

205-16-H53-2F246/2F220/2F171-SOW-005
SOW 160039B
10 MAY 2017

SUPERSEDING
SOW 160039A
12 April 2017

**STATEMENT OF WORK
FOR
CH-53E BASELINE CONFIGURATION UPGRADE (BCU)**



**DEPARTMENT OF THE NAVY
PROGRAM MANAGER, AIR PMA205
NAVAL AIR SYSTEMS COMMAND
PATUXENT RIVER, MD 20670**

Revision History

Revision	Affected Paragraph (s)	Changes
		Initial Release
A	3.2.1.4.1.a	Added the requirement: “Disassemble Device 2F171 no earlier than 10 days after the Interim Contractor Support (ICS) period begins for device 2F246.”
	1.c; 3.2.16	Changed Interim Contractor Support period to an optional requirement.
	3.2.1.4	Changed disassembly and disposal of Device 2F171 to an optional requirement.
	Various	Removed the requirement for FACE software architecture.
	Various	Updated specification number to add latest specification revision number PMA205-16-CH53E-2F220/2F246-SPEC-001-PRF-160042B (PRF160042B)
B	3.1.3 Cybersecurity	Changed Confidentiality Level Medium to Confidentiality Level Low
	3.2.1.2.7 Cockpit instruments, panels, and controls	Removed letter “a” requirement and changed requirement letters “b” and “c” to letters “a” and “b”, respectfully. Added “replace or paint” to letter “a” requirement.
	3.2.3	Reworded Conferences and Reviews to “...be held at the contractor facility” vs. “contractor and Government facilities.”
	3.2.9.5.20.1.a	Spelled out “FCD” and “ACD”
	3.2.9.5.20.2.a, b	Spelled out “PCD” and PBL”
	3.2.9.5.20.2.d-i	Updated criteria for conducting PCA
	A.1.11.6	Added definition for Incremental PCA.

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Statement of Work
For CH-53E Baseline Configuration Upgrades (BCU)

1. SCOPE

This Statement of Work (SOW) establishes the contractor tasks for the:

- a. Modifications to be made to the CH53E Containerized Flight Training Device (CFTD) 2F220 located at Marine Corps Air Stations (MCAS) Kaneohe Bay, HI
- b. Design, fabrication, installation, and test of a new CH53E CFTD Device 2F246 located at MCAS Futenma, Japan.
- c. Disassemble, transport, and coordinate the disposal of Device 2F171 located at MCAS Futenma, Japan (Option).

2. APPLICABLE DOCUMENTS

The following documents of the issue listed form a part of this SOW to the extent specified herein. In the event of a conflict between documents referenced herein and the contents of this SOW, the contents of this SOW take precedence. Nothing in this SOW, however, supersedes applicable laws and regulations, unless a specific exemption has been obtained.

2.1 Government Documents

SPECIFICATIONS:

Naval Air Systems Command (NAVAIR), Naval Aviation Training Systems Program Office (PMA205)/Naval Air Warfare Center Training Systems Division (NAWCTSD)

PMA205-16-CH53E- - Performance Specification for the BCU Rev B, dated
2F220/2F246-SPEC-001-PRF- 12 April 2017
160042B

STANDARD PRACTICES:

Department of Defense (DoD):

MIL-STD-881C - Work Breakdown Structures for Defense Materiel Items
(Copies of these documents are available online at <https://acc.dau.mil/CommunityBrowser.aspx?id=56317>,
<http://www.navair.navy.mil/nawctsd/Resources/Library/Acqguide/MIL-STD%20881C%203%20Oct%2011.pdf>, or from the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094.)

OTHER PUBLICATIONS:

Code of Federal Regulations (CFR):

22 CFR, Parts 120 - 130 - Foreign Relations, Chapter I - Department of State,
Subchapter M - International Traffic in Arms Regulations

(The above regulations are available at http://www.pmddtc.state.gov/regulations_laws/itar_official.html

29 CFR 1910.147 - The control of hazardous energy (lockout/tagout)
(OSHA standards are downloadable from <https://www.osha.gov/law-regs.html>)

Chief of Naval Operations Instructions (OPNAVINST):

OPNAVINST 11010.20H - Facilities Project Instruction (24 June 2015)

(The above regulation is available at <https://doni.documentservices.dla.mil/>)

Defense Federal Acquisition Regulations Supplement (DFARS):

DFARS 252.211-7003 - Item Unique Identification and Valuation (Mar 2016)

DFARS 252.239-7001 - Information Assurance Contractor Training and Certification (Jan 2008)

(DFARS Clauses are downloadable from <http://farsite.hill.af.mil/vfdara.htm>)

Department of Defense (DoD) Handbooks:

MIL-HDBK-217F, Notice 2 - Reliability Prediction of Electronic Equipment

MIL-HDBK-472, Notice 1 - Maintainability Prediction

(Copies of the above handbooks are available at <http://everyspec.com/MIL-HDBK/> , or from the Standardization Document Order Desk, 700 Robbins Ave., Bldg 4D, Philadelphia, PA 19111-5094.)

DoD and Department of the Navy (DoN) Security Instructions, Cybersecurity, Manuals, Policy Memos, and Guidance Documents:

DoD 5220.22-M - National Industrial Security Program Operating Manual, dated 28 Feb 2006

Incorporating Change 2, May 18, 2016

DoDI 8500.01 - Cybersecurity

DoDI 8510.01 - Risk Management Framework

Incorporating Change 1, effective May 24, 2016

DoDI 8570.01-M - Information Assurance

Workforce Improvement Program

Incorporating Change 4, 11/10/2015

(The NISPOM is available for download at <http://www.dtic.mil/whs/directives/corres/pdf/522022m.pdf>)

DoD Manuals:

Federal Acquisition Regulations (FAR)

FAR 52.204-9 - Personal Identity Verification of Contractor Personnel

FAR 52.222-54 - Employment Eligibility Verification

(FAR Clauses are downloadable from <http://farsite.hill.af.mil/vffara.htm>)

NAWCTSD:

TMCR-16-06 - Technical Manual Contract Requirements

NPSI-1019-002.2 - NAVAIR Portable Source Initiative (NPSI) Data Preparation Standard (DPS) (Version 2.2, dated 22 May 2012)

NPSI-1021-002.2 - NAVAIR Portable Source Initiative (NPSI) Standard for Material Properties Reference Database (MPRD) (Version 2.2, dated 26 Sept 2012)

CH-53E-TECR-01 - Trainer Engineering Change Request (TECR) List for CH-53E Baseline Configuration Upgrade (BCU) Program 17 Jan 2017.

Government ATPs:

CH-53E-2F220-ATP - CH-53E Containerized Flight Training Device (CFTD), DV 2F220, Accepted Test Procedures (ATP), dated 09 April 2012

CH-53E-2F239-ATP - CH-53E Flight Training Device (FTD), DV 2F239, Accepted Test Procedures (ATP), dated 27 April 2016

PMA-205 Documents:

PMA205-CMP - Configuration Management Plan, PMA205-16-0-CMP-01, dated Aug 2016

(The above document will be provided as Government-Furnished Information (GFI))

United States (U.S.) Army Corps of Engineers:

EM-385-1-1 - Safety and Health Requirements
(<http://www.usace.army.mil/Safety-and-Occupational-Health/Safety-and-Health-Requirements-Manual/>)

United States (US) Code:

Title 10, Section 2451 - 2456 - Defense Standardization Program
(U.S Code is downloadable from <http://uscode.house.gov/search/criteria.shtml>)

US Office of Personnel Management (OPM):

OPM Memorandum - Final Credentialing Standards for Issuing Personal Identity Verification Cards under HSPD-12, dated 31 July 2008

(The above document is downloadable from
http://www.opm.gov/investigate/resources/final_credentialing_standards.pdf)

2.2 Non-Government Documents

INDUSTRY STANDARDS:

American National Standards Institute (ANSI)/American Society for Quality (ASQ):

- | | |
|---------------------|--|
| ANSI/ASQ Q9000-2005 | - Quality Management Systems - Fundamentals and Vocabulary |
| ANSI/ASQ Q9001-2015 | - Quality Management Systems - Requirements |
| ANSI/ASQ Q9004-2009 | - Quality Management Systems - Guidelines for Performance Improvements |

(Copies of the above documents are available from www.ansi.org, <http://global.ihs.com/>, or Global Engineering Documents, 15 Inverness Way, East Englewood, CO 80112.)

ANSI/Institute of Electrical and Electronics Engineers (IEEE):

- | | |
|--|---|
| IEEE 1233-1998 Edition (R2002) | - IEEE Guide for Developing System Requirements Specifications |
| IEEE 12207-2008, 2 nd Edition | - Systems and Software Engineering – Software Life Cycle Processes |
| IEEE 15288-2008, 2 nd Edition | - Systems and Software Engineering – System Life Cycle Processes |
| IEEE 15939-2008 | - Adoption of ISO/IEC 15939:2007 - Systems and Software Engineering - Measurement Process |
| IEEE 29148-2011 | - Systems and software engineering - Life cycle processes - Requirements engineering |

(Copies of this document are available from www.ieee.org or IEEE Service Center, 445 Hoes Lane, Piscataway, NJ 08854-1331.)

International Organization for Standardization/International Electro-technical Commission (ISO/IEC):

- | | |
|--------------------|---|
| ISO/IEC 27002:2013 | - Information technology - Security techniques - Code of practice for information security controls |
|--------------------|---|

(Copies of this document are available from <http://global.ihs.com/>, http://www.iso.org/iso/home/store/catalogue_ics/catalogue_detail_ics.htm?csnumber=54533 or Global Engineering Documents, 15 Inverness Way, East Englewood, CO 80112)

SAE International/Electronic Industries Alliance (EIA):

- | | |
|--------------------|---|
| SAE/EIA-649-1 2014 | - Configuration Management Requirements for Defense Contracts |
|--------------------|---|

(Copies of the above document are available from www.ansi.org, <http://global.ihs.com/>, or Global Engineering Documents, 15 Inverness Way, East Englewood, CO 80112.)

United States Marine Corps (USMC) Tactical Environment (TEen) Documents:

- | | |
|---------------------|---|
| Unnumbered Document | - Overview and Installation Guide - USMC TEen 6.0 |
|---------------------|---|

(Copies of the above TEen document will be provided as Government-Furnished Information.)

3. REQUIREMENTS

3.1 General

3.1.1 Program Management

The contractor shall:

- a. Plan, organize, coordinate, control, and track the program activities to ensure compliance with the contract requirements and the timely delivery of the required product and services.
- b. Provide the program management, systems engineering, materials, services, equipment, facilities, testing, technical, logistics, manufacturing, quality assurance, configuration management, and clerical support for the efforts described in this SOW and Specification PMA205-16-CH53E-2F220/2F246-SPEC-001-PRF-160042B.
- c. Measure, record, monitor, and evaluate the progress of the work performed and costs incurred under the contract.

3.1.1.1 Program Planning

The contractor shall perform the program planning activities and tasks as specified in IEEE 15288-2008 section 6.3.1.3.

3.1.1.1.1 Life Cycle Model Management

- a. The contractor shall perform life cycle model management, at the program level, IAW IEEE 12207-2008, section 6.2.1.
- b. References to the organizational implementation of life cycle model management within IEEE 12207-2008, section 6.2.1 shall only apply to the program.

3.1.1.1.2 Infrastructure Management

- a. The contractor shall implement infrastructure management, at the program level, IAW IEEE 12207-2008, section 6.2.2.
- b. References to the organizational implementation of infrastructure management within IEEE 12207-2008, section 6.2.2 shall apply only to the program.

3.1.1.1.3 Program Assessment and Control

The contractor shall implement program assessment and control IAW IEEE 12207-2008, section 6.3.2.

3.1.1.1.4 Program Decision Management

The contractor shall implement program decision management IAW IEEE 12207-2008, section 6.3.3.

3.1.1.1.5 Contract Work Breakdown Structure (CWBS)

The contractor shall:

- a. Develop, document, implement, and maintain a CWBS and CWBS dictionary IAW the CDRL (B002).
- b. Develop the CWBS based upon the generic program WBS included in the contract and address devices 2F220, 2F246 and 2F171.

3.1.1.1.6 Work Planning and Scheduling

The contractor shall:

- a. Construct the IMS to ensure that the program milestones are met and to ensure that deliveries meet the requirements of the contract.
- b. Develop and document a tiered scheduling system based on the CWBS elements showing the program milestones and prerequisite events, conferences, reviews, data submittals, and deliveries.
- c. Perform analyses of the IMS tasks, compare the IMS tasks to the schedule baseline, report potential or existing problem areas, and recommend corrective actions to eliminate or reduce schedule impact.
- d. Use the IMS as a day-to-day execution tool to assess progress in meeting program requirements.
- e. Develop, document, implement, and maintain the Integrated Program Management Report (IPMR) IAW the CDRL (B003).

3.1.1.2 Subcontractor Management and Reporting

The contractor shall:

- a. Manage all subcontracts, including those that are Firm-Fixed Price (FFP).
- b. Ensure the timely award of subcontracts, the integration of the subcontractor's plans into appropriate schedules, and the monitoring of the subcontractor's staffing plans, to include the execution of those staffing plans to the required levels with the required skills.
- c. Ensure that the subcontractor's efforts, to include technical, quality, configuration management, and risk processes are accomplished per contract requirements.
- d. Integrate the principal subcontractors' IMSs into the contractor's scheduling system.
- e. Ensure that subcontractor's use objective criteria to measure performance.

3.1.1.3 Integrated Product Teams (IPTs)

The contractor shall define, document, implement, and maintain an IPT structure for the duration of the contract. IPT membership consists of multi-functional stakeholders working together with a product-oriented focus. Each IPT will be empowered to make critical life cycle decisions regarding each product or process within their purview. IPTs will be applied at various levels ranging from the overall structure of an organization to informal groups functioning across existing units.

3.1.1.4 Risk Management

The contractor shall:

- a. Provide the Government access to the contractor's tools, assessment, mitigation, and control techniques.
- b. Define, document, manage, and apply a risk management process IAW IEEE 15288-2008, section 6.3.4.3.
- c. Attend and participate in the Government Risk Working Group established for the program.

3.1.1.5 Quality Management

The contractor shall define, document, manage, and apply a quality management process IAW IEEE 12207-2008, sections 6.2.5 and 7.2.3; and ANSI/ASQ Q9001-20 (or equivalent quality management system).

3.1.1.5.1 Control of GFE

The contractor shall perform the following tasks to control GFE as part of the quality management process:

- a. Examine upon receipt, consistent with practicality, to detect damage.
- b. Provide storage that precludes deterioration.
- c. Examine prior to installation, consistent with practicality, to detect damage.
- d. Identify and protect from improper use or disposition.
- e. Verify and audit quantity periodically.

3.1.1.5.2 Use of Contractor's Inspection Equipment

The contractor shall:

- a. Provide the personnel needed to operate such devices and to verify calibration, accuracy, and condition.
- b. Make measuring and testing devices available for use by the Government when required to determine conformance with contract requirements.

3.1.1.6 Configuration Management (CM)

The contractor shall:

- a. Follow their government approved Configuration Management Plan (CMP) that was delivered under the TSC III Basic contract.
- b. Identify any changes or modification to their approved CMP as necessary.
- c. Place Government-Furnished Software (GFS), NDI, and Commercial Item software and each item's associated documentation under CM upon receipt.
- d. Place Commercial Item software items under CM as "disk image" files of the physical media.

3.1.1.6.1 Change Management

The contractor shall:

- a. Ensure that configuration baselines are maintained and controlled.
- b. Prepare and deliver for Government approval the Baseline Description Document (BDD) IAW the CDRL (B005).

3.1.1.6.2 Request for Variance (RFV)

The contractor shall:

- a. Use an RFV to obtain Government approval on products that do not conform to contract requirements
- b. Prepare an RFV IAW the CDRL (A001).

3.1.1.6.3 Configuration Identification Process (CIP)

The contractor shall:

- a. Use a documented process for configuration identification IAW PMA-205 CMP
- b. Uniquely identify each Configuration Item (CI)
- c. Determine the types of configuration documentation required by each CI
 - (1) Establish a Configuration Identification structure and hierarchy.
 - (2) Prepare and deliver for Government approval the Configuration Item Documentation Recommendation IAW the CDRL (B006).
 - (3) Present the functional and physical characteristics of the proposed Configuration Items (CIs) during Systems Engineering Technical Reviews (SETR).

3.1.1.6.4 Configuration Audits

The contractor shall:

- a. Prepare and deliver for Government approval a Configuration Audit Plan (CAP) IAW CDRL (B007).
- b. Conduct and participate in the Functional Configuration Audit (FCA).
- c. Prepare and deliver to the Government a completed configuration audit summary report IAW CDRL (B008).
- d. Conduct and participate in the Physical Configuration Audit (PCA).
- e. Prepare and deliver to the Government a completed configuration audit summary report IAW CDRL (B008).

3.1.1.7 Information Management

The contractor shall define, document, manage, and apply an information management process IAW IEEE 12207-2008, section 6.3.6 and 7.2.1.

3.1.1.7.1 Government-Industry Data Exchange Program (GIDEP)

The contractor shall:

- a. Maintain procedures to participate in the GIDEP.
- b. Contact the GIDEP Help Desk by calling (951) 898-3207 within 30 days after contract award to obtain the guidance necessary to become a GIDEP participant, if not already a participant (GIDEP Operations Center, P.O. Box 8000, Corona CA 92878-8000).
- c. Not be relieved from complying with other provisions of the contract by complying with this requirement.
- d. Insert this requirement and change the word “contractor” to “subcontractor” in subcontracts hereunder exceeding \$500,000.

3.1.1.7.2 Data Management

The contractor shall:

- a. Develop, manage, and implement a data management process for data deliverables.
- b. Establish and implement procedures to manage the configuration of contractually required data, including data provided by subcontractors.

3.1.1.8 Program Measurement

The contractor shall:

- a. Define, document, manage and apply a process to collect, analyze, track, and report a balanced and diverse set of measures and metrics as defined in IEEE 12207-2008, section 6.3.7.
 - (1) Ensure that program related measures and metrics reflect schedule, cost, quality, staffing, product stability, requirements volatility, and complexity information.
 - (2) Incorporate measures and metrics related to schedule, quality, staffing, build stability, size, requirements volatility, and resource utilization into the overall measurement process.
- b. Track and analyze measures and metrics data over time to report trends.
- c. Define acceptable bounding criteria associated with each metric.
- d. Define and implement a corrective action process that takes effect when a metric deviates from the acceptable bounding criteria.
- e. Present and discuss metrics data at the formal reviews and audits.

3.1.2 Security (Classified Programs)

The contractor shall:

- a. Safeguard classified information and meet the security requirements identified in the DD Form 254.
- b. Enforce these safeguards throughout the life of the contract including the transport and delivery phases.

3.1.2.1 Operations Security (OPSEC)

The contractor shall:

- a. Apply OPSEC in their management of the contract IAW NAVAIRWARCENACDIVINST 3432.1A, Operations Security to reduce program vulnerability from successful adversary collection and exploitation of Critical Information (CI). The PROGRAM OPSEC plan and CI List are available as part of the PPP by the Government. Security policy, procedures, and requirements for classified information are provided in DoD 5220.22-M.
- b. Enforce these safeguards throughout the life of the contract including the development, delivery, support phases, and the storage of classified and controlled unclassified information at contract completion. If the contractor does not have an established security plan that addresses the protection of proprietary, sensitive, or controlled unclassified information, a template for the development of an OPSEC Plan is available.
- c. Comply with the requirements specified in the following subordinate paragraphs, regardless of the contractor's established security plan.
- d. Prepare the OPSEC Plan IAW the CDRL (A00C).

3.1.2.2 Personnel Security - Background Check (Physical Access to and Working on DoD Installations)

The Common Access Card (CAC) shall be the principal identity credential for supporting interoperable access to DoD installations, facilities, buildings, controlled spaces, and access to

U.S. Government information systems IAW FAR 52.204-9. A National Agency Check with Local Agency Checks including Credit Check (NACLC) is required for permanent issuance of the credential. There shall be no additional NACLC submission for an individual holding a valid national security clearance. The Government may issue the credential upon favorable return of the Federal Bureau of Investigations (FBI) fingerprint check, pending final favorable completion of the NACLC. Contractors with clearances shall contact the NAWCTSD Security Office to initiate the CAC issuance process. Access to restricted areas, controlled unclassified information (sensitive information), or Government Information Technology by contractor personnel shall be limited to those individuals who have been determined trustworthy as a result of the favorable completion of a NACLC or who are under the escort of appropriately cleared personnel. Where escorting such persons is not feasible, a NACLC shall be conducted and favorably reviewed by the appropriate DoD component, agency, or activity prior to permitting such access. For contractor personnel performing sensitive duties including access to controlled unclassified information, but do not have a clearance to access classified information, the contractor shall use the Standard Form 86 (Questionnaire for National Security Positions) in order to obtain the CAC. The contractor shall submit the Standard Form 86 to the NAWCTSD Security Office for processing. Contractors shall contact the NAWCTSD Security Office to initiate the CAC issuance process.

3.1.2.2.1 Government-Issued Personal Identification Credentials

The contractor and subcontractor(s) (when applicable) shall:

- a. Account for all forms of U.S Government-provided identification credentials (CAC or U.S. Government-issued identification badges) issued to the contractor (or their employees in connection with performance) under the contract.
- b. Return such identification credentials to the issuing agency if:
 - (1) When no longer needed for contract performance
 - (2) Upon completion of the contractor employee's employment
 - (3) Upon contract completion or termination.
- c. Be subject to delayed final payment under the contract, if the contractor or subcontractors fail to comply with these requirements.

3.1.2.3 Personnel Security – Background Checks

The contractor shall:

- a. Have company personnel undergo the company internal vetting process prior to gaining access to U.S. Government controlled unclassified information.
- b. Use the Employment Eligibility Verification Program (E-Verify) IAW FAR 52.222-54 in order to comply with immigration law.
- c. Ensure that foreign persons, as defined under section 120.16 of the International Traffic and Arms Regulation (ITAR) (22 CFR, Parts 120 - 130), are not given access to U.S. Government controlled unclassified information, sensitive information, defense articles, defense services, or technical data, as defined in the ITAR, Part 120.

3.1.2.4 Information Assurance and Personnel Security Requirements for Accessing Government Information Technology (IT) Systems - Credentialing Standards

The NAWCTSD Security Office will apply the credentialing standards and execute the credentialing process for individual contractors. The contractor shall:

- a. Comply with the cybersecurity and personnel security requirements for accessing U.S. Government IT systems specified in the contract.
- b. Be subject to a background check if requiring access to U.S. Government IT systems.
- c. Review and become familiar with the credentialing standards presented in OPM Memorandum for Issuing Personal Identity Verification Cards to use as an aid in their employee selection process.

3.1.2.5 Unclassified Contractor-Owned Network Security

The contractor shall:

- a. Manage and maintain contractor-owned unclassified IT network assets (including computer assets used for contractor Teleworkers) used to process U.S. Government controlled unclassified information (sensitive information) IAW vendor-specific, or other nationally or internationally-recognized IT configuration and management standards (e.g., Center for Internet Security (CIS), Control Objectives for Information and related Technology (CobiT®), Common Criteria, National Information Assurance Program (NIAP), DoD, Defense Information Systems Agency (DISA), International Computer Security Association (ICSA), National Industrial Security Program (NISP), National Security Agency (NSA), System Administration, Networking, and Security Institute (SANS), and ISO/IEC 27002:2005).
- b. Prevent U.S. Government controlled unclassified information from being placed or stored on peer-to-peer applications or social media applications on contractor owned networks, including computer assets provided to contractors in a Teleworker status.
- c. Manage and control networks (which contain U.S. Government controlled unclassified information) serving in a Continuity of Operations (COOP) capacity to meet the same personnel and security requirements identified in this SOW and the DD-Form-254.

3.1.2.6 Information Security Requirements for Protection of Unclassified DoD Information On Non-DoD Systems

The contractor shall:

- a. Safeguard unclassified DoD information stored on non-DoD information systems to prevent the loss, misuse, and unauthorized access to or modification of this information.
- b. Not process DoD information on public computers (e.g., those available for use by the general public in kiosks or hotel business centers) or computers that do not have access control.
- c. Protect information by no less than one physical or electronic barrier (e.g., locked container or room, login and password) when not under direct individual control.
- d. Sanitize media (e.g., overwrite) before external release or disposal.
- e. Encrypt the information that has been identified as Controlled Unclassified Information (CUI) when it is stored on mobile computing devices such as laptops and personal digital

assistants, or removable storage media such as compact disks, using the best available encryption technology.

f. Limit information transfer to subcontractors or teaming partners with a need to know and a commitment to at least the same level of protection.

g. Transmit e-mail, text messages, and similar communications using technology and processes that provide the best level of privacy available, given facilities, conditions, and environment. Examples of recommended technologies or processes include closed networks, virtual private networks, public key-enabled encryption, and Transport Layer Security (TLS).

h. Encrypt organizational wireless connections and use encrypted wireless connection, where available, when traveling. When encrypted wireless is not available, encrypt application files (e.g., spreadsheet and word processing files), using no less than application-provided password protection level encryption.

i. Transmit voice and fax transmissions only when there is a reasonable assurance that access is limited to authorized recipients.

j. Not post DoD information to Web site pages that are publicly available or have access limited only by domain or Internet protocol restriction. Such information may be posted to Web site pages that control access by user identification or password, user certificates, or other technical means and provide protection via use of TLS or other equivalent technologies. Access control may be provided by the intranet (vice the Web site itself or the application it hosts).

k. Provide protection against computer network intrusions and data exfiltration, including no less than the following:

(1) Current and regularly updated malware protection services, e.g., anti-virus, anti-spyware.

(2) Monitoring and control of inbound and outbound network traffic (e.g., at the external boundary, sub-networks, individual hosts) including blocking unauthorized ingress, egress, and exfiltration through technologies such as firewalls and router policies, intrusion prevention or detection services, and host-based security services.

(3) Prompt application of security-relevant software patches, service packs, and hot fixes.

l. Comply with other current Federal and DoD information protection and reporting requirements for specified categories of information (e.g., critical program information, Personally Identifiable Information (PII), export controlled information) IAW the requirements of the contract.

3.1.3 Cybersecurity

The contractor shall:

- a. Design, develop, document, integrate, verify, and deliver a security architecture for the trainer that satisfies system Risk Management Framework (RMF) security controls and overlay requirements to meet Confidentiality Level Low, Integrity Level Low, and Availability Level Low, and Classified overlay as defined in DoDI 8500.01 and NIST SP800-53 Rev4.
- b. Meets the Cybersecurity performance requirements specified in the Specification PMA205-16-CH53E-2F220/2F246-SPEC-001-PRF-160042B.

3.1.3.1 Initial Cybersecurity RMF Meeting

The contractor shall:

- a. Conduct and participate in a meeting with the NAWCTSD USMC Information System Security Manager (ISSM) to tailor the NIS TSP 800-53 Rev4 RMF controls.
- b. Attend and participate in the RMF meeting prior to SRR II-SFR.
- c. Present changes in the security architecture to the ISSM for approval.
- d. Present and establish the Cybersecurity approach by detailing:
 - (1) High level program description:
 - (a) Scope
 - (b) Team members
 - (2) Identification of each IT-appliance with supporting rationale
 - (3) Detailed network diagram and accreditation boundary to include:
 - (a) Network devices
 - (b) External connections
 - (c) IT-appliance and Cybersecurity-enabled delineations
 - (4) Propose and establish a Cybersecurity test plan detailing:
 - (a) Plan milestones
 - (b) Pre-validation testing
 - (5) Present and establish the RMF security controls and sub controls
 - (6) Propose and establish the RMF security control implementation and provide synopsis of DODI 8510.01 Cybersecurity control responsibility (e.g., responsibility of NAWCTSD Orlando, Site, or Not Applicable).

3.1.3.2 Cybersecurity Certification and Accreditation Support

The contractor shall:

- a. Perform the tasks identified in Enclosure 6, Section 2, paragraphs 2a through 2f of DODI 8510.01 agreed upon at the Initial Cybersecurity RMF meeting.
- b. Provide the required information to support certification and accreditation activities for the trainers delivered under the contract.
- c. Prepare the RMF Package IAW the CDRL (A009).

3.1.3.3 Software Integrity Testing and Certification

The contractor shall:

- a. Provide a Vendor Compliance Test Report for Software (VCTRS) for each subsystem.
- b. Include the VCTRS as part of the RMF package.

3.1.3.4 Cybersecurity Compliance

The contractor shall:

- a. Test, verify, and document the security architecture and configuration of the trainers.
- b. Use DoD-authorized assessment tools to perform Cybersecurity testing to verify and validate each applicable Security Technical Implementation Guide (STIG).

- c. Acknowledge receipt of the Government provided list of Cybersecurity assessment tools the Government intends to use during IT-C1.
- d. Complete testing with the latest revision of the Cybersecurity assessment tools identified by the Government 30 days prior to start of IT-C1.

3.1.3.5 Cybersecurity Vulnerability Management Program (IAVMP)

The contractor shall:

- a. Incorporate applicable DoD and Department of the Navy (DoN)/USMC Cybersecurity/IA vulnerability messages issued up to the start of IT-C1.
- b. Document the unincorporated IA Vulnerability Alerts (IAVAs), IA Vulnerability Bulletins (IAVBs), and IA Vulnerability Technical Advisories (IAVTAs) with justification in the POA&M document of the RMF package.

3.1.3.6 Cybersecurity Training

The contractor shall:

- a. Provide four hours of Cybersecurity training for the on-site System Administrator or designated Cybersecurity representative(s) for the training device at each installation site.
- b. Provide the training after completion of Government-ran cold starts.
- c. Use the Cybersecurity System Administrator Guide (CSAG) as the primary support reference document during the Cybersecurity training course.
- d. Prepare the CSAG as part of the RMF package.

3.1.3.7 Contractor Cybersecurity Training and Certification

Contractor lead Cybersecurity personnel shall have the Cybersecurity training and certification appropriate for IAM Level II IAW DoD 8570.01-M Appendix 3.

3.2 Detailed Tasks

3.2.1 Combined Trainer Tasks for Device 2F220 and Device 2F246

The contractor shall:

- a. Design, document, develop, fabricate, integrate, test, validate, install, and deliver a modified and a new training device that meets the performance requirements specified in Specification PMA205-16-CH53E-2F220/2F246-SPEC-001-PRF-160042B.
- b. Document, manage, and apply any changes to the Government-furnished Product Drawings/Models and Associated Lists needed for each Device.
- c. Install, integrate, test, and validate a Drogue Chute model IAW the Baseline Update Training Device information that meets the performance requirements of Specification PMA205-16-CH53E-2F220/2F246-SPEC-001-PRF-160042B.
- d. Prepare the Product Drawings/Models and Associated Lists IAW the CDRL (E001).
- e. Modify the GFI and GFS for each trainer to meet the requirements of Specification PMA205-16-CH53E-2F220/2F246-SPEC-001-PRF-160042B.

3.2.1.1 Baseline Training Device Corrections (Option)

The contractor shall correct the deficiencies described in CH-53E-TECR-01.

3.2.1.2 Detailed Tasks for Device 2F220

3.2.1.2.1 Enhanced Aircrew Externals Trainer (EAET) connectivity

The contractor shall verify that Device 2F220 maintains network functionality with EAET Device 2H164-3.

3.2.1.2.2 Visual System (VS)

The contractor shall:

- a. Provide a VS that meets the performance requirements of Specification PMA205-16-CH53E-2F220/2F246-SPEC-001-PRF-160042B.
- b. Prepare a Visual System Engineering Report (VSER) IAW the CDRL (A00D).

3.2.1.2.2.1 Image Generator (IG) replacement

The contractor shall replace the existing IG with a new IG that meets the requirements of Specification PMA205-16-CH53E-2F220/2F246-SPEC-001-PRF-160042B.

3.2.1.2.2.2 Visual and Sensor Databases, Moving Models, and Alignment and Test Patterns

- a. The contractor shall provide visual and sensor databases, moving models, and alignment and test patterns in runtime format that meet the requirements of Specification PMA205-16-CH53E-2F220/2F246-SPEC-001-PRF-160042B.
- b. Perform either one, or a combination, of the two sets of tasks specified below for each Visual and Sensor Database and moving model on the trainer.

3.2.1.2.2.2.1 Visual and Sensor Databases and Moving Models Development

If the contractor chooses to develop the visual and sensor databases or moving models, then the contractor shall:

- a. Use NAVAIR Portable Source Initiative (NPSI) Source Data as the basis for the databases. NPSI Source Data may be requested through the Contracting Officer.
- b. Plan, coordinate, and conduct Database Working Group (DBWG) meetings to provide a venue to discuss, review, and evaluate the progress and status of development of Visual and Sensor Databases and Moving Models that meet the requirements in Specification PMA205-16-CH53E-2F220/2F246-SPEC-001-PRF-160042B.
- c. Integrate and test visual and sensor databases, moving models, and alignment and test patterns to fulfill the requirements in Specification PMA205-16-CH53E-2F220/2F246-SPEC-001-PRF-160042B.
- d. Deliver visual and sensor databases, moving models, and alignment and test patterns as part of the SPP IAW the CDRL (A002).
- e. Deliver source data and models that are in the runtime database(s) and are not part of the GFI NPSI dataset.
- f. Prepare the NPSI Dataset Delivery IAW the CDRL (A00F).
- g. Prepare the Synthetic Environment Database Design Document (SEDDD) IAW the CDRL (A00E).

3.2.1.2.2.2.2 Visual and Sensor Databases and Moving Models Reuse

If the contractor chooses to reuse runtime Visual and Sensor Databases or Moving Models that were previously developed for and utilized on existing USN or USMC Flight Training Devices and comply with the performance requirements specified in Specification PMA205-16-CH53E-2F220/2F246-SPEC-001-PRF-160042B, the contractor shall:

- a. Plan, coordinate, and conduct visual IPT meetings to provide a venue to discuss database testing, risk mitigations, and generation of database test procedures to ensure the Visual and Sensor Databases and Moving Models comply with performance requirements specified in Specification PMA205-16-CH53E-2F220/2F246-SPEC-001-PRF-160042B.
- b. Integrate and test visual and sensor databases, moving models, and alignment and test patterns to fulfill the requirements in Specification PMA205-16-CH53E-2F220/2F246-SPEC-001-PRF-160042B.
- c. Deliver visual and sensor databases, moving models, and alignment and test patterns as part of the SPP IAW the CDRL (A002).

3.2.1.2.2.3 Display System Projectors and Automatic Alignment System Replacement

The contractor shall replace the existing display system projectors and alignment system with new projectors and an alignment system that meet the performance requirements specified in Specification PMA205-16-CH53E-2F220/2F246-SPEC-001-PRF-160042B.

3.2.1.2.2.4 Visual System Tuning for Night Visual Goggles (NVG) Stimulation

The contractor shall tune the display system to ensure compliance with the NVG stimulation requirements specified in Specification PMA205-16-CH53E-2F220/2F246-SPEC-001-PRF-160042B.

3.2.1.2.2.5 Light Tight Crew Compartment

The contractor shall perform trainer modifications so that a light tight crew compartment is maintained IAW the performance requirements specified in Specification PMA205-16-CH53E-2F220/2F246-SPEC-001-PRF-160042B.

3.2.1.2.3 Cockpit Ambient Light

The contractor shall add a cockpit ambient lighting system that simulates ambient light conditions that meets the performance requirements specified in Specification PMA205-16-CH53E-2F220/2F246-SPEC-001-PRF-160042B.

3.2.1.2.4 Host Computer System (HCS)

The contractor shall provide a new HCS computer that, when integrated with the modified trainer, complies with requirements specified in Specification PMA205-16-CH53E-2F220/2F246-SPEC-001-PRF-160042B.

3.2.1.2.5 Baseline Updates for Device 2F220

The contractor shall install, integrate, test and validate the following Device 2F220 Baseline Updates IAW the Baseline Update Training Device.

3.2.1.2.5.1 Smart Multi-Functional Color Display (SMFCD)

The contractor shall:

- a. Add SMFCD's IAW the Baseline Update Training Device information and the Specification PMA205-16-CH53E-2F220/2F246-SPEC-001-PRF-160042B.
- b. Remove the Forward Looking Infra-Red (FLIR) Panel Display Units (PDU), and Pilot's and Co Pilot's Electronics Data Manager (EDM) kneeboards.
- c. Add a Data Loader with Removable Mass Media Device, Ethernet Switch, Improved Data Modem (IDM), and the modified Multi-Function Control Unit (MFCU) mounting base.
- d. Load the Operational Flight Program (OFP) software version that will be defined at CDR.
- e. Load the Signal Data Converter (SDC) Operational Program version that will be defined at CDR.
- f. Reuse, modify, or replace trainer mechanical and software interfaces such that the SMFCD functionality, when integrated with the modified trainer, meet the requirements in Specification PMA205-16-CH53E-2F220/2F246-SPEC-001-PRF-160042B.
- g. Replace trainer electrical interfaces such that the SMFCD functionality, when integrated with the modified trainer, meet the requirements in Specification PMA205-16-CH53E-2F220/2F246-SPEC-001-PRF-160042B.

3.2.1.2.5.2 AN/AAR-47 Missile Warning Set (MWS)

The contractor shall:

- a. Modify the AN/AAR-47 MWS IAW the Baseline Update Training Device information and the Specification PMA205-16-CH53E-2F220/2F246-SPEC-001-PRF-160042B.
- b. Reuse, modify, or replace trainer mechanical and software interfaces such that the new installed AN/AAR-47 MWS, when integrated with the modified trainer, meet the requirements in Specification PMA205-16-CH53E-2F220/2F246-SPEC-001-PRF-160042B.
- c. Replace trainer electrical interfaces such that the new installed AN/AAR-47 MWS, when integrated with the modified trainer, meet the requirements in Specification PMA205-16-CH53E-2F220/2F246-SPEC-001-PRF-160042B.

3.2.1.2.5.3 AN/ARC-210(V) Satellite Communication (SATCOM) / COMM3 Radio

The contractor shall:

- a. Add AN/ARC-210 SATCOM/COMM3 and simulate the functionality IAW the Baseline Update Training Device information and the Specification PMA205-16-CH53E-2F220/2F246-SPEC-001-PRF-160042B.
- b. Install and integrate the AN/ARC-210 SATCOM/COMM3 Radio Control Unit (RCU) panel, BFT/SATCOM control panel and COMM3 circuit breakers.
- c. Reuse, modify, or replace trainer mechanical and software interfaces such that the new installed AN/ARC-210 SATCOM/COMM3 radio, when integrated with the modified trainer, meet the requirements in Specification PMA205-16-CH53E-2F220/2F246-SPEC-001-PRF-160042B.

- d. Replace trainer electrical interfaces such that the new installed AN/ARC-210 SATCOM/COMM3 radio, when integrated with the modified trainer, meet the requirements in Specification PMA205-16-CH53E-2F220/2F246-SPEC-001-PRF-160042B.

3.2.1.2.5.4 AN/APX-123 Identification Friend or Foe (IFF)

The contractor shall:

- a. Add AN/APX-123 IFF IAW the Baseline Update Training Device information and the Specification PMA205-16-CH53E-2F220/2F246-SPEC-001-PRF-160042B.
- b. Remove the AN/APX-72 IFF hardware and software functionality.
- c. Reuse, modify, or replace trainer mechanical and software interfaces such that the AN/APX-123 IFF functionality, when integrated with the modified trainer, meet the requirements in Specification PMA205-16-CH53E-2F220/2F246-SPEC-001-PRF-160042B.
- d. Replace trainer electrical interfaces such that the AN/APX-123 IFF functionality, when integrated with the modified trainer, meet the requirements in Specification PMA205-16-CH53E-2F220/2F246-SPEC-001-PRF-160042B.

3.2.1.2.6 Enclosure exterior

The contractor shall paint all external surfaces and resurface the roof of Device 2F220 enclosure IAW the requirements in Specification PMA205-16-CH53E-2F220/2F246-SPEC-001-PRF-160042B.

3.2.1.2.7 Cockpit instruments, panels, and controls

The contractor shall:

- a. Replace or paint any worn or damaged cockpit instrument, panel, or control knobs and switches.
- b. Retain the cockpit instrument, panel, and controls performance of the Baseline Training Device (DV 2F220).

3.2.1.2.8 Instructor Operator Station (IOS)

The contractor shall:

- a. Provide a new IOS computer that, when integrated with the modified trainer, complies with requirements specified in Specification PMA205-16-CH53E-2F220/2F246-SPEC-001-PRF-160042B.
- b. Modify the GFI and GFS to meet the IOS requirements specified in Specification PMA205-16-CH53E-2F220/2F246-SPEC-001-PRF-160042B.

3.2.1.2.9 Software Support Equipment (SSE)

The contractor shall:

- a. Provide a new SSE computer that, when integrated with the modified trainer, complies with requirements specified in Specification PMA205-16-CH53E-2F220/2F246-SPEC-001-PRF-160042B.

- b. Modify the GFI and GFS to meet the SSE requirements specified in Specification PMA205-16-CH53E-2F220/2F246-SPEC-001-PRF-160042B.

3.2.1.2.10 Aural Cueing and Intercommunication System (Aural/ICS)

The contractor shall provide a new Aural/ICS computer that, when integrated with the modified trainer, complies with requirements specified in Specification PMA205-16-CH53E-2F220/2F246-SPEC-001-PRF-160042B.

3.2.1.2.11 United States Marine Corps (USMC) Technical Environment (TEn)

The latest version of the USMC TEEn software will be provided as GFS. The contractor shall:

- a. Integrate the latest USMC TEEn software version determined at the CDR with the TEEn computational subsystem IAW the requirements of Specification PMA205-16-CH53E-2F220/2F246-SPEC-001-PRF-160042B.
- b. Only install software that is identified in the Overview and Installation Guide - USMC TEEn for the TEEn computational subsystem.
- c. Request Government approval to install software not identified Overview and Installation Guide - USMC TEEn.
- d. Maintain the functionality of the existing Host-USMC TEEn interface as defined in Baseline Configuration Audit (BCA).

3.2.1.2.12 Surveillance Computer

The contractor shall remove the existing Surveillance computer.

3.2.1.2.13 Display Graphics (DG) Computer

The contractor shall:

- a. Remove the existing DG computer.
- b. Retain the DG functionality and performance of the Baseline Training Device (DV 2F220).

3.2.1.2.14 Input/Output (I/O) System Obsolete Hardware Components Replacement

The contractor shall:

- a. Replace or redesign I/O system obsolete VMIC boards and DC power supplies components with the latest technology of these components IAW the requirements specified in Specification PMA205-16-CH53E-2F220/2F246-SPEC-001-PRF-160042B.
- b. Reuse, or update the I/O interfaces (mechanical, electrical and software) such that the I/O system, when integrated with the modified trainer, complies with requirements specified in Specification PMA205-16-CH53E-2F220/2F246-SPEC-001-PRF-160042B.

3.2.1.2.15 Debrief Room

3.2.1.2.15.1 Debrief Recorder

The contractor shall remove the existing debrief recorder computer.

3.2.1.2.15.2 Debrief IG

The contractor shall remove the existing debrief standalone IG.

3.2.1.2.15.3 Debrief Computer

The contractor shall provide a new debrief computer that, when integrated with the modified trainer, complies with requirements specified in Specification PMA205-16-CH53E-2F220/2F246-SPEC-001-PRF-160042B.

3.2.1.2.16 Flight Control Loading System

The contractor shall:

- a. Provide a new DCL computer that meets the requirements specified in Specification PMA205-16-CH53E-2F220/2F246-SPEC-001-PRF-160042B.
- b. Replace with new, or refurbished, any worn, damaged, or obsolete DCL parts such that the DCL system, when integrated with the modified trainer, complies with requirements specified in Specification PMA205-16-CH53E-2F220/2F246-SPEC-001-PRF-160042B.

3.2.1.2.17 Peripherals

The contractor shall replace the general computer's peripheral components (keyboards, mouse, printers, displays and other components) with new peripheral components IAW the requirements specified in Specification PMA205-16-CH53E-2F220/2F246-SPEC-001-PRF-160042B.

3.2.1.2.18 Environmental Control Units (ECU)

The contractor shall replace the ECU IAW the requirements specified in Specification PMA205-16-CH53E-2F220/2F246-SPEC-001-PRF-160042B.

3.2.1.2.19 Uninterrupted Power Supply (UPS) system

The contractor shall replace the UPS system IAW the requirements specified in Specification PMA205-16-CH53E-2F220/2F246-SPEC-001-PRF-160042B.

3.2.1.3 Detailed Tasks for Device 2F246

3.2.1.3.1 Visual System

The contractor shall:

- a. Provide a VS that meets the performance requirements of Specification PMA205-16-CH53E-2F220/2F246-SPEC-001-PRF-160042B.
- b. Prepare a VSER IAW the CDRL (A00D).

3.2.1.3.1.1 Visual and Sensor Databases, Moving Models, and Alignment and Test Patterns

The contractor shall:

- a. Provide the visual and sensor databases, moving models, and alignment and test patterns being installed on Device 2F220 in runtime format to meet the requirements specified in Specification PMA205-16-CH53E-2F220/2F246-SPEC-001-PRF-160042B.

- b. Integrate and test visual and sensor databases, moving models, and alignment and test patterns to fulfill the requirements in Specification PMA205-16-CH53E-2F220/2F246-SPEC-001-PRF-160042B.
- c. Deliver visual and sensor databases, moving models, and alignment and test patterns as part of the SPP IAW the CDRL (A002).

3.2.1.3.1.2 Visual System Tuning for NVG Stimulation

The contractor shall tune the display system to ensure compliance with the NVG stimulation requirements specified in Specification PMA205-16-CH53E-2F220/2F246-SPEC-001-PRF-160042B.

3.2.1.3.2 USMC Tactical Environment (TEen) Integration

The contractor shall:

- a. Integrate an unclassified version of the USMC TEen 6.0 provided at Post Award Conference (PAC).
- b. Integrate TEen 6.0 Cybersecurity media provided at CDR. TEen 6.0 may be requested through the Contracting Officer
- c. Request Government approval to install software not identified in Table 2 of the Government-furnished USMC TEen 6.0 Overview and Installation Guide.

3.2.1.3.3 Baseline Updates For Device 2F246

The contractor shall install, integrate, test and validate the following Device 2F246 Baseline Updates IAW the Baseline Update Training Device.

3.2.1.3.3.1 SMFCD

The contractor shall:

- a. Add SMFCD's IAW the Baseline Update Training Device information and the Specification PMA205-16-CH53E-2F220/2F246-SPEC-001-PRF-160042B.
- b. Install and integrate the SMFCD's, Data Loader with Removable Mass Media Device, Ethernet Switch, IDM, and the MFCU mounting base.
- c. Load the Control Display Navigational Unit (CDNU)-800 Operational Flight Program (OFP) software version that will be defined at CDR.
- d. Load the Signal Data Converter (SDC) Operational Program (OP) software version that will be defined at CDR.

3.2.1.3.3.2 AN/AAR-47 MWS

The contractor shall provide a AN/AAR-47 MWS IAW the Baseline Update Training Device information and the Specification PMA205-16-CH53E-2F220/2F246-SPEC-001-PRF-160042B.

3.2.1.3.3.3 AN/ARC-210(V) SATCOM / COMM3 Radio

The contractor shall:

- a. Provide AN/ARC-210 SATCOM/COMM3 and simulate the functionality IAW the Baseline Update Training Device information and the Specification PMA205-16-CH53E-2F220/2F246-SPEC-001-PRF-160042B.
- b. Install and integrate the AN/ARC-210 SATCOM/COMM3 RCU panel, BFT/SATCOM control panel and COMM3 circuit breakers to meet the requirements in Specification PMA205-16-CH53E-2F220/2F246-SPEC-001-PRF-160042B.

3.2.1.3.3.4 AN/APX-123 IFF

The contractor shall provide AN/APX-123 IFF IAW the Baseline Update Training Device information and the Specification PMA205-16-CH53E-2F220/2F246-SPEC-001-PRF-160042B.

3.2.1.3.4 Crew Seats

The contractor shall integrate the Government-Furnished Equipment (GFE) aircrew seats IAW the requirements in Specification PMA205-16-CH53E-2F220/2F246-SPEC-001-PRF-160042B.

3.2.1.3.5 Enclosure

The contractor shall provide an enclosure IAW Specification PMA205-16-CH53E-2F220/2F246-SPEC-001-PRF-160042B.

3.2.1.4 Detailed Tasks for Device 2F171 (Option)

3.2.1.4.1 Disassembly and Disposal

The contractor shall:

- a. Disassemble Device 2F171 no earlier than 10 days after the Interim Contractor Support (ICS) period begins for device 2F246.
- b. Coordinate with Defense Logistics Agency (DLA) Camp Kinser and Camp Futenma personnel for disposal of the trainer.
- c. Transport the trainer's DLA components to Camp Kinser DLA IAW DLA disposal processes.
- d. Transport the trainer's non-DLA components IAW Camp Futenma disposal processes.
- e. Provide technical documentation IAW CDRLs (B003, B004).

3.2.2 Systems Engineering Processes

The contractor shall use the system engineering processes to define the requirements for the system, to transform the requirements into an effective product, and to verify and validate the functionality of the delivered product.

3.2.2.1 System Requirements Definition

The contractor shall define, document, manage, and apply a requirements definition process IAW IEEE 12207-2008, section 6.4.1.

3.2.2.2 System Requirements Analysis

The contractor shall:

- a. Define, document, manage, and apply a requirements analysis process IAW IEEE 12207-2008, section 6.4.2; and IEEE 1233-1998 Edition (R2002).
- b. Analyze the Specification PMA205-16-CH53E-2F220/2F246-SPEC-001-PRF-160042B and contract requirements to determine lower level functional requirements.
- c. Analyze the requirements and decompose lower level functional requirements.
- d. Analyze the interaction between systems, subsystems, and components to derive the functional requirements.
- e. Decompose and derive requirements IAW the criteria within IEEE 1233-1998 Edition (R2002), sections 6.1 and 6.2.
- f. Record the requirements in Specification PMA205-16-CH53E-2F220/2F246-SPEC-001-PRF-160042B, technical SOW requirements, and contractor decomposed and derived requirements within the Requirements Traceability/Verification Matrix (RTVM).

3.2.2.3 Traceability

The contractor shall:

- a. Define, document, manage, and apply a process and mechanism to accomplish traceability between the requirements, allocated design baseline, implementation configuration items, and test procedures (TPs).
- b. Utilize an electronic tool (e.g. Doors, RequisitePro, Access Database, and Excel Spreadsheet) to accomplish the requirement traceability function.
- c. Prepare the Requirements Traceability and Verification Matrix (RTVM) IAW the CDRL (A00A).

3.2.2.4 System Architectural Design

The contractor shall:

- a. Define, document, manage, and apply a system architectural design process IAW IEEE 12207-2008, section 6.4.3.
- b. Prepare the Product Drawings/Models and Associated Lists IAW CDRL (E001).

3.2.2.5 Software Requirements Analysis

The contractor shall:

- a. Perform the software requirements analysis activities and tasks as specified in IEEE 12207-2008 section 7.1.2.3.
- b. Construct the software requirements, ensuring that each requirement satisfies the criteria as specified in IEEE 29148-2011 section 5.2.4 and 5.2.7.
- c. Evaluate the software requirements, ensuring that each requirement satisfies the characteristics as specified in IEEE 29148-2011 sections 5.2.5 and 5.2.6.

3.2.2.5.1 Software Requirements Verification

The contractor shall perform software requirements verification IAW IEEE 12207-2008, section 7.2.4.3.2.1.

3.2.2.6 Software Architectural Design

The contractor shall:

- a. Use a software architectural design process to provide a design for the software that are to be implemented, and can be verified against the requirements.
- b. Define, document, control, maintain, and implement a software architectural design IAW IEEE 12207-2008, section 7.1.3.
- c. Document the software architectural design in the Software Product Design (SPD).

3.2.2.7 Software Detailed Design

The contractor shall:

- a. Have a software detailed design process to provide a design for the software that are to be implemented, can be verified against the requirements and the software architecture, and is sufficiently detailed to permit coding and testing.
- b. Evaluate define, document, control, maintain, and implement software detailed design IAW IEEE Std 12207-2008, section 7.1.4.
- c. Document the software detailed design in the SPD.

3.2.2.7.1 Software Product Design

The BCU GFI List and contract contains the Software Design Description (SDD), from Devices 2F220 and 2F239, as a reference. The contractor shall prepare the SPD IAW CDRL (A003).

3.2.2.8 Implementation

The contractor shall perform the implementation activities and tasks as specified in IEEE 15288-2008, section 6.4.4.

3.2.2.8.1 Software Implementation

The contractor shall perform the software implementation activities and tasks as specified in IEEE 12207-2008, section 7.1.1.

3.2.2.8.1.1 Software Unit Construction and Testing

The contractor shall perform the software construction activities and tasks as specified in IEEE 12207-2008, section 7.1.5.

3.2.2.8.1.1.1 Automated Processes Languages

The contractor shall document, control, maintain, validate, and deliver; scripts, batch files, job control languages, and computational automated processes in the same manner as software source code.

3.2.2.8.1.1.2 Software Code Verification

The contractor shall perform the software code verification activities and tasks as specified in IEEE 12207-2008, section 7.2.4.3.2.3.

3.2.2.8.2 Software Integration

The contractor shall perform the software integration activities and tasks as specified in IEEE 12207-2008 section 7.1.6.3.

3.2.2.8.3 Software Integration Verification

The contractor shall perform software integration verification activities and tasks as specified in IEEE 12207-2008, section 7.2.4.3.2.4.

3.2.2.8.3.1 Software Qualification Testing

The contractor shall perform software qualification testing activities and tasks as specified in IEEE 12207-2008, section 7.1.7.

3.2.2.9 System Integration

The contractor shall perform system integration activities and tasks as specified in IEEE 12207-2008, section 6.4.5.

3.2.2.10 Device Transition

The contractor shall perform the training device system transition and installation activities and tasks as specified in IEEE 15288-2008, section 6.4.7.

3.2.2.10.1 Software Product Package

The contractor shall prepare the Software Product Package (SPP) IAW the CDRL (A002).

3.2.2.10.2 Software Product Installation

The contractor shall perform the software product installation activities and tasks as specified in IEEE 12207-2008 section 6.4.7.3.

3.2.2.10.2.1 Cold Start Processes

The contractor shall:

- a. Develop, document, validate, and deliver detailed instructions to install and configure any system that stores or process information.
- b. Develop, document, validate, and deliver a software build procedure for each trainer computational subsystem that runs software that is built (compiled and linked) from delivered source code.
- c. Deliver the most recent noncommercial source code required to perform the software build procedures concurrent with each SPP submission.

3.2.2.10.2.2 Installation Procedures

The contractor shall develop, document, validate, and deliver an installation procedure for each unique trainer computational system that only runs CaNDI software.

3.2.2.10.2.3 Firmware Configuration Procedures

The contractor shall develop, document, validate, and deliver a firmware configuration procedures for each computational device that only runs CaNDI firmware based software.

3.2.2.10.2.4 Media and Storage Devices

The Government will retain custody and control of the media and storage devices created or used to conduct Government testing. The contractor shall:

- a. Provide a complete set of software media and storage devices necessary to perform the cold start procedures independent of any set of software media and storage devices used by the contractor to develop, troubleshoot or operate the training system device during government testing.
- b. Provide the associated license(s), product key(s), activation code(s), and hardware key(s) of the software media.
- c. Provide the additional media and storage devices necessary for their own use while the Government retains custody and control of the media and storage devices created and used to conduct cold start procedures during Government testing.
- d. Deliver the commercial and noncommercial software, databases and the build tools required to perform the cold start procedures prior to Test Readiness Review (TRR).

3.2.2.10.2.4.1 Mass Storage Device Wiping

Prior to the final Government execution of the cold start, installation, and firmware configuration procedures, the contractor shall wipe the deliverable mass storage devices IAW Specification PMA205-16-CH53E-2F220/2F246-SPEC-001-PRF-160042B.

3.2.2.10.2.4.2 Software Media Marking

The contractor shall mark each piece of software media with the following:

- a. Device Name
- b. Software Item Name(s)
- c. Software Item Vendor Name
- d. Software Item Version
- e. Software Item Release Date
- f. Security classification
- g. Media piece number, for multiple piece items (e.g. Disk 1 of 3, Disk 2 of 3)
- h. Contractor's Configuration Management Identifier.

3.2.2.10.3 Contractor Execution

The contractor shall:

- a. Execute and validate each subsystem cold start, installation, and firmware configuration procedure prior to the start of each TRR or Test and Evaluation Technical Interchange Meeting (T&E TIM).
- b. Perform the entire cold start and installation procedure, step-by-step as written, and document the results of each step.
- c. Present the results of each contractor-run cold start, installation, and firmware configuration procedure to the Government for review at TRR events.
- d. Execute, document, correct and validate each cold start, installation, and firmware configuration procedure until no discrepancies exist.

3.2.2.10.3.1 Procedure Artifacts

The contractor shall:

- a. Record the results of performing each step of the cold start, installation, and firmware configuration procedures.
- b. Present the results of the contractor-run cold start, installation, and firmware configuration procedures to the Government at TRR and T&E TIM events.
- c. Present, and explain to the Government at TRR and T&E TIM events, the deviations made and recorded while executing the cold start; installation; and firmware configuration procedures.

3.2.2.10.3.2 Government Execution

The contractor shall:

- a. Make available personnel knowledgeable in the operation of the trainer's computational systems during Government execution of the cold start; installation; and firmware configuration procedures.
- b. Support Government execution and verification of the accepted cold start; installation; and firmware configuration procedures:
 - (1) After successful completion of DT-C1 and prior to the start TRR (Device 2F220).
 - (2) After successful completion of DT-C1 and prior to the start of DT-C2 (Device 2F246).
 - (3) Prior to the start of IT-C1.
- c. Relinquish configuration control of the software used to execute the Government run cold start; installation; and firmware configuration procedures to the Government.
- d. Not modify the trainer computational system hardware configuration once the Government PCA has begun.

3.2.2.10.4 Software Acceptance Support

The contractor shall perform the software acceptance activities and tasks as specified in IEEE 12207-2008, section 6.4.8.3.

3.2.2.11 System Validation

The contractor shall perform the system validation activities and tasks as specified in IEEE 15288-2008, section 6.4.8.3; and the system T&E requirements specified herein.

3.2.2.12 E³ Engineering

The contractor shall:

- a. Establish an E³ control program that meets the program objectives and the E³ requirements specified in Specification PMA205-16-CH53E-2F220/2F246-SPEC-001-PRF-160042B.
- b. Incorporate the following E³ controls into the design- approach, hardware-selection, and the integration of the Trainer-equipment specified in Specification PMA205-16-CH53E-2F220/2F246-SPEC-001-PRF-160042B:
 - (1) Electromagnetic Environment (EME)

- (2) Electromagnetic Compatibility (EMC)
- (3) Electromagnetic Interference (EMI)
- (4) Electrostatic Discharge (ESD)
- (5) Lightning effects
- (6) Electrical bonding
- c. Use E³ design effort which considers the Electrostatic Discharge developed by the students operating the trainer.
- d. Use E³ design effort which considers electromagnetic emissions generated by the equipment in use at the Trainer-site and the electromagnetic emissions which will be generated by the integration of the Trainer-equipment into the electromagnetic environment at the installation site(s).
- e. Implement E³ control techniques.
- f. Include E³ controls as a topic of discussion in the scheduled technical reviews.
- g. Correct the bonding issues found during testing.

3.2.2.12.1 ESD Management

The contractor shall:

- a. Establish, implement, and document an ESD control program for the protection of ESD sensitive electrical and electronic parts, assemblies, and equipment from damage due to ESD.
- b. Apply ESD controls to the design, production, inspection and test, storage and shipment, installation, maintenance, and repair.

3.2.2.13 Reliability and Maintainability (R&M) Engineering

The contractor shall ensure the training system equipment, including Commercial Items, NDI, and TPE, meet the R&M requirements specified in Specification PMA205-16-CH53E-2F220/2F246-SPEC-001-PRF-160042B.

3.2.2.13.1 Failure Reporting, Analysis and Corrective Action System (FRACAS)

The contractor shall:

- a. Establish and maintain a closed loop FRACAS that applies to the failures that occur throughout development, manufacture, handling, checkout, and testing of the trainer equipment, including subcontracted items.
- b. Provide failure analysis covering identification of failure causes and the corrective actions as part of FRACAS.
- c. Collect maintainability data (e.g., failure isolation, repair, and checkout times) as an integral part of the FRACAS.
- d. Present a summary of the R&M data collected under FRACAS at the scheduled program reviews.

3.2.2.13.2 R&M Predictions

a. The contractor shall develop R&M predictions for the trainer equipment to examine the probability, early in the program, to meet the R&M requirements of Specification PMA205-16-CH53E-2F220/2F246-SPEC-001-PRF-160042B.

b. MIL-HDBK-217F may be used as guidance for reliability prediction methods and MIL-HDBK-472 may be used as guidance for the maintainability prediction methods.

c. Manufacturer's data, documented engineering analysis, verifiable field data, MIL-HDBK-217F, and MIL-HDBK-472 may be used as sources of failure rate, Mean-Time-Between-Failures (MTBF), and Mean-Time-To-Repair (MTTR) data.

d. The contractor shall update the R&M predictions throughout the duration of the contract and shall present the prediction results at the scheduled program design reviews.

3.2.2.14 Human Factors Engineering (HFE)

The contractor shall integrate human factors into the trainer design, which include:

a. A balance of system performance and cost of ownership by ensuring that the system design is compatible with the capabilities and limitations of the personnel who operate and maintain the item.

b. HFE design decisions reflective in supporting instructional strategies and materials.

3.2.3 Conferences and Reviews

The contractor shall:

a. Conduct, attend, and participate in conferences and reviews to be held at the contractor facilities.

b. Clarify the reasoning, assumption, and methodologies in arriving at particular conclusions, recommendations, or alternatives in the accomplishment of the tasks required by the contract.

c. Prepare drawings and other data to aid in the presentations.

d. Provide key personnel and support available to carry out the conference.

e. Provide facilities for Government only meetings during the conferences and reviews.

f. Require subcontractors to attend conferences and reviews when required to address key elements.

g. Prepare the Presentation Material for each conference and review IAW the CDRL (B001).

h. Prepare the Conference Minutes for each conference and review IAW the CDRL (B004).

3.2.3.1 Post Award Conference (PAC)

a. The purpose of the conference is to establish the framework of the contractor and Government interaction during the performance period of the contract.

b. At the PAC, the contractor shall present an IMS showing the critical milestones and supporting events, including logistics, leading to these milestones.

c. The contractor shall make available to the Government, the completed program specific planning documents presented and discussed during the PAC, such as the Quality Assurance and Management Plan (QAMP), and Risk Management Plan (RMP).

d. The contractor shall prepare the PAC presentation and agenda for discussion of information and data relating to:

- (1) Introduction and contract overview.
- (2) Discussion and clarification of Specification PMA205-16-CH53E-2F220/2F246-SPEC-001-PRF-160042B.
- (3) Presentation of a complete, accurate, and realistic IMS and detailed schedule with status.
- (4) Identification of the critical paths within the IMS and detailed schedule.
- (5) CDRL delivery schedule and status.
- (6) Provisioning Guidance Conference (PGC).
- (7) Training Program Orientation Conference.
- (8) Technical Documentation Orientation Conference (TDOC).
- (9) Program specific OSMP.
- (10) Program specific CM Plan (to include Data Management).
- (11) Program specific QAMP (to include Software QA).
- (12) Program specific RMP.
- (13) Program specific OPSEC and cybersecurity implementation plans.
- (14) Program life cycle model selection and rationale.
- (15) IPT structure, membership, and responsibilities.
- (16) Action item reporting and status.
- (17) Long lead time item identification and status.
- (18) Updated team contact list (names, IPT memberships, phone numbers, and email addresses).
- (19) Metrics collection process, analysis, and reporting.

3.2.3.1.1 Provisioning Guidance Conference

The purpose of the PGC is to ensure that the contractor has a clear understanding of the contractual provisioning requirements.

3.2.3.1.2 Training Program Orientation Conference (TPOC)

The purpose of this conference is to review and discuss the contractor's proposed development and implementation of the operator and maintenance course and initial training of operator and maintenance personnel on trainer operations procedures.

3.2.3.1.3 Technical Documentation Orientation Conference (TDOC)

The purpose of the TDOC is to review and discuss the contractor's proposed Technical Data Support Plan and the Government's requirements for end item training and technical documentation deliverables. Primary attendees shall be contractor and Government working level personnel responsible for the preparation, delivery, review, and acceptance of the end item

training and technical documentation deliverables. The contractor shall meet the entry and closure requirements described in TMCR-16-06.

3.2.3.1.4 PAC Entry Criteria

The contractor shall meet the following entry criteria prior to convening PAC:

- a. The contractor-submitted PAC agenda is complete and acceptable.
- b. The contractor has completed the program specific CM Plan, QAMP, RMP, and OPSEC plan.

3.2.3.1.5 PAC Completion Criteria

The contractor shall meet the following PAC completion criteria:

- a. Required PAC topics have been presented, discussed, and documented.
- b. IMS and detailed schedule are complete, accurate, and realistic.
- c. IPT structure, membership, and responsibilities are satisfactorily defined, documented, and implemented.
- d. The contractor has documented and started implementation of the program specific CM Plan, QAMP, RMP, and OPSEC plan.
- e. PAC minutes and presentation materials have been submitted and accepted.
- f. Action items have been assigned with suspense date for closure.

3.2.3.2 Systems Engineering Technical Reviews (SETR)

- a. The contractor shall conduct and participate in SETR events chaired and attended by the Government.
- b. The SETRs shall not be a place for problem solving, but to verify that problem solving has been accomplished.
- c. Each SETR will be chaired and led by a Government Technical Review Board (TRB) Chairperson that is independent to the program team.
- d. The SETR shall be event driven vice schedule driven and are scheduled when the required system baseline has achieved a level of maturity for the intended review.
- e. Any results from the SETR shall not eliminate the contractor's responsibility to meet contract requirements.
- f. Regardless of Government interaction in the design review process, the contractor shall maintain design responsibility for the system.

3.2.3.2.1 System Requirements Review-II-System Functional Review (SRR-II-SFR)

- a. The contractor shall conduct a combined SRR-II-SFR.
- b. The SRR-II-SFR shall assess the system functional requirements and ensure that the required system performance is fully defined and is traceable to Specification PMA205-16-CH53E-2F220/2F246-SPEC-001-PRF-160042B.
- c. At the SRR-II-SFR, the contractor shall:
 - (1) Identify and discuss resource availability to support the schedule.
 - (2) Present and discuss a schedule critical path.

- (3) Provide current status vs. critical path.
- (4) Provide a complete program organizational structure.
- (5) Identify relevant contractor Subject Matter Experts (SMEs) to be used during development and testing.
- (6) Show that the functional requirements are traceable to the system requirements.
- (7) Show that the explicit and derived requirements are quantified and documented.
- (8) Address the following applicable functional areas:
 - (a) Electromagnetic Environment Effects (E³)
 - (b) Human systems integration
 - (c) Environment, safety, and occupational health
 - (d) T&E
 - (e) Logistics
 - (f) Technical Documentation
 - (g) Facilities
 - (h) Interoperability
 - (i) Cybersecurity
 - (j) Quality management
 - (k) CM
 - (l) Security
 - (m) Diminishing Manufacturing Sources and Material Shortages (DMSMS).
 - (n) TECR corrections analysis.
- (9) Present the results of a comprehensive risk assessment for design, integration, and test.

3.2.3.2.1.1 SRR-II-SFR Entry Criteria

The contractor shall meet the following entry criteria prior to convening SRR-II-SFR:

- a. PAC Completion criteria have been met.
- b. CDRL items scheduled to be delivered prior to SRR-II-SFR have been delivered and accepted (when applicable) IAW CDRL requirements.
- c. The contractor-submitted SRR-II-SFR agenda is complete and acceptable.
- d. PAC action items requiring contractor response have been completed and closed.
- e. RTVM.
- f. IMS is resourced at reasonable levels with realistic performance expectations
- g. Program technical risks have been identified.
- h. Program execution risks have been identified.

3.2.3.2.1.2 SRR-II-SFR Completion Criteria

The contractor shall meet the following SRR-II-SFR completion criteria:

- a. SRR-II-SFR RFAs have been completed (closed).
- b. The required technical areas have been represented at the review.

- c. The RTVM.
- d. Functional requirements, as disclosed, will satisfy the training objectives.
- e. System functional definition and functional decomposition is detailed enough to support preliminary detailed design.
- f. Processes and metrics are in place.
- g. Risks are known and are manageable for implementation of the functional requirements into a preliminary design.
- h. Program schedule is executable within the anticipated cost and technical risks.
- i. Program is properly staffed.

3.2.3.2.2 Preliminary Design Review (PDR)

a. The contractor shall conduct a PDR at the Government facility, NAWCTSD Orlando, FL. The purpose of the PDR is for the Government to formally review the activities and work products generated by the contractor during the performance of the preliminary design stage in order to develop the allocated baseline, and verify that the approach for the system design is ready to proceed into the detailed design phase.

b. The contractor shall present and describe the training system design and program status, and address the design changes made to the preliminary design proposed in the proposal.

c. The following items shall be topics of discussion and presentation at the PDR:

(1) Training system hardware and software design, including:

- (a) Computational system
- (b) VS
- (c) Aerodynamic model
- (d) Motion seats
- (e) CLS
- (f) Communication and audio systems
- (g) Network
- (h) Interoperability design and implementation
- (i) Instructional system
- (j) Software tools
- (k) Use of developmental and Commercial and Non-developmental (CaNDI)

software and databases.

- (l) Trainer databases
- (m) Software
- (n) Hardware and software interfaces.
- (o) Design modularity and commonality
- (p) System engineering process of analysis, design, and verification to

implement TECR corrections.

(2) Facility planning.

(3) E³ impacts.

- (4) R&M, and systems safety program progress, including R&M predictions and preliminary identification of hazards.
- (5) Logistics design aspects and concerns.
- (6) Parts management program progress and identification of long lead time items.
- (7) Item Unique Identification (IUID) marking of trainer and ISK.
- (8) T&E.
- (9) Security and cybersecurity, including systems security design, initial security risk assessment, security test approach, security training approach, and any other security and IA relevant information.
- (10) Program problem and risk areas, recommended solutions, and evaluation of alternatives.
- (11) Updated RTVM.

3.2.3.2.2.1 PDR Entry Criteria

The contractor shall meet the following entry criteria prior to convening PDR:

- a. SRR-II-SFR completion criteria have been met.
- b. CDRL items scheduled to be delivered prior to PDR have been delivered and accepted (when applicable) IAW CDRL requirements.
- c. Updated RTVM.
- d. Allocated baseline has been developed.
- e. Risk assessments and risk mitigation plans have been developed.
- f. R&M requirements have been allocated to the design.
- g. IMS shows critical path through Critical Design Review (CDR).
- h. Program technical risk is medium or lower.
- i. Program execution risk is medium or lower.
- j. PDR agenda has been submitted and accepted.

3.2.3.2.2.2 PDR Completion Criteria

The contractor shall meet the following PDR completion criteria:

- a. CDRL items that were part of the PDR entry criteria have been satisfactorily discussed.
- b. Risk assessments and risk mitigation plans have been satisfactorily discussed. Risks and their respective mitigation plans are in place and manageable for implementation of the functional requirements into a preliminary design.
- c. Program schedule is executable within the anticipated cost and technical risks.
- d. Program is properly staffed.
- e. PDR action items have been successfully resolved and closed.
- f. PDR presentation materials are available.
- g. Per the IMS, an executable schedule has been presented.
- h. PDR minutes have been submitted and accepted.
- i. Allocated baseline has been established.

3.2.3.2.3 Critical Design Review (CDR)

a. The contractor shall conduct a CDR at the Government facility, NAWCTSD Orlando, FL. The purpose of the CDR is for the Government to formally review the activities and work products generated by the contractor during the performance of the critical design stage in order to develop the product baseline, and verify that the system is ready to proceed into the hardware-software coding, assembly, and integration phase.

b. The contractor shall present and describe the finalized training systems' design and program status, and address the design changes made since the PDR.

c. The following items shall be topics of discussion and presentation at the CDR:

- (1) Training system hardware and software design, including:
 - (a) Computational system
 - (b) Visual system
 - (c) Aerodynamic model
 - (d) Motion seats
 - (e) Control loading system
 - (f) Communication and audio systems
 - (g) Network
 - (h) Interoperability design and implementation
 - (i) Instructional system
 - (j) Software tools
 - (k) Use of developmental and CaNDI software and databases
 - (l) Trainer databases
 - (m) Software
 - (n) Hardware and software interfaces
 - (o) Design modularity and commonality
 - (q) System engineering process of analysis, design, and verification to implement TECR corrections
- (2) Facility planning
- (3) E³ impacts
- (4) R&M and system safety programs progress, including updated R&M predictions and hazards analysis results
- (5) Logistics design aspects and concerns
- (6) IUID marking of trainer equipment and ISK
- (7) Parts management program status
- (8) T&E
- (9) Security and IA, including updates to the systems security design, security risk assessment, security test approach, security training approach, and any other security and IA relevant information.
- (10) Program problem and risk areas, recommended solutions, and evaluation of alternatives.
- (11) Updated RTVM.

3.2.3.2.3.1 CDR Entry Criteria

The contractor shall meet the following entry criteria prior to convening CDR:

- a. PDR completion criteria have been met.
- b. CDRL items scheduled to be delivered prior to CDR have been delivered and accepted (when applicable) IAW CDRL requirements.
- c. Updated RTVM.
- d. Product baseline has been developed.
- e. Updated risk assessment and risk mitigation plans are available.
- f. Risks and their respective mitigation plans are in place and manageable for implementation of the functional requirements into a final design.
- g. R&M requirements have been addressed in the design.
- h. Trade-off analyses have been completed.
- i. Logistics analysis has been completed and plans have been established.
- j. Facility planning has been completed.
- k. IMS shows critical path through testing.
- l. CDR agenda has been submitted and accepted.

3.2.3.2.3.2 CDR Completion Criteria

The contractor shall meet the following CDR completion criteria:

- a. CDRL items that were part of the CDR entry criteria have been satisfactorily discussed.
- b. Updated risk assessments and risk mitigation plans have been satisfactorily discussed.
- c. Risks and their respective mitigation plans are in place and manageable for implementation of the functional requirements into a final design.
- d. Program schedule is executable within the anticipated cost and technical risks.
- e. Program is properly staffed.
- f. CDR action items have been successfully resolved and closed.
- g. CDR presentation materials are available.
- h. Per the IMS, an executable schedule has been presented.
- i. CDR minutes have been submitted and accepted.
- j. Product baseline has been established.

3.2.3.3 In-Process Reviews (IPRs)

- a. The contractor shall conduct IPRs.
- b. IPRs shall provide attendees with information regarding the status and planned activities of the program.
- c. IPRs shall include the following:
 - (1) A presentation on the status of the overall program, including the training system design (hardware and software), QMS, CM, E³, testing, and production.
 - (2) Review of the integrated logistics support program.
 - (3) Review of software status.

- (4) Review of Failure Reporting, Analysis, and Corrective Action System data, when applicable.
- (5) Review of the program schedule status.
- (6) Review of program risks.
- (7) Review of updated RTVM.

3.2.3.3.1 IPR Entry Criteria

The contractor shall meet the following entry criteria prior to convening the IPR event:

- a. Successful accomplishment of the prior project event (Conference and Reviews)
- b. IPR presentation materials have been prepared and are available to the IPT.
- c. IPT concurrence with the project's readiness to enter the IPR.
- d. Preparation, submittal, and acceptance of the IPR agenda.

3.2.3.3.2 IPR Completion Criteria

The contractor shall meet the following IPR completion criteria:

- a. All RFAs have been resolved (closed).
- b. Preparation, submittal, and acceptance of the IPR minutes.

3.2.3.4 Provisioning Item Selection Conference (PISC)

The contractor shall:

- a. Conduct and participate in the PISC
- b. Provide Logistics Product Data (LPD) from which the Government will use to select items that are desired to be included in the Initial Support Kit (ISK).
- c. Provide LPD during the PISC in order to facilitate discussion on the range and depth for the recommended spares.
- d. Provide data to support the Government in determining the reliability and criticality of each item to mission and probable replacement lead-time to determine recommended quantities.
- e. Demonstrate the approach to developing and populating the data elements of the LPD during the PISC.
- f. Include a representation of the top-down breakdown structure of all training system components reduced to the line replaceable unit (LRU).

3.2.3.4.1 PISC Entry Criteria

The contractor shall meet the following entry criteria prior to convening the PISC event:

- a. Successful completion of Provisioning Guidance Conference.
- b. Submission of the first ISKL.
- c. Acceptance of the PISC agenda.

3.2.3.4.2 PISC Completion Criteria

The contractor shall meet the following PISC completion criteria:

- a. Capture and documentation of the range and depth of all items that the Government has selected during the PISC.
- b. Any action items has been captured and assigned with suspense date for closure.
- c. Acceptance of the PISC minutes and presentation materials.

3.2.3.5 Technical Documentation (TD) Reviews

The purpose of these reviews is to monitor the status and progress of the TD preparation. The contractor shall:

- a. Hold a 40 percent at the contractor's facility at times determined by the ILS IPT.
- b. Hold an 80 percent at the installation site for Device 2F220 and at the contractor's facility for Device 2F246, at times determined by the ILS IPT.
- c. Satisfy all conference closure requirements described in TMCR-16-06.
- d. Be available exclusively to the logistics documentation team for the duration of each TD IPR.

3.2.3.6 Integrated Logistics Support Verification (ILSV) Conference

The contractor shall:

- a. Participate in the ILSV conference at the device site and in conjunction with the final PCA on a date determined by the IPT.
- b. Provide all necessary data to support the ILSV conference which will include a physical inventory of all deliverable items and equipment, technical manuals and training documentation, technical data (TD) package, tools, test and support equipment, and spare and repair parts procured under the contract.
- c. Demonstrate at the ILSV conference the readiness and completeness of the device support system including the logistic support package, technical data, engineering data, storage of support resources, and the inventory control system.
- d. Initiate corrective actions to resolve all deficiencies.
- e. Use the contractor provided inventory lists (TD ICL/R) as a master control document for all inventoried items.

3.2.4 Commercial and Non-Developmental Items (CaNDI)

The contractor shall fulfill the requirements of the contract through acquisition of CaNDI to the maximum extent practicable. CaNDI proposed by the contractor will be reviewed by the Government to determine whether each proposed CaNDI component is, in fact, CaNDI. The Government will also determine the extent to which the proposed CaNDI is practicable for off-the-shelf use within the Government's logistical environment. The Government reserves the right to perform inspections and tests as deemed necessary to verify the practicability of items proposed as CaNDI for off-the-shelf use in the trainers.

3.2.5 Materials

The contractor shall ensure materials and processes:

- a. Meet the primary design requirements of their application.
- b. Except in the case of consumable items, preclude deterioration in performance and appearance over the design service life of the equipment for materials used in the construction of nonexempt equipment.
- c. When commercially practicable, allow training device peculiar parts to be repairable by commonly applied commercial processes.
- d. Be weldable metal where a weldable metal will perform as well as a non-weldable metal in a part that could be repairable by welding.
- e. Withstand, without deterioration, the effects of the environment in which the equipment will be operated, stored, and transported.
- f. Preclude exposure of personnel, facilities, and the environment to toxic, explosive, and fire hazards throughout the life cycle of the equipment.
- g. Conform to restrictions peculiar to the installation site.

3.2.6 Parts Standardization

The contractor shall comply with the Defense Standardization Program (U.S. Code Title 10, Section 2451 - 2456), which requires the achievement of the highest practicable degree in the standardization of items and practices used through the DOD. The parts standardization program defines the management controls to minimize the number of unique parts in the design and maximize the use of Government standard parts.

3.2.6.1 Parts Management

The contractor shall establish a parts management program that ensures that the training systems meet the performance requirements specified in Specification PMA205-16-CH53E-2F220/2F246-SPEC-001-PRF-160042B with the lowest life cycle cost.

3.2.6.1.1 Custom Microelectronic Designs

The contractor shall:

- a. Avoid the use of custom microelectronic designs unless no reasonable alternative exists (Commercial Items, COTS items, NDI, and GFE are exempt).
- b. Request Government permission for microelectronic designs if no reasonable alternative exists.
- c. Provide drawings of the microelectronic design if granted Government permission to use the design.

3.2.6.1.2 Exempt Hardware

Unmodified GFE, unmodified Commercial Items, and Government-designated NDI will be exempt from the parts management program requirements. Prior to gaining exemption from the parts management program requirements, each item proposed by the contractor as CaNDI will be reviewed by the Government to determine whether or not the Government considers the item suitable for exemption from the parts management program. Items that are determined by the Government as not suitable for exemption from the parts management program requirements shall be treated as TPE.

3.2.6.1.3 General purpose computers

The contractor shall purchase general purpose computers:

- a. That are available for purchase not more than 24 months prior to contract award.
- b. With the purpose of being integrated with an OS and application software.

3.2.6.2 Special Tools and Test Equipment List

The contractor shall include any Special Tools and Test Equipment required to inspect, test, calibrate service, repair or overhaul the end item as discussion point during the ILS IPT. The Government will approve or reject proposed tools and equipment for inclusion in the design.

3.2.6.3 Obsolescence

The contractor shall perform the following obsolescence requirements.

3.2.6.3.1 Obsolescence Management/Diminishing Manufacturing Sources and Material Shortages (DMSMS)

The contractor shall establish an obsolescence management program to ensure training systems are designed, produced and delivered free of obsolete parts. Include subject in all program reviews and ILS IPT meetings.

3.2.6.3.2 Obsolescence Management Planning

The contractor shall:

- a. Perform a planning effort for managing the loss or impending loss of manufacturers or suppliers of deliverable training system parts and materials
- b. Develop mitigation plans for all known and forecasted DMSMS issues and provide updates at all program meetings.

3.2.7 System Safety Tasks

The contractor shall:

- a. Establish and maintain an active and effective system safety program (SSP) that meets program objectives and ensures that the training system meets the system safety requirements specified in Specification PMA205-16-CH53E-2F220/2F246-SPEC-001-PRF-160042B.
- b. Identify, document, analyze, and resolve (i.e., eliminate or reduce the associated risk to a level acceptable to the Government) safety hazards to both personnel and equipment.
- c. Include system safety as a topic of discussion during the scheduled program reviews.

3.2.7.1 Safety Assessment (SA)

The contractor shall:

- a. Perform an SA of the trainer.
- b. Perform a comprehensive evaluation of the safety risks being assumed prior to testing or operation of the trainer.
- c. Develop and document the specific hazard controls or the precautions to be followed to use the system and provide verification of compliance to the safety requirements of the contract.

- d. Identify instances of non-compliance, recommended corrective action, and a schedule for correction, to the PCO.
- e. Present safety compliance and non-compliance issues at the TRR and T&E TIMs.
- f. Present to the Government Test Director, at the TRR and T&E TIMs, the specific details of non-compliance issues, the risks, and the risk mitigation approaches, for consideration for commencement of Government testing.
- g. Prepare a Safety Assessment Report (SAR) IAW the CDRL (A00B).

3.2.8 Product Assurance Audits and Inspections

The Government may perform audits and inspections of contractor conformance to contractual requirements, including product assurance programs such as reliability, maintainability, parts management, safety, ESD control, CM, and QMS, at any time during the performance of the contract. The contractor shall make non-deliverable product assurance documentation and data available to the Government during these audits and inspections. The Government will provide notice to the contractor prior to conducting audits and inspections.

3.2.9 Device Events

3.2.9.1 Device Events for 2F220

The Contractor shall perform the following events on device 2F220:

- a. BCA
- b. DT-C1 (Contractor Preliminary Inspection)
- c. Test Readiness Review (TRR)
- d. IT-C1 (Integrated Final Testing)

3.2.9.2 Device Events for 2F246

The contractor shall perform the follow events on device 2F246:

- a. Naval Preliminary Evaluation (NPE)
- b. DT-C1 (Contractor Preliminary Testing)
- c. T&E TIM
- d. DT-C2 (Government Preliminary Testing)
- e. TRR
- f. IT-C1 (Integrated On-Site Final Testing)

3.2.9.3 Baseline Configuration Audit (BCA) (Device 2F220 and Device 2F239)

The contractor shall:

- a. Perform a BCA on device 2F220 and 2F239.
- b. Conduct a BCA to establish the pre-modification configuration and performance baseline of the trainers.
- c. Coordinate the BCA effort among the Government, the contractor, and the Contractor Operation and Maintenance of Simulators (COMS) contractor.
- d. Examine existing documents, drawings, and publications, and by testing IAW the pre-modification TPs.

e. Record the results of the BCA which will be used as a basis to determine resolution of discrepancies that appear during the program T&E Components.

3.2.9.4 NPE (Device 2F246)

The contractor shall:

a. Assist the Government designated pilots and engineers who will perform preliminary evaluations during the development of the trainer to ensure early identification of major problem areas.

b. Attend and participate in NPE testing after trainer assembly but prior to Contractor testing.

c. Coordinate with the Government test team during T&E WIPT meetings to determine the duration of NPE visits.

d. Conduct NPE with the Government team when sufficient controls and cockpit displays are operational to evaluate trainer's characteristics, to determine the training potential, and to determine if there are gross deficiencies of the fidelity of the trainer, using TPs established by the Government test team.

e. Attend and participate in additional NPE visits scheduled for the purposes of evaluating changes made to correct problem areas and to assess progress with the integration of major trainer subsystems.

f. Continue to attend and participate in the NPE phase until the qualitative performance of the system meets the desired maturity level.

3.2.9.5 System Test and Evaluation

The contractor shall plan, coordinate, establish, and implement a T&E program designed to verify that the trainer and the integration of all subsystems and equipment meet the technical and operational requirements as stated in this SOW and Specification PMA205-16-CH53E-2F220/2F246-SPEC-001-PRF-160042B.

3.2.9.5.1 Test and Evaluation Working IPT (WIPT)

The contractor shall attend and participate in the T&E WIPT meetings which are the forum for discussion, coordination, and resolution of test planning goals, strategy, and issues.

3.2.9.5.2 Integrated Test Team (ITT)

The contractor shall provide personnel to participate in the Integrated Test (IT) events and identify applicable personnel names and functions for team members involved in the IT events.

3.2.9.5.3 Responsibility for Tests

The contractor shall conduct or provide personnel, facilities, or equipment to facilitate specified tests and inspections.

3.2.9.5.4 Test Authority

The contractor shall record the test results during contractor's inspections and provide the results to the Government Test Lead to certify contractor's test results.

3.2.9.5.5 T&E Program Planning

- a. The contractor, working with the T&E WIPT, shall develop and document the structure and objectives of the trainer T&E program.
- b. The contractor shall continuously reassess and refine the T&E program as trainer development, production, and testing progresses.

3.2.9.5.6 Test Resources and Facilities

The contractor shall:

- a. Furnish the inspection and testing facilities, equipment, and personnel required to ensure that the training system meets the requirements of Specification PMA205-16-CH53E-2F220/2F246-SPEC-001-PRF-160042B and the contract.
- b. Ensure that the inspection and testing facilities provide the environmental conditions required by the tests specified herein.
- c. Ensure that the contractor personnel, test equipment, test facilities, other supporting equipment, spare assemblies and parts, test and data logs, and other items necessary for testing are available for the start and during the required testing events.

3.2.9.5.7 Test Methods

The contractor shall:

- a. Conduct their tests IAW the Government-Accepted TPs document and other Government-accepted test plans.
- b. Document, manage, and apply any changes to the TPs that support the verification of the training device as specified in Specification PMA205-16-CH53E-2F220/2F246-SPEC-001-PRF-160042B.
- c. Develop the TPs so that a qualified technician can perform the tests.
- d. Include the Mission Validation Testing (MVT) Mission Exercises in the TP as determined and agreed upon in the T&E WIPT.
- e. Provide an automated means for data collection, when two or more quantitative readings are required simultaneously.
- f. Receive authorization from the T&E WIPT when automated data collection is not possible.
- g. Only use calculations, extrapolations, and or other mathematical processing to arrive at the expected test results if authorized by the T&E WIPT.

3.2.9.5.7.1 Test Documentation

The BCU GFI List and contract contains the TPs, from Device 2F220, 2F239, and 2F174-1, as a reference. The contractor shall:

- a. Document, manage, and apply any changes to the Government-furnished TPs.
- b. Prepare and deliver the TPs. (CDRL A006).
- c. Prepare and deliver the Test/Inspection Report (TIR). (CDRL A007).

3.2.9.5.8 Test Criteria

The BCU GFI List and contract contains the Trainer Criteria Report, from Devices 2F220 and 2F239, as reference. The contractor shall:

- a. Use test criteria for tests and examinations that include both quantitative and qualitative performance data of the operational system(s).
- b. Use quantitative test criteria to the maximum extent practicable.
- c. Use qualitative data such as video, photographs, and tape recordings, obtained from operational system or subsystem performance, may be used as test criteria whenever quantitative test criteria is not practical or is not measurable, and the requirement for simulation or stimulation realism can only be judged qualitatively.
- d. Request Government authorization to use test criteria that are not based on actual operational system performance data.
- e. Use test criteria for individual inspections, analyses, demonstrations, and tests consisting of both quantitative and qualitative test criteria where appropriate.
- f. Provide qualitative comparisons of visual, video, and aural presentations as a complement to quantitative test results.
- g. Obtain the criteria to be utilized in determining acceptability of the flight characteristics directly or calculated from design basis aircraft flight test data. If flight data is neither available nor obtainable from the aircraft, the contractor may use supplemental data from a like aircraft as test criteria, if authorized by the T&E WIPT.
- h. Document, manage, and apply any changes to the Government-furnished TCR.
- i. Prepare Aircraft Trainer Criteria Report (TCR) IAW the CDRL (A008).

3.2.9.5.9 Tolerance Data

The contractor shall:

- a. Identify and document the test tolerances for the test criteria and the source from which the specified tolerances are derived.
- b. Derive specified tolerances from the trainer specification, design criteria reports, manufacturing criteria, and operational equipment data.

3.2.9.5.10 Alignment

The contractor shall perform the necessary equipment alignments prior to the initiation of each increment of the T&E program.

3.2.9.5.11 Testing Interruptions due to Safety Concerns

The contractor shall:

- a. Stop testing when anyone raises a safety concern and report safety concerns to the Test Director (TD) and entire test team.
- b. Resume testing after requesting and receiving concurrence from the Government TD that the safety concern has been cleared.

3.2.9.5.12 Testing Suspension

The contractor shall:

- a. Suspend a test phase if the severity of the DRs cause the trainer system or subsystems to be unusable/un-testable and/or inoperative for a duration as determined by the Government TD.
- b. Use the following guidelines to determine if the test event should be suspended:
 - (1) Part I DR that is terminal: Does the deficiency preclude further testing of the trainer such that the problem requires correction prior to continuation of testing?
 - (2) Numerous Part I and/or Part II DRs: Does the accumulation of major deficiencies affect functionality in numerous areas of the trainer? Do the problems interrupt executions of the test to the point that time would be better spent evaluating trainer issues than to continue testing?
 - (3) Excessive Total DRs: Does the total quantity of all DRs (Parts I/II/III) degrade trainer operation to the extent that testing or training cannot proceed uninterrupted without an excessive amount of workarounds?

3.2.9.5.13 Test Log

The contractor shall:

- a. Prepare and maintain a log of subsystem and system tests.
- b. Begin the entries of the test log at the start of contractor and subcontractor engineering verification testing and continue until the completion of testing.
- c. Include, by date, equipment adjustments, modifications, failures, removal, replacements, and scheduled and unscheduled maintenance in the test log.
- d. Make the test log available, at any time, to the Government technical representative upon request.

3.2.9.5.14 Regression Testing

The contractor shall:

- a. Attend and participate in the Government regression testing when there is a need to verify that a change made to the trainer hardware or software, during or after the test phase, has not inadvertently affected trainer functionality.
- b. Conduct regression testing IAW the full or modified Government approved TPs.
- c. Attend and participate in the Government regression testing, unless a Government technical representative determines that such changes have not invalidated the related test data.
- d. Attend and participate in the Government regression testing at the following times:
 - (1) When a new software load is installed.
 - (2) To verify DR corrections.
 - (3) When the trainer load/disks are rebuilt from source code (cold start).
 - (4) When reverting to a previous baseline.
 - (5) When a hardware change has the potential to affect complex interfaces in an unpredictable way.
 - (6) When the Government needs to verify that the trainer software baseline has not been corrupted.

3.2.9.5.15 Software and Hardware Changes During Government Testing

The contractor shall:

- a. Obtain Government authorization prior to making changes to software baselines during Government and Integrated test events.
- b. Maintain configuration control of software baselines used during Government testing.
- c. Demonstrate to the Government that proposed software baseline changes are supported by contractor regression testing.
- d. Obtain Government authorization prior to making hardware changes to the trainer during Government and Integrated test events.

3.2.9.5.16 T&E Deficiency Reporting System

The contractor shall:

- a. Implement a deficiency reporting system for tracking (identification, assignment, status, progress, resolution of) hardware and software problems, anomalies, discrepancies, deficiencies, software crashes, lockups, and specification nonconformance discovered during the T&E Program Components.
- b. Utilize the deficiency reporting system to track documentation problems including technical documentation and data errors.
- c. Utilize a System Trouble Reports (STRs) system during Hardware-Software Integration (HSI), Production, and all test phases.
- d. Provide the Government with their definitions for STRs, categories and priorities for concurrence on suitability for the program.
- e. Document and record mission related deficiencies as government DRs Part I through Part III and have them categorized through the Deficiency Review Board (DRB).
- f. Identify Government documented DRs in their reporting system to include any corresponding STR number when generated.
- g. Make its STR/DR tracking system remotely accessible, viewable, and searchable from a Government Navy-Marine Corps Intranet (NMCI) computer.
- h. Provide select Government T&E WIPT personnel writeable access to the contractors tracking system.
- i. Ensure each corrected DR and STR are signed-off by its originator or the originator's designated representative and the Government Test Director (TD) or the Test Director's designated representative.
- j. Obtain final adjudication authority of all DRs and STRs from the Government Program Manager (PM).
- k. Provide a STR/DR tracking system that includes at a minimum:
 - (1) DR/STR Number
 - (2) Status (Open, Closed, No Planned Correction, Out of Scope, etc.)
 - (3) Description
 - (4) Rated for severity
 - (5) Test Section, if applicable
 - (6) Impact to Mission recorded, if any

(7) Intention to Correct

(8) Correction Plan (to include timing), if applicable

3.2.9.5.17 Deficiency Review Board (DRB)

The contractor shall:

- a. Participate in DRB meetings as determined by the T&E WIPT.
- b. Assign personnel to participate in the DRB after contract award.
- c. Record the results of the DRB in the Program STR/DR tracking system.
- d. Defer to Government Assistant Program Manager for Test and Evaluation (APMT&E), USMC Aviation Training Systems, for final authority on STR and DR severity classification in the event the Government T&E WIPT and contractor disagree on the severity classification.

3.2.9.5.18 STR/DR Adjudication

The contractor shall:

- a. Correct all program STRs and DRs prior to proceeding into the next program test phase, unless adjudicated by the Government Program Manager (PM).
- b. Obtain authority from the Government PM to either correct the elevated STRs and DRs, accept the STR/DR with no planned correction, or defer the risk for future action.

3.2.9.5.19 T&E Program Components

The contractor shall structure the T&E program that consists of the following components.

3.2.9.5.19.1 Device 2F220 T&E Components

3.2.9.5.19.1.1 DT-C1 (Device 2F220)

The contractor shall:

- a. Perform DT-C1 IAW the updated TPs and other Government-accepted test plans.
- b. Conduct the tests incrementally under the direction of the contractor's QMS representative.
- c. Certify by signature that the specific test(s) have been completed and the documented results are correct and comply with the requirements specified in Specification PMA205-16-CH53E-2F220/2F246-SPEC-001-PRF-160042B.
- d. Completely run the updated TPs from start to finish.
- e. Document that the TPs have been run start-to-finish as a complete test, without segregation of elements of individual tests, prior to TRR.
- f. Annotate in the TPs, procedural changes made as a result of DT-C1 and shall provide a copy of the annotated TPs to the Government prior to TRR.
- g. Document the DT-C1 results in the Test/Inspection Report.
- h. Record tests results that do not comply with specification requirements as deficiencies.
- i. Correct the deficiencies found during DT-C1 prior to the commencement of IT-C1 and run regression testing.

j. Present the documented DT-C1 results, including open deficiencies, to the Government, on an incremental basis at the next scheduled T&E WIPT meeting, and in final total form prior to TRR.

3.2.9.5.19.1.2 Test Readiness Review (Device 2F220)

a. TRR will be conducted by the Government, following completion of DT-C1 and after the TRR entry criteria have been met.

b. The contractor shall provide the resources, including facilities, equipment, and personnel to support the TRR.

c. The contractor shall include in the TRR a review of the T&E program, including the test results, presentation of contractor certification of test readiness, and STR/DR status.

d. The contractor shall repeat the TRR until the trainer has been determined by the Government to be acceptable for commencement of IT-C1.

e. The contractor shall attain Government approval for the closure of the TRR when all RFAs are signed off and an acceptable level of program risk is ascertained.

f. The contractor shall review the following during the TRR:

(1) Installation and check out process to show system is integrated, operational and ready for test

(2) Detailed resourced test schedule

(3) Trainer TPs

(4) Updated RTVM to verify specification requirements have been tested

(5) Recorded R&M data

(6) The contractor's test log

(7) DT-C1 test results, STRs, and DRs

(8) Summary of device STRs and DRs including current status and/or adjudication decision

(9) Test discrepancy reporting process and applicable test discrepancy report form to be used during IT-C1.

(10) Identification of software test tools to be used during IT-C1

(11) Summary of software problems status

(12) Status of spare capacities, such as CPU (timing), memory capacity, and disk storage

(13) Cold start procedures

(14) Complete installation procedures

(15) Complete firmware configuration procedures

(16) Complete cold start, installation, and firmware configuration procedure execution

(17) MVT Mission exercises

(18) Logistic Support

3.2.9.5.19.1.2.1 TRR Entry Criteria (Device 2F220)

The contractor shall attain Government concurrence that the following TRR entry criteria have been met prior to convening TRR:

- a. Updated TP.
- b. The DT-C1 tests have been run as evidenced by the existence of contractor test logs, TP execution entries, and related DR records.
- c. Complete the government led execution of the cold start, installation and firmware configuration procedures, and provide the documented step by step results.
- d. There is documented evidence that demonstrates that a complete run of the Government-Accepted TPs have been accomplished from start to finish during DT-C1, without segregation of elements of individual tests.
- e. All DRs & STRs not corrected have been adjudicated by the Government PM.
- f. The above documents and data are available prior to the start of the TRR.
- g. CDRL items scheduled to be delivered prior to TRR have been delivered IAW CDRL requirements.

3.2.9.5.19.1.2.2 TRR Completion Criteria (Device 2F220)

The contractor shall attain Government concurrence that the following TRR completion criteria have been met:

- a. Contractor's test logs and records demonstrate that a complete run of the TPs have been executed for DT-C1.
- b. The Integrated Test Team has been identified to include applicable personnel names and functions for team members involved in testing.
- c. Contractual CM processes have been followed, and contractor generated CM logs are available for Government review/inspection;
- d. Baseline configuration has been established;
- e. System crashes have been recorded denoting cause of each crash and recovery time measured from system crash to resuming testing;
- f. The contractor has demonstrated that the test equipment needed to execute the complete TP was used, functions properly, is in calibration, and is currently available and working.
- g. The contractor's QA representative has certified in writing that contractor testing has been completed and that the trainer is ready for Government testing.
- h. Agreed plan for integrated testing has been established and TPs have been accepted by the Government.
- i. The contractor's test personnel are available to work with the Government, when required, in the execution of IT-C1.
- j. TP red-lines have been incorporated and the testing documentation is ready for use and annotation of results.
- k. STR/DR database has been setup for tracking deficiencies.

3.2.9.5.19.1.3 IT-C1 (Device 2F220)

The contractor shall:

- a. Commence IT-C1 upon notification by the PCO representative that the TRR completion criteria have been met.
- b. Attend and participate in on-site IT-C1 with the Government team.

- c. Attend and participate in a full execution of the updated TPs and (revised to include corrections made during previous test phases) and other Government-accepted test plans as agreed upon by the T&E WIPT.
- d. Attend and participate in the Mission Validation Testing (MVT) performed with the assigned Government pilots as agreed upon in the T&E WIPT and documented in the updated TPs.
- e. Attend and participate in the Government Cybersecurity verifications performed IAW the verification requirements of Specification PMA205-16-CH53E-2F220/2F246-SPEC-001-PRF-160042B, and the updated TPs.
- f. Attend and participate in the deficiency correction verification and validation activities.
- g. Provide the personnel and equipment necessary to participate in the testing activities.
- h. Correct deficiencies found during IT-C1 and verified by the Government test team prior to Government acceptance of the trainer unless otherwise adjudicated.

3.2.9.5.19.1.3.1 IT-C1 Completion Criteria (Device 2F220)

The contractor shall request and receive Government concurrence that the IT-C1 has been completed by satisfying the following completion criteria:

- a. A cold-start has been successfully performed to establish final software baseline
- b. Cybersecurity verifications have been successfully performed
- c. A complete run of the TPs has been executed and signed off.
- d. STRs and DRs identified have been documented, categorized for severity, and tracked to final resolution (STR/DR sign-off or adjudication)
- e. All STRs and DRs identified during testing that have not been corrected have been adjudicated.
- f. Acceptable regression test series representative of the complete TP (as determined by the T&E WIPT) has been run after the final STR/DR ready for re-test.
- g. Government MVT performed IAW the TP has been performed successfully.
- h. A copy of the final TP test results has been provided with the results recorded in the contractual testing documentation, including date/time of final results, and red-lines.
- i. Any changes to the final TP that affect maintenance and operational procedures have been updated in the appropriate maintenance manuals.
- j. CM baseline (software and hardware) has been maintained throughout STR and DR correction.
- k. CM deficiencies identified during IT-C1 have been corrected or adjudicated.
- l. IT-C1 has demonstrated that the test and support equipment necessary to execute the complete TP testing were used, documented, in calibration, and functioned properly
- m. Required QA standards have been satisfied and achieved.
- n. The contractor's QA representative, contractor's test manager, and Government's test director have signed off testing as complete.

3.2.9.5.19.2 Device 2F246 T&E Components

3.2.9.5.19.2.1 DT-C1 (Device 2F246)

- a. The contractor shall perform DT-C1 IAW the updated TPs and other Government-accepted test plans.
- b. The contractor shall conduct the tests incrementally under the direction of the contractor's QMS representative.
- c. The contractor's QMS representative shall certify by signature that the specific test(s) have been completed and the documented results are correct and comply with Specification PMA205-16-CH53E-2F220/2F246-SPEC-001-PRF-160042B requirements.
- d. DT-C1 shall include a complete run of the updated TPs from start to finish. A PCO representative may witness the performance of DT-C1.
- e. The contractor shall document that the TPs have been run start-to-finish as a complete test, without segregation of elements of individual tests, prior to TRR.
- f. The contractor shall annotate in the TPs, procedural changes made as a result of DT-C1 and shall provide a copy of the annotated TPs to the Government prior to TRR.
- g. The contractor shall document the DT-C1 results in the Test/Inspection Report.
- h. The contractor shall record tests results that do not comply with specification requirements as deficiencies.
- i. The contractor shall correct the deficiencies found during DT-C1 prior to the commencement of DT-C2 and run regression testing.
- j. The contractor shall present the documented DT-C1 results, including open deficiencies, to the Government, on an incremental basis at the next scheduled T&E WIPT meeting, and in final total form prior to TRR.

3.2.9.5.19.2.2 T&E Technical Interchange Meeting (Device 2F246)

The contractor shall:

- a. Conduct T&E TIM for Device 2F246 prior to DT-C2 and after the T&E TIM entry criteria specified herein have been met. The purpose of the T&E TIM is to determine trainer readiness for DT-C2.
- b. Provide the resources, including equipment, and personnel to support the T&E TIM.
- c. Include a review of the T&E program, including the test results, presentation of contractor certification of test readiness, open deficiencies remaining from DT-C1 and a plan and schedule of tests to be conducted.
- d. Present a cross-reference matrix, in contractor's format, to verify that the Specification PMA205-16-CH53E-2F220/2F246-SPEC-001-PRF-160042B requirements have been tested.
- e. Include a contractor-conducted, Government-witnessed demonstration of trainer stability for testing based on a Government cold started version of the contractor software load.
- f. Review the following during the T&E TIMs:
 - (1) Trainer test procedures
 - (2) Updated RTVM to verify specification requirements have been tested.
 - (3) Recorded R&M data

- (4) Contractor test log
- (5) DT-C1 test results and deficiencies.
- (6) Test discrepancy reporting process and applicable test discrepancy report form to be used during DT-C2.
- (7) Identification of software test tools to be used during DT-C2.
- (8) Summary of software problems status.
- (9) Status of spare capacities, such as CPU (timing), memory capacity, and disk storage.
- (10) Cold start procedures
- (11) Test schedule
- (12) Planned test activities and Mission exercises
- (13) Resources required
- (14) Logistic Support

3.2.9.5.19.2.2.1 T&E TIMs Entry Criteria

The contractor shall attain Government concurrence that the following T&E TIMs entry criteria have been met prior to convening TRR:

- a. Updated TP.
- b. The DT-C1 tests have been run as evidenced by the existence of contractor test logs, TP execution entries, and related DR records.
- c. There is documented evidence that demonstrates that a complete run of the Government-Accepted TPs has been accomplished from start to finish during DT-C1, without segregation of elements of individual tests.
- d. The above documents and data are available prior to the start of the T&E TIMs.
- e. All DRs and STRs not corrected have been adjudicated by the Government PM.
- f. CDRL items scheduled to be delivered prior to T&E TIMs have been delivered IAW CDRL requirements.

3.2.9.5.19.2.2.2 T&E TIMs Completion Criteria

The contractor shall attain Government concurrence that the following T&E TIMs completion criteria have been met:

- a. Contractor's test logs and records demonstrate that a complete run of the TPs have been executed for DT-C1.
- b. The Integrated Test Team has been identified to include applicable personnel names and functions for team members involved in testing.
- c. Contractual CM processes have been followed, and contractor generated CM logs are available for Government review/inspection;
- d. Baseline configuration has been established;
- e. System crashes have been recorded denoting cause of each crash and recovery time measured from system crash to resuming testing;
- f. The contractor has demonstrated that the test equipment needed to execute the complete TP was used, functions properly, is in calibration, and is currently available and working.

- g. The contractor's QA representative has certified in writing that contractor testing has been completed and that the trainer is ready for Government testing.
- h. Agreed plan for integrated testing has been established and TPs have been accepted by the Government.
- i. The contractor's test personnel are available to work with the Government, when required, in the execution of DT-C2.
- j. TP red-lines have been incorporated and the testing documentation is ready for use and annotation of results.
- k. STR/DR database has been setup for tracking deficiencies.

3.2.9.5.19.2.3 DT-C2 (Device 2F246)

The contractor shall:

- a. Request and receive notification by the PCO representative that the completion criteria for the T&E TIM have been met prior to commencement of DT-C2.
- b. Attend and participate in DT-C2 with the Government test team.
- c. Attend and participate in the DT-C2 test phase that will be conducted IAW the updated TPs (revised to include corrections made during DT-C1).
- d. Attend and participate in the MVT performed with the assigned Government pilots as agreed upon in the T&E WIPT and documented in the updated TPs.
- e. Attend and participate in the Government Cybersecurity verifications performed IAW the verification requirements of Specification PMA205-16-CH53E-2F220/2F246-SPEC-001-PRF-160042B, and the updated TPs.
- f. Attend and participate in the deficiency correction verification and validation activities.
- g. Correct deficiencies found during these tests and participate in the verification of the corrections by the Government test team prior to shipment of the trainer to the installation site, unless otherwise authorized by the Government adjudication authority.
- h. Request and receive an authorization to ship the trainer to the installation site which will be contingent upon notification by the PCO representative that the DT-C2 completion criteria specified below have been met.

3.2.9.5.19.2.3.1 DT-C2 Completion Criteria (Device 2F246)

The contractor shall attain Government concurrence that the following DT-C2 completion criteria has been met for each DT-C2 conducted:

- a. Cold start has been successfully performed to establish the trainer's software baseline configuration to be used for testing.
- b. A complete run of the TP including MVT has been executed and signed off.
- c. SME resources (software, hardware, visual, aircrew, and other required personnel) and test equipment necessary for remaining testing have been identified by name.
- d. Acceptable regression test series representative of the complete TP has been run after the final STR/DR ready for re-test.
- e. Updated tests results have been recorded in the contractual test documentation, including date and time of final results and red-lines.

- f. STRs and DRs have been documented, categorized for severity, and tracked to final resolution (STR/DR sign-off or adjudication).
- g. All STRs & DRs identified during testing that have not been corrected have been adjudicated.
- h. DT-C2 has demonstrated that test equipment needed to execute the complete TP have been used, functions properly, and is currently available, calibrated, and working.
- i. CM baseline (software and hardware) has been maintained throughout STR/DR correction.
- j. CM deficiencies identified during DT-C2 have been corrected or adjudicated.

3.2.9.5.19.2.4 Test Readiness Review (Device 2F246)

- a. TRR will be conducted by the Government, following completion of DT-C2 and after the TRR entry criteria have been met. During TRR, the Government will determine the trainer readiness for IT-C1.
- b. The contractor shall provide the resources, including facilities, equipment, and personnel to support the TRR.
- c. The contractor shall include in the TRR a review of the T&E program, including the test results, presentation of contractor certification of test readiness, and STR/DR status.
- d. The contractor shall repeat the TRR until the trainer has been determined by the Government to be acceptable for commencement of IT-C1.
- e. The contractor shall attain Government approval for the closure of the TRR when all RFAs are signed off and an acceptable level of program risk is ascertained.
- f. The contractor shall include a review of the following during the TRR:
 - (1) Installation and check out process to show system is integrated, operational and ready for test
 - (2) Detailed resourced test schedule
 - (3) Trainer TPs
 - (4) Recorded R&M data
 - (5) The contractor's test log
 - (6) Previous Test phases test results, STRs, and DRs
 - (7) Summary of device STRs and DRs including current status and/or adjudication decision
 - (8) Test discrepancy reporting process and applicable test discrepancy report form to be used during IT-C1.
 - (9) Identification of software test tools to be used during IT-C1
 - (10) Summary of software problems status
 - (11) Status of spare capacities, such as CPU (timing), memory capacity, and disk storage
 - (12) Cold start procedures
 - (13) Installation procedures
 - (14) Firmware configuration procedures
 - (15) Complete cold start, installation, and firmware configuration procedure execution

(16) MVT Mission exercises

(17) Logistic Support

3.2.9.5.19.2.4.1 TRR Entry Criteria (Device 2F246)

The contractor shall attain Government concurrence that the following TRR entry criteria have been met prior to convening TRR:

- a. Updated TP
- b. The DT-C2 tests have been run as evidenced by the existence of test logs, TP execution entries, and related DR records.
- c. Complete the government led execution of the cold start, installation and firmware configuration procedures, and provide the documented step by step results.
- d. There is documented evidence that demonstrates that a complete run of the updated TPs have been accomplished from start to finish during DT-C2, without segregation of elements of individual tests.
- e. All DRs & STRs not corrected have been adjudicated by the Government.
- f. The above documents and data are available prior to the start of the TRR.
- g. CDRL items scheduled to be delivered prior to TRR have been delivered IAW CDRL requirements.

3.2.9.5.19.2.4.2 TRR Completion Criteria (Device 2F246)

The contractor shall attain Government concurrence that the following TRR completion criteria have been met:

- a. Contractor's test logs and records demonstrate that a complete run of the TPs have been executed for DT-C2.
- b. The Integrated Test Team has been identified to include applicable personnel names and functions for team members involved in testing.
- c. Contractual CM processes have been followed, and contractor generated CM logs are available for Government review/inspection;
- d. Baseline configuration has been established;
- e. System crashes have been recorded denoting cause of each crash and recovery time measured from system crash to resuming testing;
- f. The contractor has demonstrated that the test equipment needed to execute the complete TP was used, functions properly, is in calibration, and is currently available and working.
- g. The contractor's QA representative has certified in writing that contractor testing has been completed and that the trainer is ready for Government testing.
- h. Agreed plan for integrated testing has been established and TPs have been accepted by the Government.
- i. The contractor's test personnel are available to work with the Government, when required, in the execution of IT-C1.

j. TP red-lines have been incorporated and the testing documentation is ready for use and annotation of results.

k. STR/DR database has been setup for tracking deficiencies.

3.2.9.5.19.2.5 IT-C1 (Device 2F246)

The contractor shall:

- a. Commence IT-C1 upon notification by the PCO representative that the TRR completion criteria have been met.
- b. Attend and participate in on-site IT-C1 with the Government team.
- c. Attend and participate in a full execution of the updated TPs and (revised to include corrections made during previous test phases) and other Government-accepted test plans as agreed upon by the T&E WIPT.
- d. Attend and participate in the Mission Validation Testing (MVT) performed with the assigned Government pilots as agreed upon in the T&E WIPT and documented in the updated TPs.
- e. Attend and participate in the Government Cybersecurity verifications performed IAW the verification requirements of Specification PMA205-16-CH53E-2F220/2F246-SPEC-001-PRF-160042B, and the updated TPs.
- f. Attend and participate in the deficiency correction verification and validation activities.
- g. Provide the personnel and equipment necessary to participate in the testing activities.
- h. Correct deficiencies found during IT-C1 and verified by the Government test team prior to Government acceptance of the trainer unless otherwise adjudicated.

3.2.9.5.19.2.5.1 IT-C1 Completion Criteria (Device 2F246)

The contractor shall request and receive Government concurrence that the IT-C1 has been completed by satisfying the following completion criteria:

- a. A cold-start has been successfully performed to establish final software baseline
- b. Cybersecurity verifications have been successfully performed
- c. A complete run of TPs have been executed and signed off.
- d. STRs and DRs identified have been documented, categorized for severity, and tracked to final resolution (STR/DR sign-off or adjudication)
- e. All STRs and DRs identified during testing that have not been corrected have been adjudicated
- f. Acceptable regression test series representative of the complete TP (as determined by the T&E WIPT) has been run after the final STR/DR ready for re-test.
- g. Government MVT performed IAW the TP has been performed successfully.
- h. A copy of the final TP test results has been provided with the results recorded in the contractual testing documentation, including date/time of final results, and red-lines.
- i. Any changes to the final TP that affect maintenance and operational procedures have been updated in the appropriate maintenance manuals.

- j. CM baseline (software and hardware) has been maintained throughout STR and DR correction.
- k. CM deficiencies identified during IT-C1 have been corrected or adjudicated
- l. IT-C1 has demonstrated that the test and support equipment necessary to execute the complete TP testing were used, documented, in calibration, and functioned properly
- m. Required QA standards have been satisfied and achieved
- n. The contractor's QA representative, contractor's test manager, and Government's test director have signed off testing as complete.

3.2.9.5.20 Configuration Audits

The contractor shall participate in all audits identified in the approved Configuration Audit Plan CDRL (B007) and as described below.

3.2.9.5.20.1 Functional Configuration Audit (FCA)

The objective of the FCA is to verify the CI's and system's performance against its approved functional and allocated configuration documentation. The software CI (or CSCI) FCA ensures that all requirements have a related test step, and the test, as performed by test engineers, passes successfully. The contractor shall:

- a. Conduct the FCA to verify that the CI meets its performance requirements as documented in the approved Functional Configuration Documentation (FCD) and Allocated Configuration Documentation (ACD).
- b. Use test data from the verification of the CI for the FCA.
- c. Provide the FCA minutes to include the requirements traceability and test matrix.

3.2.9.5.20.2 Physical Configuration Audit (PCA)

The purpose of the PCA is to provide assurance to the Government that the product configuration documentation (including CAD models, drawings and software source code) accurately reflects the validated product, and the documentation is a clear, complete and accurate representation of the intended design and to establish the final product baseline. The Contractor and Government conducts a PCA to examine the as-built configuration of a validated CI, comparing results against its design documentation plus any approved changes. The software PCA is completed prior to performing a software build, and is witnessed by the Government. This would include verifying all software updates have been applied, as listed on the problem reports for this build. Each PCA non-compliance identified during the audit is documented by CM and evaluated by the project lead for appropriate action. The contractor shall:

- a. Attend and participate in the PCA to verify that the Product Configuration Documentation (PCD) is consistent with the validated CI.
- b. Conduct a final system-level PCA to ensure the system Product Baseline (PBL) is correct when conducting incremental PCAs (IPCA).
- c. Attend and participate in an IPCA to be conducted in the contractor's facility following DT-C1 for device 2F246.
- d. Correct all deficiencies prior to commencement of DT-C2 for device 2F246.

- e. Attend and participate in an IPCA to be conducted on site following DT-C1 for device 2F220.
- f. Correct all deficiencies prior to commencement of IT-C1 for device 2F220.
- g. Prepare Configuration Audit Summary Report consisting of the applicable audit action items and discrepancy.
- h. Prepare a detailed configuration audit summary report after successful verification of the completed action items has been conducted.
- i. Correct deficiencies recorded by the Government during final PCA prior to the signing of the DD-250.
- j. Prepare and deliver to the Government a completed configuration audit summary report IAW CDRL (B008).

3.2.10 Integrated Logistics Support (ILS) Program

The contractor shall:

- a. Establish, implement, and manage a comprehensive ILS program.
- b. Establish and manage the ILS IPT.
- c. The ILS IPT meetings are the forum for discussion, coordination, and resolution of sustainment data, goals, strategy, and issues.
- d. Ensure that the ILS program provides technical support data, commercial documentation for Commercial Items, spares, Tools and Test Equipment (T&TE), provisioning and ISI, TD, inventory management and documentation, training and training documentation, Contractor Field Support (CFS), and related support elements needed to maintain and operate the training system.
- e. Ensure that the ILS program includes a total maintenance and support capability for the training systems by the Government.
- f. Provide details on the progress and status of the ILS program at each scheduled Program Review.

3.2.11 Provision Items

The contractor shall provide logistics support in the form of Logistics Product Data (LPD) and Buy-Through-The-Prime (BTTP) items per the following requirements.

3.2.11.1 Logistics Product Data

The contractor shall:

- a. Prepare and deliver the product data for the items that will be identified during the PISC and included in Logistics Product Data IAW the CDRL (C001).
- b. Ensure that the Initial Support Items List (ISIL) contains all ISI required to maintain the training devices in an operational condition for a period of five years.
- c. Certify that the LPD Products are accurate at the time of submission.

3.2.11.2 Engineering Data for Provisioning

The contractor shall:

- a. Prepare and develop Engineering Data For Provisioning (EDFP) IAW the CDRL (C002).

- b. Ensure that the EDFP contains all engineering data required to maintain and/or replace the items selected.
- c. Certify that the EDFP products are accurate at the time of submission.

3.2.12 Technical Data Package (TDP)

The contractor shall:

- a. Develop the TD package consisting of all documentation and drawings required to operate, repair, and modify the training system consistent with the Government's maintenance concept.
- b. Provide other relevant technical support data to support and maintain the training device configuration.
- c. Prepare and deliver the below documentation:
 - (1) Product Drawings/Models and Associated Lists (PDAL) IAW the CDRL (E001).
 - (2) Operation and Maintenance (O&M) Manual IAW the CDRL (E002).
 - (3) Planned Maintenance System (PMS) IAW the CDRL (E003).
 - (4) Commercial Off-the-Shelf (COTS) Manuals and Associated Supplemental Data IAW the CDRL (E004).
 - (5) Training Systems Support Document IAW the CDRL (F001).

3.2.13 Training Program

The contractor shall produce the Instructor/Operator and Maintenance Training Courses IAW the following requirements.

3.2.13.1 Instructor/Operator Training Course(s)

The contractor shall:

- a. Prepare and present a 20-hour Instructor/Operator training course on the complete functionality, utilization, and operation of the device.
- b. Conduct training at all trainer installation sites prior to device acceptance. Training will take place at a time mutually agreed upon between the Government and the contractor.
- c. Use the Training Systems Support Document (TSSD) as a controlling document for the training courses.
- d. Provide a course instructor who has been a member of the team that developed the training documentation and is fully knowledgeable of all training device technical data.
- e. Provide courses that are a combination of classroom (25 percent) and hands-on training (75 percent) for a maximum of eight (8) Government-designated instructor personnel for each course.
- f. Provide an I/O training course that shall enable Government-designated personnel to obtain the necessary skills and level of proficiency to safely operate the device at its maximum training capacity for up to eight (8) hours per day, five (5) days per week, consistent with the training schedule established by the on-site operations officer.
- g. Present course materials and structure to the ILS IPT at least 30 days prior to course.

3.2.13.2 Maintenance Training

The contractor shall:

- a. Prepare and present a 20-hour Maintenance training course to train the maintainers on the corrective and preventative maintenance requirements of the device.
- b. Conduct training at all trainer installation sites prior to device acceptance. Training will take place at a time mutually agreed upon between the Government and the contractor.
- c. Use maintenance documentation and content coordinated during the ILS IPT as the controlling documents for the training courses.
- d. Provide a course instructor that who has been a member of the team that developed the training documentation and be fully knowledgeable of all training device technical data.
- e. Provide courses that are a combination of classroom (25 percent) and hands-on training (75 percent) for a maximum of six (8) Government designated maintenance personnel for each course.
- f. Provide a maintenance training course that shall enable Government designated personnel to obtain the necessary skills and level of proficiency to safely maintain the device in an operational state of readiness for up to eight (8) hours per day, five (5) days per week, consistent with the training schedule established by the on-site operations officer or other assigned authority.
- g. Present course materials and structure to the ILS IPT at least 30 days prior to course.

3.2.14 Maintenance Planning

The contractor shall:

- a. Perform maintenance planning to ensure that the trainer equipment and deliverable Training Device is supported using the levels of maintenance.
- b. Document maintenance requirements in the TDP.
- c. Have a device maintenance concept that provides optimum mission operability with minimum maintenance interruptions.
- d. Use Daily Operational Readiness Test (DORT), Built-in Test (BIT), computer diagnostics, standard test equipment, and Commercial Item support products, along with the O&M Manual and maintenance related drawings to verify the operational status of the device and to facilitate rapid fault detection, isolation, and repair of failed systems.

3.2.15 Inventory Management

The contractor shall:

- a. Establish, update and maintain records of all deliverable equipment, software, documentation, support items, spare and repair parts, and other items that are delivered as part of or with the training device for inventory control.
- b. The contractor shall prepare the Training Device Inventory Checklist/Record (TD ICL/R) IAW the CDRL (D001).

3.2.16 Interim Contractor Support (Option)

The contractor shall:

- a. Provide 30 calendar days of On-Site Logistics Support following successful completion of the FPCA and 5 months of On-Call Engineering Services.
- b. Document all support provided during ICS periods and prepare the Training Device Interim Support Report (TDIR) IAW the CDRL (D002).

3.2.16.1 On-Site Logistics Support

The contractor shall:

- a. Provide On –Site Logistics Support to support the maintenance personnel with unforeseen difficulties, help collect data for tuning of supply support, and to ensure that the training devices remain in an operable condition during support period.
- b. Provide ICS representatives to:
 - (1) Have an in-depth knowledge of the training device and engineering and maintenance support.
 - (2) Track and report the work accomplished, malfunctions encountered, time spent, materials used and problem areas encountered.
 - (3) Be trained in electronics systems troubleshooting and operation, be thoroughly familiar with and qualified in the operation and maintenance of the training system, and be knowledgeable of the trainer system programming, software, and hardware for the entire trainer.
 - (4) Have direct access to engineering and logistics personnel at the contractor's facility to assist in diagnosis of problems, provisioning of parts, and repair of defective hardware.
 - (5) Be available 8 hours per day, five days per week coordinated with the local activity.
 - (6) Provide on-site software maintenance support for the correction of trainer software errors.
 - (7) Provide continuing analysis of maintenance difficulties and advice on the establishment of maintenance, inspection, and training programs.
 - (8) Support the government maintenance activity in the performance of preventive maintenance on the trainers IAW procedures outlined in the technical documentation.
 - (9) Advise and support instructors/operators to enable console operators to gain a working knowledge of the instructor console modifications and applicable display page changes.
 - (10) Provide technical and advisory support to the assigned Government/contractor personnel and emphasize safety precautions.
 - (11) Provide on-the-job training, over-the-shoulder training, and other support to the training device maintenance and operating personnel on the use and maintenance of the training system, support equipment, special tools, and test equipment. Emphasis shall be placed on safety, troubleshooting, alignment, adjustment, and inspection procedures of the training system.
 - (12) Verify all trainer technical documentation for technical errors, omissions, and other deficiencies. Comments, redlines, and other corrections to documentation shall be submitted to the Government as part of the monthly ICS report.

- (13) Record all scheduled and unscheduled maintenance actions including repair times, preventative maintenance times, troubleshooting times, replaced and repaired parts by part number, consumable materials utilized, training provided, all operational and maintenance errors.

3.2.16.2 On-Call Engineering Services

The contractor shall:

- a. Provide both telephone and Internet support to address technical issues with the training site during device operation time.
- b. Provide a voice mail system outside the device operation times.
- c. Provide ICS personnel during the on-call support period to:
 - (1) Conduct telephone or Internet instructions utilizing the Training Device as the primary text material.
 - (2) Provide guidance in the operation, maintenance, troubleshooting techniques, alignment, diagnostic system operation and interpretation, software regeneration and repair of the trainer.
 - (3) Provide telephone or Internet instructions on the use and maintenance of related support equipment, special tools, and test equipment.
 - (4) Provide continuing analysis of maintenance difficulties and advice on the establishment of maintenance, inspection, and training programs.
 - (5) Provide guidance on safety precautions to be taken in all facets of maintenance and operation of the equipment.
 - (6) Provide on-site assistance to restore the system to an operational condition when a failure occurs and Government maintenance personnel are unable to restore the system to an operational condition.
 - (7) Bring the system to an operational condition within 48 hours after notification of problem.

3.2.17 Facility Requirements

The contractor shall perform activities associated with trainer installation and the facilities per the following requirements.

3.2.17.1 Site Survey and Analyses

The contractor shall:

- a. Conduct an Engineering Site Survey (ESS) of each designated training device installation location that includes the facility information necessary for initiating the trainer design, the documented coordination with the Government representatives, the documented pre-installation facility conditions and the recommendations for a successful training device installation.
- b. Collect detailed site data for the training device to ensure that the trainer can properly interface with existing GFF during the ESS.
- c. Determine if any facility modifications are necessary and report them via the Trainer Facilities Report (TFR).

- d. Acknowledge that any required GFF modifications are limited to those defined by the Government as "equipment installation" modifications per OPNAVINST 11010.20H Paragraph 4.b.
- e. Make every effort to minimize the degree of modification to the current facilities and shall make no modifications without the consent of the Contracting Officer.
- f. Prepare the TFR IAW the CDRL (D003).

3.2.17.2 Trainer Installation

The contractor shall:

- a. Off-load, assemble, install, and deliver the new equipment and support systems.
- b. Be responsible for opening, safeguarding, and closing all means of access into the GFF, training device, and equipment during the installation.
- c. Comply with all weight handling operations IAW EM-385-1-1.

3.2.17.3 Trainer Installation Support

The contractor shall:

- a. Be responsible for and provide all support equipment, special handling equipment, data, and qualified maintenance personnel needed to support this effort.
- b. Ensure there is no damage to the equipment during removal, transportation, off-loading, installation, delivery, and test.
- c. Return any damaged equipment or GFF to a serviceable condition.

3.2.18 IUID Assignment

The contractor shall:

- a. Assign an IUID to the training system and a separate IUID to the ISK and record the IUID data into the Wide Area Workflow (WAWF) system (<https://wawf.eb.mil/>) per DFARS 252.211-7003.
- b. Display the IUID barcodes for the training system and ISK IAW the marking requirements of Specification PMA205-16-CH53E-2F220/2F246-SPEC-001-PRF-160042B.
- c. Document the training system IUID barcode, the ISK IUID barcode, and the parts listing capturing ISK range and depth in the Product Drawings/Models and Associated Lists cited in 3.2.2.4.

Appendix A and Definitions

A.1 Definitions

A.1.1 Commercial Item

Commercial Item is defined per the Federal Acquisition Regulations (FAR), Part 2.101, "Commercial Item".

A.1.2 Commercially available off-the-shelf (COTS) item

COTS is defined per the FAR Part 2.101, "COTS".

A.1.3 Deficiency Report (DR) Categories

DRs will be categorized as Part I through Part III. During system level Developmental Testing (DT) in the Conformance Inspections, the Government will assign DR categories as deemed appropriate. The following are the definitions of the DR categories:

A.1.3.1 Part I DRs

A Part I deficiency indicates a severe deficiency, the correction of which is necessary because it adversely affects accomplishment of an operational or mission essential training objective, or jeopardizes safety, security, life cycle support, or other critical training system requirements. Part I deficiencies occur in the following situations:

- a. There is a deviation that exceeds acceptable tolerances in the training device characteristics, response, or functionality when compared to the system being simulated.
- b. The training system causes a negative transfer of skills or the development of habit patterns that would result in an unsafe condition if conducted in the operational environment.
- c. The training system or its subsystems do not provide adequate capability, functionality, or fidelity to accomplish required training objectives.
- d. External and environmental simulations (such as radar, threats, and High Level Architecture) are insufficient to accomplish required training objectives.
- e. The level of performance in the training device consistently exceeds that of the simulated system, or a task workload is excessively low compared to the simulated system.
- f. The reliability, availability, and/or maintainability of the training system are insufficient to support operational readiness.
- g. Excessive instructor or simulator operator compensation is required in order to meet training objectives.
- h. A severe hazard to personnel and/or equipment exists (as defined in OPNAVINST 3750.6R).

A.1.3.1.1 Part I DR Resolution Timing

Part I deficiencies may employ the use of "Stars" (asterisks (*)) to designate a specific recommended time for accomplishment of corrective action. While stars will, by association, be

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a reflection of the relative seriousness of the deficiency, the focus of stars should remain on the timing recommendation.

a. Double Star Part I (Part **I) - Safety critical deficiencies or deficiencies that would preclude or degrade accomplishment of primary or alternate mission(s) to such a degree as to preclude further testing of the system will be assigned a Part **I with recommended correction prior to further testing or next test phase.

b. Single Star Part I (Part *I) - Deficiencies with recommended correction prior to acceptance or delivery of the training system.

A.1.3.2 Part II DR

A Part II deficiency indicates a deficiency of lesser severity than a Part I that does not degrade the training system to a state precluding accomplishment of the training objectives, but correction will result in significant improvement in the training system. Part II deficiencies occur in the following situations:

a. A deviation from the real system's characteristics or functionality is apparent, but does not substantially degrade task performance or prevent achieving training objectives.

b. A deviation from the real system's characteristics or functionality is not apparent and, therefore, requires training evolutions be interrupted in order to describe the correct system functionality and meet required training objectives (instructor or operator compensation or intervention).

c. The training device causes a negative transfer of skills or the development of habit patterns that would adversely affect effectiveness in the operational environment.

d. A routine safety hazard to personnel and/or equipment exists (as defined in OPNAVINST 3750.6).

A.1.3.3 Part III DR

A Part III DR indicates a deficiency that is annoying or requires minimal compensation to overcome. The system fidelity could be improved, but can be tolerated with little or no impact to training objectives. The training device deviates from the real system's characteristics, fidelity, or functionality in a way that is not readily or routinely apparent during training. The training system design meets training objectives and builds the skill sets required for training tasks, but the human-system interface or experience differs from the real system.

A.1.3.4 System Trouble Reporting

STRs identify problems related to verification that the training system is specification compliant. During Hardware/Software Integration, Integrated Test (IT), and Developmental Test (DT) the contractor will utilize a STR system. The contractor's defined STR process will be submitted to the Government T&E WIPT for approval or modification prior to deficiency reporting during H/SI. The following definitions of the STR categories are defined (Reference MIL-STD-498, Appendix C, Figure 5).

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A.1.3.4.1 Priority 1

Priority “1” STR prevents the accomplishment of essential training capability specified by baseline requirements, creates a safety hazard or jeopardizes a critical requirement.

A.1.3.4.2 Priority 2

Priority “2” STR adversely affects accomplishment of essential training capability or Reliability, Availability, or Maintainability (RAM) specified by baseline requirements without acceptable work-around.

A.1.3.4.3 Priority 3

Priority “3” STR adversely effects the accomplishment of essential training capability or Reliability, Availability, or Maintainability (RAM) specified by baseline requirements with a known and acceptable work-around solution.

A.1.3.4.3.1 Acceptable Work Around

“Acceptable Work Arounds” will be reviewed and determined on a case by case basis and will utilize end user input in determining acceptability of the work around.

A.1.3.4.3.2 Chargeable Failures

For STRs/DRs deemed to be a chargeable failure as defined in NAVAIR MCAT System Specification PMA205-16-CH53E-2F220/2F246-SPEC-001-PRF-160042B, rebooting of system computers or restarting the trainers will not be an acceptable work-around.

A.1.3.4.4 Priority 4

Priority “4” STR is an inconvenience or annoyance that does not affect essential training capability, or RAM.

A.1.4 Electromagnetic Environmental Effects (E³)

A.1.4.1 Electromagnetic Environment (EME)

The resulting product of the power and time distribution, in various frequency ranges, of radiated or conducted electromagnetic emission levels which may be encountered by a military force, system, or platform when performing its assigned mission in its intended operation environment.

A.1.4.2 Electromagnetic Compatibility (EMC)

The ability of all equipment and systems to co-exist and operate in their intended operational environments without causing or suffering unintentional performance degradations or harmful reactions as a result of electromagnetic interference.

A.1.4.3 Electromagnetic Interference (EMI)

Any electrical or electromagnetic phenomenon, either natural or synthetic, either radiated or conducted, which results in unintentional and undesirable responses from, or performance-degradation or malfunction of, electronic equipment.

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A.1.4.4 Electrostatic Discharge (ESD)

Static electricity is defined as an electrical charge caused by an imbalance of electrons on the surface of a material. This imbalance of electrons produces an electric field that can be measured ($\geq 35\text{kv}$) and that can influence other objects at a distance. Electrostatic Discharge is defined as the transfer of charge between bodies at different electrical-potentials.

A.1.4.5 Lightning Effects

Lightning is hazardous to systems. Lightning effects can be direct (physical) or indirect (electromagnetic). Direct effects such as burning and eroding, blasting, and structural damage are visible. Indirect effects result from the interaction of the EM-fields with subsystems and equipment within the system.

A.1.4.6 Electrical Bonding

Electrical bonding is the establishment of a low-impedance path between two conductive surfaces. This path may be between two points on a system ground-plane or between ground-references and a component, circuit or structural element.

A.1.5 Government Test Director

The Government Test Director:

- a. Provides technical support at Test and Evaluation (T&E) Working Integrated Product Team (WIPT) meetings, Technical Interchange Meetings (TIMs), and risk management boards.
- b. Provides inputs to trainer TPs.
- c. Conducts on-site testing and test results analysis.
- d. Reviews and provides recommendations for acceptance of contractor-prepared test plans, procedures, and reports.
- e. Monitors and reviews results of BCA/NPE, DT-C1, DT-C2, and IT-C1.
- f. Supports planning, conduct, analysis, and reporting of DT-C2 and IT-C1.
- g. Evaluates training and documentation materials.
- h. Provides progress reports as necessary to the Government Program Management Office.
- i. Identifies deficiencies and generate DRs as appropriate.

A.1.6 Initial Support Kit (ISK)

The ISK includes:

- a. Spares (repairable items) and repair parts that are manufactured, subcontracted, or modified by the prime contractor having the design control responsibility.
- b. Spares that support vendor hardware utilized by the device, which can be procured on the open market or from established sources and for which the prime contractor is not the design activity.
- c. Support items that are not an integral part of the end item, but are required to inspect, test, calibrate, service, repair, or overhaul the end item, which are manufactured, subcontracted, or modified by the prime contractor having the design control responsibility.

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d. Items required for support of the trainer system (excluding common hand tools), which can be procured on the open market or from established sources and for which the prime contractor is not the design activity.

A.1.7 Levels of maintenance

Levels of maintenance to be used in maintenance planning;

a. On-equipment, Organizational Level (O-level) maintenance -- pertains to all training device equipment (Commercial Items, NDI, TPE, and ACOE). O-level maintenance consists of scheduled preventative maintenance and unscheduled corrective maintenance, which is performed on the training device and may employ the device as a maintenance test bed during periods of scheduled maintenance. O-level maintenance includes the following:

- (1) Verify that the training device is ready for training by performing appropriate tests and inspections.
- (2) Isolate training device malfunctions to faulty parts or Line Replaceable Unit (LRU) through the use of General Purpose Electronic Test Equipment (GPETE), computer-based Built-in-Test diagnostics, and maintenance documentation.
- (3) Perform system alignments, adjustments, and calibration.
- (4) Remove and replace faulty modules in a manner that minimizes device downtime by replacing the item with a spare.
- (5) Perform scheduled preventative maintenance and inspections IAW the Planned Maintenance System (PMS).
- (6) Isolate and document software related failures.

b. Off-Equipment, Intermediate level (I-level) maintenance pertains to all unique tools, and unique training device components. I-level maintenance includes the following:

- (1) Commercial Items and NDI - I-level maintenance on Commercial Items is limited to those actions identified by the manufacturer as owner/user maintenance actions and detailed tasks must be included in manufacturer's documentation.
- (2) ACOE - The local Intermediate Maintenance Department (IMD) that supports the operational equipment will support repair of ACOE. Modified operational equipment which can be converted to its original configuration, by device site O-Level maintenance personnel, shall be unmodified prior to turn in to IMD.
- (3) TPE - I-level maintenance of TPE consists of performing fault isolation/location and repair of failed repairable assemblies to the piece part or component level through the use of commercially available miniature electronic repair stations, training device unique and general purpose tools, general purpose electronic test equipment, and engineering drawings. Engineering drawings to support this level of maintenance shall include interface, mechanical, electrical (schematic) and assembly drawings, circuit card assembly electrical run silkscreen drawings, parts lists, and procedures for loading software on Programmable Read Only Memory (PROM), E-PROM, or EE-PROM. All TPE including circuit cards, instruments, and assemblies shall be repairable at this level.

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c. Depot Level (D-Level) maintenance includes repair of all items that cannot be repaired at the O or I-levels of maintenance. For Commercial and NDI items this is optimally performed by the OEM.

A.1.8 Non-Developmental Item (NDI)

NDI is defined per the Federal Acquisition Regulations (FAR), Part 2.101, “NDI”.

A.1.9 Ready for Training

a. Ready for Training (RFT) is defined per OPNAVINST 1500.76C as “The date a training system and its associated logistics, maintenance, syllabus, and instructors are certified to be available for training at the learning facility. This date is predicated on the availability of a new, modified, or rehabilitated learning facility for training purposes. All aspects of the facility must be ready including building completion, completed site preparation, training system installation and testing, trained instructors, furnishings, e.g., non-technical collateral equipment. This is the ultimate planning date for the new, modified, and changed training system and its readiness for use.”

b. Completion of a DD Form 250, Material Inspection and Receiving Report, subject to conditions as determined by the PCO, will be concurrent with the RFT.

A.1.10 Trainer-Peculiar Equipment (TPE)

TPE is:

- a. Training device equipment uniquely developed and manufactured for this program; or
- b. A Commercial item, NDI, GFE, or CAO, that:
 - (1) Needs other than Minor Modification (see FAR 2.101 “Commercial Item” (3), (ii)); or
 - (2) Lacks existing logistics support documentation.

A.1.10.1 Logistics Product Data (LPD) terms

A.1.10.1.1 Provisioning List Item Sequence Number (PLISN)

An alpha numeric sequentially assigned value for each item contained in the system/equipment breakdown (EXAMPLE-A001-Cockpit, B001-Visual, C001-IOS, etc. This alpha numeric format will allow for separate System Sorting.

A.1.10.1.2 Type of Change Code (TOCC)

A required field in the LPD which is blank on initial submissions of provisioning data, and shall be used as a type of change code to indicate deletions, modifications, typographical error, quantity changes (increase, decrease), and limited part applications as follows:

- a. A - Added item.
- b. C - CAGE code change.
- c. D - Indicates a deleted item.

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- d. G - Deletion of a data element.
- e. L - Item is replaced during production and support of the old part may be required for prior production quantities.
- f. M - Indicates a modified item. Required to identify entries for those items changed as a result of either administrative or engineering requirements (not for initial entry of NSN) before or during production.
- g. P - Reference number change.
- h. Q - Used to make quantity field changes.
- i. T - Used to make a typographical error correction.

A.1.10.1.3 Manufacturer's Commercial and Government Entity (CAGE) Code

A five-character code assigned by the Defense Logistics Information Service (DLIS) to the design control activity or actual Manufacturer/Supply Company of an item as contained in the Cataloging Handbook H4/H8 Series.

A.1.10.1.4 Original Equipment Manufacturer's Part Number (OEM/P/N)

The actual Original Equipment Manufacturer's part, model or drawing number used by the manufacturer to identify their item of supply.

A.1.10.1.5 Item Name/Nomenclature

An identifying noun with appropriate adjective modifier, as contained in Federal Item Name Directory for Supply Cataloging, H6-1.

A.1.10.1.6 Quantity Per End Item (QPEI)

The total number of times the line item is used in the complete system/equipment.

A.1.10.1.7 Unit of Issue (UI)

A code that indicates the UI quantity of an item. The UI quantity is the managing activity's established accounting unit, upon which the smallest unit pack is based, or accountable records are maintained and requirements are computed. For applicable codes see DOD 4100.38-M.

A.1.10.1.8 Upgrade

Involves the action of procuring new hardware and software to modernize the trainers. The action is completed when the new hardware and software is installed, integrated and delivered as a complete functional system.

A.1.10.1.9 Unit of Issue Price (UI Price)

The price for one UI of an item.

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A.1.10.1.10 Total Quantity Recommended (TQR)

A recommended quantity of items required to support a specific number of applications for a specific period of time. The applications may be to a weapon system, end item, component, or combinations thereof, which are contained in the applicable contract.

A.1.10.1.11 Total Price

The total price after multiplying the UI Price and the Total Quantity Recommended.

A.1.10.1.12 National Stock Number (NSN)

A number assigned under the Federal Cataloging Program/North Atlantic Treaty Organization (NATO) codification of equipment system to each approved item identification which provides a unique identification of an item of supply within a specified Federal Supply Classification (FSC).

A.1.10.1.13 Long-Lead Item

Any items with delivery date of 6 months or longer from date of order, including all computer systems and display systems repairables.

A.1.10.1.14 Essentiality Code (EC)

A numeric code to indicate the degree to which the failure of the part affects the ability of the end item to perform its intended operation.

- a. (1) - Failure to this part will render the end item inoperable.
- b. (2) - Item does not qualify for the assignment of code 1, but is needed for personnel safety.
- c. (3) - Item does not qualify for assignment of code 1, but is needed for legal, climatic, or other requirements peculiar to the planned operational environment of the end item.
- d. (4) - Item does not qualify for the assignment of code 1, but is needed to prevent impairment of/or the temporary reduction of operational effectiveness of the end item.
- e. (5) - Failure to this part will not render the end item inoperable.

A.1.10.1.15 Part Availability Code

A numeric code showing the manufacturer's estimated time before the part is discontinued and unavailable.

- a. (1) - 1 - 6 months
- b. (2) - 7 - 12 months
- c. (3) - 1 - 2 years
- d. (4) - 2 - 5 years
- e. (5) - Greater than 5 years

A.1.10.1.16 Provisioning Remarks

Narrative clarification of provisioning data.

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A.1.10.2 Computational Subsystem

A Computational Subsystem, also referred to as Computer Subsystem, is a computer that is controlled by internally stored programs and that is capable of using common storage for all or part of a program and also for all or part of the data necessary for the execution of the programs; executing user-written or user-designated programs; performing user-designated manipulation of digitally represented discrete data, including arithmetic operations and logic operations; and executing programs that modify themselves during their execution.

A.1.10.3 Computational System

A Computational System is one or more computational subsystems, their peripheral devices, and network equipment working synergistically to satisfy a set of requirements.

A.1.10.4 Days

All "days" identified in this SOW and CDRL items are "business" days, which are defined as Monday thru Friday, unless otherwise noted.

A.1.11 Baseline Training Devices

A.1.11.1 GFI

GFI includes Contract Data Requirement list (CDRLs) and other documentation listed in the BCU GFI List.

A.1.11.2 GFS

GFS includes software and associated documentation listed in the BCU GFI List.

A.1.11.3 Baseline Training Device (DV 2F220)

A.1.11.3.1 Baseline Training Device hardware

Baseline Training Device hardware is defined as the GFI and GFS listed in this contract. The Baseline Training Device's hardware will be Device 2F220.

A.1.11.3.2 Baseline Training Device software

Baseline Training Device software is defined as the GFI and GFS listed in this contract. The Baseline Training Device's software will be Device 2F239.

A.1.11.4 Baseline Training Device (DV 2F246)

Baseline Training Device is defined as GFI and GFS from DV 2F239.

A.1.11.5 Baseline Update Training Device

Baseline Update Training Device is defined as GFI and GFS from DV 2F174-1.

A.1.11.6 Incremental PCA

Incremental Physical Configuration Audit (IPCA) is a review of the technical documentation and Product Drawings and Associated Lists (PDAL) against the "as-built" training system.