either the allowable stress or a deflection of L/240.
* Wall Openings - For wall openings such as required for doors, pass-through openings, and access panels, the framing system must provide for the installation and anchorage of the required sub frames or finish frames. Studs at openings must be 18 gauge minimum bare metal thicknesses and spot grouted at jamb anchor inserts. Double studs must be fastened together and secured to floor and overhead runners with screws.
* Blocking and Backing - Coordinate with other trades for location and loads. Provide blocking and backing sufficient for anchorage and support of items attached to gypsum wallboard assemblies. Comply with manufacturer's current published fixture attachment recommendations.
* Control Joints - Control joints must be installed as recommended by the manufacturer and be in accordance with the following additional requirements: Ceiling-height door frames may be used as vertical control joints for partitions. Door frames of less than ceiling height may be used as control joints only if standard control joints extend to the ceiling from both corners of the top of door frame. Control joints in the ceiling must be located to intersect column penetrations. In wall lengths over 30 feet, window openings must be treated in the same manner as shown for doors.
* Application of Gypsum Wallboard - Gypsum wallboard must be applied to framing and furring members in accordance with ASTM C 840 and the requirements specified herein except when fire-resistant assemblies are required. Gypsum wallboard must be applied with separate boards in moderate contact without forcing in place. End joints of adjoining boards must be staggered. Abutting end and edge joints must be neatly fitted. Use gypsum wallboard of maximum practical length. Gypsum wallboard must be cut as required to make neat close joints around openings. In vertical application of gypsum wallboard, panels must be of length required to reach full height of vertical surfaces in one continuous piece. Surfaces of gypsum wallboard and substrate members may be adhered together with an adhesive, except adhesive must not be used in lieu of fasteners for fire-rated assemblies. In single-ply installations and the first layer in a multi-ply installation, all ends of gypsum wallboard must occur over framing members or other solid backing except where treated joints occur at right angles to framing or furring members. Casing beads must be provided at the edges of gypsum wallboard abutting dissimilar surfaces.
* Vapor Retarder - Vapor retarder must be installed with joints over framing members. Joints must be lapped for the full width of the framing members. Foil-backed wallboard may be used in lieu of a separate vapor retarder sheet, in which case the reflective surface of the foil-backed wallboard must be placed against the face of the framing members.
* Finishing of Gypsum Wallboard - Gypsum wallboard must be taped and finished in accordance with ASTM C 840. Joint, fastener depression, and corner treatment must be provided.
* Patching - Surface defects and damage must be corrected as required to leave gypsum wallboard smooth, uniform in appearance, and ready to receive finish as specified.

## 4.2 FAA Item Managers (IM)

The Item Manager at the FAALC is the point of contact who controls requisitions and supply levels of equipment, parts, and supplies between depot and field and who authorizes the CDLS Contractor to issue Government property from the CDLS depot.

# 5 Definitions

As used throughout this contract, the following terms must have the meaning set forth below. Additional definitions are in the "DEFINITIONS" clause in Section I.

* Where "as shown", "as indicated", "as detailed", or words of similar import are used, it must be understood that reference is made to this specification and the drawings accompanying this specification unless stated otherwise.
* Where "as directed", "as required", "as permitted", "approval", "acceptance", or words of similar import are used, it must be understood that direction, requirement, permission, approval, or acceptance of the Contracting Officer is intended unless stated otherwise.
* Clean. "Clean" must be defined as free of dirt, dust, spots, streaks, stains, smudges, litter, debris, and other residue.
* Contracting Officer. The Contracting Officer is a person with the authority to enter into, administer, and/or terminate contracts and make related determinations and findings. The term includes certain authorized representatives of the Contracting Officer acting within the limits of their authority as delegated by the Contracting Officer.
* Contractor. The term Contractor as used herein refers to both the prime Contractor and any subcontractors. The prime Contractor must ensure that his/her subcontractors comply with the provisions of this contract.
* Contractor Representative. A foreman or superintendent assigned in accordance with the "CONTRACTOR EMPLOYEES" clause, Section H.
* Disinfect Cleaning in order to destroy any harmful microorganisms by application of an approved chemical agent.
* Facility. An establishment, structure, or assembly of units of equipment designated for a specific function.
* Frequency of Service.

(1) Annual (A). Services performed once during each 12 month period of the contract at intervals of 345 to 385 days.

(2) Semi-Annual (SA). Services performed twice during each 12 month period of the contract at intervals of 160 to 200 calendar days.

(3) Quarterly (Q). Services performed 4 times during each 12 month period of the contract at intervals of 80 to 100 calendar days.

(4) Monthly (M). Services performed 12 times during each 12 month period of the contract at intervals of 28 to 31 calendar days.

(5) Semi-Monthly (SM). Services performed 24 times during each 12 month period of the contract at intervals of 14 to 16 calendar days.

(6) Weekly (W). Services performed 52 times during each 12 month period of the contract at intervals of six to eight calendar days.

(7) Twice weekly (2W). Services performed twice a week, such as Monday and Thursday or Tuesday and Friday.

(8) Three times weekly (3W) Services performed three times a week, such as Monday, Wednesday and Friday.

(9) Daily (D5). Services performed once each calendar day, Monday through Friday, including holidays unless otherwise noted.

(10) Daily (D7). Services performed once each calendar day, seven days per week, including weekends and holidays.

* Quality Assurance (QA). A method used by the Government to provide some measure of control over the quality of purchased goods and services received.
* Quality Assurance Evaluator (QAE). The Government employee designated by the Contracting Officer is responsible for monitoring of Contractor performance.
* Quality Control (QC). A method used by the Contractor to control the quality of goods and services produced.
* m. Regular Working Hours. The Government's regular (normal) working hours are from [STARTING HOUR] to [ENDING HOUR], Mondays through Fridays except (a) Federal Holidays and (b) other days specifically designated by the Contracting Officer.
* Relamping. A procedure by which the Contractor periodically inspects each building included in this contract in order to systematically replace burned out and/or blinking fluorescent tubes and incandescent bulbs.
* Response Time. Response time is defined as the time allowed the Contractor after initial notification of a work requirement to be physically on the premises at the work site, with appropriate tools, equipment, and materials, ready to perform the work required. Response times are designated in the appropriate technical clauses in Section C.
* Space. A space is an area to receive custodial services which may or may not be considered a room by common definition. Examples of spaces are definable sections of hallways, stairwells, lobbies, offices, entrances, and elevators.
* Waste Containers. Waste containers are defined as trash receptacles, waste baskets, trash cans, wastepaper baskets, ash trays, or any container holding trash, paper, or refuse of any type.

## 5.1 Management Support Services

The contractor must provide a program manager (PM) as the single point of contact for all of the requirements defined in this SOW. The PMs must be assigned the responsibility for control and coordination of all work performed. The PM must have sufficient experience and authority to ensure efficient and timely program execution. The PM must immediately respond to CDLS Contract Status information, and maintenance and engineering requests from the CO, the COR, and/or specified FAA contractor support personnel. A Product Engineer must also be available to perform these functions in the absence of the PM. The PE must provide maintenance and engineering support services as requested from the CO, the COR, and/or specified FAA contractor support personnel. The contractor must be responsible for providing alternate personnel to act in absence of the PM.

## 5.2 Field Sampling Plan - Quality Assurance Plan (FSP-QAP)

(a) The contractor must develop and implement a comprehensive FSP-QAP.

(b) The FSP-QAP must be consistent with the requirements of the State's Field Sampling Manual.

(c) The FSP-QAP must also comply with CERCLA, United States Environmental Protection Agency (USEPA)-Region II Quality Assurance/Quality Control (QA/QC) Manual, and any existing State and Federal regulations.

(d) All laboratory analysis must be performed by a State certified laboratory.

## 5.3 Engineering Change Proposal (ECP)

* The contractor must provide an ECP for any of the following circumstances:

(a) An item is no longer manufactured and cannot be procured or the vendor is no longer in business.

(b)An item is no longer repairable because the piece parts are no longer available from vendors.

(c) Where the proposed ECP would increase the reliability and performance of the system(s), the contractor must provide the failure analysis to substantiate the increased reliability and performance.

* The contractor must conduct evaluations of performance to assure that task outcomes are met, and to evaluate contract compliance.