PRELIMINARY DESIGN
INTERIM REQUIREMENTS DOCUMENT

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FOR

LITTORAL COMBAT SHIP (LCS) FLIGHT 0

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LITTORAL COMBAT SHIP
FLIGHT 0

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INTERIM REQUIREMENTS DOCUMENT
(PD-IRD)

February 10, 2003

LITTORAL COMBAT SHIP FLIGHT 0
PRELIMINARY DESIGN INTERIM REQUIREMENTS DOCUMENT (PD-IRD)

1. 0 PURPOSE

This document is an Interim Requirements Document (IRD) generated for the design and procurement of the LCS Flight 0 ships and integration of mission systems into the total ship design. This IRD will serve as the basis for developing future LCS requirements. The data gained from ongoing studies and analysis will be incorporated into the requirements of this IRD to develop an IRD for a Final Design IRD and eventually a Capabilities Development Document for Flight 1 LCS.

1. 1 Background

The LCS will be a focused mission ship capable of defeating the conventional and asymmetric access-denial threat in the littoral. The open systems architecture and modular characteristics of the LCS will enable timely change-out of Mission Packages so LCS can be optimized to confront threats that can deny access to U.S. and friendly forces in the littoral. The LCS will be a dominant and persistent platform that enables sea based joint forces to operate uncontested and provide lethality in the littorals. This is a capability provided by the LCS that is identified in the Global CONOPS, the LCS CONOPS, and the Concepts of Employment as articulated in the Analysis of Multiple Concepts.

2.0 THREAT

Further details on existing, projected, and technology feasible threats are contained in the Classified "Major Surface Ship Threat Assessment", ONI-TA-018-02, July 2002. Specific threat information for the LCS is provided in Classified Attachment 1.

3.0 LCS Requirements

This section describes the LCS Seaframe and Mission Package requirements to perform the missions as envisioned in the concept of operations. Critical Design Parameters are listed for the LCS Flight 0 ships. The LCS shall be configured with core systems and a Mission Package that will enable the ship to perform all core ship functions and at least one focused mission or inherent capability. A core system is a system that is resident in the LCS in all configurations with the purpose of carrying out core ship functions such as self-defense, navigation, and C4I, or other capabilities common to all mission areas. To allow for spiral development, core systems may or may not be modular. A Mission Package is a functional grouping of systems that is integrated in LCS to give it the capability to execute a focused mission or inherent mission. The LCS shall have the capability to change out Mission Packages in the times specified in the Critical Design Parameters table in section 3.1 in order to shift missions.

3.0.1 LCS Missions

LCS will conduct missions in support of Sea Power 21 and Naval Power 21. The LCS will deliver focused mission capabilities to enable joint and friendly forces to operate effectively in the littoral. These focused mission capabilities are an enhanced mine warfare capability, a better shallow-water ASW capability, and an effective counter to small craft. There are other

capabilities inherent in the LCS that support other missions such as Maritime Interdiction Operations (MIO) and Intelligence, Surveillance, and Reconnaissance (ISR). As a focused mission ship, the LCS will enable unimpeded accomplishment of other missions such as ballistic missile defense or precision strike by multi-mission surface combatants.

3.0.2 Modularity

The modular Mission Packages are a central feature of the LCS design and will provide the main war fighting capability and functionality for specific mission areas. A Mission Package may consist of a combination of modules, manned and unmanned off-board vehicles, deployable sensors, and mission manning detachments. The modules will be integrated in the ships' module stations or zones. The ship's module stations will have defined volumes, structures, and support service connections.

The LCS design must meet the critical performance parameter requirements for mission reconfigurability specified in Section 3.1. The ship's open system architecture will affordably maximize lifecycle flexibility for use of future systems upgrades and required mission systems change-out. This will facilitate the separate production and platform integration of modular mission systems. The major elements of the open systems architecture, module stations, functional element zones, standard interfaces, links, controls etc., will be designed to accommodate future Mission Packages, future ship flights, and technology refresh. Mission packages, to the greatest extent possible, should integrate into the Seaframe's core command and control architecture to minimize the use of unique equipment.

3.1 Critical Design Parameters

LCS Flight 0 Critical Design Parameters		
Category	**Threshold Level**	**Objective Level**
Total Price per Ship	Meet CAIV target in the RFP	Exceed CAIV target in the RFP
Hull Service Life	20 Years	30 Years
Draft at Full load Displacement	20 feet	10 feet
Sprint Speed at Full Load Displacement in Sea State #	40 Knots in Sea State 3 (note 1)	50 Knots in Sea State 3 (note 1)
Range at Sprint Speed	1,000 nautical miles (note 2)	1,500 nautical miles (note 2)
Range at Economical Speed	3,500 nautical miles (>18 knots) with payload	4,300 nautical miles (20 knots) with payload
Aviation Support	Embark and hangar: one MH-60R/S and VTUAVs, and a flight deck capable of operating, fueling, reconfiguring, and supporting MH-60R/S/UAVs/VTUAVs	Embark and hangar: one MH-60R/S and VTUAVs, and a flight deck capable of operating, fueling, reconfiguring, and supporting MH-60R/S/UAVs/VTUAVs
Aircraft Launch/Recover	Sea State 4 best heading (note 1)	Sea State 5 best heading (note 1)
Watercraft Launch/Recover	Sea State 3 best heading with in 45 mins. (note 1)	Sea State 4 best heading with in 15 mins. (note 1)
Mission Package Boat type	11 Meter RHIB	40 ft High Speed Boat
Time for Mission Package Change-Out to full operational capability including system OPTEST	4 days	1 days
Provisions	336 hours (14 days)	504 hours (21 days)
Underway Replenishment Modes (UNREP)	CONREP, VERTREP and RAS	CONREP, VERTREP, and RAS
Mission Module Payload (note 3)	180 MT (105 MT mission package / 75 MT mission package fuel)	210 MT (130 MT mission package / 80 MT mission package fuel)
Core Crew Size	50 Core Crew Members	15 Core Crew Members
Crew Accommodations (both core crew and mission package detachments)	75 personnel	75 personnel
Operational Availability (Ao)	0.85	0.95

Note 1: Sea State parameters are defined in Appendix A
Note 2: Includes Payload - Taking into account the focused mission nature of the LCS, payload is defined as the heaviest possible Mission Package and core mission systems, excluding ship's fuel.
Note 3: Mission package payload is defined as all non-core systems, vehicles, helos, ordnance, and associated personnel, equipment, and containers to perform a single mission. This includes fuels to operate the mission package.

3.2 Mission Package Performance Requirements

The following sections provide specific performance requirements for the LCS, when outfitted with core systems and a Mission Package.

3.2.1 Focused Mission Capabilities

a. Mine Warfare (MIW)
b. Littoral Surface Warfare (SUW) against small, highly armed boats
c. Littoral Anti-Submarine Warfare (ASW)

3.2.1.1 Mine Warfare (MIW)

In all mission configurations the LCS shall have core systems that provide the capability to conduct precise navigation to avoid previously identified minefields, and enable the employment of off-board or onboard sensors to perform mine avoidance along the LCS' intended track. When equipped with the appropriate Mission Package, the LCS will conduct mine warfare missions along its intended track and in operational areas as assigned with on-board and off-board systems from deep water through the beach. Mission requirements may dictate employing different package configurations on multiple LCSs. The LCS will make use of MIW environmental models and databases. The Mission Package will enable LCS to:

a. Detect classify and identify surface, moored and bottom mines to permit maneuver or use of selected sea areas.
b. Coordinate/support mission planning and execution with Joint and Combined assets in the absence of dedicated MIW command and control platforms. MIW mission planning will include the use of organic and remotely operated sensors. The LCS will exchange MIW tactical information including Mine Danger Areas (MDA), mine locations, mine types, environmental data, bottom maps, off-board system locations, planned search areas and confidence factors.
c. Conduct mine reconnaissance.
d. Perform bottom mapping.
e. Perform minefield break through/punch through operations using off-board systems.
f. Perform minesweeping using off-board mission system.
g. Conduct precise location and reporting of a full range of MCM contact data. For example: identified mines and non-mine bottom objects.
h. Perform mine neutralization.
i. Employ, reconfigure, and support MH-60S for MIW operations.
j. Embark an EOD detachment.
k. Deploy, control, and recover off-board systems, and process data from off-board systems.

3.2.1.2 Littoral Surface Warfare (SUW)

In all mission configurations the LCS shall have core systems that provide the capability to conduct multi-sensor search, detection, classification, localization and tracking of surface contacts in its assigned area of responsibility. The LCS will also have the core capability to protect itself against small boat attacks, including the use of speed and maneuverability, and have the core capability to conduct warning and disabling fire. When equipped with the appropriate Mission Package, the LCS will have the capability to engage surface threats, particularly small fast boats, to minimize threats to friendly units. The Mission Package will enable LCS to:

a. Conduct integrated surface surveillance using onboard and off board sensors.

b. Discriminate and identify friendly and neutral surface vessels from surface threats in high-density shipping environments.
c. Conduct coordinated SUW mission planning, contribute to and receive the Common Tactical Picture, and initiate engagement of surface threats. Maintain and share situational awareness and tactical control in a coordinated SUW environment. When operating in company with other SUW assets, such as fixed-wing/rotary-wing attack aircraft and maritime patrol aircraft, the LCS must be capable of planning and coordinating the SUW mission.
d. Engage surface threats independently, as part of a LCS group, and in coordination with other friendly forces. This includes threats in the line-of-sight and over-the-horizon. In addition to hard kill capabilities, the LCS will use agility and speed, signature management and soft kill measures to disrupt the threat's detect-to-engage sequence and conduct offensive operations against surface threats.
e. Deploy, control, and recover off-board systems, and process data from off-board systems.
f. Employ, reconfigure, and support MH-60 series helicopters and smaller rotary wing aircraft for SUW operations.
g. Conduct SUW Battle Damage Assessment after engagements against surface threats.

3.2.1.3 Littoral Anti-Submarine Warfare (ASW)

In all mission configurations the LCS shall have core systems that provide the capability to detect threat torpedoes at sufficient range to permit initiation of effective countermeasure and/or maneuver action to defeat the threat. When equipped with the appropriate ASW Mission Package, the LCS will conduct multi-sensor ASW detection, classification, localization, tracking and engagement of submarines throughout the water column in the littoral operating environment. The LCS will have the capability to embark ASW/multi-mission helicopters and unmanned vehicles, and will utilize Undersea Surveillance Systems, environmental models and databases. The Mission Package will enable LCS to:

a. Conduct offensive ASW operations. The LCS must achieve a mission abort or sink a threat submarine, if the submarine target of interest is transiting through a designated key choke point or operating (e.g., patrolling) in a designated search/surveillance area.
b. Conduct defensive ASW operations. The LCS must defeat threat submarine attacks against units operating in company with CSGs, ESGs, or LCS squadrons. The LCS must achieve a mission abort or sink a threat submarine that poses a threat to any friendly units.
c. Conduct coordinated ASW, contribute to the Common Undersea Picture, maintain and share situational awareness and tactical control in a coordinated ASW environment.
d. Maintain the surface picture while conducting ASW in a high-density shipping environment.
e. Detect, classify, localize, track and attack diesel submarines operating on batteries in a shallow water environment to include submarines resting on the sea floor.
f. Perform acoustic range prediction and ASW search planning.

g. Conduct integrated undersea surveillance employing on-board and off-board systems.
h. Achieve a mission kill of ASW threats through engagement with hard kill weapons from on-board and off-board systems.
i. Employ signature management and soft kill systems to counter and disrupt the threat's detect-to-engage sequence in the littoral environment.
j. Deploy, control, recover, and conduct day and night operations with towed and off-board systems, and process data from off-board systems.
k. Employ, reconfigure, and support MH-60R in ASW operations.
l. Conduct ASW Battle Damage Assessment after engagements against undersea threats.

3.2.2 Inherent Capabilities

The following sections provide specific performance requirements for the LCS, when outfitted with core systems and the appropriate Mission Package.

a. Joint Littoral Mobility
b. Intelligence, Surveillance and Reconnaissance (ISR)
c. Special Operations Forces (SOF) support
d. Maritime Interdiction/Interception Operations (MIO)
e. Home-Land Defense (HLD)
f. Anti-Terrorism/Force Protection (AT/FP)

3.2.2.1 Joint Littoral Mobility

The LCS' speed, agility, and shallow draft will give it the inherent capability to provide rapid movement of small groups of personnel and material. When equipped with the appropriate Mission Package, the LCS will provide transport and limited lift capability to move personnel, supplies and equipment within the littoral operating environment. The Mission Package will enable LCS to:

a. Provide facilities for secure stowage of transported materials and equipment.
b. Provide habitability support for transported personnel.
c. Replenishment and refueling at sea of MH-60 sized non-organic helicopters and SOF craft/boats.

3.2.2.2 Intelligence, Surveillance and Reconnaissance (ISR)

In all mission configurations the LCS shall have core systems that provide that level of persistent ISR consistent with the use of installed apertures, automated data collection, storage and processing: emphasizing LCS as an information node for through-put. ISR coverage will include surface, overland and electronic domains. When equipped with the appropriate Mission Package, the LCS will provide enhanced collection and onboard processing capabilities using onboard systems and off-board vehicles and sensors and in some cases embarked detachments that include the capability to conduct Information Operations (IO), Electronic Warfare (EW), Military Deception (MILDEC), Operational Security (OPSEC), Computer Network Defense/Attack (CND/CNA), and Psychological Operations (PSYOP). The LCS will have the command and control architecture and systems to conduct ISR planning and coordination, make

near-real-time input to enhance decision making, and facilitate order generation, weapons direction and ship system monitoring and control. The Mission Package will enable LCS to:

a. Use organic and non-organic resources to conduct surveillance and reconnaissance operations with onboard and off board equipment.
b. Use organic and non-organic resources to collect, process and disseminate strategic, operational and tactical information.
c. Use ISR planning, coordination and execution tools.

3.2.2.3 Special Operations Forces (SOF) Support

The LCS will have the inherent core capability to provide rapid movement of small groups of SOF personnel and material due to the LCS' speed, agility, and shallow draft. When equipped with the appropriate Mission Package, the LCS will have the following SOF capabilities:

a. Support Naval Special Warfare (NSW) Task Unit and surface/subsurface combatant craft and mobility platforms, or their JSOF equivalent including weapons and equipment stowage, berthing, C4ISR connectivity and space within the hull for mission planning and rehearsal.
b. Launch, recover, and conduct organic maintenance on multiple embarked and organic craft specified in section 3.1.
c. Support Marine Expeditionary Unit (Special Operations Capable) [MEU (SOC)] and JSOF hostage rescue operations, aircraft operations for helicopters such as the MH-60S.
d. Support maritime Special Operations with the capability to refuel MK V Special Operations Craft (SOC) and follow-on (Special Operations Forces) Medium Range Insertion Craft (MRIC).
e. Support SOF in Noncombatant Evacuation Operations (NEO).
f. Provide compressed air (diver quality) for the SEAL Delivery Vehicle (SDV).
g. Embark a Fly Away Recompression Chamber (FARC).
h. Support and conduct Combat Search and Rescue (CSAR) operations.
i. Support a Tactical Sensitive Compartmented Information Facility (TSCIF).

3.2.2.4 Maritime Interdiction/Interception Operations (MIO)

The LCS will have the inherent core capability to support MIO due to the LCS' speed, agility, and shallow draft, and have the core capability to conduct warning and disabling fire. When equipped with the proper Mission Package, the LCS will have the capability to:

a. Perform maritime interception and interdiction operations.
b. Provide staging areas for MIO teams.
c. Provide a secure holding area detainees.
d. Employ, reconfigure, and support MH-60 and smaller rotary wing aircraft for MIO.

3.2.2.5 Home Land Defense (HLD)

The LCS will have the inherent core capability to support the HLD by providing rapid movement of small groups of personnel and material due to the LCS' speed, agility, and shallow draft. When equipped with the proper Mission Package, the LCS will perform operations to support

national and coalition policy. In support of national security and HLD objectives, the ship will be capable of supporting and conducting missions in coordination with the U.S. Coast Guard (USCG). The Mission Package will enable LCS to:

a. Perform maritime interception, interdiction and law enforcement operations.
b. Provide staging areas for boarding teams.
c. Conduct maritime Law Enforcement Operations (LEO) including counter-narcotic operations with embarked law enforcement detachment.
d. Provide emergency, humanitarian, and disaster assistance.
e. Support JSOF hostage rescue operations.
f. Conduct marine environmental protection.
g. Perform naval diplomatic presence operations.
h. Employ, reconfigure, and support MH-60 and smaller rotary wing aircraft for HLD, and AT/FP operations.

3.2.2.6 Anti-Terrorism/Force Protection (AT/FP)

The LCS will have the inherent core capability to conduct AT/FP through its speed, agility, and shallow draft. When equipped with the proper Mission Package will:

a. Perform maritime interception, interdiction and law enforcement operations.
b. Provide staging areas for boarding teams.
c. Conduct maritime Law Enforcement Operations (LEO) including counter-narcotic operations with embarked law enforcement detachment.
d. Provide AT/FP to U.S. and friendly forces against attack in port, at anchorage, and during period of restricted maneuvering. Defensive capability will incorporate both passive design and active weapon measures, including non-lethal mechanisms, that can deter, delay, and defend against attack by terrorist and unconventional threats.
e. Employ, reconfigure, and support MH-60 and smaller rotary wing aircraft for HLD, and AT/FP operations.

3.3 Ship (Seaframe) Performance Requirements

The LCS Seaframe will provide core capabilities in the following areas in support of its focused and inherent mission areas.

3.3.1 Hull Performance

The LCS will have hull structural strength and provisions for growth allowances and fatigue life in accordance with its expected service life. The ship will withstand extreme environmental conditions such as high sea state, wind and air/sea temperature. The ship will withstand impacts from tugs, piers, and other hazards typical to routine ship operations in navigable waters. Tankage volume shall reflect environmental as well as fluid management requirements. It will provide adequate static and dynamic stability to ensure safe and efficient ship operation and not degrade personnel performance.

3.3.2 Survivability

The LCS will incorporate a total ship approach to survivability that addresses susceptibility, vulnerability, and recoverability, with crew survival as the primary objective. The principal

means to be employed will be to minimize susceptibility through speed, agility, signature management and the core self-defense weapon suite. The LCS' capability to reduce vulnerability by absorbing a weapon impact and retain seaworthiness and weapons system capability will be commensurate with ship's size and hull displacement and will emphasize crew survival and automated damage control and firefighting applications. The LCS will meet the requirements for Level I in accordance with OPNAVINST 9070. 1. In addition to Level I requirements, the LCS will have the capability to:

a. Similar to SMARTSHIP technologies, automate damage control actions to the most practical extent to support optimum manning level requirements to include automatic detection, location, classification and management of fire, heat, toxic gases and flooding, structural damage and hull breaching throughout the ship using a ship's damage control management system.
b. Economically maximize personnel protection, prevention of ship loss, and retention of self-defenses capability through the use of fragmentation protection.
c. Employ an appropriate level of collective protection against chemical, biological, and radiological threats.
d. Deploy life rafts and other survival equipment in both intact and damaged conditions. Equipment must support 120% of the ship's maximum manning capacity.
e. Incorporate signature management to deny and disrupt the enemy's detect-to-engage sequence to reduce the probability that the ship will be hit by a threat.
f. Monitor and control own ship emissions (EMCON) and apply tactical signature control through rapid control of electronic, infrared, optical and acoustic signatures in anti-surveillance, anti-targeting, and self defense roles.
g. Monitor own ship magnetic and acoustic signature to maximize ship survivability when operating in the vicinity of a minefield.

3.3.3 Air Self Defense

The LCS shall have core systems that provide the capability detect, identify, track, and protect itself against anti-ship cruise missiles (ASCMs) and threat aircraft. Self-defense capability against the other threats is listed in the appropriate warfare section. Specifically, the LCS will:

a. Employ signature management, hard kill and soft kill systems to counter and disrupt the threats detect-to-engage sequence in the littoral environment, and have networked capabilities to improve situational awareness to complement hard kill, soft kill and signature management systems.
b. Have the capability to provide point defense against ASCMs and threat aircraft through the use of hard-kill and soft-kill systems, counter-targeting, speed, and maneuverability. LCS will be Link16 and CEC (receive only) capable. For Flight 0 LCS, the capabilities provided by CIWS Mk 15 Blk 1B, RAM, and NULKA should be considered.
c. Have the capability to operate in clear and severe natural and electronic countermeasures environments inherent in littoral operating areas.
d. Have the capability to evaluate engagements against air targets.

3.3.4 Ship Mobility

The LCS will maneuver and maintain itself in all expected operational environments and situations with emphasis on the worldwide littoral operating environment. It will be self-deployable and operate with naval strike and expeditionary forces. The ship's draft will permit it to operate in the littoral. The LCS will:

a. Provide the speed and endurance to deploy and operate with CSG, ESG, and LCS groups.
b. Perform seamanship and navigation evolutions such as: formation steaming, precision navigation, precision anchoring, recover man overboard, handle small boats and off-board mission systems, launching and recovering small boats, maneuvering for torpedo evasion and for ASCM countermeasures employment.
c. Perform deck evolutions such as: underway vertical and connected replenishment, recover man overboard, launch/recover off-board sensors and vehicles, handle small boats, tow or be towed, and when necessary abandon ship.
d. Provide a redundant and responsive ship control system that enables effective evasive maneuvering against torpedoes, ASCMs, mines and small boat attack.
e. Support and conduct Search and Rescue (SAR) operations.

3.3.5 Aviation Support

The LCS will conduct aviation operations with the following capabilities:

a. Handling of organic, day/night, all weather manned rotary-wing and unmanned aviation assets to support the principal mission areas of ASW, MIW and SUW and operations such as, but not limited to SOF, SAR, CSAR, MIO, MEDEVAC, EW and logistics. Aviation operations will support the MH-60 family of aircraft to include flight deck certification.
b. Class II facilities of NAEC-ENG-7576 to include electricity (400Hz), fresh water and fuel (landing, fueling, hangar, reconfigure, and rearm) for the MH-60 family of aircraft, and to conduct joint and interagency rotary wing capability (such as USCG helicopters, AH-58D AHIP or similar type helicopters), and employ and embark VTUAVs. LCS shall not have the capability to conduct Helicopter In-Flight Refueling (HIFR). It is envisioned that the LCS will embark MH-60 family of aircraft for limited durations. The material for repairs and minimal organic maintenance to support these limited embarks should come onboard in a modular fashion and be tailored in size, and the air detachment should be optimally manned. Material support for MH-60 limited embarks shall not include Phased Maintenance.
c. Control manned and unmanned aircraft, including the capability to provide safety-of-flight for the controlled aircraft.
d. Aviation fire fighting capability should be automated to the maximum extent practicable.

3.3.6 Off board Vehicle and Systems Support

The LCS will:

a. Have the capability to support day and night operations with available air, surface and subsurface unmanned vehicle operations. These capabilities will include control, data-link, day/night launch and recover, refuel, hangar, maintain, and rearm. The LCS operations will support Mission Packages containing VTUAVs, USVs and UUVs.
b. Be capable of rapidly reconfiguring Unmanned Vehicles and their mission payloads, while the ship is underway. The ship must be capable of launch, recovery and control of multiple unmanned vehicles, and should use common launch/recovery and control systems to the maximum extent practicable.
c. The LCS must be capable of employing manned and unmanned systems such as RMS, LMRS, 11m RHIB, SPARTAN, AH-58D, MH-60R/S and Fire Scout VTUAV, in support of meeting the focused mission requirements.

3.3.7 Command, Control, Computing and Communications (C4) Systems

The LCS shall have a core C4 system that will support mission and ship systems tactical and non-tactical operations, including the capability to fully integrate into FORCEnet. The C4 system will conform to the Navy's Open Architecture program guidelines and standards, will be interoperable with embarked Mission Packages and joint forces, and integrate all sensors, communication systems, and weapon systems into a single C2 system. The LCS will:

a. Provide a total ship and LCS squadron command and control capability that provides automation of command and control functions, ship situational awareness, and decision-making.
b. Provide for the capability to simultaneously coordinate and control multiple manned and unmanned systems in support of LCS missions.
c. Fuse organic data and non-organic data to maintain integrated tactical picture.
d. Implement a Total Ship Computing Environment (TSCE), which includes processors, networks, storage devices and human system interfaces in support of core and modular mission capabilities that conforms to the Navy's Open Architecture (OA) Program guidelines and standards.
e. Provide multiple levels of security as required by mission systems.
f. Provide external communications capability to control and operate with embarked and off-board systems, communicate with theater sensor assets, operate with joint, allied, coalition and interagency forces, and use reach-back assets. The ship will have secure, reliable, automated, wide bandwidth, high data rate communications with ship based and shore based warfare component commanders.
g. Be interoperable with standard Navy and Joint data networks including CEC, Joint Planning Network, Joint Data Network, Global Command and Control System - Maritime (GCCS-M), SIPRNET, NIPRNET and Global Information Grid.
h. Provide for onboard processing and data storage capabilities to accommodate handling and use of data generated by off board sensors.

3.3.8 Manning/Habitability, Human Systems Integration (HSI), Safety and Training

The LCS will:

a. Provide sufficient berthing for the simultaneous assignment of ship's company and mission detachments.
b. Use a human-centered design approach to automate decision processes and optimize manning. Exploit SMARTSHIP technologies to the maximum extent practicable.
c. Generic multi-modal reconfigurable work-stations and consoles will be used to the maximum extent practicable.
d. Maintain the health and well being of the crew.
e. Provide medical care to assigned and embarked personnel.
f. Provide administrative and supply support for assigned and embarked personnel.
g. Provide on demand individual and team training, with mission rehearsal capability, both in port and underway.
h. Provide ship upkeep and maintenance.
i. Provide physical security.
j. Ensure safety to equipment, personnel and ordnance.

3.3.9 Readiness

The LCS will:

a. Meet the established Navy readiness criteria for shipboard system performance, unit-level training, and equipment reliability that support the principal mission areas for every class.
b. Provide operational availability (Ao) in accordance with the critical design parameter matrix in Section 3.1

3.3.10 Logistics

The LCS program will:

a. Include shore-based support for training, maintenance, supply and administrative functions.
b. Include life cycle support and modernization plan for the ship systems and functions and for the mission packages that improves operational availability and minimizes the impacts of technological obsolescence over the life of the ship.
c. Provide the capability to rearm, refuel and replenish at sea.
d. Provide the capability to conduct Vertical Replenishment (VERTREP) and personnel transfer operations.
e. Provide a logistics support structure to support all ship missions, including both interior (Government) and exterior (Contractor) logistics activities, and support the efficient management of life cycle costs.
f. Accommodate reach-back facilities and distant support to maximum extent practicable.

3.3.11 Pollution Control and Environmental Constraints

The LCS will operate throughout its life cycle in U.S., foreign, and international waters in full compliance with applicable Federal, state, local foreign and international pollution control laws

and regulations. Environmental constraints include minimization/mitigation of discharges and emissions.

3.4 Operational Conditions of Readiness Requirements

The projected operational environment for the LCS is:

a. Capable of performing all defensive and assigned offensive combat functions while in Readiness Condition I.
b. Capable of performing all defensive functions while in Readiness Condition III.
c. Continuous Readiness Condition III at sea.

3.4.1 Weather Environment

a. Limiting environmental conditions requirements applicable to the range of wind, temperature, and sea conditions in which the ship is to operate are as follows:

Condition	Requirements
Sea State 5	Full capability for all systems
Sea State 6	Continuous efficient operation (See Note 1)
Topside ice loading of 0.4 kN/m2	Full capability for all ship systems
Sea State 8 and above	Best heading survival without serious damage to mission essential subsystems
Air temperature -29° C to 50° C with a sustained wind velocity of 40 knots and wind loads of 1.5 kN/m^2	Full system capability for all equipment and machinery installed in exposed locations
Sea water temperature -2° C to 38° C	Full capability for all ship systems
Air temperature -40° C to 52° C at prime mover intake inlet.	Full capability for Power Plant
Sand and Dust Concentrations up to 0.177 g/m3, particles up to 150 micrometers	Full capability for all ship systems and manned spaces for temperatures above between 21° C and 52° C and relative humidity below 30%
Relative Humidity 0 to 100%	Full Capability for all systems

Note 1: Assumes selection of the most benign course and speed under the conditions stated. The LCS should be capable of withstanding intermittent wind velocities up to 100 knots without sustaining serious damage to mission essential equipments.

b. The LCS's system functional performance, by warfare area and combinations of warfare areas, shall be categorized under combinations of four separate reference environments. Conditions for these four environments are summarized as follows:

Good Environment	Typical Environment	Poor Environment	Arctic Environment
Clear Sea State 0-4 No ECM	Light Rain Sea State 3-5, Light to Moderate ECM	Moderate Rain Sea State 6, Heavy ECM	Light Snow Sea State 3-5, MIZ (50%), Light Topside Icing, Moderate ECM
Wind Light (Friendly EM Light)	Wind 20 Knots (Friendly EM Moderate)	Wind 30 Knots (Friendly EM Heavy)	Wind 50 Knots (Friendly EM Moderate)

3.5 Regulatory and Statutory Requirements

The LCS will comply with applicable laws of the United States other applicable requirements and standards of the following Regulatory Bodies and Agencies:

a. International Regulations for Preventing Collision at Sea, 1972 (72 COLREGS) and subsequent instructions and modifications.
b. Suez Canal Regulations.
c. Panama Canal Regulations, 35 CFR.
d. International Convention for Safety of Life at Sea (SOLAS).
e. Navy Occupational Safety and Health (NAVOSH) Program Manual for Forces Afloat; OPNAVINST 5100.19D.
f. U.S. Department of Health, Education, and Welfare, Public Health Service (USPHS) Publication No. 393; Handbook on Sanitation of Vessel Construction.
g. Postal Regulations
h. Privacy Act
i. Navy Regulations
j. Classification by National or International regulatory body for Naval use.
k. International Convention for the Prevention of Pollution from Ships MARPOL)

4.0 AFFORDABILITY

Affordability is a critical parameter for the LCS. This ship is envisioned to be a smaller, less expensive to build (e.g. compared to DDG's), with the flexibility for supporting focused and inherent missions through the use of modular Mission Packages, open interfaces, and greater dependence on force or shore support. This concept will allow the LCS to be procured in numbers required in the Global CONOPS. A variety of deployment concepts and optimal mission manning requirements should be considered during the design and development phase to

reduce life cycle costs. Life cycle cost must be addressed and considered in particular ship lifetimes.

In order to achieve the CAIV target, the following priority list of discriminators will be used for the LCS: top speed, performance in seaway (both at loiter and cruise speeds), aviation capability, high-speed endurance and modularity/payload, and signatures.

Appendix A

Sea State Matrix

General	WIND			SEA								
				WAVE HEIGHT								
Sea State	Beaufort Wind Force	Range (knots)	Wind Velocity (knots)	Average Wave Height (m)	Significant Wave Height (m)	Average 1/10 Highest Wave Height (m)	Significant Range of Periods (sec)	Period of Maximum Energy of Spectrum	Average Period	Average Wave Length (m))	Minimum Fetch (nmi)	Minimum Duration (hrs)
0	1	1 - 3	2.0	0.0	0.0	0.0	up to 1.2 sec	0.7	0.5	0.3	5.0	0.3
1	3	7 - 10	8.5	0.2	0.3	0.4	0. 8 -5.0	3.4	2.4	6.1	9.8	1.7
2	4	11 - 16	13.5	0.5	0.9	1.1	1.4 - 7.6	5.4	3.9	15.8	24.0	4.8
3	4	11 - 16	16.0	0.9	1.4	1.8	2.0 - 8.8	6.5	4.6	21.6	40.0	6.6
4	5	17 - 21	19.0	1.3	2.1	2.7	2.8 - 10.6	7.7	5.4	30.2	65.0	9.2
5	6	22 - 27	24.0	2.4	3.7	4.9	3.7 - 13.5	9.7	6.8	48.8	130.0	14.0
6	7	28 - 33	28.0	3.4	5.5	7.0	4.5 - 15.5	11.3	7.9	64.6	230.0	20.0
7	8	34 - 40	38.0	7.6	12.2	15.2	6.02 - 20.8	15.4	10.7	119.5	600.0	38.0
8	9	41 - 47	44.0	11.0	17.7	22.3	7.0 - 24.2	17.7	12.5	162.8	960.0	52.0
9	12	64 - 71	>64.0	> 24.4	> 39.0	> 50.0	10.0 - 35.0	26	18	-	-	-