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C4ISR STATEMENT OF OBJECTIVES
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**ATTACHMENT J-9
STATEMENT OF OBJECTIVES FOR IDS C4ISR ASSETS**

1 INTRODUCTION

1.1 SCOPE

This attachment to Section C of the contract applies to any type of work performed on C4ISR Assets. A C4ISR Asset is a set or arrangement of C4ISR components that operate together to function in a desired manner satisfying one or more of the requirements of the System Performance Specification. A C4ISR Asset may encompass hardware and/or software, data, facilities, services, or other possible capabilities, and system functionality as specified in the Contractor's C4ISR Architectures. C4ISR components included within an air, surface or logistics asset may be ordered under that asset's statement of work. In this case, the C4ISR specific requirements will be incorporated or referenced and the C4ISR team will support the development team. C4ISR work may include new hardware and software development and production, upgrade to legacy assets, conversion or major upgrade modification, installation, training, maintenance and repair of all magnitudes, as well as design, engineering and analysis work. The description of scope for each Contractor-developed SOW generated from this SOO shall clearly define the specific products and services to be delivered to the Government as a result of performance of the SOW. Delivery of data may be described by reference to the applicable Contract Data Requirements List (CDRL).

1.2 STRUCTURE OF THIS ATTACHMENT

This attachment is structured such that it is applicable to all types of work as indicated above. There are two main sections to this attachment in addition to this Introduction Section. The General Requirements Section (2) contains tasks required to be performed as a part of task and/or delivery orders for all phases of C4ISR Asset related work. The Asset Phased Procurement Section (3) includes five subsections, each of which invokes the General Requirements Section tasks and further describes the minimum tasks to be performed for sequential acquisition phases as follows:

- Concept & Technology Development (3.1) includes, but is not limited to conducting studies, analysis, and tests where appropriate, of various concept designs alternatives to establish technical feasibility, demonstrating the capability to comply with applicable system performance specifications, requirements and standards, and identifying associated risks with the C4ISR Asset meeting these requirements.
- Development & Demonstration (3.2) includes, but is not limited to detailed design and development, risk reduction, ensuring operational supportability, producibility and affordability, and demonstration of system integration, interoperability, and utility for each C4ISR Asset.
- Production & Deployment (3.3) includes, but is not limited to the development, fabrication, modification, test, qualification and delivery of C4ISR Assets.

- Operations & Support (3.4) includes, but is not limited to execution of supply, maintenance, transportation, sustaining engineering, data management, configuration management, manpower, personnel, training, reliability, safety/occupational health, interoperability, and ILS plans.
- Disposal (3.5) includes, but is not limited to tasks to properly store, preserve, or de-preserve, and dispose of the C4ISR Asset.

The figure below depicts the structure of this attachment and how it relates to the Contractor’s SOW Development process.

C4ISR Asset Statement of Objectives Structure / SOW Development Flow

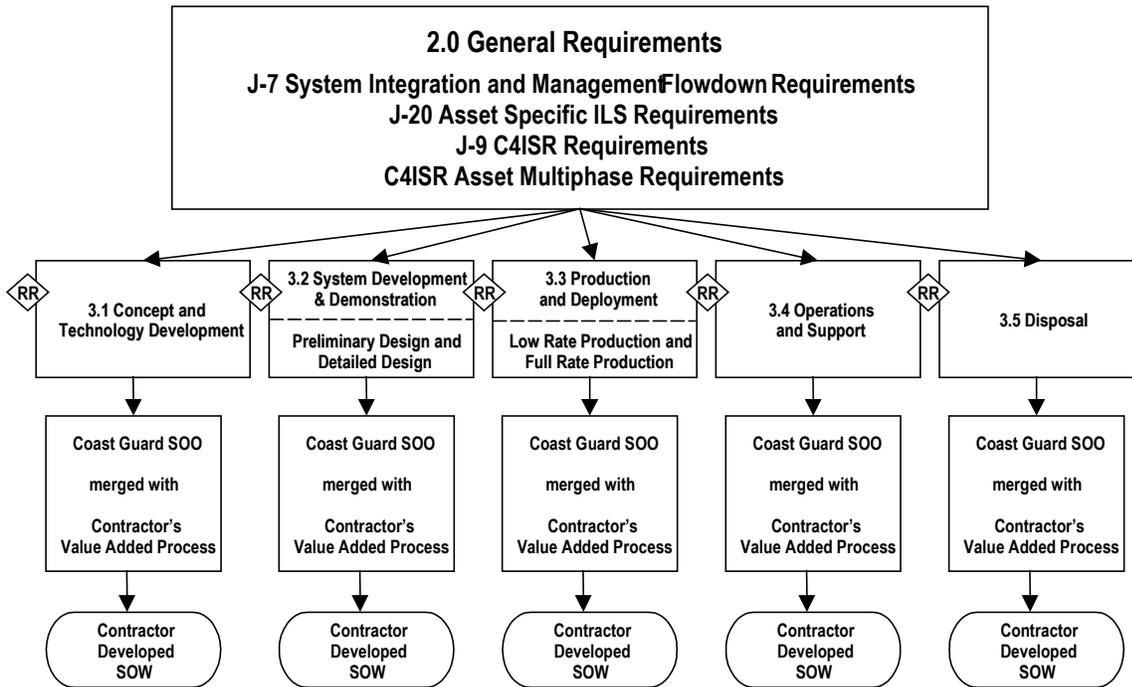


FIGURE J-9-1

2 GENERAL REQUIREMENTS

2.1 PROJECT MANAGEMENT

The Contractor shall perform C4ISR Asset specific project management for each C4ISR Asset in addition to IDS project management. It shall comply with all requirements set forth in section 2.1, including all subsections, of attachment J-7, the statement of work for IDS Systems Integration and Management. In addition, the Contractor shall assign a C4ISR Asset project manager specifically charged with the responsibility to establish, implement and maintain a management system and organization that will plan, organize, control, coordinate and oversee all contract activities relating to the C4ISR Asset task and/or delivery orders. The Contractor shall also fully integrate sub-contractors and vendors to provide overall direction and guidance, track

progress and status, and integrate products and services provided by major sub-contractors and vendors with the products and services provided by the Contractor.

2.1.1 REVIEWS AND AUDITS

The following Task and/or Delivery Order Review and Audit requirements apply in addition to the Post Award Conference, Project Management Review, and Technical Review requirements invoked from section 2.1.9, including all subsections, of attachment J-7, the statement of work for IDS Systems Integration and Management. During each phase of C4ISR Asset related work, the Contractor shall plan and conduct reviews and audits IAW standard acquisition practices. Department of Defense (DoD) 5000.2(series), *Mandatory Procedures for Major Defense Acquisition Programs (MDAPs) and Major Automated Information System (MAIS) Acquisition Programs*, and Chapter 11 of *DSMC Systems Engineering Fundamentals* (http://www.dsmc.dsm.mil/pubs/gdbks/sys_eng_fund.htm) shall be used for guidance. The Contractor shall propose reviews and audits as deemed necessary and implement all reviews and audits in the appropriate phase as determined by the Contractor and approved by the Government.

2.1.1.1 *Design Reviews*

The Contractor shall evaluate the technical progress relative to its technical or contractual requirements. Design Reviews will be conducted at logical transition points in the development effort to identify and correct problems resulting from the work completed thus far before the problems can disrupt or delay technical progress. Design Reviews provide a method for the Contractor and Government to determine that the development of an asset configuration item, which consists of hardware and software configuration items, and its documentation, has met contract requirements. The following Design Reviews may be performed as appropriate:

- a) System Requirements Review (SRR)
- b) System Design Review (SDR)
- c) Software Specification Review (SSR)
- d) Preliminary Design Review (PDR)
- e) Critical Design Review (CDR)
- f) Production Readiness Review (PRR)

2.1.1.2 *Audits*

The Contractor shall conduct audits with Government participation to examine and validate that the development of each configuration item within the asset has achieved the performance and functional characteristics specified. As appropriate, the Contractor shall incorporate the following reviews and audits into the Integrated Master Schedule and the C4ISR System Engineering Management Plan. The Contractor shall perform the following audits, but not limited to:

- a) Functional Configuration Audit.

b) Physical Configuration Audit.

2.2 *QUALITY ASSURANCE*

The Contractor shall provide and maintain a C4ISR Asset specific quality assurance system as part of the IDS quality assurance system. It shall comply with all requirements set forth in section 2.2, including all subsections, of Attachment J-7, the Statement of Work for Systems Integration and Management.

2.3 *DATA MANAGEMENT*

The Contractor shall ensure that all information for C4ISR Asset task and/or delivery orders resides on the Integrated Product Data Environment (IPDE). The Contractor shall use the IPDE as the data repository for all information required by this SOO including design and engineering work, logistics, production, management, and other information which provides insight into the development and management of C4ISR Asset and task and/or delivery orders

2.4 *ENVIRONMENTAL MANAGEMENT*

The Contractor shall establish and implement a C4ISR Asset-specific environmental management program as part of the IDS environmental management program. It shall comply with all requirements set forth in section 2.4, including all subsections, of Attachment J-7, the Statement of Work for Systems Integration and Management.

2.5 *SYSTEMS ENGINEERING*

The Contractor shall establish and implement a C4ISR systems engineering program in accordance with the IDS systems engineering program required in section 2.5, including all subsections, of attachment J-7, Statement of Work for IDS System Integration and Management. In addition, the Contractor shall provide and implement the following:

- A. The Contractor shall provide, and implement an overall C4ISR Systems Engineering Management Plan (SEMP) detailing the common processes for C4ISR Asset design, development, production and life cycle support. The C4ISR SEMP shall include an applicable milestone schedule that is synchronized with the overall event-based IDS Integrated Master Schedule. If the Task or Delivery Order implements multiple C4ISR assets, the C4ISR SEMP will have separate sections that describe the individual C4ISR Asset design plans and procedures. For each C4ISR Asset, the C4ISR SEMP shall indicate the asset (hardware & software) engineering documentation provided with a brief description. The plan shall document the processes or procedures, per task order, to implement the asset's C4ISR architecture through system design, implementation and support. The C4ISR SEMP shall be tailored to the applicable procurement phase.

In the C4ISR SEMP, the Contractor shall identify the specific metrics used to monitor all C4ISR system design and development processes, including designated software development efforts. The Contractor shall propose how the Government and industry team will define, set threshold values for, and report each metric.

The Contractor shall perform a requirements analysis for each C4ISR Asset that includes explicit and derived requirements from the IDS SPS, C4ISR Architectures, as well as asset user requirements. The Contractor shall collect user requirements for C4ISR Asset design and development, and validate these requirements with the Government. The Contractor shall provide a C4ISR Asset Performance Specification to the Government for approval. The intent of the C4ISR Asset Performance Specification is to describe the performance requirements inherent in the C4ISR Asset and its lower level functions and capabilities.

The Contractor shall provide C4ISR Asset Design Documentation which encompasses both software and hardware configuration items for Government review. The documentation shall address design at both the high level IDS and at the detailed level. A system segment is a combination of hardware and software configuration items that can be integrated and tested in small groups. The Contractor's documentation shall include a break down of the asset into system segments that provide further definition of the hardware and software that will be integrated and tested at the lowest level.

- B. The Contractor shall provide and implement a C4ISR Software Acquisition, Development and Integration Plan (SADIP) which implements an incremental software acquisition, development and integration process through each procurement phase. The software acquisition, development and integration process should consider various types of software deliverables, which may include strictly CANDI or GOTS, a combination of upgrades with COTS/GOTS/in-house development, and Contractor developed products. The Contractor's software development process for each software configuration item shall be compatible with the contract schedule for formal reviews and audits.

The Contractor shall also provide in the SADIP, any particular processes and procedures that address software design, development, integration, and testing and evaluation. The processes and procedures may be tailored for each phase of development. The plan will include a description of the software testing activities and use of a software development library for the control of all source code and associated documentation. The plan shall identify interfaces with various existing and future IDS and non-IDS C4ISR systems, subsystem, equipment, and software.

For each C4ISR Asset, the Contractor shall provide a Software Performance Specification to the Government for approval. The Software Performance Specification shall describe the asset's software performance requirements inherent in its functions and capabilities. The Contractor shall maintain cost and schedule forecasts and analyses for each software item. The Contractor shall identify and perform formal qualification tests that comply with the qualification requirements identified in the software performance specification. If applicable, the specification shall also discuss the level of compliance with Defense Information Infrastructure Common Operating Environment Integration and Runtime Specification (DII COE I&RS) Version 3.1.

The Contractor shall provide Software Design Documentation in accordance with the software maturity process and procedures documented in the SADIP, and as specified in the C4ISR SEMP. The Government shall review design documentation and provide timely feedback.

In addition to following the Software Capability Maturity Model processes for level 3, the Contractor and subcontractors shall implement processes compliant with, or equivalent to, the following:

- 1) ISO/IEC 12207, Section 5.3.12, Software Installation, and Section 5.3.13, Software Acceptance Support;
- 2) ISO/IEC 12207, Section 5.3.8, Software Integration, or EIA/IS-731, Focus Area 1.5 Integrate System;
- 3) ISO/IEC 12207, Section 5.5. Maintenance Process;
- 4) IEEE 1012, Verification and Validation of Software.

For ISO/IEC publications go to - (<http://www.iec.ch/webstore/>)

2.6 C4ISR DEVELOPMENT

The Contractor shall develop and/or deliver C4ISR hardware and software conforming to the C4ISR Architecture required in section 2.6, including all applicable subsections, of Attachment J-7, the Statement of Work for Systems Integration and Management.

2.7 LOGISTICS

The Logistics Requirements Matrix contained in Attachment J-20 lists requirements for system and asset level logistics development, design, production, implementation and disposal by ILS element. In developing an asset Statement of Work (SOW) from this SOO, the Contractor shall tailor this matrix for the asset by proposing additions, deletions and modifications consistent with their Asset and IDS ISP, CONOP, IMS/IMP, Implementation Plan, and unique production and support capabilities and processes. The matrix shall identify the asset applicability of, and proposed responsibility for, each requirement in each procurement phase in accordance with the instructions provided in Attachment J-20. The Contractor shall provide this tailored Logistics Requirements Matrix as an attachment to the proposed asset SOW. This attachment shall further include the specific, detailed, and phase-appropriate logistics work task descriptions for all Logistics Requirements Matrix requirements identified as either "Contractor" or "Joint" responsibility in the procurement phase for which the SOW is being developed.

2.8 TEST AND EVALUATION

The Contractor shall establish and implement a specific C4ISR System Test and Evaluation (T&E) program in accordance with all requirements of section 2.8, including all subsections, in attachment J-7, Statement of Work for IDS Systems Integration and Management.

The Contractor shall provide a C4ISR T&E Program Plan (TEPP) for Government review, and update and execute the plan as appropriate. The C4ISR TEPP shall address the requirements contained in J-7. In addition, the Contractor shall address the following subparagraphs:

A. SYSTEM INTEGRATION TESTING

The Contractor shall conduct system testing on integrated hardware and/or software configuration items. Systems integration testing may include multiple C4ISR components, possibly including CANDI with or without developed software, tested in combination that provides functionality or a testable capability.

For software, integration testing shall include levels of Coast Guard Common Operating Environment (CG COE) compliance where Coast Guard-to-Coast Guard interoperability is required, and levels of Defense Information Infrastructure Common Operating Environment (DII COE) compliance where Coast Guard-DOD interoperability is required. The results of these testing efforts shall address the following issues, but not necessarily be limited to:

- a) Integration with other C4ISR systems and IDS assets
- b) Integration with non-IDS Coast Guard assets (e.g. Vessel Traffic System, National Distress Response System, Coastal Patrol Boats, Buoy Tenders, Group Command Centers, etc.)
- c) Integration with DOD assets
- d) Integration with other Government agency assets (e.g. state, local, emergency response, disaster relief, law enforcement, etc.)

B. SYSTEM INTEROPERABILITY TESTING

The Contractor shall conduct Intra-Coast Guard and Inter-Government interoperability testing. The Contractor shall identify a test plan that shows how the C4ISR Asset interoperability performance objectives, compliance goals, standards and benchmarks to be employed will be tested. The results of these testing efforts shall address the following issues, but not necessarily be limited to:

- a) Interoperability with other C4ISR systems and IDS assets
- b) Interoperability with non-IDS Coast Guard assets (e.g. Vessel Traffic System, National Distress Response System, Coastal Patrol Boats, Buoy Tenders, Group Command Centers, etc.)
- c) Interoperability with DOD assets; which encompasses System/Shipboard Operation, Verification, and Test (SOVT) – interoperability testing with surface assets, or Navy carrier battle group/amphibious ready group deploying platforms to include prime Contractor interface with the Naval Sea Systems Command/Space and Naval Warfare Systems Center-Distributed Engineering Plant (DEP).
- d) Interoperability with other Government agency assets (e.g. state, local, emergency response, disaster relief, law enforcement, etc.)

The Contractor shall further identify methods to ensure and measure interoperability between systems. The Contractor shall consider various tools (e.g. DOD's Levels of Information System Interoperability – LISI Inspector Tool) for interoperability analysis and submit plans in the C4ISR System Engineering Management Plan.

C. C4ISR TESTING FUNCTIONS

The Contractor shall consider the following functions when developing and delivering the C4ISR test schedule in the TEPP and IMS:

- a) Incremental testing to satisfy that the schedule is being met;
- b) Stress testing to ensure robustness of the products;
- c) Regression testing to allow testing repeatability;
- d) Configuration management of test procedures and test results;
- e) Interaction with network topology and technical performance requirements.

D. ADDITIONAL C4ISR TESTING CRITERIA

The Contractor shall incorporate the following T&E elements into the C4ISR Asset TEPP:

- a) Electromagnetic Environment Effects (E3) Qualification Testing – ensure system will remain safe and reliable, and operate within specs when exposed to electromagnetic environment.
- b) System Security – including Information Assurance (computer and network based safeguards), cryptographic protection, and certification adherence.
- c) Environmental Qualification Testing (EQT) – ensure system will remain safe and reliable, and operate within specs when exposed to an operating environment.
- d) Independent Verification and Validation (IV&V) – independent testing of software or system products for effectiveness and suitability.
- e) Technical Evaluation – verification of technical performance specifications.
- f) Interface Verification Tests (IVT) – ensure components and system meet specifications for exchange control and data messages without degradation.
- g) Pre-Production and Qualification Testing (PPQT) – ensure design integrity over the specified operational and environmental range (may include Maintainability Demonstration). Also examines the low rate and full rate production decisions to ensure effectiveness of the manufacturing process of system or equipment and procedures.
- h) First Article Test. The Contractor shall conduct First Article Testing (FAT), which is production testing that is planned, conducted, and monitored by the material developer. FAT includes pre-production and initial production testing conducted to ensure the Contractor can furnish a product that meets the established technical performance criteria.
- i) Safety Evaluation Testing - RF emission, Radiation Hazards, emission interference, and other related safety features.
- j) features.

2.9 CONCEPT OF OPERATIONS

The Contractor shall develop and maintain a C4ISR Asset-specific concept of operations reflecting realistic operational deployment. The C4ISR Asset concept of operations shall be consistent with the IDS concept of operations and shall comply with the requirements set forth in section 2.9.3 of Attachment J-7, the Statement of Work for Systems Integration and Management.

2.10 TASK AND DELIVERY ORDER PLANNING AND DEVELOPMENT

Following the initial C4ISR Asset delivery order, the Contractor shall comply with the requirements of the Task and Delivery Order Planning and Development section 2.10, including all subsections, of Attachment J-7, SOW for IDS Systems Integration and Management, to define and plan C4ISR Asset work for the subsequent procurement phase.

2.11 DATABASE DEVELOPMENT

For any IDS database development, the Contractor shall provide a Software Database Specification (SDS), which shall include at a minimum the following: organization of the database by record structure, field tables, storage requirements, and record linkages. The Contractor shall furnish a data model that supports the business rules and the requirements of the database. Entity-Relationship Diagrams (ERDs) shall be provided that show at a minimum the following: entities, relationships, and attributes and their information types. The SDS shall also indicate whether the ERD's are supported and recorded by the technology, utilize business names to support and develop data, capture information that is necessary for the business, and include unique identifiers. The data will be normalized to avoid data duplication, and the data derivation will be driven by the business rules and needs.

The Contractor's data model shall provide physical information that is necessary to create functional database components. The physical information shall include: indicating appropriate keys and necessary indexes, detailing the appropriate data types, and building referential integrity that will ensure data safety and security within the database (e.g. protect the data from corruption or unauthorized access). The model will indicate the database's functional components, consisting of tables, columns, keys, data types, validation, rules, database triggers, stored procedures, domains, and various access constraints that may impose a limit on names throughout the Database Management System (ensures security and data access). The model shall also include technology-specific data elements such as flags, switches, and timestamps, primary keys, foreign keys, and indices for quick and efficient data access.

If applicable, the Contractor shall port existing legacy data and applicable reports to the newly developed database and shall ensure the overall integrity of the database. Furthermore, the Government shall approve any upgrades, changes, and revisions to legacy databases. The Contractor shall execute the associated ISP to provide database maintenance and support functionality.

2.12 CLASSIFIED SYSTEM DEVELOPMENT

The Contractor shall be responsible for ensuring the proper safeguards for development, integration, testing and demonstration of systems which process classified or law enforcement-sensitive information, and for the protection of any classified or sensitive information used for these purposes.

2.12.1 ACCESS TO CLASSIFIED INFORMATION

Contractor access to classified and law enforcement-sensitive information shall be approved and provided by the Government on a situational basis a necessary to develop classified systems, software and interfaces. Contractor personnel requiring access to classified or sensitive information must meet Government standards for such access, including the required personnel background investigations and indoctrination. The Contractor shall be responsible for the cost and administration of security background investigations.

2.12.2 CLASSIFIED FACILITY CERTIFICATION

Classified and law enforcement-sensitive information, and the systems, software and interfaces which process or handle such information, shall only be contained in Contractor facilities already certified for their protection in accordance with the Manual for Physical Security Standards for Sensitive Compartmented Information Facilities, Director Central Intelligence Directive 1/21, and other applicable Government references. The Contractor shall be responsible for the cost, certification and security management of Contractor-owned classified facilities. The Contractor shall ensure that any legacy IDS facilities or assets intended to contain new IDS capabilities shall meet Government security recertification criteria upon installation. The Contractor shall ensure that any new IDS facilities or assets containing classified systems shall meet the Government security certification criteria applicable to the new assets.

The Contractor shall also ensure and demonstrate that the legacy and new facilities and assets containing IDS classified systems meet Government criteria for Information Assurance security certification, including protections against TEMPEST hazards.

2.12.3 CLASSIFIED SYSTEM ARCHITECTURE

The Contractor shall refer to the DoD Joint Technical Architecture, the Maritime Cryptologic Architecture and supporting Government guidance for design standards for classified systems.

2.12.4 CLASSIFIED SYSTEM DEVELOPMENT AND INTEGRATION

Systems, software and interfaces intended to process or handle classified information must be developed and tested according to the DoD Instruction 5002.R series; DoD Information Technology Security Certification and Accreditation Process (DITSCAP) (DoD Instruction 5200.40); Security Requirements for Automated Information Systems (DoD Directive 5200.28); and, other applicable DoD and Coast Guard security instructions. Systems, software and interfaces intended to process or handle law enforcement-sensitive information, including

sensitive information which is not classified under DoD guidance, must meet Coast Guard standards for security certification and protection.

2.12.5 CLASSIFIED SYSTEM TESTING

The Contractor shall ensure that new systems, software and interfaces handling classified or law enforcement-sensitive information meet Government security certification standards and requirements appropriate to the particular classification level of operation as specified by the Coast Guard or other cognizant government authority. The Contractor shall coordinate with the Government's Program Manager to determine the requirements of all classified systems and their impact on facility and asset certification, and provide the Government with a proposed System Security Authorization Agreement (SSAA) for review and approval. The Contractor shall procure assistance services to obtain independent testing and certification of classified systems before and after any IDS system assets are integrated, tested, or demonstrated using classified or sensitive information. The Contractor shall be prepared to demonstrate the intended Information Assurance (IA) design features of all systems, software and interfaces to meet the certification standards specified by the cognizant Government agency. The results of the certification testing will be submitted to the Government to support a recommendation to the Designated Approving Authority (DAA) for an Interim or Final Approval to Operate. The Contractor shall apply the following standards, but not limited to:

- a) National Security Telecommunications and Information Systems Security Instruction (NSTISSI) No. 1000, No. 7000, No. 7001;
- b) National Information Assurance Certification and Accreditation Process (NIACAP);
- c) DoD Information Technology Security Certification and Accreditation Process (DITSCAP) (DoD Instruction 5200.40);
- d) Security Requirements for Automated Information Systems (DoD Directive 5200.28);
- e) DoD MIL-STD 461E and 464 (Electromagnetic Requirements);
- f) Related Coast Guard, DOT instructions, and DoD regulations.

3 ASSET PHASED PROCUREMENT

The following sections describe the objectives for the phased procurement of asset-related work from concept and technology development through disposal. The objectives and the associated minimum requirements presented in each section, in addition to the General Requirements of Section 2, form the basis for asset and phase specific task and/or delivery order SOW development in accordance with the Task and/or Delivery Order Planning and Development process described in Section 2.10. For all procurement phases appropriate to an asset, the Contractor shall augment and expand upon these minimum requirements to define the complete and detailed work effort required to achieve the stated objectives. Note that not all phases need apply to all assets. For example, for near term retirement of a legacy asset only support and disposal tasks may apply; if concept and technology demonstration was accomplished during

Phase I, it may not need to be repeated; if no Contractor support is proposed, operations and support tasks may not apply.

3.1 C4ISR CONCEPT AND TECHNOLOGY DEVELOPMENT

The objective of this phase is for the Contractor to develop a concept design for the asset at a level that demonstrates solid technical feasibility. The Contractor shall mature the concept of technology to a level that provides robust assessment of the design considerations, alternatives, and risks and bounds the parameters of the design or impact on existing assets and the IDS. The concept shall be fully integrated with the IDS and other IDS assets.

3.1.1 GENERAL

The Contractor shall perform all tasks identified in Section 2, General Requirements, in a manner consistent with the objectives of this phase of C4ISR Asset acquisition when concept and technology development is required for a specified C4ISR Asset. For concept exploration, the Contractor shall, in addition to the general C4ISR program management, conduct analysis and studies of alternative concepts for meeting a needed operational capability. For component-advanced development, the Contractor shall plan and execute proof of concept of subsystems and components that must be developed before integration into a system.

3.1.2 C4ISR REQUIREMENTS DEFINITION AND ANALYSIS

Using requirements specified in the System Performance Spec (SPS), IDS Operational Requirements Document (ORD), and IDS and Asset C4ISR Architectures, the Contractor shall derive C4ISR requirements to the asset level, achieving a balance between performance and cost within affordability constraints. Requirements analysis shall be conducted to define asset level functional and performance requirements, external interfaces, and to demonstrate traceability of operational and technical requirements.

3.1.3 C4ISR ASSET AND ASSET COMPONENT ALTERNATIVES

The Contractor shall provide alternatives with analysis of performance, cost and risk to enable design decisions to be made. In general, at the concept level there will be many alternatives and only limited quantification of the benefits and costs of each, but sufficient to down-select to a few promising candidates. Tradeoff analysis of C4ISR Asset requirements and CANDI product features, performance, and life cycle costs shall be presented to the Government. The Contractor shall provide the alternatives, analysis and recommendations to enable Government decisions.

3.1.4 C4ISR CONCEPT AND TECHNOLOGY DESIGN REVIEW

The Contractor shall conduct a final concept and technology design review to include, but not limited to the maturity or completion of the following items:

- a) C4ISR Asset architectures
- b) System and software requirements

- c) Concept exploration and alternative analysis
- d) Component advanced development
- e) Traceability to Operational Requirements Document (ORD)
- f) Affordability analysis
- g) Risk identification and mitigation
- h) Initial C4ISR Asset Integrated Support Plan

3.2 C4ISR SYSTEM DEVELOPMENT AND DEMONSTRATION

The objective of this phase is for the Contractor to demonstrate that the proposed design is technically feasible and capable of meeting applicable requirements and specifications with acceptable risks.

3.2.1 GENERAL

The Contractor shall perform all tasks identified in Section 2, General Requirements, in a manner consistent with the objectives of this phase of C4ISR Asset acquisition when System Development and Demonstration is required for a C4ISR Asset. The Contractor shall build upon the work of the concept and technology development phase and complete the C4ISR Asset design for the development and integration into the IDS. The Contractor shall provide initial system demonstration using various options of modeling, simulation, production of a beta version, prototype, or the development of a preliminary baseline in accordance with the schedule approved by the Government. The Contractor shall, at the conclusion of system development and demonstration at the very latest, have a single baseline design for the asset, in readiness for production and deployment if and when so authorized.

The Contractor shall perform the technical and engineering functions necessary to transfer operational or functional needs into a system enhancement through design modification of an existing system, or through new design of system hardware and/or software. This includes all engineering activities relative to the design, development, fabrication, testing, and integration of hardware and software configuration items being developed by the Contractor as specified by the Task or Delivery Order. The Contractor shall also analyze emergent technology system/equipment designs for potential application.

The Contractor shall provide system development and demonstration data to the Government for review, in an iterative methodology that spirals to increasing levels of detail and definition, evolving over time to a balanced (technical, performance, cost, risk, etc.) design.

3.2.2 C4ISR REQUIREMENTS ANALYSIS

The Contractor shall document and deliver the C4ISR Asset design requirements to the Government for review. Following system requirements analysis, the Contractor shall recommend a feasible design that integrates with the rest of IDS in all areas of technical, operational and fiscal constraints, with background information on the reasoning behind the recommendation and the reasons for prime alternatives not taken. Utilizing the IPDE, the

Contractor shall provide the requirements analysis data, corresponding functional design data and documentation at a level that is adequate to proceed with further development of the asset..

3.2.3 C4ISR HARDWARE SYSTEM DEVELOPMENT AND DEMONSTRATION

The Contractor shall proceed with hardware development as specified in the overarching systems engineering process, documented in the C4ISR SEMP. Hardware system development and demonstration shall include the category of firmware.

3.2.4 C4ISR SOFTWARE SYSTEM DEVELOPMENT AND DEMONSTRATION

The Contractor shall proceed with software development and demonstration as specified in the overarching systems engineering process and schedule, documented in the C4ISR SEMP. Further details describing the software acquisition, development, and integration processes may be included in the SADIP.

The Contractor shall produce a software design in which allocated software requirements shall be traceable and defined. The Contractor shall develop a preliminary software design, and evaluate the software's capability to meet design goals and to integrate with existing or planned software.

In general, software specifications shall include at a minimum, a description of the functions and purposes of each software configuration item, processing and accuracy requirements, timing, flexibility, interface and security requirements, screen formats for input functions, input data sources, data flows, proposed programming languages, and outputs. The Contractor shall conduct developmental testing of software through demonstrations; evaluate lessons learned, and feedback lessons into the selected software system baseline. Software system development and demonstration tasks shall include, but not necessarily be limited to, the following:

- a) incremental software demonstration testing and production software test planning
- b) independent verification and validation (IV&V)
- c) software support planning
- d) network planning and design. (the Contractor's solution and bandwidth requirements must account for interface issues with the Coast Guard, Department of Defense, and other agencies, and consider life cycle cost estimates)
- e) communications protocols
- f) computer software configuration development & management

3.2.5 C4ISR MODELING AND SIMULATION

The Contractor shall develop and provide C4ISR Asset modeling and simulation proposals early in the system development and demonstration phase. The proposal shall address the C4ISR Assets to be modeled and simulated according to the C4ISR System Engineering Management Plan and the C4ISR Architecture Plan. Possible components to be modeled include, but are not limited to, the following:

- a) communications (e.g. COMNET)
- b) EMI/RF for personnel hazards and system interference
- c) sensor detection and tracking performance
- d) network management and performance (e.g. OPNET)
- e) C4ISR Asset architectures to assess scaling, loading, and performance (e.g. client/server computer architecture) of the proposed design. This is modeling or simulation that attempts to assess the quality or viability of a specific asset or system segment design at a level lower than the C4ISR Framework Architecture process allows (e.g., not executable models of the Framework Architecture).

3.2.6 C4ISR SYSTEM INTEGRATION AND INSTALLATION PLANNING

The Contractor shall prepare a C4ISR asset specific Integration and Installation Plan for Government approval. The Contractor shall plan for the integration of the hardware and software components into completely tested and validated C4ISR assets in accordance with the C4ISR Asset integration and installation plan. The plan shall document all requirements for integration and installations at facilities, support systems, instrumentation and logistics support.

The Contractor shall provide installation strategy, plans and procedures for all C4ISR Assets (mobile and fixed assets located worldwide). The Contractor shall review, or develop applicable facilities and equipment drawings and specifications, perform site surveys, and develop installation plans, specifications, and procedures. The Contractor shall provide the engineering and technical services to plan for equipment installation and integration, testing and evaluation, and checkout of various C4ISR systems and associated interface systems, hardware, software, subsystems, or related systems.

The Contractor shall focus on the impact of the C4ISR Asset installation on the overall IDS assets, operational systems, personnel, and schedule. The documentation shall include, but not limited to, availability of the assets, impact to operations and the crew, installation and testing equipment, materials, and provide a long-range schedule with contingency dates. The Contractor shall specify the installation team with technical skills and provide the list of the installed system components. The Contractor shall be responsible for safe and proper shipment, and physical inventory.

3.2.7 C4ISR MANUFACTURING AND PRODUCTION PLANNING

The Contractor shall conduct concurrent development of producible design, capable manufacturing processes and process controls to ensure satisfaction of requirements and to minimize manufacturing costs. The Contractor shall devise a C4ISR interface strategy integrating the build strategies of Deepwater ships, aircraft, and facilities that enables efficient and affordable C4ISR installation and maintenance. The Contractor shall report on recommended strategies (e.g. modularity, standardization, weight and space, turn-key, etc) and report how these early manufacturing, production and installation concepts feed into early asset design to favorably impact availability and affordability.

3.2.8 C4ISR SYSTEM DEVELOPMENT AND DEMONSTRATION - PRELIMINARY DESIGN

The Contractor shall conduct preliminary design utilizing all the elements outlined above in this section. This preliminary design shall match cost to performance within affordability constraints of the program, for the alternatives still under consideration at the initiation of this phase. Alternatives may be dropped out based on recommendations at interim reviews to conserve resources for application to more promising options that remain in contention. At the conclusion of preliminary design, a single baseline option will be recommended and reviewed by the Government; design definition including costing, budget estimates and development schedules shall be at a level ready to proceed into detailed design when authorized.

3.2.8.1 Preliminary Design Review

The Contractor shall schedule and conduct a C4ISR Asset Preliminary Design Review (PDR). The Contractor shall formally report the results of previous tests and address design changes to be made during detailed design. The Contractor shall prepare the preliminary development design, and any associated documents or materials, for Government review. The Contractor shall perform the following during the PDR:

- a) Describe the design, the design status, development progress, and problems within individual subsystems or meeting allocated requirements
- b) Describe the system interface compatibility and requirements with other subsystems
- c) Describe the integration plan of the designed system
- d) Describe the realism of the development cost, schedule, and resource allocation in relation to technical requirements and estimated corrective action.
- e) Formulate suggested program changes requiring Government decisions and initiate action in accordance with the findings resulting from the reviews
- f) Evaluate the durability and supportability of the proposed design.

Upon Government acceptance of the preliminary design, the Contractor may proceed to further asset development under detailed design.

3.2.9 C4ISR SYSTEM DEVELOPMENT AND DEMONSTRATION - DETAILED DESIGN

The detailed design shall consist of the following, but is not limited to:

- a) Produce a design sufficient for production of the C4ISR hardware and/or software items in accordance with the requirements of the asset performance specification initiated in the previous preliminary design phase, and finalized in this detailed design phase.
- b) Complete detailed design and any preliminary software coding for demonstration.

- c) Be sufficiently matured to continue development by software programming, construction, fabrication or procurement of the configuration items in low-rate production for total system integration and testing.

3.2.9.1 Critical Design Review

The Contractor shall conduct a Critical Design Review (CDR) to show the satisfactory completion of the design work. The Contractor's deliverables, which supports satisfactory completion, shall be submitted to the Government. The Contractor shall perform the following during the CDR, but not limited to:

- a) Show conformance to the specified requirements as revealed by the Contractor's formal demonstration test.
- b) Identify interaction and interference problems that could jeopardize performance in the operational environment.
- c) Identify operability, supportability and maintainability problems that have an impact on system's performance.
- d) Provide detailed C4ISR Asset Integrated Support Plan.
- e) Define and assign corrective action that should be incorporated prior to Government TechEval or OpEval.
- f) Review the development cost, schedule, and resources allocation in relation to technical requirements.

3.2.10 C4ISR TEST READINESS REVIEW

Prior to Government TechEval or OpEval, the Contractor shall conduct a Test Readiness Review (TRR) for each of the software and hardware configuration items to determine that the software or hardware test procedures are complete and to ensure the Contractor is prepared for formal testing.

3.3 C4ISR PRODUCTION & DEPLOYMENT

The objective of this phase is for the Contractor to deliver a C4ISR Asset that meets the readiness and operational capability requirements of the C4ISR IDS and Asset architectures.

3.3.1 GENERAL

The Contractor shall perform all tasks identified in Section 2, General Requirements, in a manner consistent with the objectives of this phase of C4ISR Asset acquisition when Production and Deployment is required. The Contractor shall build upon the work of the previous System Development and Demonstration Phase. In addition, the Contractor shall produce production versions of the asset and conduct formal developmental and operational testing in limited low rate production. The Contractor shall provide technical and engineering services to conduct integration testing and installation, resolve interface problems, analyze other technical problems discovered during integration and installation, correct deficiencies in hardware and software and

documentation, and ensure the continuous updating of the configuration baseline. The Contractor shall also provide all necessary training and an asset support system (i.e. help desk). C4ISR

3.3.1.1 Low Rate Production

The Contractor shall install the developed C4ISR Asset(s) at the Government approved beta test site(s), in accordance with the installation plan specified in the C4ISR Systems Integration and Installation Plan. If applicable, the Contractor shall support a pilot or trial operational test and evaluation. The Contractor shall provide feedback to the Government on the results of T&E, recommend any design modifications, and demonstrate through operational analysis that production and deployment should continue.

3.3.1.2 Hardware Low-Rate Production

For many hardware (firmware included) C4ISR Assets, the concept of low rate production is to enable validation of testing, and initiate production plans. Utilizing user feedback, the hardware will cycle back through the system engineering process to incorporate new or revised requirements under CM, and eventually produce an updated version.

3.3.1.3 Software Low-Rate Production

For software C4ISR Assets, the software low rate production is the first accepted version. This version may be distributed to a select number of operators for user evaluation. Upon user feedback, the software will cycle back through the software development process for the release and CM of new versions. As the software matures from incremental development and fully satisfies user criteria, and obtains formal acceptance from the Government, a transition may occur to Full Rate Production, or the next phase of “Operations and Support.”

3.3.1.4 C4ISR Database and Data Low-Rate Production

For database and associated data C4ISR Assets, the database(s) and data low rate production is the initial accepted version. The data may be limited to a small sample or test set of new or legacy databases; and this version may be distributed to a select number of operators for user evaluation. Upon user feedback, the software will cycle back through the software development process for the release and CM of new versions. As the software matures from incremental development and fully satisfies user criteria, and the software obtains formal acceptance from the Government, a transition may occur to Full Rate Production, or the next phase of “Operations and Support”. C4ISR Full Rate Production Review

The Contractor shall incorporate into the C4ISR System Engineering Management Plan a master schedule for full rate production, and the various production technical reviews. These reviews shall take into account the user and operational feedback on system performance, availability, reliability, security, and overall system utility. The Contractor shall implement IDS Operational Test and Evaluation as applicable in Attachment J-7, SOW for System Integration and Management.

3.3.2 C4ISR FULL RATE PRODUCTION

Upon task authorization for full rate production, the Contractor shall produce fully integrated and initially supported assets for use within the IDS (complete production of hardware, continue software development spiral for software upgrade/new version as appropriate). The Contractor shall demonstrate and/or validate the systems' or subsystems' performance and capability in the Deepwater shall environment (if necessary conduct follow-on developmental operational testing). The Contractor shall continue the systems engineering process as feedback is obtained from applicable Test and Evaluation, in accordance with section 2.8 of attachment J-7, Statement of Work for IDS Systems Integration and Management.

The Contractor shall produce, fabricate, construct or procure the Government specified quantity of the C4ISR Asset and conduct the agreed upon testing and demonstration of the asset to gain Government acceptance. The Government, prior to acceptance of the asset, will review test results. The Contractor will include all aspects of production and deployment, to include but not limited to:

- a) resource management
- b) prioritization analysis
- c) production
- d) deployment and installation
- e) integration with other assets
- f) personnel management interface with USCG
- g) operator/supporter/administrator asset training
- h) testing, feedback and modification by continuing systems engineering
- i) certification
- j) integrated logistics support including resource management for ILS

3.3.3 C4ISR SYSTEM INTEGRATION AND INSTALLATION

The Contractor shall provide technical and engineering services to install equipment, conduct integration testing, resolve interface problems, analyze other technical problems discovered during integration and installation, correct deficiencies in hardware and software and documentation, and ensure the continuous updating of the configuration baseline in accordance with the plan.

3.4 OPERATIONS AND SUPPORT

The objective of the C4ISR Asset Operations and Support Phase is to assist in maintaining reliability, availability, maintainability and operational capability of C4ISR Assets.

3.4.1 GENERAL

The Contractor shall perform all tasks identified in Section 2, General Requirements, in a manner consistent with the objectives of this procurement phase. The Contractor shall perform all logistics support services in accordance with the Government approved Integrated Support Plan.

3.4.2 OPERATIONS AND SUPPORT

The Contractor shall execute all Contractor responsibilities in accordance with the approved C4ISR Asset specific ISP, logistics requirements matrix and CONOPS.

3.4.3 C4ISR SUSTAINMENT REVIEWS

The Contractor shall perform periodic C4ISR Sustainment Review(s) (SR) for each C4ISR Asset which validates the current operational requirements, determines new additional C4ISR system capabilities to meet operational/mission needs, and concludes whether the system is performing according to the asset requirements and inline with the total ownership cost model for the asset. The Contractor shall provide notional schedule, resource and capability corrective options for consideration by the Government. The general methodology for capability deficiency correction will be to consider modifications in the following order:

- a) If the system design and the system operational doctrine is satisfactory, corrections in execution of the training.
- b) If the system design is satisfactory and training modifications cannot correct the capability deficiency, then a modification of the doctrine using existing systems, with a subsequent modification of the training to support the revised doctrine.
- c) If neither training nor doctrine can correct the capability deficiency, then a modification or replacement by new design of the system, with subsequent modification of doctrine and training to support the modified or replaced system.

The Contractor shall present any capability deficiency correction method to the Government for review and approval.

3.5 DISPOSAL

The objective of this phase is for the Contractor to demilitarize and dispose of the C4ISR Assets in accordance with all legal and regulatory requirements relating to safety, security, and the environment at the end of its useful service life.

3.5.1 GENERAL

The Contractor shall perform all tasks identified in Section 2, General Requirements, in a manner consistent with the objectives of this phase of C4ISR Asset acquisition.

The basic asset support requirements to be addressed in this phase include, but not limited to: material phase-out, recycling and/or disposal. The Contractor shall provide all services, labor,

tools, tooling, materials when applicable, and equipment, except those listed as Government furnished, to properly store, preserve, or de-preserve, and dispose of the C4ISR Assets.

3.5.2 C4ISR DISPOSAL PLAN

The Contractor shall develop a C4ISR Disposal Plan prior to the phase-out, decommissioning or removal from service of any C4ISR Asset. The plan will include at a minimum, methodology, cost, environmental issues and concerns, personnel impacts, equipment disposal, permits.