ATP 4-15

Army Watercraft Operations

April 2015

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Headquarters Department of the Army

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Change 1
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Army Watercraft Operations

1. This change updates the Appendix B, Crew Requirements by Platform.

2. A plus sign (+) marks new material.

3. ATP 4-15, February 2015, is changed as follows:

Remove Old Pages	Insert New Pages
page i through iii	page i through iii
page B-2 through B-6	page B-2 through B-6

4. File this transmittal sheet in front of the publication for reference purposes.

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By Order of the Secretary of the Army

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Army Watercraft Operations

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Preface

ATP 4-15 is the Army's doctrinal manual for Army watercraft operations. Its purpose is to provide authoritative doctrine on watercraft operations that support unified land operations. This publication applies to the range of military operations and supports Army Doctrine Publication (ADP) 3-0, *Unified Land Operations*, ADP 4-0, *Sustainment* and Field Manual (FM) 4-01, *Army Transportation Operations*. The intent of this FM is to support strategic and operational reach, and enable endurance. This ATP also establishes how watercraft operations are integrated and synchronized into the overall operations process – plan, prepare, execute, and assess. Transportation is identified as a sub-element of logistics in the Sustainment Warfighting Function.

The principle audience for ATP 4-15 is all members of the profession of arms. Commanders and staffs of Army headquarters serving as joint task force or multinational headquarters should also refer to applicable joint or multinational doctrine concerning the range of military operations and joint or multinational forces. Trainers and educators throughout the Army will also use this publication.

Army watercraft operation as discussed in this ATP is compatible with the joint doctrine and ADP 4-0, Sustainment. It addresses transportation spanning the strategic, operational, and tactical levels of war. It introduces the roles and functions of Army watercraft organizations. It explains Army watercraft's role in the Sustainment Warfighting Function. Finally, it presents doctrine addressing how watercraft operations are planned, prepared, executed, and continuously assessed.

Commanders, staffs, and subordinates ensure that their decisions and actions comply with applicable United States, international, and, in some cases, host-nation laws and regulations. Commanders at all levels ensure that their Soldiers operate in accordance with the law of war and the rules of engagement. (See FM 27-10.)

ATP 4-15 uses joint terms where applicable. Selected joint and Army terms and definitions appear in both the glossary and the text. Terms for which ATP 4-15 is the proponent publication (the authority) are italicized in the text and are marked with an asterisk (*) in the glossary. Terms and definitions for which ATP 4-15 is the proponent publication are bold faces in the text. For other definitions shown in the text, the term is italicized and the number of the proponent publication follows the definition. This publication is not the proponent for any Army terms. ATP 4-15 does not introduce any new terms, rescind or modify any terms.

ATP 4-15 applies to the Active Army, the Army National Guard and the United States Army Reserve unless otherwise stated, and military and civilian leaders at all levels. It provides guidance to our joint, inter-organizational and multinational partners on how Army transportation contributes to sustainment of the joint force.

Headquarters, United States Army Training and Doctrine Command, is the proponent for this publication. The preparing agency is the Combined Arms Support Command, Doctrine Division. Send written comments and recommendations on a Department of the Army (DA) Form 2028 (Recommended Changes to Publications and Blank Forms) to Commander, United States Army Combined Arms Support Command, ATTN: ATCL-TS 2221 Adams Ave, Fort Lee, VA 23801- 2102 or submit an electronic Department of the Army (DA) Form 2028 by e-mail to usarmy.lee.tradoc.mbx.leee-cascom-doctrine@mail.mil.

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Introduction

The United States (U.S.) Army Transportation Corps provides an overwhelming capability for supporting Army and joint forces in achieving operational reach, freedom of action and prolonged endurance. Army transportation, combined with strategic enablers, enhances the combatant commander's expeditionary capabilities. Army watercraft support this expeditionary capability by deploying forces; distributing personnel and materiel; sustaining forces for extended durations; and redeploying/retrograding forces and materiel upon mission completion.

The Defense Transportation System is a worldwide transportation infrastructure that supports the Department of Defense (DOD) transportation needs in peace and war. U.S. Transportation Command, a strategic provider, resources and allocates sealift to support the combatant commanders. This is accomplished by U.S. Transportation Command's Service components; Military Sealift Command and Military Surface Deployment and Distribution Command. Army watercraft provides the link between strategic and operational sealift.

Watercraft operations are critical for theater opening. The transportation brigade (expeditionary) (TBX) provides a rapid deployment capability that quickly establishes ports operations and mission command of watercraft. Military Surface Deployment and Distribution Command provides essential port management for the duration of an operation. Army watercraft provides the capability to conduct logistics over-the-shore (LOTS) and joint-logistics-over-the-shore (JLOTS) operations and the ability to maneuver forces and sustainment along small channels and rivers, or land on a bare beach.

Army watercraft plays an integral part in support of the reception, staging and onward movement of forces. Watercraft support operation of strategic ports and provide the additional capability of moving forces forward via inland waterways. Watercraft are essential in establishing and supporting sea basing operations. The TBX provides mission command of watercraft in a combatant commander's area of operation. Army terminal battalions provide control of watercraft supporting terminal and sea basing operations. Army watercraft may support amphibious and riverine operations.

Unified land operations is how the Army seizes, retains and exploits the initiative to gain and maintain a position of relative advantage in sustained land operations through simultaneous offensive, defensive, and stability operations in order to prevent or deter conflict, prevail in war, and create the conditions for favorable conflict resolution (Army Doctrine Reference Publication 3-0). Watercraft support the combatant commander in conducting unified land operations by providing the ability to move land forces to the desired location via the littorals, inland waterways and rivers. This capability extends operational reach and supports freedom of action. Army watercraft are the key enablers to achieving decisive action in unified land operations in operating environments requiring operations in the littorals.

ATP 4-15 updates Army Tactics and Techniques Publication 4-15, *Army Water Transport Operations*. The purpose for this conversion and update of this manual is to align Army transportation operations roles and responsibilities with current force structures and to incorporate doctrinal transformations. ATP 4-15 supports the tenets of Army transportation as described in FM 4-01, *Army Transportation Operations* and the logistics principles as described in ADP 4-0, *Sustainment*.

This publication describes watercraft transportation doctrine and its capabilities to support deployment and movement of expeditionary forces. It will relate how transportation supports unified land operations, sustainment and the distribution of equipment and materiel to Army and joint forces operating across the full range of military operations.

ATP 4-15 contains seven chapters and two appendices.

Chapter 1, Army Watercraft Fundamentals, covers the principles of watercraft operations, categories of watercraft, watercraft missions, maritime training, maritime qualifications and various duty positions of Soldier-Mariners.

Chapter 2, Watercraft Capabilities and Supporting Organizations, describes the capability of Army watercraft and the organizations that support watercraft operations. This chapter also discusses mission command and the roles and responsibilities of organizations executing mission command.

Chapter 3, Planning Watercraft Operations, discusses the planning requirements and considerations required for executing watercraft operations. It describes operational planning factors and security considerations for successful watercraft operations.

Chapter 4, Executing Army Watercraft Operations, describes how watercraft support providing endurance to unified land operations. This chapter has four sections detailing watercraft, terminal, amphibious and riverine operations.

Chapter 5, Vessel Security and Protection, describes the various threats to watercraft and methods for responding to each type of threat.

Chapter 6, Watercraft Maintenance, describes types of watercraft maintenance, the organizations responsible for performing maintenance and requirements for maintenance reporting.

Chapter 7, Watercraft Accident Reporting and Investigation, describes reporting procedures for watercraft accidents and responsibilities of the investigating officer.

Appendix A lists and describes the various shipboard force protection levels and measures required to protect the vessel at each level.

Appendix B lists the crew requirements for each vessel by platform.

Chapter 1

Army Watercraft Fundamentals

Army watercraft provide added capability in conducting distribution and sustainment operations in support of the combatant commander. They maintain the capability to deploy to theaters worldwide and provide maneuver in the littorals and support on inland waterways and rivers. This chapter describes the principles of watercraft operations, categories of watercraft, mission and crew positions held by Soldier-Mariners.

PRINCIPLES OF WATERCRAFT OPERATIONS

1-1. The principles of watercraft operations are synchronized with the principles of transportation and support the principles of sustainment. The principles ensure that Army watercraft support the combatant commander in enabling strategic and operational reach and maintaining combat power. The principles of watercraft operations are listed below.

ANTICIPATION

1-2. *Anticipation* is the ability to foresee operational requirements and initiate actions that satisfy a response without waiting for an operations order or fragmentary order (ADP 4-0). Transportation leaders must understand, visualize, describe and direct watercraft. This requires anticipation of the end state of the operation and describing what is to be done while allocating resources to accomplish the mission.

RESPONSIVENESS

1-3. *Responsiveness* is the ability to react to changing requirements and respond to meet the needs to maintain support (ADP 4-0). Watercraft operations inherently require responsiveness. Changing weather conditions and changes to the operational tempo require transportation leaders to be responsive. Leaders must be able to prioritize resources in responding to varying situations and requirements.

CONTINUITY

1-4. *Continuity* is the uninterrupted provision of sustainment across all levels of war (ADP 4-0). Watercraft provide continuity to seaport operations at the strategic level. They are vital assets in supporting operational requirements in littoral environments and during logistics over-the shore operations. Watercraft provides the combatant commander with ability to move cargo and passengers continuously from sea to land. This allows commanders to retain freedom of action, operational reach and prolonged endurance.

IMPROVISATION

1-5. *Improvisation* is the ability to adapt sustainment operation to unexpected situations or circumstances affecting a mission (ADP 4-0). It includes creating, inventing, arranging or fabricating what is needed from what is available. Unexpected changes in climate, sea state, facilities or the enemy situation can result in unpredictable situations requiring improvisation. Transportation leaders must be ready to adapt to these changing variables to fulfill mission requirements. The ability to improvise goes hand in hand with responsiveness.

CATEGORIES OF WATERCRAFT

1-6. Watercraft fall into two categories: lighters and floating utility craft. These two categories are defined according to the missions they perform. Lighters are used to conduct heavy sustainment lift, transporting outsized equipment, lighterage (cargo), and personnel between ships, from ship to shore, or for intra-theater transport. Lighters are further classified into conventional displacement (landing craft) or modular causeway systems (powered ferry). Army lighters include the Logistic Support Vessel (LSV), Landing Craft, Utility (LCU), Landing Craft, Mechanized (LCM) and the Causeway Ferry.

1-7. Floating utility craft perform operations incidental to water terminal operations, except lighterage service. Watercraft in this category are harbor and oceangoing tugs, pusher tugs, floating cranes, floating causeways, roll-on/roll-off discharge facilities (RRDF), and modular/side-loadable warping tugs.

VESSEL CLASSES

1-8. Watercraft are fully crewed regardless of the class type vessel. No watercraft can safely operate without a full crew. A crewmember (such as one marine engineman) will not be assigned to multiple watercraft in a unit due to potential requirements for vessels to operate at the same time. Army watercraft fall into one of three vessel classes (A, B and C). Manning requirements for watercraft can be found in Army Regulation (AR) 56-9, Watercraft.

CLASS A – VESSELS DESIGNED FOR CONTINUOUS OPERATION

1-9. This class includes the Large Tugboats, Logistics Support Vessel, and Landing Craft Utility (LCU-2000). These vessels have numerous critical subsystems (such as propulsion, electrical power generation, environmental control, navigation/communications, and firefighting) which demand constant attention. These vessels are capable of long duration, independent mission profiles; some of them are capable of independent ocean-crossing voyages. These vessels must be crewed for 24 hour-per-day operations using watch standing techniques and procedures. Within this class of vessels are two sub-classes. They are:

- A1 – normally operated in coastal waters (up to 200 nautical miles off the coast).
- A2 – fully ocean capable.

1-10. Vessel masters on all A1 vessels stand a normal underway watch and chief engineers remain on call during off- duty hours. On class A2 vessels, the master and chief engineer are not part of the watch standing rotation, but remain on call 24 hours a day.

CLASS B – SELF-PROPELLED VESSELS DESIGNED FOR INTERMITTENT/RELATIVELY CONTINUOUS USE

1-11. This class includes small tugs (ST), smaller landing craft (LCM-8) and all causeway ferry systems. Because they generally operate in confined areas such as harbors or LOTS sites, they typically have significant shore-side support. Their onboard subsystems are less complex than those of the larger vessels. Crewing for this type vessel generally is shift oriented and two separate crews are required for 24 hour operations.

CLASS C – NON SELF-PROPELLED VESSELS

1-12. This class includes all barges. The crew requirements vary widely with the purpose and design of the barge. Regardless of their specific function, they are usually subject to wind, tide, and, sea state. When afloat, they have a constant requirement for tending, even when not being actively employed for their designed purpose. Except for the barge derrick (BD), crewing for these vessels is generally shift oriented. The BD, except for lack of propulsion subsystems, meets all the requirements for watch standing crew. Although this vessel is a barge, it has substantial power generation, communications, environmental control, and firefighting subsystems requiring constant attention. It also has live-aboard capability for its crew. This vessel must be crewed for 24 hour-per-day operations using watch standing techniques and procedures.

WATERCRAFT UNIT MISSIONS

1-13. Army watercraft platforms do the heavy lifting associated with water transport operational maneuver and the intra-theater lift of units, equipment and supplies. They support marine terminal and sea-based operations to conduct force closure and to execute distributed support and sustainment of employed forces. Operating as part of the Joint Force, these watercraft and the organizations to which they belong, provide critical capability in mitigating an adversaries anti-access strategy and in overcoming area denial challenges present in the theater of operations. These platforms are organized into the following Army organizations.

TRANSPORTATION MEDIUM BOAT DETACHMENT

1-14. The transportation medium boat detachment provides two-way transport of cargo, troops, and vehicles from ship to shore. It is also utilized in lighterage and utility work in harbors. It can operate in rough or exposed waters and is capable of operating through breakers and grounding on a beach. The bow ramp permits RO/RO operations with wheeled and tracked vehicles. Its small size facilitates its use in confined areas. The transportation medium boat detachment is assigned to a TBX and attached to a transportation terminal battalion for operations. The transportation medium boat detachment will be employed in a water terminal, waterborne tactical operation, LOTS or JLOTS operations. The transportation medium boat detachment consists of the landing craft mechanized 8, modification 1 (LCM-8 (MOD 1) and landing craft mechanized 8, modification 2 (LCM-8 (MOD2). The LCM-8 is not self-deployable, however, it can be deck loaded on LSVs, LCU-2000s, commercial bulk carriers, heavy lift ships, and tactical auxiliary crane ships for transport.

TRANSPORTATION HEAVY WATERCRAFT COMPANY

1-15. The heavy watercraft company provides transport of combat vehicles and sustainment cargo. It provides intra-theater movement of cargo and equipment. Tactical resupply missions can be performed to remote, underdeveloped coastlines and inland waterways. This includes missions in LOTS operations in remote areas with austere shore facilities or unimproved beaches. It is also ideally suited for the discharge or back load of sealift, including RO/RO vessels such as a large, medium speed RO/RO ship. All tracked and wheeled vehicles, including main battle tanks, dozers, and container-handling equipment, can be transported in LOTS operations.

1-16. The transportation heavy watercraft company performs waterborne transportation of personnel, cargo and equipment during intra-theater lift, water terminal and joint amphibious, riverine or LOTS operations. The primary vessel is the Landing Craft Utility (LCU) 2000. It is assigned to a transportation brigade (expeditionary) (TBX) and attached to a transportation terminal battalion for operations. The transportation heavy watercraft company is capable of being employed in a water terminal, waterborne tactical operation, LOTS or JLOTS operations. It may be attached to the Navy to support joint amphibious operations. It may also operate separately under the theater sustainment command (TSC), in an independent logistics support area. Capabilities provided by the transportation heavy watercraft company include:

- Transporting non-containerized, general (vehicles, shrink wrapped aircraft, breakbulk or pallets) cargo.
- Transporting 20-foot or 40-foot containers.
- Transporting combat-equipped personnel.
- Individuals of this organization can assist in the coordinated defense of the unit's area or installation.
- This unit performs unit level maintenance on all organic equipment except communications, electronic or navigation (CEN) or command, control, communications, computers, and intelligence (C4I).
- This unit can support the Heavy Dive Team, and the Light Dive Team, engaged in underwater maintenance support to the watercraft field maintenance company, when mission, enemy, terrain and weather, troops, time available and civil considerations (METT-TC) dictates the use of the landing craft, utility (LCU) as a dive platform.

TRANSPORTATION MODULAR CAUSEWAY COMPANY

1-17. The modular causeway company provides movement support for cargo and equipment during intra-theater lift, water terminal, water transport tactical and joint amphibious, riverine and LOTS operations. Modular causeway companies provide the Army with the capability to transfer cargo between ships or from ship to shore. It moves rolling, break-bulk, and containerized cargo from an ocean-going vessel directly to the shore-side logistics operation or to a fixed or semi-permanent pier. It supports RO/RO and lift-on/lift-off operations.

1-18. The modular causeway company provides the essential interface between Army lighters and RO/RO ships. It is capable of receiving tracked and wheeled vehicles directly from the RO/RO ship onto an Army lighter. The modular causeway company also provides a dry bridge for the discharge of cargo from lighters directly to any austere environment. It can be emplaced in a number of configurations, with the trident configuration being the most effective for most conditions. The modular causeway is a key to enabling LOTS by overcoming beach obstacles and gradients in order to permit discharge of cargo across shallow waters onto shore.

TRANSPORTATION FLOATING CRAFT COMPANY

1-19. The transportation floating craft company performs floating and harbor-craft operations and support water terminal, water transport, joint amphibious, inland waterway and LOTS operations. It is assigned to a TBX and attached to a transportation battalion terminal for operations. The company will deploy to provide floating craft and harbor-craft support along with heavy lift services either pier or ships side. This unit is in direct support of the Transportation Terminal Battalion. The unit is modular in design and can deploy with only the personnel required to support the initial deployment and build incrementally to a full company operation. This unit provides the following watercraft:

- One Large Tug (128-Foot) for ocean and coastal towing, salvage, and recovery operations, general purpose harbor duties, and firefighting service.
- Two Small Tugs (Small tug 900) for tug services in support of water terminal and inland waterway operations.
- One Floating Crane (Barge Derrick, 115-Ton) to load and discharge heavy lift cargo that is beyond the capacity of ship's gear.

1-20. The transportation floating craft companies unit depends on the harbormaster detachment (HD) for coordination of watercraft operations. An inland cargo transport company or seaport operations company provides required automotive or generator maintenance support for the floating craft company. The watercraft field maintenance company provides field and sustainment maintenance for this company.

MARITIME TRAINING

1-21. The strategy for training Army Mariners is built on an integrated approach that includes institutional and unit training, as well as continuing professional development and certifications in accordance with AR 56-9, Watercraft. Modern and updated training is vital for successful water transport operations and only grows in importance as the Army strives toward a global maneuver capability. Modernizing the way in which Army mariners receive training is required as we modernize the fleet. The use of virtual and distance learning takes advantage of advances in technology. Increased use of full-feature simulations for both deck and engineers is a must.

SIMULATIONS

1-22. Given the cost of vessel operations and the feasibility of real-world training at distant ports and operating sites, a key element of the Army Watercraft training strategy will continue to be the extensive use of simulations. Currently, the Army operates a vessel simulation facility— on the east coast at Joint Base Langley-Eustis, Virginia. This facility provides a wide range of simulations, to include integrated bridge operation for all Army vessels, inclement weather and damage control operations, and the ability to simulate a number of ports around the world. The facility includes an engine room simulator that provides underway engine operations and trouble-shooting training. Potential development in simulation include:

- Increased simulation training as a viable alternative to develop and maintain diverse operational skills.
- Increased Force Protection training for operators and leaders, to include development of vessel force protection simulator and simulations should be considered as part of the tactical port operations capability development.
- Development and implementation of system specific training for low density military occupational specialty personnel within the watercraft field.

JOINT TRAINING

1-23. The Joint Training Information Management System is a web-based system providing automated support to the Joint Training System. The system is used by the joint staff and major commands to manage all large-scale, military training and operational events. The Joint Training System provides a multi-phase methodology for aligning training strategy with assigned missions while optimizing application of scarce resources. Joint Training Information Management System supports the task-based, closed-loop features of the Joint Training System by facilitating the development of an integrated, task-based thread to guide all four Joint Training System phases. Training requirements, plans, events, and assessments are all linked to mission and mission essential tasks. Entry of supporting planning data into Joint Training Information Management System is required during planning of joint exercises such as JLOTS exercises using APS-3 equipment.

TRANSPORTATION SCHOOL MARITIME TRAINING

1-24. The U. S. Army Transportation School fields a trained and ready force of Army mariners. Training the force begins with Training and Doctrine Command and carries over to the Active and Reserve component units. The high level of skill an Army mariner is expected to attain and maintain requires that frequent crew and unit training be performed at sea. While strong training programs emphasize hands-on underway operations, training aids, devices, simulators and simulations complement underway training and are integral to providing a trained and ready force while minimizing training costs associated with actual vessel operations. Vessel Bridge and Engine Room simulators and simulations familiarize and stress vessel crews in performing intricate underway maneuvers during heavy sea conditions, limited visibility and in less than ideal conditions are critical to ensuring that mariners can perform watercraft operations worldwide.

MARITIME QUALIFICATIONS

1-25. Maritime qualification is a dual process consisting of a marine technical examination for certification and a vessel-specific duty performance test for licensing. Certification is normally achieved by passing the marine technical examination for each level of skill. The marine technical examination verifies that an individual has knowledge of common maritime tasks at the appropriate skill level. A maritime certificate is valid for 5 years from the date of issue and must be renewed or upgraded before the expiration date. When the certification of any individual is revoked, it is no longer valid for any purpose. Revocation renders the individual not military occupational specialty (MOS) qualified and therefore, the individual cannot be assigned for duty aboard Army watercraft. Licensing is achieved by completing a vessel-specific duty performance test. These duty performance tests verify that an individual has the knowledge and ability to safely perform vessel-specific operational tasks to a designated skill level. The type vessels on which an individual has licensed and attained necessary endorsements will be noted on the reverse side of the United States Army Marine License. Vessel licenses expire 1 year after a Soldier's departure from the vessel or expiration of the United States Army Marine Certification. A Soldier not assigned to a position for which licensed during the previous 12 months must complete revalidation at the unit of assignment, by completing tasks designated by the duty performance test. An Army Marine License may be suspended or revoked for cause. If an individual's Army Marine Certification is suspended or revoked by Maritime Qualification Board action, the Army Marine License is automatically suspended or revoked.

SOLDIER-MARINERS

1-26. Soldier-Mariners crew Army watercraft of all types. Soldier-Mariners hold the military occupational specialties of 880A, Deck Officer, 881A Engineering Officer for warrant officers or 88K, watercraft operator or 88L, watercraft engineer, for enlisted members. They are unique in that they are both the primary operators and maintainers of the craft on which they are assigned. All watercraft crew members must be both licensed and qualified on the vessel to which they are assigned. Maritime qualification is a dual process consisting of a marine technical exam for certification and a vessel-specific duty performance test for licensing. No other MOS has this distinction. (For additional information on duties and responsibilities for each position described below see Army Regulation 56-9, Surface Transportation Watercraft.)

MASTER

1-27. The vessel master command authority derives from maritime law and rules of navigation. The master is the ultimate authority even with the presence of a pilot or senior officer. At all times he or she is the technical authority and is responsible for crew training and vessel safety, operation, navigation, and environmental stewardship. The master will ensure when underway that: the wheelhouse is constantly manned by persons who direct and control the movement of the vessel; and who fix the vessel's position; and that each person performing a duty is competent and qualified to perform that duty. The master will ensure that the vessel is operated efficiently, safely, and economically; prepared to sail at the time scheduled; properly supplied and that sufficient fuel and fresh water are on board before sailing; and that the vessel is seaworthy and, properly crewed to accomplish assigned mission, manage fire, emergency and adverse weather.

CHIEF ENGINEER

1-28. The chief engineer is responsible to the master for the efficient, safe, and economical operation of the engine department. Duties include maintaining vessel maintenance logs, records, reports and inventory of repair parts. Additionally, the chief engineer directs & supervises maintenance and repair of vessel equipment in accordance with Army Regulation 750-1 and Maintenance Allocation Chart.

FIRST, SECOND AND THIRD ASSISTANT ENGINEER

1-29. The first assistant engineer is the primary assistant to the chief engineer, the first assistant engineer holds the appropriate license and marine certification depending on which class vessel assigned, and assumes responsibility of the engine department in the chief engineer’s absence. He or she will ensure that the chief engineer’s orders are obeyed; supervises the engine department to include personnel training, safety, maintenance, and general ships business and notify the chief engineer of unusual circumstances.

1-30. The second and third assistant engineers are only assigned to Army class A-2 vessels and holds an A–1 license and marine certification, The second assistant engineer acts as assistant to the chief and first engineer, and assumes responsibility of the engine department in the chief engineer’s and first assistant engineer’s absence. He or she will ensure that the chief engineer’s orders are obeyed, supervise training, safety, general ship’s business, and maintenance on auxiliary systems.

1-31. The third assistant engineer acts as assistant to the chief and first engineer, and assumes responsibility of the engine department in the absence of senior engineering officers. He or she will ensure that the chief engineer’s orders are obeyed. As the officer in charge of property book, supply, and voyage funds, he or she is responsible for all supply functions, inventories, and maintenance sustainment tracking for the vessel.

Enlisted Assistant Engineer

1-32. The enlisted assistant engineer holds an 88L40 license and marine certification. The enlisted assistant engineer acts as assistant to the chief engineer, and assumes responsibility of the engine department in the chief engineer’s absence. He or she ensures that the chief engineer’s orders are obeyed and supervise the

engine department to include personnel training, safety, maintenance, and general ships' business and notifies the chief engineer of unusual circumstances.

ENLISTED JUNIOR AND SENIOR MARINE ENGINEERS

1-33. The enlisted junior marine engineer holds an 88L30 license and marine certification and is responsible to the assistant engineer and performs his/her duties in their absence as directed. The enlisted senior marine engineer holds an 88L20 license and marine certification, is responsible to the assistant engineer, and performs his/her duties in their absence as directed.

FIRST, SECOND AND THIRD MATE

1-34. The first mate acts as assistant to the master and assumes responsibility for the vessel in the master's absence. Specifically, the first mate will ensure that the master's orders are obeyed, supervise the deck department to include personnel training, safety, maintenance, cargo operations, security officer, and general ship's business, and navigate the vessel during appropriate watches. Maintain the prescribed course and deviate only as required to avoid danger.

1-35. The 2nd and 3rd mates are normally only assigned to Army class A-2 vessels and are usually warrant officers in the grade of WO1 or CW2. The 2nd mate holds an A-1 license and marine certification, acts as assistant to the master, and assumes responsibility for the vessel in the master's and first mate's absence. Specifically, the 2nd mate will ensure that the master's orders are obeyed, supervise the navigation department to include plotting course, maintaining bridge equipment, and ensuring sea pay for the vessels crew is maintained properly; navigate the vessel during appropriate watches. Maintain the prescribed course and deviate only as required to avoid danger. Other duties include supervision of the communication department and personnel.

1-36. The 3rd mate holds an A-1 license and marine certification and acts as an assistant to the master and assumes responsibility for the vessel in the absence of senior deck officers. Specifically, the 3rd mate will ensure that the master's orders are obeyed, supervise galley operations and personnel to include ordering subsistence, acquiring subsistence funds, and ensuring the proper health and welfare standards are maintained in the food storage and preparation areas. Other duties of the 3rd mate include supervision of the emergency care NCO, maintenance of medical equipment and supplies. He or she will navigate the vessel during appropriate watches.

MATE (ENLISTED)

1-37. An enlisted mate is assigned to a Class A-1 vessel and holds an 88K40 license and marine certification. The mate acts as assistant to the master, and assumes the responsibility for the vessel in the master's absence. Specifically, the mate will ensure that the master's orders are obeyed, supervise the deck department to include soldier training and safety, vessel & vessel systems maintenance, cargo operations, and general ship's business, navigate the vessel during appropriate watches.

WATERCRAFT NON-COMMISSIONED OFFICER (BOATSWAIN)

1-38. The boatswain is responsible to the master and is the first line supervisor of the vessels deck department. He or she will report operational conditions of all deck machinery and equipment and insures proper maintenance of all deck gear. The boatswain will ensure that the vessel is secured for sea before getting underway. Under the supervision of the first mate and/or mate, the boatswain assigns deck department personnel to watches and details. On craft not authorized a mate, the boatswain performs the mate's duties except for navigation of the vessel. The boatswain also supervises preparation of cargo or towing operations and stands underway watches as appropriate.

WATERCRAFT OPERATOR (SEAMAN)

1-39. The watercraft operator holds an 88K20 license and marine certification, is responsible to the boatswain, and performs his/her duties in their absence as directed. The leading seaman assists the boatswain in planning and preparing for vessel operations. Duties include maintaining all navigation

equipment and publications. Additionally, the leading seaman stands underway watch as appropriate and assists the Boatswain by supervising deck operations and maintenance as required.

1-40. The seaman holds an 88K10 license and marine certification and assists the boatswain in maintaining and operating all equipment and in the conduct of cargo on load and deck offload operations. Other duties include standing underway watch as helmsman and lookout when required.

ENGINEMAN

1-41. The marine engineman assists in maintaining/operating vessels main propulsion systems, generators and electrical systems. Other duties include standing underway watch assisting the Engineer non-commissioned officer in-charge of the Watch as required.

COXSWAIN

1-42. The coxswain is the master on Class B Vessels and responsible for all aspects of vessel operations.

CRANE OPERATOR

1-43. The crane operator operates the barge crane in support of lift operations, as directed. This position requires familiarization with emergency station bill and participation in all vessel drills and emergencies.

COOK AND COOK'S HELPERS

1-44. The cook and cook's helpers are qualified in the 92G military occupational specialty. The senior cook operates the ship's galley and is responsible for maintenance of food preparation equipment and area, food preparation, ensuring food handlers' personal hygiene, preparing requests for rations, coordinating ration delivery, and menu preparation. This position requires familiarization with emergency station bill, ship's medicine chest, and participation in all vessel drills and emergencies.

EMERGENCY TREATMENT NONCOMMISSIONED OFFICER

1-45. The emergency treatment noncommissioned officer is responsible to the master for recording all medical emergencies and provision of emergency medical care of all crew and passengers. Duties include providing emergency treatment for injuries, cardiopulmonary resuscitation, ensures surgical instruments and medical supplies are maintained onboard. The emergency treatment noncommissioned is required to be familiar with procedures for birth and death at sea, prevention and control of shipboard and communicable diseases, and telemedicine procedures. This position requires familiarization with emergency station bill and participation in all vessel drills and emergencies.

Chapter 2

Watercraft Capabilities and Supporting Organizations

The purpose of this chapter is to describe the Army watercraft fleet and other capabilities in terms of the total requirement, missions, capabilities, distribution, and modernization goals. It introduces and graphically portrays individual vessels that make up the Army watercraft fleet. It addresses vessel mission, transportability, characteristics and capabilities, vessel requirements, on-hand quantities, procurement or divestiture actions, distribution, and specific or ongoing actions required for the particular vessel. The tables for each vessel provide a synopsis of Army watercraft requirements that shape the fleet.

WATERCRAFT CAPABILITY DESCRIPTION

2-1. Army watercraft deploy worldwide and are capable of supporting operational movement and maneuver and force repositioning, as well as distribution and expeditionary sustainment in various roles, including: deployment from staging bases, sea bases or intermediate staging bases to insertion points in joint operations area, JLOTS and single service LOTS operations, thus extending the intra-theater mobility of combat equipment and increasing the capability to distribute equipment and supplies across the range of military operations. To enable the Combatant Commander to meet land maneuver requirements, Army watercraft possess the following capabilities:

- Intra-theater Lift – Army watercraft are designed to perform missions specifically related to intra-theater movement of combat power and sustainment. While capable of deploying over strategic distances, Army watercraft are not strategic lift platforms, but are a critical link between strategic lift and land oriented tactical maneuver operations. This capability provides the joint forces commander the flexibility to tactically position and support the operational scheme of maneuver, with unprecedented speed and magnitude.
- LOTS – Lighters transport cargo from ship to shore or seabase to shore, reducing operational footprint ashore and provide an alternative to using piers and developed ports.
- Anti-Access/Port Denial – Circumvent enemy anti-access strategies by providing alternative water transport means for achieving combat power throughput when strategic and tactical ports are unavailable.
- Surface Infiltration – Army watercraft are distinctly suitable as secure “mother ship” staging bases for various types of special operations infiltration/exfiltration operations. (FM 3-05.212 addresses incorporation of Army watercraft for special operations mission support).

2-2. Watercraft provide the capability to support and maneuver an expeditionary force. This flexibility allows maneuver forces to be positioned near the objective, but out of contact. Further, the command, control, communications, computers, and intelligence (C4I) capability on board vessels assist with providing situational awareness and mission planning. Watercraft can also provide the capability to reposition forces in an operational area or move forces between theaters.

2-3. The Army’s landing craft are specifically designed to dramatically increase the ability to access austere points on the littorals that are currently unavailable to land forces. The vessels’ shallow draft, adaptable cargo space and ramp support delivery and follow-on support of land forces at a wide variety of points, without the need for improved port facilities and the added footprint of terminal service operators. The ability to access austere areas increases the amount of flexibility that can be added into an operation.

2-4. Army vessels are capable of operating and surviving in various sea states and adverse weather conditions. Intra-theater sealift movement of units, equipment, and sustainment may require voyages of

significant distances, requiring the vessels to not only operate but provide adequate survivability to ensure embarked combat forces arrive ready to conduct operations.

2-5. Army watercraft are also capable of operating alone or in conjunction with other vessels. Larger vessels can operate as individual detachment or a part of a larger fleet. When operating as a detachment, operational planning and external support are provided by Army, Joint and commercial resources. Large tugs and smaller vessels coordinate their operational planning and support through their unit headquarters and liaison officers.

2-6. Class A2 Army watercraft operate using a minimal footprint and are self-sustaining. They are able to fully sustain their crew by providing food, shower and living space. They are capable of conducting maintenance underway without returning to a port for assistance. Army watercraft's self-sustaining capability is a critical element that reduces the logistics footprint in the operational area.

2-7. Army watercraft are not designed for naval or amphibious warfare. However, vessels conduct transportation missions in all phases across the range of military operations requiring the ability to defend and protect crew, cargo and embarked passengers. Therefore, Army watercraft are equipped with organic lethal and non-lethal defense capabilities to enable completion of sustainment and maneuver missions.

2-8. Army vessels are capable of supporting a wide range of Joint, interagency, intergovernmental and multi-national partners. Watercraft can operate independently to support Army efforts, or they can work in conjunction with Navy and Marine assets. Watercraft can support the full range of unified land operations.

2-9. The fleet possesses global reach capability. The larger vessels are designed to be forward- deployed, providing continuous operational support to a wide variety of missions, to include peacekeeping operations, disaster relief, non-combatant evacuation operations, support to the theater support and cooperation program, as well as priority support and sustainment operations. Other watercraft lift capabilities are forward-stationed in operational units or prepositioned stock for ready availability to combatant commanders.

ARMY WATERCRAFT CAPABILITIES

2-10. The following sections provide the organization assigned, vessel type, current system mission, assessment, capabilities and characteristics. In order to accurately interpret the contents of this section, the reader must understand the scope of each paragraph as defined:

- Capability—the operational mission of the vessel.
- Transportability—the methods available to transport the vessel to the area of operation.
- Characteristics/capabilities—vessel dimensions; payload in terms of capacity, equipment, and container carrying equivalents; operating range in nautical miles; crew size; and age of craft.
- Length overall—the total length of the vessel in feet.
- Beam—the extreme width of the vessel in feet.
- Displacement—the weight of the total amount of water in long tons that a vessel displaces when afloat (Displacement [light] is the weight stated with no stores, fuel, water, or equipment [basic issue items] aboard. Displacement [loaded] is the weight stated with full stores, fuel, water, and equipment aboard.).
- Deck area—the total square footage of deck space available for loading equipment. It is stated in square footage and, where appropriate, in terms of M1 main battle tanks, Strykers, and 20-foot containers.
- Payload—the total weight a vessel can carry in tons.
- Range—the distance a vessel can travel with one full load of fuel (stated in both light [no cargo] and loaded [fully laden] terms.).
- Draft—the amount of hull underwater in feet when the vessel is afloat (stated in both light (no cargo) and loaded (fully laden) terms).
- Crew size—derived from doctrinally documented requirements, approved changes, additional documentation by Headquarters, Department of the Army since that change was published, and proponent-advised additional requirements.

- On-hand—the total number of craft on hand.
- Distribution table—Modified Table of Equipment (by component) and pre-positioning distribution requirements.

LOGISTICS SUPPORT VESSEL

2-11. The logistics support vessel (LSV) is assigned to the transportation brigade (expeditionary) (TBX) and attached to transportation battalion terminal for operations. It can also be used for unit deployment and relocation. Because of its shallow draft, the LSV can carry cargo from deep-draft ships to shore ports or areas too shallow for larger ships. The LSV can also execute cargo operations along coastal lines of communication. There are eight LSVs within the Army's inventory. The LSV is self-sustaining and can deploy to support operations anywhere around the globe. Additional capabilities of the LSV include:

- Transporting 2,000 short tons of cargo, consisting of vehicles, containers, and/or general cargo.
- Bow thrusters to conduct beaching, beach extraction, docking and undocking without tug assist.
- Receiving and discharging cargo through a bow ramp and stern ramps.
- Beaches with a 1:30 offshore beach gradient with a maximum of 900 short tons of cargo.
- Performing maintenance on all organic equipment, except communication, electronic, and navigation (CEN) or C4I equipment.
- Providing Army health service and food service support.
- Is capable of self-deploy to a theater of operations and meets the requirements to transit the Panama and Suez Canals.

2-12. The LSV is a Class A type vessel. Its deck area is 10,100 square feet and can accommodate up to twenty-four M1A2 Abrams tanks or twenty-four 20-foot containers (48 double stacked containers). The payload of the LSV is 2,000 short tons (roughly equivalent to 40 C-17 aircraft). LSVs 1 through 6 have a range of 8,200 nautical miles unloaded and 6,500 nautical miles loaded. LSVs 7 and 8 have a range of 8,200 nautical miles unloaded and 5,500 nautical miles loaded. The crew size for this vessel is 31 personnel (8 warrant officers and 23 enlisted). The LSV is pictured in Figure 2-1 on page 2-4.

2-13. The LSV is a versatile vessel that provides a heavy lift capability on water. Other characteristics of the LSV include:

- Length overall: LSV 1 through 6 - 272.75 feet (83.1meters (m)); LSV 7 and 8 – 314 feet (95.7m).
- Beam: 60 feet (18.3m).
- Displacement (loaded): LSV 1 through 6 – 4,199 long tons; LSV 7 & 8 – 5,905 long tons.
- Range: LSV 1 through 6 – Light: 8,200 nautical miles at 11.5 knots, Loaded: 6,500 nautical miles at 11 knots; LSV 7 & 8 – Light 8,200 nautical miles at 11.5knots, Loaded: 5500 nautical miles at 12 knots.
- Draft: Light: (All LSVs) 6 feet (1.8m); Loaded: LSVs 1 through 6 – 12 feet (3.7m); LSVs 7 & 8 – 13 feet.

Figure 2-1. Logistics support vessel

LANDING CRAFT, UTILITY 2000

2-14. The LCU is capable of self-deployment depending upon distance, weather, sea conditions, and crew training. It can also be transported aboard a float-on/float-off or lift-on/lift-off ship. The LCU is a Class A vessel. The LCU has a deck area of 2,500 square feet and can accommodate 5 M1A2 Abrams tanks or fifteen 20-foot containers (30 double stacked containers) or up to 350 short tons of non-containerized cargo. A single LCU can carry up to 250 combat-equipped personnel on deck (personal floatation devices provided by supported unit) for very short durations (up to one hour). The payload of the LCU is 350 tons (equivalent payload capacity of 7 C-17 loads). The range of the LCU is 4500 nautical miles. The crew size for this vessel includes 13 personnel (2 warrant officers and 11 enlisted for 24-hour operation). The LCU is pictured in figure 2-2.

2-15. The LCU provides a heavy lift water asset that can be used in both terminal and LOTS operations. Other capabilities provided by the LCU include:

- Length overall: 174 feet (53m)
- Beam: 42 feet (12.8m)
- Displacement (weight): 575 long tons (light); 1,087 long tons (loaded)
- Draft: Light: 8 feet (2.4m); Loaded: 9 feet (2.7m)

Figure 2-2. Landing craft, utility 2000

Landing Craft, Mechanized 8 (Modification 1)

2-16. The medium boat detachment transports cargo, troops, and vehicles from ship to shore or in retrograde movements. The medium boat detachment is also utilized to transfer lighterage and perform utility work in harbors and costal waterways. It is designed for use in rough or exposed waters through sea state 3 and is capable of operating through breakers and grounding on a beach. The bow ramp permits roll-on/roll-off (RO/RO) operations with wheeled and tracked vehicles. Its small size facilitates its use in confined areas. The medium boat detachment also supports the mission command of vessels and the transport of Army stevedores between shore points and a ship in a protected environment. The LCM-8 is a Class B vessel. It has a deck area of 620 square feet and can accommodate two 20-foot containers or 62 combat-equipped Soldiers for voyages of short duration. It has a payload 53 tons (equivalent payload capacity of one C-17). The LCM-8 has a range of 332 nautical miles unloaded and 271 nautical miles loaded. The crew for this vessel consists of 6 enlisted personnel (3 per shift for 24-hour operation). The LCM-8 (MOD 1) is pictured in Figure 2-3 on page 2-6. The LCM-8 (MOD 1) provides a required ship to shore capability for LOTS operations. Other characteristics of the LCM-8 (MOD 1) include:

- Length overall: 74 feet (22.5m).
- Beam: 21 feet (6.4m).
- Displacement (weight): 58 long tons (light); 111 long tons (loaded).
- Draft: Light: 3.5 feet (1m); Loaded: 5 feet (1.5m).

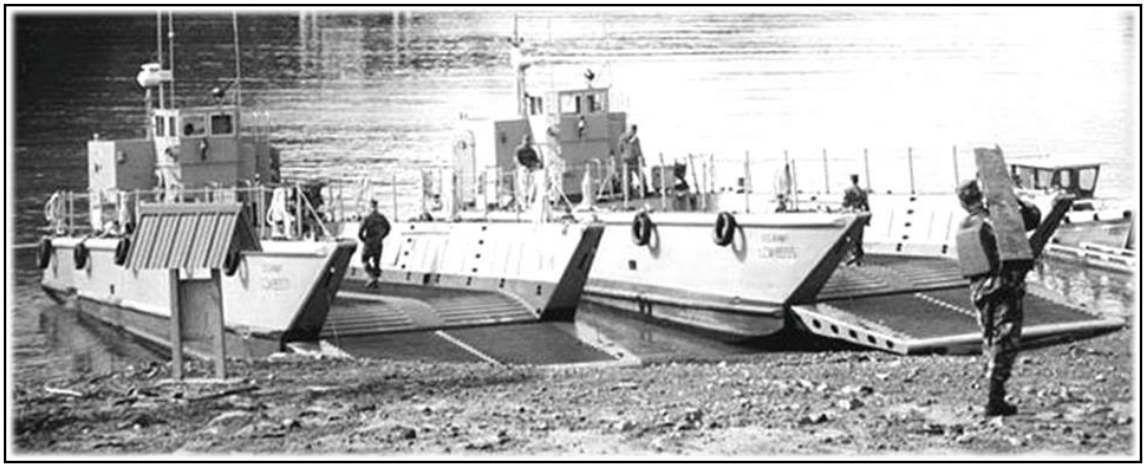

Figure 2-3. Landing craft, mechanized 8, modification 1

Landing Craft, Mechanized 8 (Modification 2)

2-17. The primary mission of the LCM-8 (MOD 2) is mission command, personnel transfer, and light salvage. It is used in harbors and inland waterways. The LCM-8 (MOD 2) is a versatile vessel capable of performing many support functions in conditions up to Sea State 3. As a mission command platform, the LCM-8 (MOD 2) provides the critical link between ship and shore operation centers. It transports Army stevedores between shore points and a ship in a protected environment. It may also be used as a medical evacuation vessel, diver support platform, and firefighting and light salvage boat. The LCM-8 (MOD 2) can work in shallow inlets and rivers as well as retain its original ability to land on an unimproved beach. The LCM-8 (MOD 2) may be deck loaded onto a larger vessel for deployment to overseas locations. The LCM-8 (MOD 2) is a Class B vessel. It has a deck area of 230 square feet and a payload of 41.26 short tons or 47 combat equipped Soldiers. The range of the LCM-8 (MOD 2) is 320 nautical miles unloaded or 271 nautical miles loaded. The crew consists of 8 enlisted personnel (4 per shift for 24-hour operation). The LCM-8 (MOD 2) is pictured in figure 2-4. The LCM-8 (MOD 2) supports mission command of ship to shore operations. Additional characteristics include:

- Length overall: 72’9” Beam: 21 feet (6.4m).
- Displacement: Light – 71.81 long tons; Loaded – 116.07 long tons.
- Draft: 4 ft. 6 in. (1.4m).

Figure 2-4. Landing craft, mechanized 8, modification 2

128-FOOT LARGE TUG

2-18. The 128-foot large tug is a Class A vessel and is self deployable worldwide. It is capable of coastal and ocean towing and docking and undocking operations with large ocean vessels. The 128-foot large tug serves as the trans-oceanic transport for the barge derrick 115 ton. It has a bollard pull of 58 long tons. The 128-foot large tug is capable of towing five Type 231A or 231B barges and sustaining a minimum speed of 5 knots in sea state 4 under full tow. It has a secondary mission of accomplishing general-purpose harbor duties, such as positioning floating cranes. The LT is equipped to accomplish fire-fighting duties, required where ammunition ships are being worked. It is also used to perform salvage and recovery operations for watercraft disabled or damaged along water transport line of communications and to overcome anti-access and port denial activities. The range of the 128-foot large tug is 5,000 nautical miles. The crew size for this vessel consists of 23 personnel (8 warrant officers and 15 enlisted). The 128-foot large tug is pictured in Figure 2-5 on page 2-8. Additional characteristics of the 128-foot large tug include:

- Length overall: 128 feet (39m).
- Beam: 36 feet (11m).
- Displacement (weight): 786 long tons (light); 1,057 long tons (loaded).
- Draft: Light: 14 feet; Loaded: 16 feet.

Figure 2-5. 128-Foot large tug

Small Tug 900

2-19. The small tug 900 is a Class B vessel that supports movement of barges and lighterage of various types in harbors, port areas and during LOTS anchorage. It can assist larger tugs with utility work, such as movement of ships, floating cranes, and line-handling duties. It is capable of operation in sea state 3. The small tug 900 is not capable of self-deployment and must be moved via a float-on/float-off ship or lift on/lift off ship (each tug has its own transport cradle and can be lifted by the 115 ton BD crane) to worldwide destinations for employment. It has a bollard pull of 15 long tons and a range of 720 nautical miles unloaded. The range in nautical miles varies based on the type of tow it is executing. The crew size for this vessel consists of 12 personnel (all enlisted). This vessel is capable of 24 hour operations if augmented with a licensed 88K40 or 88L40. The small tug 900 is pictured in Figure 2-6. Additional characteristics of this vessel include:

- Length overall: 60 feet (18.3m).
- Beam: 22 feet (6.7m).
- Displacement (weight): 105 long tons (light).
- Draft: 6 feet (1.8m).

Figure 2-6. Small tug 900

Barge Derrick, 115-Ton

2-20. The barge derrick, 115-ton is a Class A non-self propelled vessel used to load and discharge heavy lift cargo that exceeds lift or reach capacity of ship or land-based cranes. It provides the lift and reach needed to discharge cargo from large, medium speed RO/RO ships, as well as commercial container ships, to accomplish strategic deployment. It can be towed to overseas locations or loaded on a float-on/float-off ship for movement. The barge derrick, 115-ton has a lifting capacity of 115 long tons at an 80 foot radius and can be employed theater-wide anywhere water terminal or offshore operations are conducted. The crew size for this vessel is 14 personnel (1warrant officer and 13 enlisted). The barge derrick is pictured in Figure 2-7 on page 2-10. Additional characteristics include:

- Length overall: 200 feet (61m) Beam: 80 feet (24.4m).
- Displacement: 1560 long tons Boom length: 220 feet (67m).
- Draft: Light: 7 feet, 4 inches (2.2m); Loaded: To be determined.

Figure 2-7. Barge derrick, 115 ton

TRANSPORTATION MODULAR CAUSEWAY SYSTEM

2-21. The transportation modular causeway system provides the essential interface between Army watercraft and RO/RO ships. The modular causeway company is assigned to the TBX and attached to a transportation terminal battalion. It may also be attached to the U.S. Navy or U.S. Marine Corps to support joint amphibious, riverine or LOTS operations.

2-22. The transportation modular causeway system deploys to a theater of operations to provide movement support on a 24 hour basis. This unit is modular in design and can deploy with only the personnel required to support the initial deployment and build incrementally to a full company operation. This unit provides the following:

- Two RRDF platforms consisting of up to 18 non-powered causeway sections each that interfaces between RO/RO ships and lights for the rapid discharge of rolling stock.
- One CF consisting of one powered causeway section and up to three non- powered causeway sections for moving rolling stock, break bulk, containerized cargo from ship to shore.
- One FC pier consisting of from 1 to 17 non-powered causeway sections (up to 1,200 feet in length), with a dry bridge for the discharge of cargo and equipment from lighters directly to an unimproved shoreline or degraded fixed port facility.
- Several variants of causeway section configuration to meet mission needs.

2-23. This modular causeway company requires assistance from the seaport operations company, and floating craft company in assembling the causeway systems. An engineer horizontal construction company and heavy dive team provides the beach site survey and required pier maintenance. The HD provides lighter control during operations.

Modular Causeway System (Roll-On/Roll-Off Discharge Facility)

2-24. The RRDF is a Class B vessel. It is constructed of modular causeway systems and can be deployed aboard container ships and other cargo vessels or via rail. The RRDF consists of 18 modular causeway sections, 1 combination beach and sea-end section, 2 modular, side-loadable warping tugs and 1 lighting, fendering, and anchoring system. The crew size for this vessel consists of 76 enlisted (main section: 36 enlisted; warping tug crew: 20 x 2 crews for 24-hour operation). The modular causeway system RRDF is pictured in figure 2-8.

Figure 2-8. Modular causeway system (roll-on/roll-off discharge facility)

Modular Causeway System (Causeway Ferry)

2-25. The CF is a Class B vessel. It is constructed of modular causeway sections and can be deployed aboard container ships and other cargo vessels or via rail. The CF contains a powered modular causeway section, 2 modular causeway (intermediate) sections and 1 combination beach and sea-end section. The crew size for this vessel is 16 personnel (powered section 12 enlisted; causeway section 4 enlisted). The CF is pictured in figure 2-9 on page 2-12.

Figure 2-9. Modular causeway system (causeway ferry)

Modular Causeway System (Floating Causeway)

2-26. The FC is a Class B vessel. It is constructed of modular causeway sections and can be deployed aboard container ships and other cargo vessels or via rail. The FC contains 2 combination beach and sea ends, 1 lighting, fendering and anchor system, 29.3 modular causeway (intermediate) sections and 2 modular, side-loadable warping tugs (powered sections). The crew size for this vessel is 38 personnel (main segment: 18; warping tug: 10 x 2 crews for 24-hour operation). The FC is pictured in Figure 2-10.

Figure 2-10. Modular causeway system (floating causeway)

Modular Causeway System (Warping Tug)

2-27. The modular warping tug is a self-propelled, Class B craft composed of a 40-foot section and two 20-foot raked ends which are configured into 80' x 24' sections. The warping tug can be deployed aboard container ships and other cargo vessels or via rail.

SUPPORTING ORGANIZATIONS

2-28. The logistics support vessel, watercraft field maintenance company and harbormaster detachment (HD) provide operational and maintenance support and control of watercraft operations. The following sections describe their capabilities.

LOGISTICS SUPPORT VESSEL (LSV) DETACHMENT

2-29. The LSV detachment provides worldwide transport of combat vehicles and sustainment cargo. It provides intra- theater line haul of large quantities of cargo and equipment. Tactical resupply missions can be performed to remote underdeveloped coastlines and inland waterways. It is also ideally suited for the discharge or back load of sealift, including RO/RO vessels, such as a large, medium speed RO/RO ship. The LSV detachment can transport cargo from ship to shore in LOTS operations, including those in remote areas with unimproved beaches. All container and bulk cargo, tracked and wheeled vehicles, including main battle tanks, dozers, and container-handling equipment, can be transported in LOTS operations.

WATERCRAFT FIELD MAINTENANCE COMPANY

2-30. The watercraft field maintenance company provides field maintenance support for U.S. Army watercraft. It is assigned to a TBX and attached to a transportation terminal battalion for operational support. It performs maintenance on all organic equipment except communications security equipment. For underwater maintenance, the heavy and light diving teams provide support to the watercraft field maintenance company. The watercraft field maintenance company is equipped with the containerized maintenance facility (CMF) to support maintenance operations.

Containerized Maintenance Facility

2-31. The CMF is the primary repair system that supports theater-level Army watercraft field maintenance operations. When operational, the CMF provides a fully-equipped watercraft maintenance shop configured in five expandable-wall and two ISO containers. The CMF is a combination of tactical rigid wall shelters and standard ISO containers grouped into a system that is the principal, field level maintenance capability for Army watercraft. The system is a stand-alone maintenance support package that can be tailored to the needs of the mission. The CMF has its own power generation/distribution system and is capable of using local commercial power sources when available. When configured for movement, the CMF's containers are fully transportable on inter- and intra-theater air and sea lift platforms. The CMF contains the following capabilities:

- Welding/Machine Shop
- Engine Rebuild/Component Rebuild Shop
- Electrical/Electronic Repair Shop
- Air Conditioning/Hydraulic Repair Shop
- Command and Control/Administrative/Shop Office
- Shop Stock/Bench Stock Storage
- Power Generation/Distribution System

HARBORMASTER DETACHMENT

2-32. The HD is assigned to a TBX and attached to a transportation terminal battalion for operations. The HD is specifically designed to operate as an integral part of the terminal battalion to enable the Battalion S3 and S6 to collaborate and coordinate with Joint and Coalition partners in conducting waterborne maneuver, maneuver support and maneuver sustainment operations. The HD executes this through the harbormaster

command and control center (HCCC). The HD enables the terminal battalion to provide 24 hour operational control for Army vessels conducting intra-theater lift, water terminal, inland waterway, joint amphibious, and LOTS operations. The HD can operate in water ports and terminals in all areas of the world throughout the spectrum of contingency missions. It coordinates berthing and anchorage assignments for Army vessels within a terminal area controlled by the Military Sealift Command, joint, coalition, or host nation agencies. The HD is responsible for operation of the lighterage control center, ship lighterage control point and beach lighterage control point in bare beach or degraded port LOTS environments. It can form the nucleus for a joint lighterage control center during joint LOTS operations. Operating as an extension of the terminal battalion headquarters, the HD provides staff expertise for watercraft maintenance operations and planning, and coordination for vessel maintenance support with joint, host nation or contractor maintenance activities. In addition, it provides expertise for watercraft operational planning and coordination with other joint or host nation activities conducting vessel operations. For details on personnel assigned to the harbormaster detachment and terminal battalion S3 and S6 see Appendix B.

Harbormaster Command and Control Center

2-33. The HCCC is a mission essential system employed by the HD to maintain operational control and visibility of Army watercraft. It is used to collaborate and coordinate with joint and coalition partners in conducting waterborne maneuver, maneuver support and maneuver sustainment operations. The HCCC is a mobile joint-interoperable mission command platform equipped with sensors capable of observing the local maritime operational environment. Configured with two sets of communication platforms, sensors, and support equipment, the HCCC is capable of conducting independent operations in two geographically-separate sites or employing both platforms for coordinated operations in a single site. The communications platforms are contained within a variant of the Army's Standardized Integrated Command Post System and Command Post Platform. The Standardized Integrated Command Post System and Command Post Platform are each equipped with workspaces for HD and terminal battalion watercraft operations personnel; mobile, independent power sources; and sensor platforms capable of supporting two dispersed operating sites. Information systems integrated into the HCCC platforms are capable of being networked and interoperable with Joint and Coalition Forces. The HCCC platform is equipped with sensors to collect and process asset tracking and relevant environmental data from the local operating area. It also has knowledge management tools needed to establish and maintain situational awareness of the littoral environment, real-time tracking of watercraft, and interoperability with the common operational picture. In order to support distributed and agile logistics operations, HCCC platforms are readily deployable by strategic airlift and sealift assets. On land, HCCC platforms are mobile and capable of conducting split-based operations at the operational and tactical levels.

Chapter 3

Planning Watercraft Operations

Army/Joint planners within the theater must plan for the deployment of vessels and crew, movement of cargo, opening of new ports, unimproved facilities and beaches to accommodate throughput of cargo via areas made untenable by enemy actions. Plans should include the means of deployment (transshipment port-to-port or LOTS), proposed location and layout of the area, type of lighters to be used, the task organization needed to attain the desired tonnage capacity, and other planning factors listed in this and subsequent chapters. Plans must also include U.S. and host nation or allied Coast Guard port security capability. Furthermore, planners must consider and should incorporate available host nation and allied capability as appropriate for watercraft operations in all conditions.

UNDERSTANDING THE OPERATIONAL ENVIRONMENT

3-1. Anti-access and access denial strategies developed by our adversaries impact forward basing of military capabilities. Sea lift platforms will enable prompt responding Army formations to deploy in combat ready unit configurations, with integrated sustainment, in a matter of days, with units prepared to begin operations immediately after arrival. LOTS or JLOTS operations will allow commanders to employ forces ashore through multiple, unimproved entry points. Army watercraft provides the ability to rapidly project combat power and sustainment. This includes defeating anti-access challenges while setting the conditions for the rapid build-up of combat power through the use of simultaneous force flows by air and sea via multiple and if necessary, austere entry points.

3-2. Littoral regions contain over three- quarters of the world's population, over eighty percent of the world's capital cities, and nearly all of the marketplaces for international trade. These facts mean the littorals are no longer a distinctly maritime domain. The littorals are increasingly a critical area of the operational environment that involves a complex intersection of three critical domains: sea, land and air. Denial of one domain by enemy or natural forces requires military access to the others.

THREAT ENVIRONMENT

3-3. The current and projected global environment requires U.S. forces to operate in potentially hostile regions. With limited and unpredictable overseas access, basing and over-flight rights, our leadership must increasingly rely on expeditionary forces for quick response to developing crises. This places an emphasis on gaining access to contested areas as well as providing persistent presence.

3-4. Potential adversaries possess an inventory of increasingly sophisticated and overlapping sensors, command and control systems, platforms, and weapons designed to deny access to littoral areas. Many of these systems are specifically built to deny the U.S. the ability to project its military instrument of National power. Enemy capabilities for area denial will vary significantly and our ability to overcome them will depend on doctrine, strategy, speed of deployment, equipment in use and its maintenance, and the level of training of military forces. Army watercraft provides a significant capability set to overcome area denial.

3-5. Threats to the Army watercraft include air, surface, and subsurface threats in conventional as well as chemical, biological, radiological and nuclear (CBRN) threats and hazards. Threat platforms may employ a mix of weaponry to include guns, shoulder fired weapons, anti-ship cruise missiles, torpedoes, bombs, mines, improvised explosive devices, and unmanned undersea vehicles. While Army watercraft do not provide combat power from the sea as the Navy does, they operate as a fully capable combat maneuver-enabling force in the uncertain threat environment described in the Joint Operational Environment. The

combatant commander ensures protection for assets operating within the air, land and sea domains within the operational area, including over the horizon, inclusive of operations. The Army capability set includes: Lighters such as LSV, LCU and LCM to complement this capability with heavy lift access into austere ports and onto bare beaches; Tugs and cranes to provide access into austere ports requiring salvage and port clearance; and Causeway systems to link that last 50 yards over shallow gradient beaches. All Army watercraft will face a range of challenging weather and climatic conditions and environments in their areas of operation.

VESSEL EMPLOYMENT THE RANGE OF MILITARY OPERATIONS

3-6. Army watercraft fills a critical capability gap in the ability of the Army to conduct operational maneuver in support of the Joint Force. As such, they provide critical capabilities needed to ensure ground combat forces are successful across the range of military operations. Thus, the first step in understanding how the fleet will be employed by land maneuver commanders is to understand the capability link to full spectrum operations.

3-7. When employed across full spectrum operations, watercraft provides the land maneuver commander with overarching capability sets required to meet the demands of the operational environment. Those capability sets are global response, force closure, movement and maneuver, and sustainment.

GLOBAL RESPONSE

3-8. The nation's capability to provide rapid, global military response options to the President and to our geographic combatant commander has never been more important than it is in our current strategic environment. In 2003, the Army repositioned and restructured the Army watercraft fleet and associated force structure to meet the demands of our strategic environment. The goal of those directives was to position the existing and future watercraft fleet to better support the geographic combatant commander. The changes improve the ability of the fleet to respond to geographic combatant commander requirements.

3-9. The plan described in the following paragraphs balances requirements with the need to support our continental United States (CONUS) training base and combatant command operational requirements. Vessel allocation and stationing strategy are focused on supporting national security and defense strategies. The plan is grounded on a mix of vessels that are forward-stationed and pre-positioned in tailored packages to meet training and regional support requirements. CONUS-based vessels are maintained at the minimum essential levels to meet unit and individual training requirements for CONUS units and to meet operational requirements in the Western Hemisphere. Each of the packages can support operations in another theater as required. The following paragraphs describe the concept of employment of these support packages.

FORCE CLOSURE

3-10. The CONUS package is dedicated to supporting Southern Command, Northern Command, CONUS-based missions and providing reinforcement for major combat operations worldwide as required. Additionally, the CONUS-based package supports unit training and exercises and provides current institutional training support to the U.S. Army Transportation School, outside continental United States and prepositioned watercraft Mission Sets.

3-11. The two primary support packages outside continental United States are tailored to provide theater-specific intra-theater lift of forces forward of the strategic port; sustainment, port opening, recovery, salvage activities, port denial, anti-access, and LOTS operations. Forward stationing and pre-positioning Army watercraft in theater significantly reduces the response time to support combatant commanders' timelines, and represents a tremendous improvement in increased payload capability available to the combatant command. Pre-positioned vessels are stored and maintained in theater by the U.S. Army Materiel Command (USAMC) at a reduced operational status. Reduced operational status requires vessels are fully mission-capable within a pre-determined amount of time of crews being deployed to activate the pre-positioned assets. The manning concept for pre-positioned craft requires CONUS-based crews to deploy the pre-positioned vessels and restore the craft to full mission capability within combatant command–approved timelines. All personnel and a minimum amount of unit equipment deploy from home station via strategic airlift. Equipment that typically deploys with unit personnel includes to-accompany-

troops materiel, such as individual weapons, individual protective equipment (mission oriented protective posture) and chemical detection equipment.

3-12. All vessels allocated to the pre-positioned support packages are pre-positioned without crews. By maintaining tailored packages of pre-positioned vessels in theater, crews can be deployed within hours to begin operations shortly after arrival in the area of responsibility. This avoids lengthy vessel transit times from CONUS bases or aboard strategic sealift, and increases response times dramatically. The outside continental United States stationing plan accounts for combatant commander requirements.

3-13. The medium boat detachment provides the capability for riverine and inland waterway operations, port security augmentation, and amphibious assault augmentation. The maintenance craft provides support for contact maintenance and repair of vessels operating within the area of responsibility.

3-14. Large tugs are provided for vessel recovery and open-ocean towing requirements. Tugs provide the recovery capability for vessels requiring emergency tow, serves as the prime mover for the barge derrick crane during open-ocean towing, and positions the barges for lift and refueling operations. The tug also provides the capability to tow commercial barges that may be required to support mission requirements.

3-15. Small tugs (ST 900) are provided in each support package for port management; docking and undocking assistance to smaller vessels; and for inland waterway operations. These tugs also provide significant capabilities during LOTS operations when using causeways.

3-16. Each forward support package includes a the barge derrick (BD) 115-ton floating crane for heavy lift support and degraded port recovery and salvage operations.

3-17. The final portion of the pre-positioned support packages is a causeway company. Each company provides roll-on/roll-off discharge facilities; causeway ferry (CF), including warping tugs; and floating causeway to provide in-stream discharge and bare-beach LOTS and JLOTS capability.

Request for Watercraft

3-18. Even with forward stationing and prepositioning of vessels and crew, a combatant commander may have increased requirements for maneuver of forces across maritime intra-theater, littorals, or inland waterways. When this occurs, the combatant commander may submit a request for forces through Forces Command for additional watercraft support.

Army Pre-positioned Stocks Afloat (APS-A) –Watercraft

3-19. Commanders of watercraft units, and leaders who may be directed to draw prepositioned watercraft, must be intimately familiar with what is and is not included in the prepositioned unit sets. Units deploying to prepositioned equipment must refer to FM 3-35.1, *Army Pre-positioned Operations*, for unit roles and responsibilities leading up to and including deployment. The deploying unit will not send anything needed for immediate use upon arrival from home station via sealift, as this would incur delays and negate the advantages of employing APS-3 equipment. Unit equipment not mission essential early in an operation may be sent by strategic lift for subsequent link-up with the deployed force, however, commanders must be cognizant of the long delays associated with shipping equipment via sealift.

3-20. Prepositioned watercraft are equipped and configured in accordance with applicable authorization documents and regulations. They do not include unauthorized modifications that the unit and/or crew may have installed. Units will not include these unauthorized items in to-accompany-troops equipment being shipped to the prepositioning site.

3-21. Higher echelon commanders and staffs with subordinate watercraft organizations must be aware of the impacts of activating prepositioned watercraft. Because of the low density of Army watercraft systems, activation of prepositioned watercraft immediately impacts the readiness of CONUS based watercraft systems and organizations. In most cases the CONUS based vessels will be left without a crew, impacting the unit's ability to maintain the stay behind equipment. When deciding which units will activate prepositioned vessels, consideration must be given the status of the vessels in storage as well as the type unit activating the vessels. For example, if an LSV detachment is to activate a number of prepositioned LCUs, commanders and staffs must recognize the to-accompany-troops equipment requirements to

physically activate the craft. Although the personnel requirements can be met, the equipment requirements may not.

3-22. Activation of prepositioned Army watercraft is different than activating ground equipment. More planning and coordination is required due to the very nature of the assets being activated. By requiring the unit to bring too much equipment or by allowing the unit to bring too much "just in case" gear, the commander responsible to activate prepositioned watercraft may jeopardize their ability to accomplish the mission. The following describes conditions for the release and use of Army Pre-positioned Watercraft:

- Major Combat Operations. APS-3 will be released as directed to support an operation. In the event of an imminent attack or capture by hostile forces, the senior Army commander present has the authority to order the immediate release of APS-3.
- Small-Scale Contingencies/National Emergencies. APS-3 will be released in support of small-scale contingencies/national emergencies.
- Peacetime emergencies. APS-3 will be released in support of peacetime emergencies.
- Exercise support. Major Commands (MACOM)s may request APS-3 to validate war reserve materiel "draw" procedures during an approved USAMC or MACOM exercise.

3-23. Headquarters, Department of the Army must approve all issues and loans of APS-3 stock to meet emergency peacetime requirements with the following exception: the USAMC and U.S. Army Medical Materiel Agency Inventory Materiel Management Centers may authorize issue of secondary items (spares, repair parts, and Class VIII consumables) to fill emergency peacetime operational requirements (issue priority designation 01-03, not mission capable requisitions only).Control of items approved for loan will be transferred to the responsible/accountable officer(s) designated by the MACOM commander. At a minimum, the MACOM will:

- Ensure APS-3 equipment loaned to a subordinate unit/task force or element will not be further loaned or transferred from the initial recipient without written approval of Headquarters, Department of the Army, unless outlined in the initial request from the MACOM.
- Check property accountability procedures, in accordance with AR 710-2 and AR 735-5, and will be established and maintained throughout the period of the loan. Accountable or property book officers will be appointed for units/ task forces or elements that would not otherwise deploy with an individual responsible for maintaining property accountability. Additional requirements are outlined in AR 725-50, *Requisition, Receipt, and Issue System*, chapter 9, and AR 710-3, *Asset and Transaction Reporting System.*
- Make sure Technical Manual 10/20 technical standards will be strictly enforced at time of issue and turn-in of all loaned or issued APS-3 equipment in accordance with AR 750-1, unless previously agreed upon in writing by all parties (USAMC and requesting MACOMs). The MACOM will reimburse the APS-3 releaser for any direct repair, technical inspection labor, packing, crating, transportation, preservation, protection costs, and cost to return to 10/20 standards and storage incurred as a result of the loan or issue of equipment.
- Ensure equipment loaned in support of an operation will be returned to APS-3.

MANEUVER AND SUSTAINMENT

3-24. Gaining and maintaining access to an operational area requires a comprehensive joint force and interagency solution. The cross-domain synergy required to support operational access requires integration of capabilities at lower echelons, to enable the maneuver force ability to rapidly transition to offensive operations, and generate the tempo critical to our forces for disrupting enemy systems. Maneuver and sustainment forces must conduct operations over extended distances, often in contested or austere environments, through combinations of air, sea and ground movement platforms. Army watercraft provides the lower echelon integration capability to overcome anti-access/area denial obstacles by countering intra-domain points of failure between strategic and tactical movement of combat forces, enabling movement and sustainment of land combat power in rivers, littorals, coast-wise and oceans to achieve operational and tactical military objectives.

CONCEPT OF SUPPORT

3-25. The vessels operated by the Army are supported by established Army support systems and infrastructure. While many vessels are resourced by the Army, they all operate as part of a global maritime fleet that supports the full range of joint operations and services. Thus, they are supported by an integrated logistics system that leverages Navy and Army, as well as commercial, support capabilities.

SOVEREIGN IMMUNITY

3-26. Sovereign immunity, as established in international and treaty law, provides that all vessels owned or operated by a State, and used only in government, non-commercial service, are entitled to complete immunity from the jurisdiction of any State other than the flag State. This provides for freedom from certain activities as follows:

- Vessels cannot be required to consent to an onboard search or inspection (police and port authorities may board a sovereign immune vessel only with permission of the commanding officer).
- Vessels may not be required to fly the flag of the host nation in port or when transiting the territorial sea.
- Vessels are required to comply with coastal nation traffic control, sewage, health and quarantine restrictions. Failure to comply is subject to diplomatic complaint or coastal nation orders to leave its territorial sea immediately.
- Vessels are immune from arrest and seizure, whether in national or international waters.
- Vessels are exempt from foreign taxes and regulation.
- Vessels exercise exclusive control over persons onboard (crew and passengers) with respect to acts performed onboard. Includes protecting the identity of personnel, stores, weapons or other property. U.S. government vessels do not provide crew/passenger lists to host nation authorities as a condition of entry to a port or to satisfy local immigration requirements for force protection and security reasons. The commanding officer may certify to requesting officials that there are no indications that personnel entering the host country from the ship will present a health hazard.

LOGISTICS SUPPORT

3-27. Vessel-specific support such as berthing, fresh water, provisioning, shore power, fuel, and waste management services are provided by the vessel's assigned chain-of-command while the unit is at its home station and prior to deployment. In most cases, the larger vessels will not require en route logistical support, as they can access both Army and Naval support channels while en route when needed. The vessels are also capable of accessing contractor and locally-provided commercial support services and facilities. Once they arrive in the joint operations area, and during operations in a remote theater of operation, vessels will obtain logistics services through the joint logistics command or system in place in that theater.

3-28. Due to the expeditionary nature of the operations that Army watercraft are called on to perform, they are capable of sustained operations with little or no available external maintenance support structure when deployed for short periods. Most Army vessels are designed with redundant systems to allow continued operations when certain systems fail through normal use. Upgrades and modernization strategies occur on a system-by-system basis. Soldiers are trained to perform field and limited sustainment maintenance on organic equipment and internal systems related to vessel operations. While the crew can perform emergency troubleshooting on communications equipment, the vessel is not resourced to maintain communications security equipment and systems. The vessel crew is capable of leveraging local contractor and host-nation maintenance facilities and shipyards, and will coordinate with the HD and the Army's watercraft field maintenance company for reinforcing field and sustainment maintenance support when required.

UNIT SUPPORT

3-29. While watercraft units are organized to conduct sustained stand-alone operations, they are not designed to operate independently of normal chain-of-command support channels. While operating at home

station, the vessels crews will be supported by their higher headquarters element. All medical, finance, personnel and administrative services, personnel billeting, health care, unit sustainment training and deployment readiness requirements will be supported by the home station chain-of-command. Once deployed into the joint operations area, those functions will be provided by the chain-of-command to which the unit is attached or assigned. Class A1 and A2 vessels are capable of providing unit-level health service and food service support.

MISSION COMMAND OF WATERCRAFT

3-30. Army watercraft may be assigned to several varying command structures and levels depending on the mission and geographic location. These include but are not limited to the TSC or expeditionary sustainment command. As an Army organization in support of joint maneuver operations, the watercraft company or detachment will most likely be assigned to the Army Service component command and further attached as needed to meet combatant commander maneuver requirements. Mission dependent, the watercraft can be under tactical control or operational control to the joint force commander as a theater asset. Army watercraft can work singularly or together with multiple detachments under the joint force command. This arrangement may be seen in operations with limited Army ground combat force participation such as disaster or humanitarian relief operations involving host nation personnel support.

MISSION COMMAND

3-31. The mission command or control structure will be at the direction of the geographical combatant commander dependent on the theater and the operation. The unit's higher headquarters will establish the hierarchy for operational mission tasking. Mission orders will be directed in accordance with established organizational structures, dependent on the combatant commander's operation. The vessel master is responsible for all operations and duties aboard the vessel, communication with higher command and ensuring mission objectives are met. One of the most critical actions the vessel master will perform during deployment to a new area of employment or during change of mission or attachment is to clearly establish the vessel's and tasking chain of command. The vessel detachments are organized to conduct vessel-specific operations and are not designed to provide mission command for subordinate or embarked units.

3-32. When the vessel is providing maneuver support to a command, the commander of the embarked unit is responsible for the unit conduct while aboard the vessel. The vessel master and the embarked unit commander will coordinate the mission planning aspects as it relates to the movement of the unit and the support requirements while underway. Regardless of rank, the vessel master has final authority and ultimate responsibility aboard the vessel.

COMMUNICATIONS

3-33. The vessel bridge serves as the command post in both peacetime and wartime environments. The vessel master is responsible for all external and internal vessel communications. The command post remains operational whether static or underway. On the bridge, an Electronic Chart Display Information System or similar system will be used to provide an accurate common operational picture of navigation and vessel traffic. The Electronic Chart Display Information System is capable of displaying electronic charts for the local area and tracking the vessel's course. On some vessels, an Integrated Bridge System is installed that facilitates detailed waypoint navigation, alarms, and radar target inputs integrated into a single monitor. All of this information, displayed on one screen, allows the navigator to immediately understand the status of the vessel in relation to the surrounding environment. When the Integrated Bridge System is integrated, it provides the vessel with a significant safety enhancement over the traditional Electronic Chart Display Information System. When co-located in an area of operations with Army watercraft, a land-based harbormaster detachment (HD) provides the link to the vessel for land-based units with the HCCC.

3-34. The HCCC's C4I capability provides continuous vessel tracking, and communications among the services, coalition, commercial and host nation vessels in fixed ports, austere ports, and LOTS or JLOTS sites. Constant vessel tracking is critical to successful, safe operations. The HD must maintain constant interoperability with the supported command of which it is a part via the Army-operated LandWarNet, as well as the Maritime Force via the Navy-operated FORCENet, and Coalition, multi-national, and/or inter-

agency organizations as appropriate to the mission. The HCCC enables the unit to conduct split-based operations with main and remote operations capabilities. All of the vessel's C4I architecture and capability is designed to allow the vessel and the embarked force to become an integral element of the common operational picture. Through a tracking system (such as the Movements Tracking System or Global Command and Control System-Joint), mobile sensors provide critical input to the common operational picture of platforms on the battlefield and at sea, while the vessel and its embarked forces leverage the common operational picture to conduct joint operations. The vessel common operational picture capabilities can include the following:

- Current locations and all available status information for friendly, neutral, and enemy ground, maritime, and air units.
- All available planned movement information for friendly, neutral, and enemy ground, maritime, and air units.
- All available information that could impact the disposition of friendly, neutral, and enemy ground, maritime, and air units (e.g., weather, Battle Damage Assessment).
- Generated features and projections (e.g., battle plans, operating zones, fly-through depictions).

TRANSPORTATION BRIGADE (EXPEDITIONARY) (TBX)

3-35. The TBX supports the geographic combatant commander in managing and conducting seaport operations. The TBX deploys to a theater of operation to provide mission command for port opening and operation at inland waterway, bare beach, degraded, and improved sea terminals in support of theater operations. The TBX is normally attached to a TSC or expeditionary sustainment command and serves as the expert on the watercraft management and port operations. The TBX support operations section provides oversight of watercraft assets in order to develop and synchronize plans, makes recommendations on employment, and provides expertise on all issues related to water terminal and watercraft readiness, training, and employment.

3-36. Regardless of mission command alignment, water terminal and watercraft units assigned to the TBX conduct deployment, redeployment and distribution support in accordance with combatant command operational requirements. The TBX commander and staff serve as the geographic combatant commander's primary experts on port operations and management. The TBX and its subordinate battalions establish and maintain close coordination with the TSC, expeditionary sustainment command, and sustainment brigade responsible for executing theater distribution. The TBX also maintains close mission coordination with the Military Surface Deployment and Distribution Command single port manager and port commanders. The TBX's ability to maintain close mission coordination between Military Surface Deployment and Distribution Command and the TSC ensures a seamless strategic-to-tactical transition from port opening to distribution operations in a manner that meets geographic combatant commander operational priorities.

3-37. The TBX is capable of providing mission command and technical supervision of up to seven terminal battalions. The TBX staff is specifically trained to conduct port opening operations, to include receiving, loading/discharging, stage, maintaining control and in-transit visibility, and releasing equipment and materiel to the receiving unit or command. The TBX is capable of deploying to and operating in all sea ports. Ideally the sea ports are well-equipped, fixed facilities capable of discharging large medium speed roll-on and roll-off ships. However, the port can be a fixed facility capable of discharging a variety of vessels, an austere port requiring ships to be equipped with the capability to conduct their own offloading, or beaches requiring the conducting of logistics over-the-shore operations. (For more information on the TBX, see ATP 4-13, *Army Expeditionary Intermodal Operations*.)

OPERATIONAL PLANNING

3-38. Watercraft operations must be well-planned to achieve a balanced operation. The turnaround time of the lighters must match (as closely as possible) the unloading and loading cycle of the port operating units involved. Balance cannot be maintained unless craft are unloaded at discharge points at least as fast as they are loaded at shipside or shore terminal. Every effort must be made to ensure that enough lighters are available to accept and deliver all the cargo that the port operating personnel can handle. Undue delays at loading and unloading points must be minimized. Information obtained from actual operating experience

should be used when planning for lighter employment in beach operations or in ship-to-shore or shore-to-shore operations. If information is not available, factors noted in this manual may be helpful.

3-39. The transportation theater opening element (TTOE) is essential during this process. The TTOE deploys early into the theater of operation to provide staff augmentation for planning reach-back capability, network visibility, joint reception, staging, onward movement operations including life support, force protection, and theater sustainment operations. The TTOE becomes fully integrated into the staff of the headquarters to which attached to provide the commander with technical staff expertise for the planning and employment of transportation organizations engaged in theater and port opening operations. The TTOE is normally assigned to a TSC, attached to the sustainment brigade designated to conduct theater and port opening operations. Throughout the planning phase, the terminal commander appraises the situation based on directives and information from higher headquarters, the TTOE, his or her staff and the vessel masters involved in the operation. The appraisals decide the most effective use of Army watercraft. On the commander's final decision, the staff members prepare a detailed plan of operation. The operation plan covers all units assigned or attached to the terminal. It details the preparation and actual movement of vessel units. The appropriate terminal command plans the detailed operations of the attached vessel units at the site. The HD provides a central control cell for all watercraft in the operating area and provides a common operational picture for the combatant commander.

3-40. Preliminary rehearsal of units participating in watercraft cargo operations must occur prior to an actual operation and include all aspects such as; maneuvering vessels in close quarters, conducting beach, ship, and causeway approaches, material handling equipment operations (cranes and forklifts), floating crane operations (in port and anchored), and loading and discharging cargo and vehicles on vessels.

3-41. The terminal command's operation plan includes items such as fuel and maintenance support as well as:

- Planned bivouacs and anchorages.
- Refueling and resupply plans and facilities, to include hazardous waste disposal.
- Communications instructions.
- Location and operations support units such as the maintenance company and harbormaster detachment salvage capabilities.
- Threat assessment/force protection conditions.

3-42. The operation order must be clear and simple. Detailed alternate plans are prepared in case the operation plan transitions to execute a branch or sequel. The terminal command or higher headquarters provides subordinate vessel units with various aids useful in planning and during operations. These may include–

- Aerial photographs – Beach reports based on interpretation of aerial photographs. (Photographs taken at low tide are preferred when showing the foreshore).
- Intelligence & planning tools with imbedded survey data.
- Beach reports provided by an engineer dive team.
- Reliefs, surface models, other maps, digital products, charts, shoreline sketches, and photographs of the beach area, with as much detail as possible.
- Special studies prepared by theater intelligence brigades or other national level agencies.
- Terrain studies and other reports from various informed sources.

3-43. One of the most useful sources of information about the area of operations is Annex B of the operations order. Issued by the terminal command or a higher headquarters, it is often distributed early in the planning phase as a reference for subordinate units. The area of planned operations directly influences the way watercraft are employed.

TASK ORGANIZATION

3-44. Potential task organization for a water transport operation must take into consideration the capability of the area of operations to support infrastructure. The deployed water transport task force and support element must be properly sized for the mission. A notional waterborne task force is shown in figure 3-1.

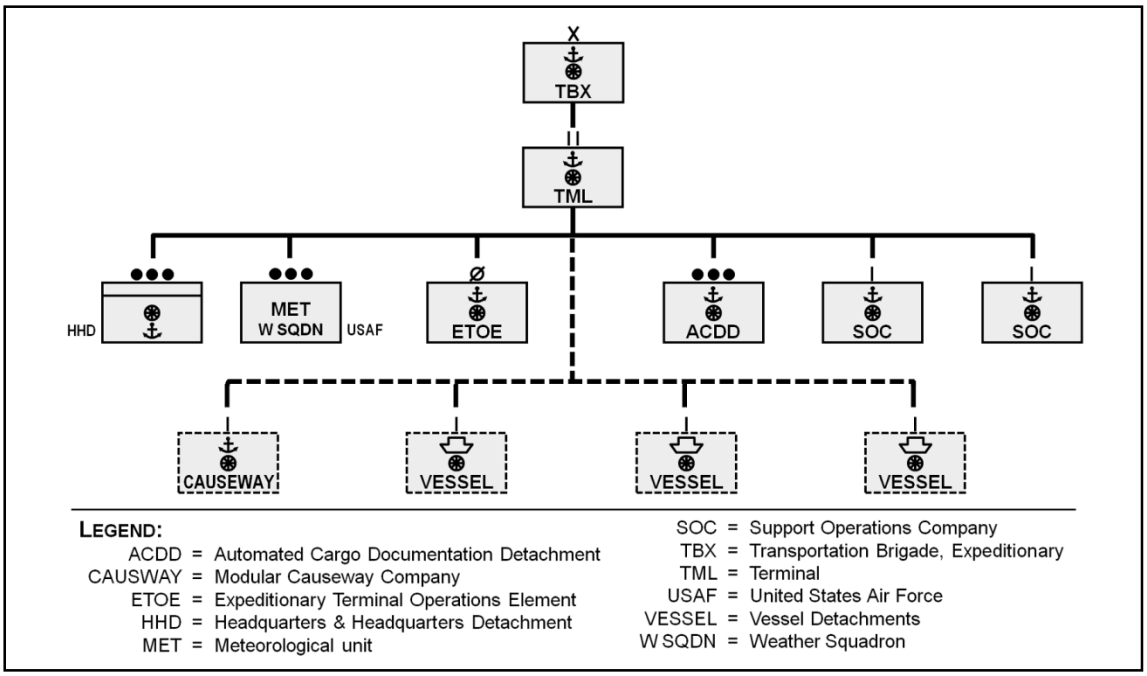

Figure 3-1. Notional water transport task force configuration

HARBORMASTER DETACHMENT

3-45. The HD is employed as an integral part of the transportation terminal battalion headquarters. The HD deploys and operates as part of the battalion S2/S3 transportation support operations section. As designed, the HD and terminal battalion operate as an integrated and inter-dependent organizational and operational entity. The terminal battalion S6 section is manned with personnel required to support the mission command functions provided by the HCCC and the battalion will typically position S6 personnel with the HD to support 24-hour net-centric operations. Figure 3-1 shows the terminal battalion headquarters organization and the organizational relationships that exist between the HD, the battalion staff and the other units typically task organized within the battalion.

3-46. The HD is responsible for coordinating and synchronizing vessel operations and proper vessel employment. Typically, the HD goes ashore in one of the first vessels scheduled to land. They may also arrive, or send a section, as an advance party prior to vessel arrival. The HD conducts a ground reconnaissance of the landing beach, checks the actual conditions against plans, and makes any necessary changes or modifications. A section of the HD lands in the first wave near the center of the beach and immediately erects range markers and other landing aids. When the remainder of the HD arrives, it employs the HCCC to establish the necessary mission command systems needed to manage battalion watercraft operations. The duties of the section on shore include:

- Helping to detect and remove underwater obstacles and other hazards to navigation.
- Marking obstacles that cannot be removed.
- Controlling and tracking vessel traffic during the approach of craft to the beach, while at the beach, and during departure from the beach.
- Coordinating emergency repairs to vessels.
- Coordinating salvage of vehicles that may become damaged or stalled in the water at the beach.
- Helping to evacuate casualties according to the medical plan (in a tactical landing).
- Help keep the beach clear.
- Communicating with vessels.

3-47. The HCCC is configured on two communications platforms enabling the battalion to support multi-site watercraft and terminal operations. Each HCCC platform is equipped with workspace for HD and Terminal Battalion watercraft operations personnel; mobile, independent power sources; and sensor platforms capable of supporting multi-site operations. One communication's platform, workspace and sensor set will typically be employed with and in close proximity to the battalion's tactical operations center. Dependent on the operational environment, the terminal battalion may be required to conduct simultaneous operations at more than one operating site, for example, a secondary port or temporary JLOTS site. In these cases, the HCCC supports multi-site operations by deploying one of the platforms to the remote battalion operating site. When deployed to a remote operating site, the HCCC platform will normally be employed with and in close proximity to the terminal battalion's remote operating site or tactical operations center. Although capable of "stand-alone" operations, the remote operating site is not intended to operate at the same manning level as the primary site. Due to manpower limitations, the secondary operating site will typically operate at no more than 50% of the capacity of the primary operating site with no more than two operators and one officer in-charge and/or non-commissioned officer in-charge on duty in the center during operational periods.

3-48. The battalion will normally receive hydrographic data of its operating area from the Navy. When Navy data is unavailable, the HCCC is equipped with a mobile hydrographic survey capability that provides the battalion the ability to collect, collate and display hydrographic data to include sea state and depth, identification of primary channels and the presence of objects that might pose a threat to watercraft operating in the terminal battalion's area of operation. Transported on HD or terminal battalion assets, the HCCC's hydrographic sensor array will normally be employed by battalion assets.

CASUALTY EVACUATION

3-49. One vessel should be designated for evacuating casualties in the event of a medical emergency. This is usually an LCM8 Mod 2, or similar craft. Procedures must be established and disseminated to all units. During mission rehearsals, notifications to support elements and transfer procedures are practiced. Ambulances must be located within the vicinity of the landing area, alert to assist where needed, or they may be embarked on a vessel for rapid dispatch to the anchored craft. Air medical evacuation support is coordinated for remote or austere mission areas.

VESSEL COMMUNICATIONS

3-50. Communications are vital for water transport operations. Ship-to-ship and ship-to-shore communications can be by data, satellite, radio, radiotelephone, flag hoist, and blinker signal lights (using Morse code). Shipboard communications are essential in normal water transport operations, maneuver support operations, distress situations, and/or sea-air rescue missions. Ships must be able to communicate across not only services, but with commercial and international fleets to meet Safety of Life at Sea requirements.

3-51. The Global Maritime Distress and Safety System (GMDSS) suite provides distress and search and rescue communications capability. The CEN equipment provides secure/non-secure, high to very high frequency, short- and long-range communications capability appropriate for the mission capability of Army watercraft.

3-52. Army shipboard tactical communications can interface with Army land-based communications, Navy, Military Sealift Command, United States Coast Guard, and merchant marine stations (shore and ship) and military affiliated radio stations that will be used in joint operations, deployment, morale/welfare, and long-range missions. The signal systems aboard Army watercraft vary in type and design. These systems must meet Army tactical communications requirements and federal regulations that govern vessel communications.

MARITIME AND TACTICAL COMMUNICATIONS

3-53. Vessel watch-standers and radio operators must be thoroughly familiar with their communications equipment and procedures for initiating and conducting communications with civilian, commercial, and military operated vessels. Procedures may not be the same for communicating with merchant vessels as for

military vessels, and can vary from informal bridge-to-bridge radio traffic to use of the Defense Messaging System via Secure Internet Protocol Network. All military mariners should be familiar with use of Allied Communications Publications, which provides codes and procedures for communicating with allies.

3-54. Support personnel, such as communications equipment maintainers and specialized operators (25-series military occupational specialty) should be trained in the special requirements of maritime C4I, including operations and field maintenance of CEN equipment on vessels. Signal maintainers and operators should be assigned or attached to vessel units or field maintenance units, such as the watercraft field maintenance company, in order to best serve the maritime fleet's communications requirements.

3-55. Tactical radios communicate with higher headquarters, other Army vessels, and military units that are being supported. Training Circular 4-15.51, Marine Crewman's Handbook contains additional information on the various types of tactical radios used aboard Army vessels. Detailed information on a specific radio used for tactical communications is in the applicable technical manual for that particular system.

3-56. Code of Federal Regulations 47, chapter 1, part 80 delineates specific limitations and capabilities for marine communications, particularly GMDSS. Several radio systems are installed on Army vessels to meet the federal requirements for communications at sea. In addition, portable, handheld radios are used for internal shipboard communication, as well as local, short-range ship-to-ship, ship-to-shore, and detached work boat communications. Military research, development, and acquisition agencies are working together to reduce the cost of signal systems. They have determined that purchasing commercially designed radios that meet military requirements can save money and provide high tech, state-of-the-art signal systems that meet federal communication regulation requirements for vessels. As a result, different signal systems may be on Army vessels such as those described below.

Bridge-to-Bridge Radiotelephone

3-57. Commonly called bridge-to-bridge, this very high frequency radiotelephone is part of the GMDSS requirement, and is designed to communicate between ships and from ship to shore.

Digital Selective Calling

3-58. The Digital Selective Calling capability is the primary capability within GMDSS, and provides the latest technology to Army watercraft communications. It adds an additional capability to the bridge-to-bridge radiotelephone. The system provides the vessel master with 200 different communication call functions and is equipped with built-in test equipment. Digital distress calling is provided on all Digital Selective Calling-equipped systems.

High-Frequency Radio Systems

3-59. The high-frequency systems give Army vessels the capability to communicate over great distances. They can be used in both secure and non-secure modes. There are several high-frequency capabilities required, to support the missions of Army watercraft today. High-frequency transceiver system can be operated double sideband and/or upper or lower sideband, and should operate high-frequency and very high-frequency as required for the mission. It is designed as a continuous duty, high-frequency, single sideband transceiver.

International Maritime Satellite Systems

3-60. Maritime communications capabilities include satellite communications, especially international maritime satellite systems to be installed on each Army vessel. International maritime satellite system installation includes a stabilized tracking 85- to 100-centimeter dish antenna with radome and antenna cabling. Below decks equipment includes transceiver, processor, telephone, and telex units. An auxiliary receiver tuned to the Armed Forces Radio and Television Service broadcast frequency and connected to the international maritime satellite is also available. A public automatic branch exchange is provided to furnish additional phone and data line connections to the ship earth station if desired.

Configuration Management

3-61. Vessel masters and unit Commanders must inventory and manage CEN to insure unauthorized changes are avoided. Software for authorized applications must be kept on the vessel or at the unit to insure it is available for updates and program reloading if required. Additional requirements for CEN, including satellite communications, electronic charting systems, Internet routers, and wireless computer routers can be identified by users and supported units, but must not be incorporated on vessels without program office oversight.

3-62. Many capabilities are available that provide additional utility for successful mission accomplishment. Using the DOD acquisition system to acquire these capabilities will insure safety, security, and interoperability are not compromised with addition of unauthorized systems.

PLANNING TIME FACTORS

3-63. Turnaround time is the basic factor to determine watercraft capabilities and requirements. It is used to compute the number of craft for a specific operation or the amount of tonnage that a given number of craft can deliver. Turnaround time is the total elapsed time that a single vessel takes to load, travel to the discharge point, unload, and return to shipside or terminal ready to be loaded again. The elements involved are average speed in the water, distance to be traveled, loading time, unloading time, and predictable delays. An estimated turnaround time must be worked out for each new operational site and mission and for each change in any of the elements given above. Sea, wind, and terrain conditions affect speed, and variations in loads alter loading and unloading times. Average turnaround time is computed by using the following formula:

Turnaround time in hours = (round trip water distance in nautical miles/water speed in knots) + loading time in hours + unloading time in hours + potential delays in hours.

VESSEL REQUIREMENTS

3-64. Once an average turnaround time is established the number of vessels required to deliver an assigned daily tonnage can be computed by using the following formula:

Number of vessels required = (daily tonnage/average # tons per vessel) x (turnaround time in hours/hours of operation daily).

FORECASTING AND SITE SURVEYS

3-65. Sometimes it is necessary to forecast the amount of tonnage that the available craft can transport over a specified period of time under existing conditions. Daily tonnage capabilities are computed by using the following formula.

Daily tonnage capability = (hours per operational day/turnaround time for vessel in hours) x (average tonnage per vessels x number of vessels available).

3-66. Commanders and staffs of vessel units must carefully study charts, maps, and port guides – focusing on the port channel and beach approaches, hydrographic information, and terrain as they affect vessel operations. The operations officer secures or prepares additional aids, if required, and. Ensures the information is known and compatible for charts, maps, and global positioning systems in use.

3-67. As soon as the mission is received, the battalion or TBX intelligence officer determines the requirements of the commanders and staffs for additional information. The intelligence officer immediately initiates requests to the appropriate headquarters to obtain information as well as any maps, charts, or other planning aids that may be required. The commander of the vessel unit must secure as much detail as possible about the proposed landing beaches and how to approach them. Reconnaissance provides much of this information. Additional information is in intelligence documents and various publications distributed by higher headquarters. The battalion headquarters must ensure that all units are adequately supplied with maps and charts about the area of operations. The following types of nautical charts are used:

- Sailing charts are used to fix a position in long-distance navigation. They can employ Mercator's projection or Gnomonic projection for Great Circle sailing. Scales are 1:6,000,000 and smaller.
- General charts of the coast are used the same as sailing charts and also for near- shore navigation. They employ Mercator's projection. Scales are from 1:150,000 to 1:600,000.
- Coast charts are used for coastwise navigation and to approach a shore from a long distance offshore. They show limited terrain contour lines details of land formations and artificial landmarks which help fix positions. Scales are 1:50,000 to 1:150,000.
- Harbor/approach charts are used to navigate harbors and their approaches. They show greater detail of harbor natural and artificial features as well as the existence of hazards and/or routes of safe approach to the harbor. Scales are usually larger than 1:50,000.

WEATHER PLANNING

3-68. Whenever possible, vessel operations should be planned to take advantage of the best weather conditions. Weather conditions can be forecasted 5-7 days out. Appropriate weather activities should be requested to provide 24-hour forecasts every 12 hours along the intended route, commencing 24 to 36 hours before vessel departure and continuing until arrival. Requests for special weather forecasts should include the intended route and estimated speed. If internet access is available, weather data should be checked frequently along the route.

VESSEL CONTROL SYSTEM

3-69. Watercraft units must respond to the needs of the port operating units handling the cargo at shipside and at the beach. To maintain a smooth and continual flow of cargo over the beach, the watercraft unit commander must be aware of the status and location of his craft. This allows him to relocate platoons, sections, and individual vessels or to assign new or additional missions as rapidly as possible. Flexibility of operations requires a responsive, closely monitored control system. Control, maintained mainly by radio communication, is exercised through the harbormaster command and control center with remotely placed subordinate or partner control cells along various points on the beach and at shipside. The extent of the control system depends on the size of the operational area, the dispersion required, the ship-to-shore distance to be traveled, and the type of lighters being used. A typical control system includes 1) a main, centralized lighter control center ashore, 2) A ship lighterage control point on each ship being worked and 3) A beach lighterage control point where the cargo is discharged.

CARGO HANDLERS

3-70. Aboard small lighters, crew members normally perform all shipside cargo-handling operations. If crew members are operating or maintaining their craft and cannot be spared for cargo handling duties, the terminal or unit commander may provide extra crewmen (commonly called jumpers from their capability to jump from vessel to vessel), to position and secure cargo in the vessel for movement between ports or from the ship to the beach. Aboard larger lighters, such as LCUs, a forklift is the most prompt method to position and stack unitized or palletized cargo. Port operating units provide and operate forklifts. Because transferring personnel from one craft to another alongside the ship is potentially hazardous, jumpers and forklift operators should board and debark the lighter at the port or beach and wear personal floatation devices and required safety gear while aboard the vessel.

CARGO DOCUMENTATION AND TRACKING

3-71. Cargo documentation is a function of the cargo documentation detachment. The commander of the lighterage unit determines from the terminal commander if there is a requirement to document the cargo in the ship-to-shore operation. If the requirement exists to assure in-transit visibility and to protect the audit trail, the commander of the lighterage is responsible for the cargo loaded aboard lighterage until it is unloaded at the discharge point.

3-72. If required, cargo is documented according to DOD 4500.9-R, *Defense Transportation Regulation*. The basic document for cargo movements under these procedures is Department of Defense Form 1384, *Transportation Control and Movement Document*. This form is used as a dock receipt, a cargo delivery

receipt, an accountability document during temporary holding, and a record of all cargo handled. The craft operator receives copies of the transportation control and movement document at shipside. The number of copies depends on command requirements for each particular discharge operation. The lighter operator signs for the cargo at shipside and delivers all copies, except one, to the shore side checker at the discharge point. The retained copy is initialed by the shore checker to indicate receipt of the cargo. At the end of the shift, the lighter operator turns in all initialed copies of the transportation control and movement document to the lighter control center. The information from these transportation control and movement documents provides the lighterage company with throughput evaluation data.

3-73. Cargo accountability may also be accomplished electronically using computer hardware and Logistics Applications of Automated Marking and Reading Symbology. A handheld portable bar code reader scans the cargo as it comes aboard the lighterage. The scanner works like an automated supermarket checkout counter. Once marked using radio frequency identification technology, the cargo can then be tracked worldwide by the Movement Tracking System. The cargo is scanned again when it is discharged. No paper documents the move, but the lighter operator can use the Logistics Applications of Automated Marking and Reading Symbology label to identify cargo. Cargo accountability is also provided through the Joint Capabilities Release Logistics system. This system is the Army's next generation of mission command and situational awareness software. It provides logisticians with the capabilities of identification and tracking of intransit cargo. Joint Capabilities Release Logistics system enables logisticians to support unified land operations safely and on time.

PLANNING SEQUENCE

3-74. Water transport operations require detailed planning at all levels and close coordination with supporting elements. Units conducting water transport operations must be ready to begin as soon as possible after receiving orders. Preliminary training of units participating in riverine operations must occur prior to an actual operation and include all aspects, such as vessel operations, including maneuvering vessels in close quarters, loading and discharging cargo and vehicles on vessels, material handling equipment operations (cranes and forklifts), Floating crane operations (in port and anchored) and security at the landing area.

3-75. Plans for water transport operations must be detailed enough to give all participating units complete information. Yet, they must be simple and flexible enough to be modified as the tactical situation changes. Plans for a water transport operation are usually developed in the following sequence:

- Scheme of maneuver based on METT-TC.
- Assault plan based on the scheme of maneuver.
- Water movement plan based on the assault plan and the scheme of maneuver. (The water movement plan includes composition of the water transport force, organization of movement serials, formation to be used, movement routes, command and/or control measures, mine countermeasures, plans for fire support, and immediate reaction to ambush.).
- Loading plan based on the water movement plan, the assault plan, vessel capabilities, and the scheme of maneuver.
- Marshaling plan, when required based on the loading plan, the water movement plan, the assault plan, and the scheme of maneuver.
- Deception plan, when required, based on the mission.
- Communications plan.

3-76. While preparing for water transport operations, planners determine the availability of waterways in the area of operations, the tide and current for the scheduled period of the operation, and suitable loading sites. This information, kept current during the operation, is the basis for planning the water transport withdrawal. Active employment of watercraft during an offensive maneuver simplifies deception in the initial stages of a water transport withdrawal. The quantity of available hydrographic information increases as a result of this employment. When possible, water transport withdrawal is timed so watercraft can approach loading areas with the current on the rising tide, load during slack high water, and depart with the current on the falling tide. Due to the security problems that accompany large water transport movements and using predictable routes, loading during the last hours of daylight and moving during darkness should

be considered. Moving reconnaissance forward along possible withdrawal routes several hours ahead of the movement group is a useful deception measure. Loading, normally the most critical phase of the withdrawal requires detailed planning when selecting troop assembly areas, loading areas, loading control measures, and watercraft rendezvous areas.

PORT SECURITY

3-77. The terminal commander is responsible for local defense of his portion of the operational area, and for ensuring adequate linkage to off shore and/or port security operations and communications with units executing those missions. There are special rules of engagement (ROE) for cooperating with friendly forces during an engagement, and all commanders should insure their soldiers are properly trained in local ROE. Commanders of all units have their normal responsibility for the security of personnel and equipment. Each unit is assigned a mission in the defense system. Emergency assembly areas are designated, an alert warning system is established. An overlay of the port or beach defense is circulated to all units in the area. General security measures taken by watercraft units within their bivouac areas include–

- Dispersing all vehicles, equipment, and personnel.
- Posting guards, patrols, and sentries.
- Constructing individual fighting position crew-served weapons, emplacements, communication trenches, and bunkers.
- Designating specific defense positions for all personnel and conducting alert drills to ensure personnel are familiar with their duties in an emergency.
- Organizing definite defense groups under leaders specifically designated in a published defense plan.
- Organizing communication systems to be used during defense operations.
- Constructing obstacles to prevent the advance of attacking forces.
- Planning for integrated fields of fire.
- Requesting host nation support.

3-78. In an emergency, all members of the watercraft units, including vessel crews, may need to occupy defense positions. Accordingly, weapons must be kept at the ready at all times and maintained frequently to ensure they are in serviceable condition. Defense plans for beach areas are coordinated with higher headquarters and integrated with other existing base defense plans to ensure mutual support. The responsible terminal headquarters establishes and coordinates normal passive and active security measures to protect the beach in an air attack. These measures consist mainly of concealment, dispersion, early warning, and weapons firing. Personnel are provided shelters. A system of alert warning signals is set up, and installations are camouflaged. Military police advises commanders on ways to secure and protect port areas and beaches against enemy threat. Exposed to pilferage and sabotage, beach areas become even more vulnerable to both enemy and criminal activities because of the accumulation of supplies. Military police become proactive to security requirements as threat activity increases.

3-79. Mines are one of the greatest threats watercraft may encounter in any type of operation. Of main concern to Army watercraft are the many varieties of shallow water, magnetic influence, and bottom mines. Surface ships, submarines, or aircraft can deliver these mines. With current capabilities including delayed arming devices and ship counters, the bottom mine poses a threat to watercraft during any phase of operations on the water. The bottom mine is also extremely difficult to detect on rocky bottoms or when buried in mud or silt. A buried mine loses none of its target acquisition or destruction capability. Mine hunting or sweeping platforms are intensively managed resources in any theater of operations. Potential sources for mine clearance services include the U.S. Army divers, the U.S. Navy, and the host nation. Mine and subsurface obstacle detection and counter-employment technologies must be developed and incorporated aboard vessels to insure high-payoff targets such as personnel and cargo-filled watercraft are provided early warning of danger and capability to protect vessel and payload.

3-80. Military police typically provide area and local security for port and pier areas. The joint force commander and subordinate joint force commanders ensure that port security plans and responsibilities are clearly delineated and assigned. Area commanders (and subordinate military police) assigned a port area as part of their AO must develop and organize plans (in conjunction with the appropriate Military Surface

Deployment and Distribution Command brigade or battalion) to ensure that Soldiers are trained and equipped to protect or secure port areas and cargo as necessary. The patrol of harbors and anchorages is generally the mission of a dedicated port security unit and may include waterfront security operations. See Joint Publication 3-10, *Joint Security Operations in Theater* for more information on port security units.

3-81. In a wartime environment, military police and USACIDC will implement logistics security (LOGSEC) measures at the continental United States and outside the Continental United States terminals. Teams located at the ports of debarkation are cognizant of sensitive cargo shipments inbound to their location. This is a critical requirement to minimize or eliminate the risk of criminal activity directed against military equipment moving into the theater of operations. Criminal investigation division special agents conduct port vulnerability assessments as a part of LOGSEC (see ATP 3-39.30 for additional information on LOGSEC). This assessment—

- Is a crime prevention survey of a sea or aerial POD or POE.
- Is performed the same as a LOGSEC threat assessment.
- Is formatted as prescribed by headquarters.
- Incorporates information from the criminal activity threat assessment into the body of the report.

Chapter 4

Executing Army Watercraft Operations

Army planners must understand the capabilities provided by watercraft units. These capabilities enhance maneuver and sustainment of forces in littoral environments. Planners must understand the different requirements in executing watercraft operations. This chapter provides a discussion on how watercraft execute logistics over-the-shore operations, terminal operations, vessel convoy and risk management for watercraft operations.

ARMY WATERCRAFT PROVIDING ENDURANCE

4-1. Army watercraft provide endurance to unified land operations by enabling and sustaining port and inland waterway operations. These operations support combatant commander's requirements by maintaining the desired flow of forces, cargo and sustainment into a theater.

SECTION I – WATERCRAFT OPERATIONS

4-2. When required, water transport lines of communication are formed to control and operate a waterway system at a terminal; to formulate and coordinate plans for using resources at the port and along the littorals; and to integrate and supervise local civilian facilities used to support military operations.

WATER TRANSPORT LINES OF COMMUNICATIONS

4-3. Three separate functional components make up a water transport line of communication system: the ocean reception point (ORP), the littoral waterway, and the water terminal. The ocean reception point consists of mooring points for ships, a marshaling area for barges, and a control point. The mooring point can be alongside a wharf, at an inland anchorage or anchored offshore. The marshaling areas can be alongside a wharf or secured to stake barges at anchor. The control point can be ashore or on a stake barge. Stake barges at the ORP can be semi-permanent anchored barges or vessels. Barges can be used to house control point crews as well as the small tug crews, dispatchers, and other personnel connected with the ORP. The ORP stake barges should have gear lockers to stow the various equipment and lines needed to service barges and tugs. There should be at least two stake barges at the ORP; one for import and one for export.

4-4. The U.S. Army Corps of Engineers operates and maintains the inland waterway in a generic theater or in CONUS. However, the host country normally maintains and operates developed inland waterway systems in overseas theaters. Aids to navigation on the inland waterways differ all over the world. Some areas do not use aids, while others use the international ocean system. The U.S. uses many different and highly sophisticated systems. For illustrations of navigation aids, and the types used worldwide, refer to TC 4-15.51, Marine Crewman's Handbook.

4-5. The inland water terminal is where cargo is transferred between a ship or vessel and land-based transportation. Terminals vary in size and design; some are designed for one commodity, others, for general purposes. For military purposes, the available terminal may not be what is needed; therefore, the planner and user must adapt (at least until engineers can modify the terminal). Quays running along the river front, finger piers at wider points, or basin type terminals could be adapted by installing quays or piers, installing regular barges by either partially sinking or driving pilings to hold them in place, or using a beach that could be improved.

FACTORS EFFECTING WATERCRAFT OPERATIONS

4-6. There are many things that impact the Army's ability to conduct watercraft operations. Current and future weather conditions are of vital importance to watercraft operations. Weather conditions affect the sea state and the operations of other vessels. The following provides information on the many factors that influence the Army's ability to conduct watercraft operations.

Weather Information

4-7. Weather information about the area of operations must be analyzed carefully to determine the probable effect of weather on craft operations and working conditions. Early in the planning stage, the battalion commander must find out what source will furnish weather information and in what manner. The success of a tactical operation may depend on a sequence of several favorable days after the initial landing has been made. The most important consideration is the sea and swell caused by high winds and storms. Excessive sea and swell may end the movement of later serials, thus placing the assault troops in a precarious position ashore. Planners must consider beaching conditions, unloading conditions, speed of vessels, the effect of wind and sea on the tides, and the physical condition of the troops. Alternate plans for a water transport movement must consider possible variations from average weather.

4-8. Weather conditions en route to the area must also be considered. In a tactical operation, maximum advantage must be taken of weather conditions that might conceal an approach to the objective area. If the approach is made in calm, clear weather, the enemy can locate the attack force and the landing area more easily, and his air attacks will not be impeded. Bad weather, storms, fog, and winds affect the movement, but they also force the enemy to rely on more indirect and less dependable means of attack and of determining the target area. Weather information is a communications priority so that plans may be made or altered without delay, especially if unusual weather conditions are anticipated. In estimating the effects of weather on an operation, planners must consider the:

- Direction and speed of winds at the surface and in the upper air, the likelihood of storms, and the nature of storms typical to the target area.
- Distance at which objects can be seen horizontally at the surface and both horizontally and vertically at a given flight level.
- Restrictions to visibility by fog, haze, rain, sleet, or snow.
- Effect of extreme temperatures, excessive rain, snow or ice on personnel and materiel.

Weather Forecast

4-9. Weather prediction is based on an understanding of weather processes and observations of present conditions. Weather forecasts are based on current conditions and trends. In areas supported by weather radar and where weather patterns follow with great regularity, the probability of an accurate forecast is very high. In transitional areas (or areas where an inadequate number of reports is available), the forecasts are less reliable. Such forecasts are based on principles of probability, and high reliability should not be expected. Long-term forecasts for two weeks or a month in advance are limited to climatologic expectations about a given area of interest.

4-10. Weather forecasts developed from reports received from a widespread network of weather stations that make simultaneous observations at prescribed times. Data from these observations are transmitted to a weather center and analyzed. The resulting forecast is forwarded to the operating units concerned. Providing these operational forecasts requires reliable communications. To produce the most accurate forecasts, these observations must be located over a wide area, possibly including enemy territory. Typically, weather forecasts suitable for landing operations are made only 1 to 2 days before the operation. Such forecasts will generally be reliable.

4-11. A harbormaster command and control center (HCCC) has equipment enabling it to gather immediate weather data, pertinent to landing forces, and deliver it to lighters approaching the area of operations.

4-12. Long range forecasts are estimated by a statistical method (climatology). This method relies on weather observations accumulated over a period of years and describes the average weather that may be expected in a given area. It shows such information as the strength and direction of prevailing winds,

average temperatures, and average precipitation. If weather records at a given area have been kept for a number of years, the statistical study will be correct about 65 percent of the time.

4-13. Data about average weather conditions are essential in planning a landing operation, but assault landings require current (real-time) information. Marine forecasts are available via satellite over internet sites for those vessels with satellite communications capability.

4-14. Weather forecasts are passed to vessels and affected units via data, fax, or voice. Wind and sea state forecasts over water and land are given in the Beaufort Scale shown in table 4-1, which is understood by most weather forecasters. Sea state is the general condition of the free surface on a large body of water with respect to wind waves and swells at a certain location and moment. Sea state is characterized by statistics, including the wave height, period, and power spectrum. The sea state varies with time, as the wind conditions or swells conditions change. Weather buoys, wave radar, remote sensing satellites or an experienced observer can assess sea state. Sea State is taken from the Force column.

Table 4-1. The Beaufort Scale: sea state specification

Force	***Wind Speed: Miles Per Hour / (Knots)***	***Description***	***Sea Conditions***	***Land Conditions***
0	0-1 / (0-1)	Calm	Sea like a mirror.	Calm. Smoke rises vertically
1	1-3 / (1-3)	Light Air	Ripple with appearance of scales are formed: but without foam crests.	Smoke drift indicates wind direction. Leaves and wind vanes are stationary.
2	4-7 / (4-6)	Light Breeze	Small wavelets, still short, but more pronounced. Crests have a glassy appearance and do not break.	Wind felt on exposed skin. Leaves rustle. Wind vanes begin to move.
3	8-12 / (7-10)	Gentle Breeze	Large wavelets. Crests begin to break. Foam of glassy appearance. Perhaps scattered white horses.	Leaves and small twigs constantly moving, light flags extended.
4	13-18 / (11-16)	Moderate Breeze	Small waves, becoming larger; frequent white horses.	Dust and loose paper raised. Small branches begin to move.
5	19-24 / (17-21)	Fresh Breeze	Moderate waves, taking a more pronounced long form; many white horses are formed. Chance of some spray.	Branches of a moderate size move. Small trees in leaf begin to sway.
6	25-31 / (22-27)	Strong Breeze	Large waves begin to form; the white foam crests are more extensive everywhere. Probably some spray.	Large branches in motion. Whistling heard in overhead wires. Umbrella use becomes difficult. Empty plastic bins tip over.
7	32-38 / (28-33)	Near Gale	Sea heaps up and white foam from breaking waves blown in streaks along the direction of the wind.	Whole trees in motion. Effort needed to walk against the wind.

Table 4-1. The Beaufort Scale: sea state specification (continued)

8	39-46 / (34-40)	Gale	Moderately high waves of greater length; edges of crests begin to break into spindrift. The foam is blown in well-marked streaks along the direction of the wind.	Some twigs broken from trees. Cars veer on road. Progress on foot is seriously impeded.
9	47-54 / (41-47)	Severe Gale	High waves. Dense streaks of foam along the direction of the wind. Crests of waves begin to topple, tumble and roll over. Spray may affect visibility.	Some branches break off trees, and some small trees blow over. Construction/temporary signs and barricades blow over.
10	55-63 / (48-55)	Storm	Very high waves with long, overhanging crests. The resulting foam, in great patches, is blown in dense white streaks along the direction of the wind. On the whole, the surface of the sea takes on a white appearance. The 'tumbling' of the sea becomes heavy and shock-like. Visibility affected.	Trees are broken off or uprooted, saplings bent and deformed. Poorly attached asphalt shingles and shingles in poor condition peel off roofs.
11	64-72/ (56-63)	Violent Storm	Exceptionally high waves (small ships might be lost to view behind the waves). The sea is completely covered with long, white patches of foam lying along the direction of the wind. Everywhere the edges of the wave crests are blown into froth. Visibility affected.	Widespread damage to vegetation. Many roofing surfaces are damaged; asphalt tiles that have curled up and/or fractured due to age may break away completely.
12	73-83 / (64-71)	Hurricane	The air is filled with foam and spray. Sea completely white with driving spray. Visibility seriously affected.	Very widespread damage to vegetation. Some windows may break; mobile homes and poorly constructed sheds and barns are damaged. Debris and unsecured objects are hurled about.

4-15. The Modified Surf Index (MSI) is obtained from weather forecasters, and applied using the watercraft risk impact rules (shown in table 4-2). The MSI is a calculated, single dimensionless number used as an objective decision aid. It is an assessment of the combined effects of breakers, littoral current, and wind conditions on landing craft. If the MSI exceeds the MSI limit for a particular craft, the landing is not feasible with that type of craft without increasing the casualty rate.

4-16. To apply the watercraft risk impact rules to an operation, the leader inserts the available current or forecasted weather information within the outlined weather parameters. The leader may cease some or all operations for affected watercraft, according to the table. Category 1 watercraft are most susceptible to risk in adverse weather conditions and will usually be first to index in an operation.

Table 4-2. Watercraft risk impact rules

Category of Watercraft	*Yellow*	*Red*
Category 1 Watercraft Floating Causeway, Causeway Ferry, RRDF, Small Tug	Sea State >= 2 MSI >= 5 Visibility < 1 Mile Freezing Drizzle Winds > 30 Knots	Sea State >= 3 MSI >= 6 Visibility < ½ Mile Freezing Rain Winds > 50 Knots
Category 2 Watercraft LCM, 65FT Tug, 100FT Tug	Sea State >= 2.5 MSI >= 7 Visibility < 1 Mile Freezing Drizzle Winds > 30 Knots	Sea State >= 3.5 MSI >= 8 Visibility < ½ Mile Freezing Rain Winds > 50 Knots
Category 3 Watercraft LCU 2000, LSV, 128FT Tug	Sea State >= 3 MSI >= 10 Visibility < 1 Mile Freezing Drizzle Winds > 30 Knots	Sea State >= 4 MSI >= 12 Visibility < ½ Mile Freezing Rain Winds > 50 Knots
Legend: FT=foot LCM=landing craft, mechanized LCU=landing craft, utility LSV=logistics support vessel MSI=modified surf index RRDF=roll-on/roll-off discharge facility		

Weather Effects on Watercraft Operations

4-17. Loading cargo into a lighter from a vessel anchored in the stream is difficult and somewhat dangerous. The shipboard control point, typically operated by a cell as designated by the terminal battalion, must consider the conditions under which the ship is being unloaded. They must constantly coordinate with the lighter crews at shipside to ensure safety precautions are being followed. If it is determined that continuing the discharge operation is dangerous, they must immediately notify the ship's captain, the lighter control center, and the various unit commanders supporting the operation. The terminal commander or vessel master will decide whether to continue operations or suspend them until conditions improve.

4-18. The following variables influence the ship discharge rate:

- Cargo type to be unloaded (mobile, containerized, unitized, or loose) and characteristics of the cargo ship.
- Material handling equipment available and experience of the cargo handling personnel on the ship and ashore.
- Environmental factors such as weather conditions, beach characteristics and distance cargo ships are from the beach.
- Enemy threats.

4-19. Unless unusual wind or tidal currents exist, the ship normally anchors bow to either the wind or current, whichever is stronger. If all hatches are being worked, lighters may receive cargo over both sides of the ship or at the stern. For example, the cargo from Hold 1 may be discharged over the starboard side and cargo from Hold 2 over the port side.

4-20. If sea and weather conditions prevent cargo discharge from both sides of a ship at anchor, the method of discharge must be changed. The vessel must be moored both bow and stern to avoid swinging to the tide or wind. The lighters should come along the lee side of the vessel and be moored to the vessel to receive cargo. This operation reduces the discharge rate about 50%. Beach control personnel or the shipboard

control point non-commissioned officer direct lighter operators to the number of the hatch and the side of the ship where they should moor. Drafts of non-unitized small items of cargo are usually handled in cargo nets, which are unhooked and left in the craft. Empty nets are returned to the ship each time the lighter comes alongside for another load.

Other Considerations

4-21. There are other considerations that effect watercraft operations. These considerations while physical in nature must be accounted for during planning. Rocks, coral reefs, marine growth, seaweed, currents, surf, tide and wind can disrupt watercraft operations. The effects of each of these are discussed in the following paragraphs.

Rocks

4-22. Rocks on a beach may limit the shore approaches so that only a few craft can land at once. This prevents a large-scale landing and restricts beach operations. However, one or two rocky patches fronting a beach do not present a serious obstacle. There is slight chance that craft will strike rocky patches that have been properly marked with buoys. In a heavy sea, waves break over rocky patches on the bottom. A light sea with waves breaking on the rocks indicates that the rocks are dangerously close to the surface.

Reefs

4-23. Coral reefs are found in shallow salt water in tropical areas. The three general types of reefs are fringing reefs, barrier reefs and atoll reefs. These reefs are discussed in the following paragraphs.

4-24. Fringing reefs that are attached to the land. The reef may be only a few feet wide and is seldom more than a mile wide. Inshore vessel channels are often present on fringing reefs, but they do not occur when the reef is narrow and exposed to heavy surf action. These vessel channels are about 1 to 5 feet (0.3 to 1.5 meters) deeper than the rest of the reef surface and may be 10 to 50 yards (9.1 to 45.7 meters) wide. These channels run parallel and close to the shore, open seaward through breaks in the reef, and may continue for a nautical mile (1.852 kilometers) or more. The channels trap sediment brought down from the land or shifted inshore from the seaward side of the reef. This sediment is often quite fine; giving the vessel channels a bottom of sand or mud, although clumps of coral may live in them. Generally, they are deep enough for the smaller landing craft and too deep for troops to wade.

4-25. Barrier reefs lie offshore and are separated from the land by a lagoon. There may be a fringing reef on the land side of the barrier reef. Barrier reefs vary in width from a few hundred feet (meters) to more than a nautical mile (1.852 kilometers) and may have reef islands on them.

4-26. These barrier reefs enclose lagoons. They usually have a crescent shape with the convex side toward the sea. They may contain reef islands, or heads, composed of accumulated debris from the reef. These circular, drum like islands are seldom more than 10 to 15 feet (3.1 to 4.0 meters) higher than the reef flat. They may be up to 100 feet (30.5 meters) in diameter with a low, swampy interior. The water surrounding a coral island is usually smooth, and the island's presence may not be indicated by surf. However, the water changes color near the island from deep blue to light brown. The chief obstacles on the seaward side of an atoll reef are the marginal ridge with its consequent surf and the scattered boulders of the reef, which are difficult to spot. The inshore part of the reef is usually critical in landing operations. Often it is a band from 50 to 100 yards wide (45.7 to 91.4 meters) with boulders that may impede vehicular progress. On the whole, the surface of an atoll reef is more favorable for crossing than the surface of a fringing or barrier reef. On the lagoon side, the beaches are apt to be composed of softer sand than the seaward beaches. A landing on the lagoon side should be undertaken at high tide, and the numerous coral columns that grow in shallow water near the shore must be bypassed.

Marine Growth

4-27. Marine growth is the unwanted colonization of marine structures by marine organisms. Marine growth can impact watercraft operations by slowing down a vessel, changing vessel handling characteristics, and cause inefficiencies in vessel equipment. Vessels bottoms are painted with antifouling paint but this only slows growth. Marine growth can be removed while the vessel is out of the water in dry

dock or cleaned off by US Army Divers while still in the water. Marine growth rates can vary, water temperature is not a limiting factor.

Seaweed

4-28. Seaweed is usually found in calm waters. It may interfere with the operation of landing craft and wheeled or tracked amphibians. The marine growth may consist of free- floating minute particles that clog sea strainer intakes for engine cooling water, or it may be a thick, heavy type of weed that fouls propellers and tracks.

Currents

4-29. When visibility is poor, water currents of variable direction and low, changing velocity may interfere with or prevent landing at the designated point on a beach. When alongshore currents are anticipated, unmistakable markers or landmarks are needed to identify the beach and the approach lines. Even though landing craft compasses may be properly compensated the current and weather may prevent vessel operators from following the intended course. Therefore, all vessel operators must be aware of natural and artificial ranges that can be used to mark beach approaches during day and night operations. Directing individual craft by radio from a radar-equipped command and control vessel or from the vessel being discharged is a satisfactory method during reduced visibility. Tugs can assist other vessels during strong currents.

4-30. A strong alongshore current may contribute to the broaching of craft. A broached condition exists when a craft is cast parallel to the current or surf and grounded such that maneuverability is greatly reduced. To prevent this condition, vessel operators must be extremely careful when approaching, retracting from, or trying to maintain a position on a beach. Broaching is dangerous if the surf is running since the craft can be swamped or driven higher onto the beach. In either case, assistance will probably be needed to recover the vessel. Unloading broached craft is difficult. Injury to personnel and damage to the craft and its cargo may result from attempts to remove cargo when the craft is not perpendicular to the surf or current. If there are very strong alongshore currents, the beach may become cluttered with broached and swamped vessels unless broaching lines are used or breakwaters and jetties are constructed. Army tugs can provide assistance in recovering broached vessels.

4-31. Offshore and inshore currents are very important to watercraft operations. Offshore currents are found outside the surf zone. Tidal currents predominate around the entrances to bays and sounds, in channels between islands, or between an island and the mainland. Tidal currents generally change direction every 6 to 12 hours and may reach velocities of several knots in narrow sounds. On the surface, tidal currents may be visible as tide rips or as areas of broken water and white caps. Tidal currents are predictable; they repeat themselves as regularly as the tides to which they relate. Non-tidal currents are related to the distribution of density in the ocean and the effects of wind. Currents of this type are constant for long periods and vary in direction and velocity during different seasons. References are available for predicting area tidal currents.

Surf

4-32. Ocean waves arise as a result of local and offshore winds on the ocean surface. Two types of surface waves are produced: wind waves and swells. Wind waves are usually steep with a short time between successive crests. Frequently, the crests break in deep water. When crests are small, they are called whitecaps. When crests are large, they are called combers or breaking seas. In deep water, these waves seriously affect the performance of small craft. Swells result from storms great distances from the coast. They are characterized by a long, smooth undulation of the sea surface. These waves never break in deep water, and time between successive crests may be very long. Small craft in deep water are not affected by swell; however, swell does cause larger vessels to roll and pitch in deep water. In shallow water, swells increase in height. Upon reaching a sufficiently shallow depth, swells may give rise to surf that may damage shore installations or make harbor entrances impassable.

4-33. Swell arising from distant storms approaches the coast at high speeds. In the case of a large offshore disturbance, the swell usually arrives at the shoreline ahead of the storm. For this reason, vessels trying to reach harbors ahead of a storm may find the entrance impassable due to breaking swell.

4-34. The angle at which waves break in respect to shoreline contours generates a number of complications to landing craft operations. To successfully traverse the surf zone, landing craft must first estimate the direction and total distance of drift and then direct a course so that the craft meets the breaker's crest head on or directly astern.

4-35. The breaker or wave period affects the speed at which the craft encounters breaking waves. Short period storm waves from local sources may occur every 6 to 12 seconds. At this frequency, a craft does not have the opportunity to pass the breaking wave. Such continuous impact may cause an operator to lose his bearing and become disoriented. Long period waves may occur every 10 to 20 seconds. On steep beaches, landing craft can pass through the breaker zone between waves.

4-36. Surf characteristics can vary considerably with respect to time and location. A sequence of waves often seems to have regular characteristics, but surf characteristics are as irregular as the ocean bottom topography over which the swell travels en route to the beach. Any wave system can develop an exceptionally high wave.

4-37. The importance of beach slope to surf is in its effect on the width of the surf zone. The breaker line that represents the seaward border of the surf zone is found where the depth to the bottom is about 1.3 times the significant breaker height. With 6-foot breakers, the breaker line is located where the depth to the bottom is about 8 feet, regardless of slope. On a beach with a slope of 1:10, the breaker line for 6-foot breakers would be about 80 feet (24.4 meters) from the shoreline; with a slope of 1:50, about 400 feet (figure 4-1). Off a very steep beach, there are no lines of foam inside the breaker line. After breaking, each wave rushes violently up the shore face and hits any beached craft with great force. On a flat beach, there are numerous lines of advancing foam. The energy of the waves is expended during the advance through the surf zone, and there is only a gentle up rush and backrush on the beach. Beaches with a slight gradient may require use of causeways to offload cargo.

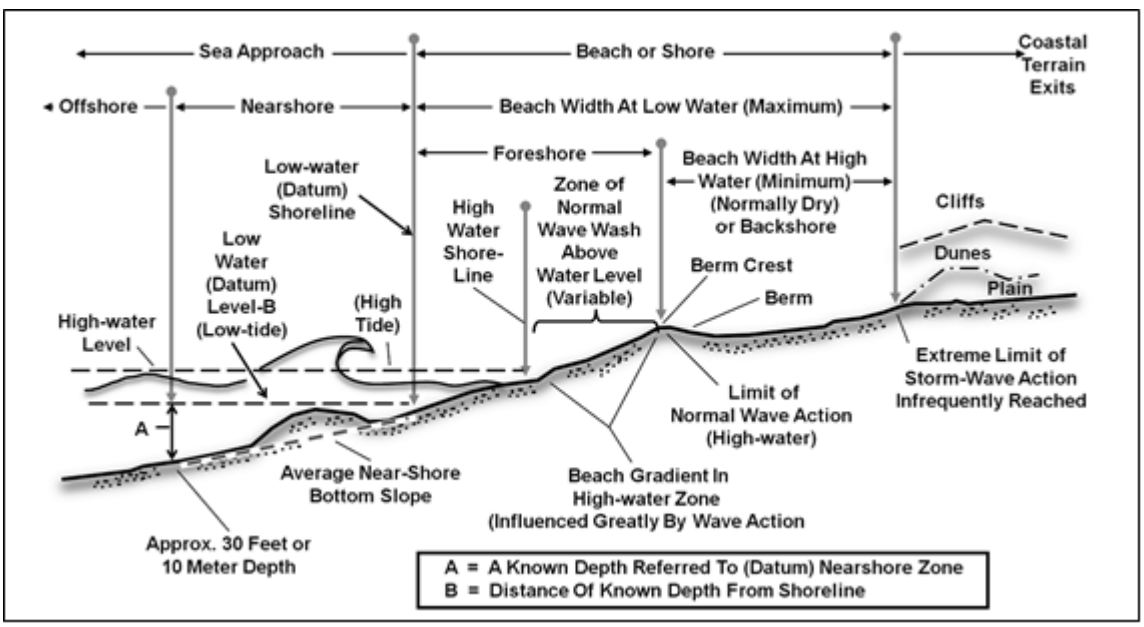

Figure 4-1. Effect of tide on surf zone

4-38. The portion of a wave over a submarine ridge slows down, while the portion on either side swings in toward the ridge. When the waves swing together, each crest is squeezed and the wave height increases. Heavy surf is found wherever a submarine ridge runs out from a coast. A submarine canyon has the opposite effect. The portion of the wave over the canyon travels faster than the portions on either side, and then fans out. When the wave fans out, the crest is stretched and wave height decreases. The amount of protection afforded by headlands, peninsulas, islands, and other obstructions depends as much on underwater topography as on the coastline's shape.

Tide

4-39. Planning for tide must be incorporated early in the planning stages of every water transport operation. Tide is the periodic rise and fall of water caused mainly by the gravitational effect of the moon and the sun on the rotating earth. In addition to the rise and fall in a vertical plane, there is horizontal movement called tidal current. When the tidal current flows shoreward, it is called flood current; when it flows seaward, it is ebb current. High tide, or high water, is the rising tide's maximum height. Low tide, or low water, is the falling tide's minimum height. The difference between the level of water at high and low tides is the range of tide.

4-40. The period of tide is the time interval from one low tide to the following low tide or from one high tide to the next high tide. These intervals average 12 hours and 25 minutes at most places. About every 2 weeks, during the new moon and the full moon, the highest high water and the lowest low water occur. The combined attractive influences of the sun and moon on the water at these times cause this unusually large range of tide. These tides are spring tides. When the moon is in its first and third quarters, the attractive influences of the sun and the moon oppose each other and the range of tide is unusually small. Tides during these times are neap tides. Tides occurring when the moon is at its maximum semimonthly decline are called tropic tides. During tropic tides, the daily range increases. Tidal range also varies with coastal configuration and barometric pressure.

4-41. The stage of the tide affects the width of the beach and, accordingly, the type of surf, the depth of water over sandbars and reefs, the width of exposed beach that must be traversed, and the requirements for special equipment to facilitate debarkation. Extreme tidal ranges may restrict unloading to the period of high tide. This requires maximum speed of operation and a rapid, heavy buildup of supplies in the early stages of a landing. If there is a relatively large tidal range on a gently sloping beach, water may rise or descend on the beach so rapidly that craft are stranded on a dry bottom before they can retract. This may put a critical number of craft out of action until the next rise of tide.

4-42. If, in addition to a flat gradient, the bottom has many irregularities, a fall in the tide may ground craft far from the beach proper. Personnel will have to debark and wade ashore through these pools. If the pools are deep, a considerable loss of equipment can be expected. In some cases the effect of the tide may require that craft be held at the beach as the tide recedes, discharging their cargo while resting high and dry on the exposed beach. The craft then retracts on the following tide.

4-43. The force of an unusually strong wind exerted on the tide at the landing area may greatly alter the width of beach available for operations. Along with an ebbing tide, a strong offshore wind may blow all the water off the beach and, on a gentle gradient, the water level may recede to an extreme distance from the beach proper. Personnel and material must then pass over a wide exposed beach. On the other hand, a powerful onshore wind can increase the advance of high tide to such an extent that beach installations and activities are endangered or flooded.

4-44. Where obstacles do not exist, a landing on a flood tide is generally preferred so that craft may be beached and retracted readily. Normally, it is desirable to set the time for landing 2 or 3 hours before high tide. It is not advised to load a craft when a high tide is going out and the depth close to the ship's draft. The result may be a loaded craft, unable to retract. References are kept on every vessel for predicting area tides, and the crew is trained to use these manuals.

Wind

4-45. Wind velocity, the distance spanned by the wind, the duration of the wind, and decay distance influence swell and surf functions on the beach. Winds at or near the surface of the earth have been classified, and their characteristics are known and predictable. Some surface winds are very deep and extend for miles into the air. Some are shallow, such as the land breeze, and extend only a few hundred feet (meters) above the surface. Winds aloft may blow in a direction opposite to surface winds. Velocity and direction may vary with different elevations. The velocity and duration of the wind and the size of the water area over which the wind has acted to produce waves, govern the growth of waves. Swells are waves that have progressed beyond the area of influence of the generating winds. A very rough sea disrupts landing schedules and formations by restricting the speed and maneuverability of craft. Normal control and coordination problems become more complex. Tugs can assist other vessels in strong winds.

4-46. Planners must consider the effects of heavy seas on personnel and landing craft when establishing timetables, distances to be traveled on the water, and loads to be carried. With an excessive or poorly distributed load, vessels may list severely or even sink. Extremely rough conditions may necessitate removing loads from the craft and placing the craft aboard another vessel or in a safe haven. When a rough sea is anticipated, craft carry smaller loads and proceed cautiously. Ship-to-shore distances are reduced as much as feasible. Since the unloading of equipment and supplies may be restricted by heavy seas, priorities must be established for critical items so that the most essential shore requirements are met as quickly as possible.

VESSEL CONVOY OPERATIONS

4-47. The vessel unit responsible for the conducting a convoy describes how the convoy will be executed. The unit describes the types of charts, navigational methods, vessel control, convoy organization and formation and security used during the convoy. These are discussed in the following paragraphs.

Tracking Chart

4-48. The track chart, prepared from a large-area/small-scale navigation chart, shows the complete route from the assembly area to the objective. Plotting a true course and the distance in nautical miles without deviation shows the route. The route or track is divided into legs at each change of course. Each leg will give true course and nautical miles to the next change of course. At the point of change, a bearing and distance off is shown to some given aid to navigation (either ashore or afloat) for course correction. The using unit makes compass corrections for all courses, using deviation tables for each vessel and the variation shown on the overlay. The unit then determines the speed limit of each vessel within its operating capabilities. The speed to be maintained is computed so that the vessel arrives at the beach objective at a specific time (H-hour or time of arrival). Time of departure is computed by planning backward from the time of arrival and including a small safety factor allowance. The final time determined is the correct time of departure from the assembly area.

Navigational Chart

4-49. Since navigation is based on the unit track chart, copies of the chart are furnished to the operator of each vessel. Instructions are then available if a vessel becomes separated from its formation. Before the movement begins, navigational instruments must be checked carefully. Preparations include:

- Providing communications security fills to military communications and navigation devices.
- Swinging the craft to obtain compass deviations, ensuring that each vessel has a current compass deviation table and that personnel are trained to use the table properly.
- Calibrating signaling equipment, testing and calibrating signaling and listening devices and associated equipment, and checking timepieces, sextants, and all other instruments.

Approach Chart

4-50. When hazardous approaches to a beach present a particularly difficult problem in navigation, an approach chart or overlay is issued to each subordinate vessel element. The chart, prepared on as large a scale as possible, shows:

- Line of departure (for a tactical landing).
- Navigational hazards, including underwater obstacles.
- Courses to avoid. Vessels may have to land in small groups or singularly. The approach may require changing course with several shifts in direction between the far shore assembly area and the beach.
- Formations required.
- Hydrographic obstructions, narrow channels, wharfs, and the speed and direction of unusual currents.
- Panoramic sketches or oblique aerial photographs of the beach seen from seaward supplement the approach chart. Identifying points are marked on the photographs.

Navigational Methods

4-51. The navigational methods used to guide a convoy vary with the availability of navigational aids and charts, ocean currents, visibility, and the configuration of the ocean bottom. In a tactical operation, the position of the leading command and navigation vessel must be known accurately to within 100 to 200 yards when within 1 to 3 miles of the enemy shore. This degree of accuracy is difficult to obtain, especially if the movement is at night.

4-52. Electronic signal devices secretly planted on or near the enemy shore by other agencies or units are often used to guide the lead vessel, which picks up the signals with its receiving equipment. Another method is to place personnel ashore by a small rubber boat or parachute to show, at a specified time, a shielded light. A beam radio or invisible-light transmitter may be set up to guide the navigational vessel. However, radio silence is jeopardized when wireless transmitting devices are used.

4-53. Regardless of the far-shore aids that may be installed, the navigator still must depend largely on conventional methods of navigation. Electronic Chart Display Information System (ECDIS) has Global Positioning System input and can provide very accurate navigation information. However, reliance upon a single system is imprudent, and dangerous when conducting operations in potentially network-denied Anti-access/area denial environments. Proper allowance for currents must be made; depth-finder soundings must be plotted on charts. The effective range of radar equipment in the convoy depends on the type of radar set used and the height of the antenna above the surface of the water. A constant radar plot is maintained both to check the accuracy of electronic navigational equipment and to keep a check on the convoy formation.

4-54. Two vessels may work together to establish a route into a network-denied or an otherwise unmarked area. One vessel, far enough ahead to scout by depth finder, sonar, hand-lead line or other means, establishes a buoy to mark a designated location. The second vessel guiding the formation homes in on the buoy. To use this method requires good charts. If visibility is sufficient, the navigator can take bearings on various land features as the far shore is approached, or radar ranges, if so equipped. These objectives must be known in relation to the landing area. This may involve running parallel to the beach until a sufficient number of points are recognized to establish a position and to set a course for the beach.

Vessel Control

4-55. While the operation is being planned, the vessel's navigation officer and a representative of the terminal headquarters (or other unit responsible for far-shore operations) thoroughly study landing conditions. The terminal headquarters coordinator for vessel operations is the HD. Tentative plans for vessel and beach control are agreed on, including the location of landing points for craft. In a shore-to-shore operation, the vessel control officer:

- Controls the movement of all craft between the near and far shore.
- Marks control points to regulate vessel movements and other points designated by the higher headquarters.
- Informs the commander of the vessel unit of the movement's progress.

Embarkation

4-56. The harbormaster operations cell of the battalion, along with the headquarters of the units being transported, prepares an assembly chart or an overlay on a small-scale navigation chart. The chart shows true courses and distances in nautical miles from the dispersal areas to the rendezvous areas, from the rendezvous areas to the embarkation points, from the embarkation points to the regulating point, and from the regulating point to a final convoy formation in the assembly area. The assembly chart is prepared similarly to the track chart. An assembly table may accompany the assembly chart. The table prescribes times of departure from the embarkation points and the regulating point. It also gives the specific times of arrival for vessel units or landing teams in the assembly areas. Vessels are queued on the near shore until they are required to form for embarkation/loading. If possible, the arrival of each craft at the shore is synchronized with the arrival of the troops and supplies. (The time required to load troops and supplies must be considered by the unit being transported and the vessel unit assigned to the movement.) To avoid undue fatigue, troops are loaded at the latest possible hour that permits the convoy to depart at the designated time. Troop movement should be aboard vessels designed to carry passengers, such as a LCM-

8, Mod 2. After loading, they proceed to designated rendezvous areas offshore. Rendezvous areas are assigned for vessels assigned to the convoy. Vessels are directed to the assembly area location that they will occupy in the convoy. Using the track chart, they then proceed in prescribed formation to the far shore.

Convoy Organization

4-57. The convoy is formed in waves or elements of six to eight vessels, depending on the landing plan. The convoy commander is normally the senior vessel master in the convoy. The convoy commander's vessel heads the formation and controls the vessel formation and route. The commander of embarked troops travels in the same vessel as the convoy commander. Control vessels are stationed on the flanks. A salvage vessel follows in the rear.

Convoy Formation

4-58. The formations used within a convoy vary according to the situation. They depend on such factors as the tactical plan (for a tactical landing), area constraints such as operating within rivers or channels, weather, time of day, sea conditions, phase of the operation (whether the convoy is en route to the far shore or approaching the beach for the landing), and Enemy situation and capabilities (including nuclear).

4-59. Generally, a convoy moves in a column formation upon arrival in the landing area. The distance between vessels, stern to bow, should be no less than 0.5 nm apart, depending on visibility. In poor weather, craft must travel further apart and closely monitor craft in close proximity. To avoid collisions, they should not move closer than one vessel length apart when operating in close quarters.

4-60. The closed-V formation provides excellent control. It permits rapid deployment into an open-V formation in case of air attack. The open-V and line-abreast formations are used to approach the beach before landing. However, they are difficult to control. Normally, they are used only for short distances. The line- abreast formation is normally used only in a landing (usually tactical) where all vessels must beach at the same time. When radio silence must be observed, code flag signals or flashing light using Morse code may be used to pass maneuvering signals between vessels. Vessel masters and Mates of Class A vesels are trained in use of flashing light with Morse code.

Mission Command

4-61. The convoy commander is responsible for the control of craft, navigation, mitigation of risk, and coordination of local defensive measures. The convoy commander must:

- Ensure that all landing craft arrive and depart from the embarkation points on time.
- Ensure that craft are in the prescribed formations and depart from assembly areas on time with minimal confusion and delay.
- Provide accurate navigation from the near shore to the landing area so that craft arrive on time and in prescribed formations.
- Patrol the convoy to maintain formation and help craft having difficulties.
- Establish control vessels ahead of the formation to direct the landing.
- Control the movement to the beach and the landing of craft.
- Conduct a comprehensive risk assessment of convoy operations.

4-62. To assist the convoy in conducting operations, one higher headquarters liaison officer should be designated to coordinate vessel activities to support combatant commander maneuver requirements.

Convoy Control

4-63. The distance between craft and poor visibility may complicate the control of vessel units in convoy. Visual communication must be highly efficient since radios must be kept free for traffic other than control messages. Voice-amplifying equipment is desirable for all control and salvage vessels. Leaders of small vessel units must ensure that coxswains maintain their positions in the prescribed formation and follow specified speeds. Night operations are particularly difficult and physically and mentally strain personnel. Strict compliance with regulations concerning authorized lights is essential. A single unauthorized light

may cause general confusion in the convoy movement. Bow lights on top of the LCM ramp are turned off because they tend to blind the coxswain. A lookout is posted in the bow to watch for hazards, and night-vision devices or forward-looking sonar may be employed. Control vessels are used to prevent straggling, assist vessels in trouble, and aid in navigational control. They patrol the flanks and rear of the formation and communicate with the navigator. Control vessels (picket boats) may also serve as messenger boats. If possible, the formation should proceed to a safe haven before the onset of bad weather. If the control officer believes that further movement would be hazardous, he may order the convoy to move into a predetermined closed formation with the control vessel in the center. The craft maintain enough way to keep their positions.

Approach To Landing Area

4-64. Command and navigation vessels and picket boats make up navigational control points and hazards. In a tactical operation, they also mark the rendezvous area and the line of departure. Picket boats may precede the convoy, establishing submerged or floating buoys, invisible-light transmitters, and other devices to mark control points, obstructions, and channels. Aircraft and submarines may also be used for this purpose. An initial point may be designated about 10 miles offshore to guide the vessel formations to the rendezvous area for tactical landings. The position of the initial point depends on the distance between the near and far shores. It should be far enough from the landing area to allow the entire convoy to rearrange time schedules if necessary. The convoy may be delayed at the initial point if it is ahead of schedule or if any rearrangements are needed in the existing formation. In a tactical landing, when the convoy enters the rendezvous area, the designated control vessels move out to their stations and mark the line of departure. The waves assemble and are ordered to the line of departure according to an approach schedule.

Convoy Security

4-65. Fighter aircraft, Army aircraft, Navy vessels, or armed landing craft may protect the convoy. Vessels in the convoy should be equipped with weapons suitable for antiaircraft and anti-vessel defense. Army watercraft may be modified locally according to the requirements of the situation and the armament available. Landing craft may also transport tanks; landing vehicles, tracked, armored; or self-propelled guns to provide defensive firepower in support of an assault landing. Weapons and ammunition in a craft are kept available at all times, and sentinels are always on duty. In the first hours of the voyage, alert warning systems are tested and rehearsed.

4-66. Each vessel is assigned a sector for observation and defense. In case of attack, vessels deploy into prearranged open formations. They must avoid becoming so scattered that communication and control are lost. All available weapons are fired against attacking airplanes or vessels.

4-67. Each control vessel section closely inspects the appropriate beach area immediately after landing. Section members determine the type of bottom; the depth of water; the location of rocks, boulders, shoals, bars, sunken wrecks, and other obstacles; the nature of any crosscurrents; and other pertinent information. After the salvage vessel arrives, it helps to evaluate the water approaches and to determine the depth of water offshore. The control vessel section or personnel of the shore party (if the landing is tactical) mark and remove all hazards to navigation. Pennants placed on buoys or stakes mark hazards that cannot be removed. The control vessel sections of the appropriate shore party unit must keep the beach clear. Stranded vessels, vehicles, supplies, and debris must not be allowed to block landing points. To control vessel traffic, members of the control vessel section signal landing craft to the proper landing place. Coxswains get directions concerning proper angle of approach, speed, beaching lowering of ramp, unloading, and retraction. Since it is often difficult for a coxswain to determine the exact location of a beach landing site, a flagman stands in the center of the site and guides the beaching craft. Guidance is particularly necessary for craft that are transporting vehicles. Range markers help the coxswain approach the beaching site.

Emergency Maintenance And Salvage

4-68. Maintenance personnel, equipment, and repair parts are distributed throughout the convoy. In addition, each company salvage boat is stationed at the rear of its company formation. This position enables

observation of any crafts that may need help. The salvage boat also acts as a rescue boat. As the convoy leaves the near shore, the salvage boat assists where needed and does not depart until the last craft is under way. Each salvage boat carries a specially trained crew. A prearranged signal indicates when a landing craft needs assistance. The salvage boat (large or small tug) assists vessels in distress as much as possible. However, under no circumstances does it lose contact with the formation. Salvage boat mechanics make minor engine repairs, supply replacement parts, or give the engineman instructions so he can correct the malfunction and get under way. However, repairs requiring considerable time are refused. The salvage boat serves the entire formation. It cannot leave the formation to service individual vessels. The salvage boat may tow the disabled craft until repairs are made, or a mechanic may be left to make repairs. A control vessel may tow the craft or may transfer troops from the disabled craft to another landing craft. If available, empty LCMs are included in the convoy for use in emergencies.

4-69. The salvage boat and at least one landing craft in each wave usually carry towlines. The lines should be of appropriate breaking strength for towing, at least 200 feet long and equipped with bridles and adequate chafing gear. The bridles should be designed so that they may be secured to the mooring bits of the towed and towing craft. At the landing area, salvage boats may cruise around the area, alert to assist where needed, or they may anchor at a location to observe all craft.

TOWING OPERATIONS

4-70. Towing is a well-developed maritime procedure. Rescue and salvage towing generates a necessary sense of urgency. Conditions of a tow, weather, war zones, and other factors commonly make towing a time critical operation. While certain ships and watercraft are designed to offer towing services, all ships can take a tow in an emergency. Towing is a routine operation for tugs. Good practice of seamanship is necessary to accomplish the mission without endangering the tow, tug, personnel, or operational schedules. While many trans-oceanic and coastal tows are completed uneventfully, the crew must be prepared to handle emergency conditions. Good planning, preparation for emergency situations, and correct ship handling are necessary elements of towing. (For more information on towing see Technical Bulletin 55-1900-232-10, United States Army Towing Manual.)

Towing Planning Factors

4-71. Present day towing has evolved throughout the history of engine-powered towing. There are distinct differences between simple barge towing, open water coastal and ocean towing. Planning factors for considering tug use include:

- Schedule harbor tug support so ocean-towing tugs are not kept waiting unnecessarily for passing of tows at the ORP.
- When the draft of the ocean-towing tugs is too great for the depth of water at either terminal, prearrange the delivery or take-over of the tow before the ocean tug arrives at the ORP.
- Estimate the required bollard towline pull and horsepower of the towing vessel before assigning a tug for a mission. Use the correct size of tug for the job.
- Use the correct size tug or proper craft for the job. Tugs are specifically designed to tow. While all vessels are capable of towing for a short time in an emergency, only tugs are designed to do so. Do not use unsuitable craft to do work beyond their capacity (consider the towline pull). For instance, do not use a landing craft to tow another landing craft over great distances or heavy seas.
- If another vessel can conduct the mission, do not use a tug unnecessarily. For instance, use an LCM-8 to move small numbers of people between shore and ship.
- Ensure tugs have proper endurance (range and capacity) for the mission. Arrange provisioning or refueling en route if necessary.
- Ensure tugs in forward areas have sufficient stability, reserve buoyancy, and protection from small arms attacks.
- Do not use tugs unnecessarily for standby duty on salvage or rescue operations. Tugs should not be ordered to stand by unless there is a definite possibility that their services may be needed and they can render the service likely to be required.

- Do not remove tugs unnecessarily from areas where tugs equipped for rescue (salvage or firefighting) may be required.

Towing Gear Selection

4-72. Towing gear provides a single point of failure in towing safety. Regular inspection of all towing gear and proper selection of gear appropriate to the tow will insure safe and efficient mission accomplishment.

4-73. Towing gear selection requires consideration of several factors. These include type of towing (pushing, towing on the hip or astern), the size and displacement of the towed vessel, the tow route (inland, coastal or open ocean), the expected weather (wind and sea) conditions for time of year, distance of the voyage, and tug's towing capacity. Refer to Chapter 13 in TC 4-15.51 Marine Crewman's Handbook and TB 55-1900-232-10, US Army Towing Manual for additional information on selection of appropriate towing gear for the mission.

4-74. US Coast Guard Navigation and Vessel Inspection Circular NVIC #5-92 provides additional guidelines for inspecting towing gear and selection of wire rope appropriate for the tow. Chain bridles, chains, all shackles, pins and sockets and detachable links to be used as part of towing gear must be certified from the manufacturer that it has been tested, proof load applied in short tons, and safe working load noted in short tons. The Master maintains a record of hawser usage in nautical miles and all inspections. Hawsers should be removed from the winch drum and completely inspected between 25,000 and 40,000 nautical miles, depending on severity of use, for damage, wear, and interior lubrication. On a continuing basis, all shackles, pins, sockets and splices should be inspected for wear and damage and replaced if necessary. If unsure of the usability/ serviceability of the towing equipment, have gear professionally tested.

Towing Responsibilities

4-75. The command requesting tow of craft must provide the craft in seaworthy condition with flooding alarms, navigation lights, electrical power for alarms and lights, salvage gear (anchors and pumps), and towing gear (bridle, pendant, and retrieving wires). For suspect or deficient seaworthiness conditions, both the tow and towing command must agree on the risk of tow. The command accepting the tow mission must provide tug and towing gear to connect to the towed craft's towing gear. The tug and gear must be seaworthy for the particular mission route and have the appropriate size, horsepower, and control to safely and successfully accomplish the towing mission. On accepting the tow, the towing command accepts full responsibility. Before accepting, seaworthiness must be verified. The tow should be refused if it is considered not fit for sea. The tow is accepted only after the tug's officers complete a comprehensive evaluation and survey of the tow.

Chain Of Command For Towing/Towed Vessels

4-76. The commanding officer of the towing ship administers the tow, even when the tow has a riding crew with an officer in charge. In assuming this responsibility, the commanding officer of the towing ship inspects administrative conditions on the tow, with particular attention to personnel accounting, sanitation facilities, safety, security, and lifesaving equipment on board, general stores, provisions, equipment, gear, communications, and defensive capability. If the tow is not satisfactorily prepared, the commanding officer of the towing ship will so inform the tow's command to correct deficiencies.

Inspection Of Tows

4-77. Towing can be a dangerous operation. Inspections must be complete and comprehensive. Tows should be properly trimmed, not overloaded, and secured for sea. Deficiencies must be identified and corrected before acceptance. Inspect and ensure all equipment is properly tied down. Turnbuckles with wire rope tie-downs with good holding results should be used. Manila line lashings effectively hold light gear. After all gear is secured, tie-downs and lashings are inspected to ensure all are taut and holding. Weather permitting, retightening of turnbuckles and lashings may be necessary during long-range tows or prolonged periods of time. This requires the tug's crew to board the tow at sea, an inherently dangerous task.

4-78. When large units of high weight must be secured for sea, it is advantageous to weld them to the deck. Welding requires extra time and effort – plan for it. Tows are generally not dry-docked for inspection before being accepted. Suitable hull inspection consists of divers and internal observation and measurements. If a number of checks along the sides, between light and full load waterlines show adequate thickness of the original hull side plating, the bottom of the craft to be towed can be assumed to be sound.

4-79. A thorough internal inspection should be made. Note the bottom framing, plating, and welds in the forward one-fifth of the craft's overall length. If no evidence of serious deterioration or displacement of hull plating exists, the craft can be considered structurally sound. If the inspection uncovers serious rusting or displacement of the frames, plating, bottom, or weld seams (particularly in the forward one-fifth of the craft's length), the craft should be dry-docked and necessary repairs made. While in dry dock, magnetic particle checks (or their equivalent) of bottom, side, butts, joints, decks, and inner bottom should be made. All defective welds and plating should be repaired or replaced. Structural reinforcing and load distribution may be accomplished with wood timbers. Craft should be examined thoroughly before towing to avoid special dry-docking of craft. Thickness and magnetic particle checks made during cyclic maintenance and resulting repairs should provide suitable supporting data to avoid special dry-docking. All flooding alarm systems should be inspected for proper installation and operations.

4-80. Navigational lights should be tested. Batteries, including hydrometer reading, should be inspected and tested. There must be sufficient battery capacity to support the systems for the duration of the mission. All flooding alarms and navigation lights should have automatic lamp changers. Packing glands in the stern tube should be checked. The shafts should be properly locked. If a riding crew is aboard, shafts may be allowed to freewheel. The craft's rudder may be locked amidships or 3 degrees left or right to prevent erratic behavior of the tow.

Towing Risk Factors

4-81. Commanding officers of the towing ship and the towed craft should agree to the conditions of risk in towing the craft. Risk conditions are based on the seaworthiness and structural condition of the tow, expected sea and weather conditions for the route, and the specifications of the towing ship. In acceptable risk, the hull, equipment, towing gear, and towing ship are seaworthy and structurally sound. In calculated risk, tow deficiencies are accepted but mitigated. The probability of tow safely reaching destination varies with deficiencies. A detailed risk assessment shall be conducted for all tows.

Seaworthiness

4-82. Towing seaworthiness means suitable condition for the mission. This concerns all the various technical implications of the tow and towing vessel. When insuring seaworthiness of the tow and towing vessel, consider the following: vessel design and specifications, structural condition and stability, age, maintenance history, and status, Reinforcement requirements, and Hull and superstructure closures. The towing gear is very important to the success of the tow. Inspect and insure the adequacy of towing gear, including the following: Dewatering facilities, Chafing gear, Firefighting and damage control facilities, emergency towing gear. Additional considerations include repair parts to be carried, tow-boarding facilities, waters to be transited, and hazards of the route.

4-83. A certificate of seaworthiness for ocean tows must be completed. The certificate indicates the general characteristics of the tow, type of cargo, towing gear, lights, and emergency gear aboard the tow. Hulls not considered seaworthy for open-ocean should be transported as deck cargo on heavy-lift, or float-on/float-off ships. Only under extreme emergency situations should open-ocean towing be attempted when the tow is not considered seaworthy, as there is an extremely high risk of sinking the towing vessel.

Towing Ships

4-84. All ships can tow in an emergency; however, only properly designed and outfitted tugs make good towing ships. Characteristically, a tug's superstructure is set forward, allowing the towing point to be close to the ship's pivot point. The towing point is located far from the rudder and screws so that it allows the towline to sweep the stern rail. High horsepower, slow speed, large rudder, towing machine, power capstans, towing points, and a clear fantail characterize a good tug. All ships can tow and be towed in an

emergency. Ships not equipped for towing can use the anchor chain, wire straps, nylon lines, or any combination necessary. A good curve ensures spring in the towline. Slow speed transfers the lowest dynamic load from the towing ship to the tow. Large ships can easily overpower the tow and excessively strain the towline. The towing ship should keep engine revolutions low for the highest torque and lowest strain and surging.

Types Of Towing Missions

4-85. Special towing missions generally transit unprotected coastal waters and the open ocean. These missions require considerably larger and stronger tugs using heavier and stronger towing gear to withstand the violent stresses encountered in open coastal and ocean seas. Normally, these tugs have greater towing power (larger engines and overall heavier equipment and construction) and are equipped with towing machinery, such as single and double drum wire rope towing winches; tow wire guides, rollers, and pinions; cranes or winch/boom assemblies to handle the tow rigging; and a small workboat for boarding and inspecting the tow while en route. Towing gear for these missions include heavy chain bridles and pendants (anchor chain), plate shackles, retrieving wires, emergency towing bridles, towlines (hawsers), flooding alarms, pumps, and anchors. Large floating equipment, such as the BD, is equipped with its own towing gear. Such heavy gear cannot be carried as basic issue items aboard tugs because of weight and cube. There are two general types of towing missions; administrative and rescue/salvage.

Administrative Towing Missions

4-86. Administrative towing missions are routine in nature. Tugs reposition floating equipment within the confines of the terminal harbor areas; dock, undock, and assist large ships in port arrivals/departures; and perform short range missions in protected waters where only light towing gear and equipment is required. Administrative towing usually requires towing gear and equipment normally found aboard as part of the tug's basic issue items. These items are wire rope bridles and pendants, shackles, wire rope clips, and swivels. This equipment is well suited for short duration towing in waters protected from the effects of coastal and ocean seas.

Rescue/Salvage Towing Missions

4-87. Rescue/salvage towing missions have two forms: planned and opportunistic. Planned rescue and salvage towing requires generally the same conditions of a special towing mission, with some additional considerations. An additional hazard is trying to tow equipment that is not seaworthy because of battle damage, grounding or other non-operational status. Opportunistic rescue and salvage towing occurs when any ship or tug is in the immediate area of a vessel requiring towing assistance to remove it from immediate danger. This type of towing uses any means at hand to remove the stricken vessel from danger. The nature of the operation makes it extremely hazardous to the towing vessel as well as the towed vessel.

Routine And Rescue Towing

4-88. Administrative point-to-point towing is routine and ensures that both the tug and tow are seaworthy and prepared for the transit. Rescue towing requires prompt action, often under pressing circumstances of a war zone, salvage operation, or inclement weather.

Manned Tows

4-89. If a continuous watch is required on the tow, a riding crew is placed aboard the tow. The riding crew provides security, fire watch, damage control, line handling, communication, flooding watch, and defense. It provides the nucleus for fire fighting, damage control, and defensive actions. Under normal conditions, and after proper securing for sea, most tows can be done without a riding crew. However, there are exceptions. It is far better to secure the tow properly than to provide a riding crew as a substitute security.

Unmanned Tows

4-90. Barges, floating cranes, dredges, pontoons, pile drivers, dry docks, and ships can be towed without riding crews. Any hull considered seaworthy can be towed unmanned. A seaworthy hull has watertight

integrity, structural soundness, proper position of the centers of gravity and buoyancy, and good stability characteristics.

4-91. Long-distance and valuable tows without a riding crew should be periodically boarded and inspected. Since the operation is often difficult and hampered by weather and sea condition, the inspection should be well planned and executed promptly and efficiently. Using an inflatable boat to transport the inspecting party to and from the tow is recommended. This boat should be equipped with an outboard engine whether or not it is veered aft on a line. This greatly enhances its maneuverability and permits its recovery if the veering line parts.

4-92. When preparing a crane, dredge, pile driver, or other floating equipment designed for operation in sheltered waters, it may be necessary to remove high weights; to secure booms, ladders, deck structures, ballast, and trim; and to perform other unique functions due to the hull's design.

4-93. Senior marine deck and engineering officers (military occupational specialty 880A2/881A2) with tow preparation experience should thoroughly analyze the configuration and modifications to the hull and recommend it for open-ocean towing. Nothing is derived from taking a marginal tow to sea only to lose it.

SECTION II – TERMINAL OPERATIONS

4-94. Several types of watercraft can be used to support terminal operations. They include landing craft, tugs, self propelled and towed commercial and military cranes and barges, and causeway systems. Logisticians must be prepared to work with available assets in conducting terminal operations.

FIXED PORT OPERATIONS

4-95. Fixed port facilities are generally worldwide, large, commercial facilities comprised of sophisticated cargo handling systems specifically designed for transfer of oceangoing freight; vessel loading/discharge operations; reception and staging operations; and port clearance. These facilities have sufficient water depth and pier length to accommodate deep-draft vessels. At these facilities, deep-draft oceangoing vessels come alongside a pier and discharge cargo directly onto the apron of the wharf or pier. Most cargo moves into open or covered in-transit storage facilities to await terminal clearance or is discharged directly to land transport. Fixed port facilities are the most capable terminals for military operations of any meaningful size, handling large volumes of equipment and containerized cargo. (See ATP 4-13, *Army Expeditionary Intermodal Operations* for additional information on terminal operations.)

4-96. The following topics must be considered when planning operations in a fixed seaport. It is not all inclusive and is intended to encourage further discussion and consultation. Terminal planning includes:

- Estimating the existing terminal capacity. This is the estimated total tonnage and numbers of personnel and containers that can be received, processed, and cleared through the terminal in a day.
- Computing the terminal workload needed to support the operation. The workload is expressed as numbers of personnel, vehicles, containers/twenty-foot equivalent units (TEU), and short tons (STON) for non-containerized cargo. This computation includes the total tonnage and numbers of personnel and containers that must be received, processed, and cleared through the terminal.
- Determine repair and rehabilitation costs of existing facilities and/or new construction needed to increase existing terminal capacity to equal computed terminal workload. (Existing terminal capacity maybe insufficient to support the operational workload.)
- Estimate the materials handling equipment and container-handling equipment needed to process the required workload to include equipment such as pallets, forklifts, tugs, barges, cranes, and the operators required to operate them.
- Estimate the units, personnel, civilian augmentation support, host-nation support, and supervisory and command requirements needed to operate the terminal.
- Identify and estimate security personnel requirements in case military police (MP) or host-nation support is not available.
- Terminal Selection:

  - Physical restrictions of working space and parking space (may impact capacity.)
  - Availability of hard surfaces in transfer areas.
  - Existing facilities for storage and maintenance of material handling equipment and other equipment.
  - Proximity to exit routes to transfer points.
  - Distances between loading and unloading points and temporary holding areas.
  - Security and safety standoff distances.
- Berths: how many ships berths are available; what, if any, restrictions are present
- Available Assets: what organic assets are available; jib cranes, container cranes, fork lift availability, port clearance assets, conveyors, pipelines
- Road Networks: is there a usable road network capable of supporting port clearance operations; what type of surface in there, can it be easily improved; is there a rail line/s available; what road maintenance assets will be required; what security assets will be required; what is the road networks vulnerability to attack/sabotage
- Marshaling/Staging Areas: are the marshalling/staging areas on or adjacent to the port; how far are they from the port; to they provide for one-way traffic into and out of the area; what security assets are present; what security assets need to be provided or improved;
- Additional Support Requirements:
  - Anti-terrorism and force protection considerations.
  - Procedures for complying with applicable federal, state, local, and host-nationenvironmental regulations, including but not limited to oil spill contingency planning, waste disposal, and site specific environmental concerns.
  - Weather/environment.
  - Administration and communications.
  - Refueling.
  - Dining and billeting.
  - Latrines.
  - Laundry and showers.
  - Vehicle recovery and maintenance.
  - Medical.

LOGISTICS OVER-THE-SHORE (LOTS)

4-97. Logistics over-the-shore (LOTS) operations provide the capability to move forces, cargo and sustainment through austere/degraded ports or over bare beaches. They also may contribute to reduced reception, staging, onward movement and integration requirement by providing movement of intact combat-configured forces. LOTS operations are resource intensive and require greater planning than fixed port operations. When Service forces conduct LOTS operations together under a joint task force, it becomes a JLOTS operation. In a JLOTS operation, each Service component provides equipment and performs designated tasks specific to that Service's capability as outlined in JP 4-01.6. (See Joint Publication 4-01.6, *Joint Logistics Over-the-Shore for more detail on JLOTS.)* The following discussion details considerations for executing LOTS operations.

4-98. In follow-on LOTS operations, the joint force commander may be inclined to leverage beaches already selected by the U.S. Navy and the U.S. Marine Corps for the initial forcible entry phase of an operation. However, the beaches that best facilitate amphibious operations may not be advantageous for setting up LOTS operations. For most follow on LOTS operations, a new beach site will be selected that has the key characteristics of deeper gradient, hard-pan cargo marshalling areas, and access to existing infrastructure to support the required throughput.

4-99. A beach reconnaissance party determines the exact location of the site. The reconnaissance party consists of representatives of the Military Surface Deployment and Distribution Command Terminal Transportation Group, sustainment brigade, engineer support unit and the military police; the commander

and the operations officer of the terminal battalion that will operate the site; and the commanders of the port operating units and vessel companies involved. During the reconnaissance, the terminal battalion commander selects and assigns company areas and frontages, indicates areas of defense responsibilities, and tentatively organizes the area of operations.

4-100. The water transport unit commanders provide advice and recommendations on factors and conditions that affect their units. These recommendations bear directly on the final choice of the exact operational sites. When CBRN incidents are suspected, the beach reconnaissance party conducts monitoring and surveys to check for CBRN threats and hazards on prospective beach sites.

PLANNING CONSIDERATIONS

4-101. The composition of water close to shore is another consideration for LOTS operations. The water depth close ashore, tidal range and period (duration and variation of high and low water), and the effect of tides on the beach width must be considered. Wind and weather conditions in the area (using Beaufort Scale) effect water and beach conditions.

4-102. Sea bottoms most nearly ideal for landing craft operations have coarse sand, shell, and gravel bottoms and similar foreshore beach composition. These bottoms are firm and usually smooth; but bank, bar, and shoal formations are common. Bottom compositions of soft mud or fine, loose sand can be hazardous to vessels, vehicles, and personnel. Soft mud and loose sand could foul the engine cooling systems. Crews on craft equipped with beaching tanks rely on this supply of cooling water during beaching operations to prevent engine fouling. Crews on vessels not equipped with beaching tanks must clean the sea strainers often to ensure the engine gets an adequate supply of cooling water.

4-103. Vehicles sink into beaches with a soft bottom and become immobilized. Mud and sand bottoms may be either firm or soft, depending on the percentage of sand. A mud bottom over a rock base may be satisfactory if the mud is not more than 1 or 2 feet (0.3 or 0.6 meters) deep. Coral heads, rocks, and other underwater obstructions in shallow waters near shore can cause bent propellers and shafts, broken skegs, and punctured hulls. Rocks covered with algae are extremely difficult for personnel to walk on and may cause wheeled vehicles to lose traction.

4-104. Sandbars are likely to develop offshore of long, sandy beaches that are exposed to continuous wave action. On aerial photographs of quiet sea and clear water, sandbars appear as a narrow band of light tone against a dark bottom. On photographs of rough water, sandbars are detected by a line of breakers outside the normal surf zone. A sandbar indicates a sandy bottom offshore and unless there are visible rock outcrops, probably a smooth, sandy bottom inshore of the bar. These characteristics, when accompanied by sand dunes behind the beach, indicate that the beach is mostly sand. Surf is likely on such beaches. The height of the surf can usually be estimated accurately under a given wind or sea swell condition if the approximate depth over the sandbar is known.

4-105. Sandbars can be a serious menace to landings. Craft may run hard aground on them while still some distance from the beach loading or discharge point. When this occurs and an appreciable sea is breaking on the bar, the craft may swamp and broach to. If troops debark while the craft is hung on a sandbar, they may be endangered due to depth of water, strong currents, or a soft bottom between the bar and the beach. Rather than be endangered, personnel should remain aboard the craft. Successive seas may lift the craft over the bar. Then the craft can proceed to the beach. If the sea condition permits and the craft is unlikely to free itself from the bar, personnel should be transferred to other craft if possible, and salvage begun to retrieve the craft. Tidal variations influence the times when beaching can be attempted.

4-106. Even though there may not be sandbars at a particular beach site or surf zone at the initial landing, the scouring action of the propellers of beached landing craft may create them. After several days, a built-up bar of this type may be large enough to prevent the satisfactory beaching of large landing craft and similar vessels. Alternating beaching sites reduces this hazard.

4-107. Small sandbars may be formed between runnels within the tidal range on foreshores having a slight slope. A runnel is a temporary small channel on the beach formed by water during normal tidal motion. A foreshore is the part of shore between the high water mark and low water mark.

4-108. The height of these bars is seldom more than 2 feet (0.6 meter) from the bottom of the trough to the top of the crest. However, such bars are hazardous to operations because landing craft may ground on the crests and troops and equipment must cross the stream of water to reach the dry shore. If the bottom of the runnel is silt, vehicles and heavy equipment may be unable to transit the beach. It may be necessary to beach the craft at high tide and unload it after the water has receded to a point where matting can be laid across the troughs. Whenever bars are present, the wave crests peak up as the waves roll over the bar. The water depth over the bar and the wave height determine if breaking takes place on or near the bar. If water depth over the bar is more than twice the significant breaker height, nearly all waves pass over the bar without breaking, but crests peak up distinctly. If the depth is between one and two times the breaker height, waves break near the bar, some on the bar itself, and others on the shoreward side. All waves break on the seaward side when the water depth over the bar is less than the breaker height. Frequently, more than one bar exists with waves breaking and re-forming and breaking again on another bar or on the beach.

4-109. High surf greatly modifies bar depth and distance from shore. There is a rough relationship between bar depth and the maximum breaker height during the preceding one or two weeks. If the breakers remain constant in height long enough, the bar attains a depth slightly less than the depth of breaking at low tide. Large waves do not ordinarily last long enough to cause this adjustment.

SITE SELECTION

4-110. When planning to open new bare beach sites most advantageous for LOTS operations, the first step is to determine the beach areas available. The theater opening element selects the general operational area in coordination with the Navy and the Military Sealift Command.

4-111. After the initial reconnaissance is completed and the terminal battalions have been dispersed to sites along the coastline, the commander must ensure that the battalions have the units, equipment, and other support needed for the assigned mission. Beaches ideally suited for LOTS without prior preparation or alteration are rare. Therefore, varying levels of engineering support is normally required to enable landing craft to beach and to provide exits from the beach to marshaling areas and the clearance transportation network. Each bare beach LOTS discharge point requires closest attention and the greatest coordination. The success of beach operations depends on the efficiency of cargo clearance. Supplies and equipment being brought to the beach must be cleared as rapidly as possible to inland destinations. This will prevent the buildup of cargo on the beach, thus eliminating or reducing targeting by the enemy and hindrances to cargo movement. Once a general area for LOTS operations has been identified, the next step is to select a beach site for each type activity. A notional beach layout for LOTS operation is pictured in figure 4-2.

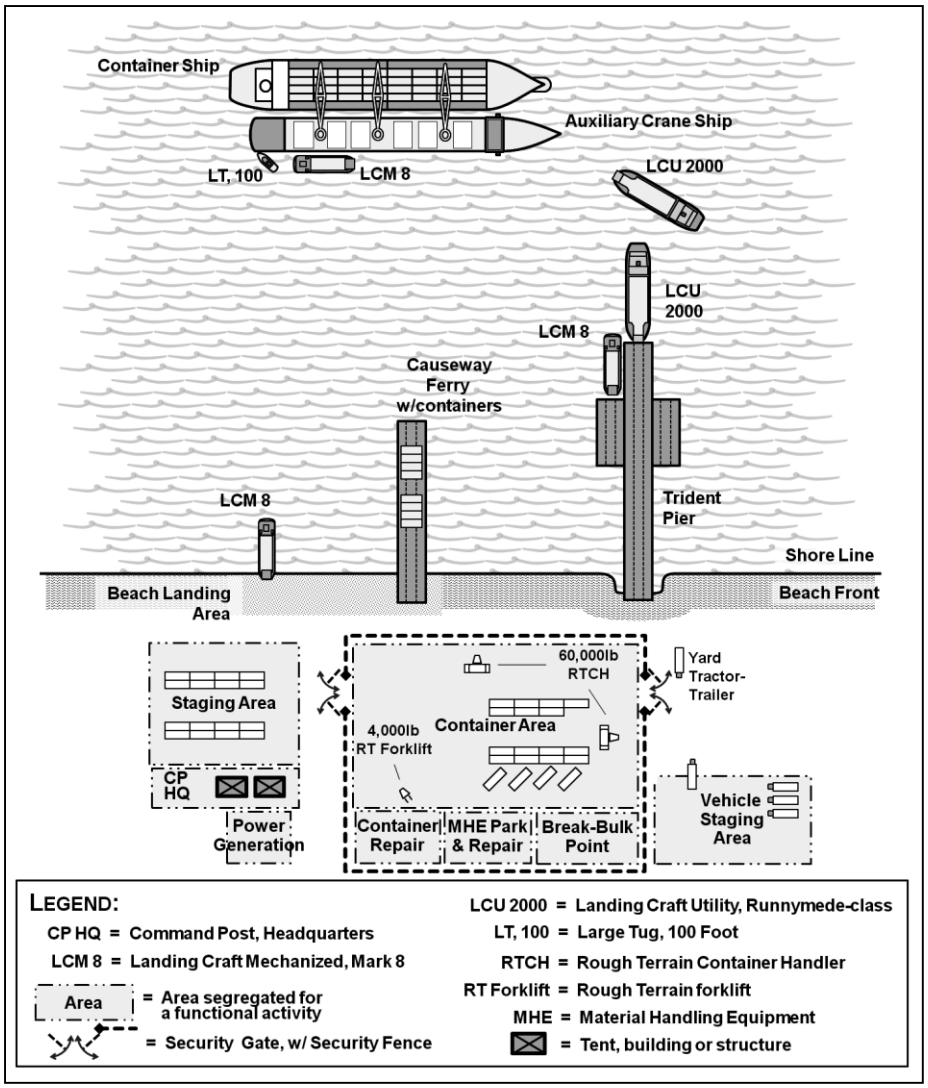

Figure 4-2. Notional LOTS operation layout

BEACH RECONNAISSANCE

4-112. Selecting the beach site is an initial step in planning offshore discharge operations. Site selection must be in coordination with the Navy and the Military Sealift Command if conducting JLOTS. A reconnaissance party consisting of representatives of the Army, including the commander of the terminal battalion that will operate the site, HD, the commanders of the cargo handling companies, and representatives of the units that will provide lighter support usually select the exact site.

4-113. During the reconnaissance, the commander of the terminal battalion assigns company areas and beach frontages, indicates areas of defense responsibility, locates his temporary command post, and tentatively organizes the area for operational use. If a ground reconnaissance cannot be made, maps, aerial photographs, and information gathered from intelligence sources form the basis for a careful study of the operational area. If possible, the commanders and staff officers responsible for planning should perform an air reconnaissance of the area. Commanders and staffs of vessel units must make a detailed study of the terrain, hydrographic conditions, enemy capabilities and dispositions, civil population and attitude, and similarities between factors affecting vessel movements and approaches to the beach. They must also analyze the lighterage requirements and the tonnages to be handled by their craft.

4-114. When selecting a specific area for beach operations, the water transport unit commander is particularly interested in the following physical and environmental characteristics. Beaches are classified by their predominant surface material, such as silt, mud, sand, gravel, boulders, rock, or coral, or by combinations of sand and boulders. The ideal composition for beaching landing craft is a combination of sand and gravel. Silt, mud, or fine sand may clog the cooling system of landing craft. Rock, coral, or boulders may damage the hull or the underwater propulsion and steering mechanism. Firm sand provides a good beach traffic area for personnel and vehicles. A beach is usually firmest when it is damp and when the material is of small size. Gravel has good bearing capacity but poor shear strength. As a general rule, the coarser the material, the poorer the capacity to handle vehicle traffic.

4-115. Beach gradient or underwater slope is usually expressed as a ratio of depth to horizontal distance. For example, a gradient of 1:50 indicates an increase in depth of 1 foot (.3048 meter) for every 50 feet (15.2 meters) of horizontal distance. For landing operations, it is usually necessary to find the gradient only from the water's edge seaward to a depth of 3 fathoms (5.5 meters). Beach gradients are usually described as: Steep (more than 1:15), Moderate (1:15 to 1:30), Gentle (1:30 to 1:60), Mild (1:60 to 1:120), or Flat (less than 1:120).

4-116. Underwater gradients can seldom be determined from hydrographic charts. Only a few areas have charts scaled larger than 1:100,000. Moreover, since the inshore seabed is subject to frequent change, only a very recent survey would have any value. However, there are ways to estimate gradient.

4-117. Commanders and operational planners should gravitate to beach gradients that are moderate to gentle. The ideal beach for landing craft operations is one with deep water close to shore, a firm bottom of hard- packed sand and gravel, minimum variation in tides, and a moderate to gentle (1:15 to 1:60) underwater beach gradient. It also has no underwater obstructions to seaward and no current or surf. Although such a beach will rarely exist in the area of operations, the battalion or unit commander weighs the characteristics of existing beaches against these desirable features:

- Soil Stabilization: What type of soil stabilization materials are required/available (mobility matting, perforated steel planking) and what is the estimated time for emplacement.
- Ingress/Egress: Is there provisions for one-way ingress and egress to the lighter discharge areas; is there an existing, adequate, and usable road network available; is there a requirement to construct and/or improve the ingress/egress routes.
- Lighter Control: how many beach discharge points are there, is lighter control a single service or joint function, do the lighter control centers/cells have a good view of their areas of responsibility.

ANTI-BROACHING MEASURES

4-118. The best insurance against broaching to (being thrown broadside to [sideways], in surf, heavy seas, or on the beach) is an alert, skilled operator who knows the capabilities and limitations of his craft in various operating conditions. Normally, anti-broaching aids are not used if the craft is to be unloaded quickly and retracted from the beach immediately. Under most conditions, anti-broaching lines from the bow or stern of the beached craft are impractical. Anti-broaching anchors or lines may be used in extreme surf conditions, where a crosscurrent may cause broaching. However, the operator must keep in mind that this method is time- consuming, severely restricts the number of craft that can be off-loaded along a specific sector of the beach, and is often ineffective in preventing broaching.

4-119. The master of a landing craft keeps the craft in position on the beach by properly using engines, rudders, and stern anchors. (The LCM-8 is not equipped with a stern anchor.) If the LCU and LCM-8 are beaching on the same sector of beach, the LCM-8 is somewhat protected if it is beached leeward of the LCU. For example, if three LCUs are on the same beach, one or two LCM-8s can be beached and discharged in the partially protected zone on the lee side of each LCU. When the LCM-8 and LCU are loaded with similar cargo, two or more LCM-8s can usually be unloaded in the time required to discharge an LCU.

SALVAGE OPERATIONS

4-120. The main objective of salvage operations during LOTS is to keep the beach and sea approaches clear. Experienced salvage personnel never lose sight of this mission. Even when freeing a single stranded or disabled craft, they do not impede beach or offshore operations.

4-121. To keep the beach clear, craft that can be repaired or removed quickly are given priority. Vessels that cannot be salvaged readily are anchored securely and left at the beach until traffic eases and more time can be devoted to them. Salvage crews must act quickly when a landing craft broaches to the shore and is stranded. Speedy assistance often prevents serious damage to vessels, especially in heavy surf. Fast recovery from seaward is usually the best procedure for salvaging broached vessels.

4-122. When a loaded craft is aground offshore, any practical system to expedite the unloading of cargo from the craft should be used. Cargo in small, packaged containers up to 40 pounds can be handed over the side. Cargo boxes placed at the rail of the craft may serve as steps and facilitate cargo handling.

4-123. Rough-terrain cranes may lift cargo too heavy to be moved by hand. The barge derrick crane is moved to the location of the stranded craft if intervening depth and surf conditions permit. A bulldozer may push stranded craft back into the water. The blade of the bulldozer must be padded by fenders, salvaged tires, or similar material to prevent damage to the hulls or ramps of the craft. To maximize salvage capability, one bulldozer should be readily available to each operational beach. Army tugs can assist by passing a hawser to the broached vessel to assist with recovery.

4-124. No craft is ever left on the beach unattended or unwatched. The operator must remain constantly at the controls while beaching, loading, unloading, and retracting.

LOGISTICS PLANNING

4-125. The logistician's interest in an inland waterway is in its capability to move cargo. Therefore, he is interested in the effect of its physical features on its ability to carry cargo. Among the physical features are the width and depth of channel; horizontal and vertical clearance of bridges; number of locks, their method of operations, and length of time required for craft to clear them. Freeze-ups, floods, and droughts also affect a waterway's capacity. The transportation planner must anticipate these seasonal restrictions. The planner must also be aware of the speed, fluctuation, and direction of water current as well as availability of craft, labor, terminal facilities, and maintenance support available.

4-126. Waterway capacity is based on turnaround time –the period between leaving a point and returning to it. Since barges are being picked up at a wharf or stake barge, barge loading time is not part of the computation. If barges are picked up at shipside without marshaling at a wharf or stake barge, loading time of the barge would become a factor of turnaround time. Craft loading and unloading times must be taken into account.

4-127. Speed is influenced by wind, current, power of craft, and size of load. If the craft's speed cannot be determined, assume it is 5 nautical miles per hour (knots) in still water (9.3 kilometers per hour). Speed and direction of current can frequently be discounted since resistance in one direction may be balanced by assistance in the other direction. However, this is not always the case.

4-128. Transit time is the time to move the craft the length of the haul and directly related occurrences. To determine transit time, add the time to make up the tow, the distance divided by the speed of the tow; the time consumed to pass through the locks; and the time to break up the tow.

SECTION III – AMPHIBIOUS OPERATIONS

4-129. The Army has used watercraft to land men and materiel since the Revolutionary War. The U.S. Navy and U.S. Marines amphibious capability is a small package designed with limited sustainment to gain a foothold or conduct limited operations in the beginning of a deployment, or may not be available to support land-based operations. The Army has historically conducted large scale and sustained amphibious operations, and continues to do so. Modern land combat forces engaged in amphibious operations may include maneuver or special operations forces.

4-130. There are four types of amphibious operations:

- Amphibious assault – involves landing and establishing forces on a hostile shore.
- Amphibious withdrawal – forces depart a hostile shore in naval ships or craft.
- Amphibious demonstration – is designed to deceive the enemy by a show of force that deludes him into an unfavorable action.
- Amphibious raid – forces land from the sea on a hostile shore intending to occupy it only temporarily, with the objective to inflict loss or damage, secure information, create a diversion, or evacuate individuals and materiel.

4-131. The phases of an amphibious operation follow a well-defined pattern or sequence of events or activities some overlap. This chapter discusses the activities in the general sequence of planning, embarkation, rehearsal, movement to the objective area, and assault and capture of the objective area. This chapter also provides watercraft commanders and operators the basic guidance Army water transport units need to participate in amphibious operations that support an Army or joint force. (See Joint Publication 3-02, *Amphibious Operations for more information.)*

PLANNING PHASE

4-132. Planning is the period between the issuance of the initiating directive to embarkation. It is a continuous process that extends from the time the initiating directive is issued to the end of the operation. Normally, Navy and Marine assault units conduct amphibious combat operations. It is at this point that the Army must identify the potential site where characteristics for a LOTS operation can be met, and this area is identified to the amphibious assault command so that it is secured early in the amphibious assault phase. Army vessels are used as floating platforms for on-call supply movement and for general unloading after the beachhead has been secured. However, Army landing craft can be part of the assault force, such as occurred in Panama during Operation Just Cause. Planning for coordinated training with shore party elements and for operational employment begins when the initiating directive assigning a water transport unit to the joint amphibious task force is received. Immediate liaison is established between the water transport unit and the naval beach group to which it is attached. The shore party's mission is twofold: to clear the beaches so the assault elements can land and move across them, and to provide maneuver support and interim sustainment for the assault elements.

4-133. Plans must be flexible so that combat demands can be met. The need to coordinate the detailed actions of all forces involved complicates planning for an amphibious operation. Consequently, planning must be concurrent, parallel, and detailed. In addition to a primary plan, alternate plans must be developed. During the planning phase, training shortfalls need to be corrected. As plans are developed, appropriate personnel must be briefed on the overall concept and their individual and collective responsibilities.

4-134. Planning for communications between joint forces is paramount. The worldwide Defense Messaging System, supplemented by Secret Internet Protocol Router Network electronic mail and secure telephone, provides the major communications means during this phase. Planning for adequate communications systems support throughout the operation is key to insuring a successful mission.

EMBARKATION PHASE

4-135. During the embarkation phase, the landing forces assigned to the amphibious task force, with their equipment and supplies, are assembled and loaded in assigned shipping sequence. This sequence is designed to support the landing plan and the scheme of maneuver ashore. Before the assault shipping arrives, water transport unit commanders, troop commanders, naval commanders, and shore party commanders prepare detailed embarkation and landing plans.

4-136. Large lighters can self-deploy or smaller lighters can be moved to the amphibious objective area aboard landing ships or assault ships. The type and numbers of lighters that each ship carries are identified by hull number. The senior water transport unit representative on each ship, the commanding officer of troops, and the ship's officer in charge of cargo operations arrange the following:

- Billet assignments.
- Assignment of crews, relief crews, and maintenance teams.

- Assignment of working parties.
- Storage for fuel, lubricants, and maintenance material. Items must be available en route and during initial stages of the assault.
- Security details.
- Personal flotation devices for each passenger and crew member.
- Messing procedures.
- Stowage of weapons and ammunition.

4-137. Supplies and equipment must be prepared for loading before the assault shipping arrives. Lighters should be completely serviced, fuel and water cans filled, accessories placed, and radio and navigation equipment waterproofed. A final inspection ensures all craft and equipment are ready for the operation. If ships are to be loaded offshore, the embarkation area should be organized so that amphibians use different beach areas. Lighters to be embarked aboard the same ship are marshaled together and escorted by guide vessels to their assigned craft. Craft are loaded aboard assault shipping so that debarkation in the amphibious objective area is in the proper order.

REHEARSAL PHASE

4-138. The rehearsal phase of is the period where elements the task force conduct one or more exercises under conditions similar to those expected at the beachhead. The purpose of the rehearsal is to test the adequacy of plans and communications, the timing of detailed operations, and the combat readiness of participating forces. The three types of exercises are:

- Separate force rehearsals: Elements (e.g., advance and demonstration forces) whose tasks are not closely associated with those of the main body of the amphibious task force normally conduct separate rehearsals.
- Staff rehearsals: Conducted before integrated rehearsals, they usually take the form of command post or game board exercises. If possible, these exercises test communications facilities, and ensure communications equipment damaged during rehearsal is repaired.
- Integrated rehearsals: The rehearsal phase should include at least two integrated rehearsals for the assault phase. The first rehearsal omits actual bombardment and unloading supplies but stresses communications and control in executing ship-to-shore movement. The final rehearsal, using the actual operations plan, includes actual combat conditions to the degree practical.

MOVEMENT PHASE

4-139. The fourth phase is the movement to the amphibious area. This includes the departure of ships from loading points, the passage at sea, and the approach to and arrival in assigned positions in the objective area. The task force is divided into movement groups which proceed on prescribed routes. Alternate routes are designated for emergency use. Movement groups are organized based on the speed of the ships involved and the time they are needed in the objective area.

4-140. Movement groups that arrive before military operations occur are the advance force. If surprise is essential, such a force may not be used or may move in just before the main body. The advance force prepares the objective area for assault. It conducts reconnaissance, minesweeping, preliminary bombardment, underwater demolitions, and air operations. Use of communications security measures is extremely important, including maximum use of secure voice equipment using minimal power on electronic emitters.

4-141. Movement groups arriving on D-day are the main body of the task force. They consist of one or more transport groups, landing ship groups, support groups, or carrier groups. Movement groups that arrive after D-day provide resupply after the initial assault. These massive operations involve moving materiel and personnel into the theater of operations to sustain the combat effort.

ACTION PHASE

4-142. The action phase begins when the assault elements of the main body arrive at their assigned position in the objective area. The action phase includes a sequence of six activities or operations 1) The

assault area is subjected to indirect fire and air bombardment, 2) Helicopters, landing ships and crafts, and amphibians move the landing force, 3) Assault elements of the landing force land in drop and landing zones and on the beaches, 4) Water transport, helicopter-borne, air-dropped, and air-landed forces unite and seize the beachhead, 5) Naval forces provide logistic, air, and naval gunfire support throughout the assault, and 6) Remaining landing force elements go ashore to conduct any operations required to support the mission.

4-143. The organization of landing ships, landing craft, and amphibious vehicles employed in assault landings parallels the landing force organization. The landing force is organized into a landing team. Landing teams consist of an infantry battalion or similar level combat unit reinforced with maneuver support and sustainment units. The teams, normally water transport or helicopter-borne, are organized into waves that contain troops and equipment that land at the same time. Vessel groups are the naval force's basic task organization for controlling amphibian vehicles and landing craft afloat. One vessel group is organized for each battalion landing team or its equivalent. The vessel group lands in the first wave of landing craft or amphibians. Vessel waves are the landing craft or amphibians within a vessel group that carry troops to be landed at the same time. Organizing into waves helps control the vessel group; command is through wave commanders rather than directly with individual vessel commanders. Vessel waves operate as a unit.

4-144. Ship-to-shore movement begins when ordered by the amphibious task force commander and ends when the unloading is complete. It may be divided into two periods: the assault and initial unloading period, and the general unloading period. The first period is tactical, and the second period is logistical. For ship-to-shore movement, tactical units are divided into special groupings and landed in successive waves. These waves are designated as scheduled, on-call, or nonscheduled units. Following the tactical units, supplies are landed at the discretion of the appropriate troop commander or as required by the landing force. Supplies so landed are designated as floating dumps or landing force supplies.

4-145. Scheduled waves normally consist of elements of the assault landing team, although other units may be included. The time and place for them to land are predetermined. On-call waves are also needed in the initial assault, but they have no fixed time and place for landing. On-call vessel waves are held in readiness in landing craft, ships, or amphibious vehicles near the primary assistant central control or approach lane control ships. On-call waves are landed when the landing force commander calls for them. Nonscheduled units are directed to land when the need for them ashore can be predicted with reasonable accuracy. They are held in readiness for landing during the initial unloading period but are not included in either scheduled or on-call waves. Floating dumps are preloaded in landing craft, landing ships, or amphibian vehicles to meet anticipated supply requirements. They remain near the line of departure and land when requested by the appropriate troop commander.

4-146. Army watercraft may land with the initial assault waves, but this is not normal practice. They usually serve as assault platforms, on-call elements or to deliver landing force supplies. Following landing of the initial waves, Army watercraft are stationed at designated control points until dispatched ashore by the lighter control officer. When dispatched ashore, the craft move to the designated beach for unloading. After unloading, they move to assigned assembly areas until routed to a specific ship for reloading. Army vessels continue to function in this manner throughout ship-to-shore movement until released by the shore party commander. Then they revert to the control of the at-sea commander or their parent organization.

4-147. In amphibious operations, the commander of the amphibious task force via the naval control officer exercises control of ship-to-shore movement. The shore party via attached naval beach parties carries out near beach movement control. Water transport unit commanders remain water transport until the general unloading period begins. Then they move ashore with their control elements to coordinate with the shore party commander and the staff of the terminal battalion being phased ashore. When ashore, commanders establish company command posts and set up shore-based control systems. While waterborne, water transport commanders help the HD or maritime force control office dispatch and route craft and coordinate maintenance and supply activities for their units.

4-148. The action phase ends when the task force mission is accomplished. When the action phase ends, the amphibious operation ends, the amphibious task force is dissolved as an organization, and its elements are reassigned. Responsibility for further operations in the former amphibious objective area is transferred.

CONTROL POINTS

4-149. Control points normally required for lighterage units in shore-to-shore beach operations are 1) Lighter control center (harbormaster detachment), 2) Loading area control point, 3) Near-shore beach control point, 4) Far-shore beach control point, and 5) Discharge control point.

4-150. These points operate in the same manner and fulfill the same functions described in the LOTS chapter. However, the loading area control point replaces the shipboard control point and a beach control point will be added on the far shore. In some cases, it may be expedient to move the lighter control center closer to the waterline and to eliminate the beach control point on the near shore.

ASSEMBLY AREAS

4-151. The commander of the supported unit must consult the commander of the water transport company before designating assembly areas. Desirable characteristics of an assembly area include 1) Location as near as practicable to the crossing or loading site, 2) Easy entrance from the rear and good exits to the crossing site, 3) Sufficient space to permit dispersion of lighters and provide an adequate loading area, 4) Defiladed so that the enemy cannot observe assembly and maneuver, and 5) Located as near as practicable to a safe harbor or inlet to protect the watercraft in a storm.

BEACH MARKERS

4-152. A system of beach markers is used while organizing the beach to receive landing craft, landing ships, and amphibians. The markers help vessel operators locate the correct beach in daylight or darkness. Shore party or HD personnel install the markers as soon as possible after the initial assault of an amphibious operation. Beaches under attack are color designated, such as red beach or green beach, with markers of corresponding colors. The daylight markers are made of cloth and held aloft. During daylight, a horizontal rectangle identifies the left flank of a beach, as seen from the sea; a square, the center of the beach; and a vertical cloth rectangle, the right flank. During night operations, a system of white and appropriately colored lights is used. When the tactical plan dictates that a number of beaches be used, each colored beach may be further divided into beach number one, beach number two, and so forth. When the colored beaches are so divided, the markers are erected in pairs.

HYDROGRAPHIC MARKINGS

4-153. Hydrographic markings have been developed for use near the shore in areas otherwise unsuitable for marking. The shore party commander determines the need for hydrographic markings and installs them. These markings have no relation to Coast Guard aids to navigation. These are the hydrographic markings for beach operations:

- Rocks, shoals, and submerged obstructions –
  - Day–A red and black vertically striped pennant on buoy or stake.
  - Night–Shielded blue light over red light.
- Boat channel –
  - Right side of channel (from seaward) –
    - Day–Red pennant on buoy.
    - Night–Shielded red light.
  - Left side of channel (from seaward) –
    - Day–Black pennant on buoy.
    - Night–Shielded white light.

RANGE MARKERS

4-154. Range markers are two lights or markers located some distance apart and usually visible only from one direction. They are arranged in pairs in line with the center of the channel or the beach. When the operator positions his craft so that the range markers appear one over the other, the craft is on the axis of

the channel or on the proper heading to arrive at a designated point on the beach. Characteristics or established ranges are indicated on the hydrographic charts for the particular area.

4-155. When ranges are constructed especially for beach operations, lighter operators get an explanation of their purpose and use in advance. Ranges should be used only after the charts or complete instructions from the water transport unit commander are carefully examined. It is particularly important to determine the distance that a range line can be safely followed. The shore party commander establishes ranges and installs range markers.

COMMUNICATIONS FOR AMPHIBIOUS OPERATIONS

4-156. The physical conditions in amphibious operations require almost complete dependence on radio communication during the initial landings and unloading periods. Because of the large number of radios available in landing force crafts and vehicles and with the combat elements, strict adherence to radio, noise and light discipline is essential. Because of this complexity, land-based communication should be established between shore installations as early as possible. During the initial phases of the operations, the HD controls the lighters afloat and the shore party control system controls them ashore. Communication between elements of the water transport units and company headquarters must be planned for and established early in the operation. However, the initial intra-company communications net must be ready to work as soon as the unit control system is established ashore. This net and the control procedures for its use must be provided for during the planning phase.

MAINTENANCE SUPPORT

4-157. During the actual conduct of an amphibious operation, maintenance will be accomplished at the operator/crew level, until additional maintenance capability can be established. Such capability is generally not phased in until the situation ashore is completely established, but will be established as soon as practicable.

SHORE TO SHORE CROSSING

4-158. Shore-to-shore crossings may use engineer bridges or modular causeways to transfer personnel and equipment from one shore to another on a river. Army landing craft are used to transfer cargo from one beach terminal to another along the same coastline, changing water obstacles into maneuver space. Water transport units with small landing craft may be called on to support combat forces conducting shore-to-shore movement or assaults. They may also be requested to ferry cargo across or along rivers and between islands in routine resupply operations. Although shipping is not involved, the operational techniques for water transport units in logistical and tactical shore-to-shore operations are identical to those described in earlier chapters. However, because of the nature of the terrain and the differences in control requirements, some basic planning considerations for shore-to-shore operations and particularly for river crossings are covered in this chapter.

4-159. During tactical shore-to-shore operations, the tactical commander selects the final landing site with the advice of the water transport unit commander. There is normally sufficient time to prepare at the site to ensure mission success. In general, the site selection factors described above in Section I of this chapter must be considered when evaluating areas for shore-to-shore crossing operations. A factor to consider for river crossing operations in particular, is the location of crossing sites. Crossing sites must be located downstream from bridge sites to reduce the chance of disabled craft and floating debris damaging bridges.

SECTION IV – RIVERINE OPERATIONS

4-160. Units conducting riverine operations use water transport extensively to move troops and equipment. Water transport operations normally start from areas where ground forces and watercraft marshal and load and where forces can effect coordination. This may be at a land base next to a navigable waterway, at a sea base, an afloat base on a navigable waterway, or in an existing area of operations. Once troops or cargo are aboard, the vessels proceed to designated landing areas within an assigned area of operations. Unit plans include control measures, such as phase lines and checkpoints, for the entire

operation. The commander controls the unit's movement either from a control vessel located within the movement formation, a ground based formation, or from an airborne command post. Maneuver unit commanders, embarked in control craft, debark these craft to take charge of their units. The withdrawal of troops from the area of operations is a tactical movement back to the watercraft loading areas. Units are loaded in reverse sequence to that used in the water assault landing. The maneuver unit employing a perimeter security provides the necessary loading area security throughout the withdrawal operation. A tactical water movement back to base areas or to another area of operations is performed after loading.

RIVER CROSSINGS

4-161. Planning for river crossings with bridges or causeways requires careful consideration of the characteristics of the body of water to be crossed. Each bank should have a slope of 40 percent or less. The slope should gradually drop off at the water's edge. Earthmoving equipment may be used to decrease the slope and to level off entrances and exits. Also consider the type and consistency of the soil at the crossing sites; avoid marshy, swampy areas and soils with a clay base. When no hard packed sand entrances and exits are available in the operational area, mobility matting, pierced steel planking, brush, and netting may be used to increase traction. Earth-moving equipment may be used to improve the surface of the entrance and exit routes at the crossing site. Ideal conditions for a crossing site are a sandy shoreline with a gradual slope; clear, deep water; and a clear river bottom. However, these conditions are not often encountered in the field. Mud is the type of soil usually found in and around rivers.

RIVER CURRENTS

4-162. Operation in rivers with swift currents (more than 2 to 4 knots) requires highly skilled, experienced operators. When exceptionally swift currents are encountered, it may be necessary to rig a cable from one bank to another to assist engineer craft, causeway ferries or warping tugs in crossing.

RIVER OBSTACLES

4-163. The most common obstacle on rivers is drifting sandbars. It is unlikely that emplaced obstacles will be encountered in the center of the river, but conventional antitank, antipersonnel, and chemical mines may be laid below the high waterline. Early reconnaissance by the tactical unit should locate mine fields in the area of operations so they can be removed or avoided during crossing. Water transport unit personnel must be trained to look out for mines and to mark and report their location. Use of subsurface obstacle detection technology may also be employed.

4-164. In areas with limited land transportation and abundant water surface, inland waterways provide natural transportation routes. In some developing countries, inland waterways are major arteries for economic circulation. Water routes are strategically and tactically important to an enemy riverine environment.

4-165. A thorough understanding of riverine environment is needed to plan and conduct riverine operations. In a riverine area, watercraft is the principal means of transport. Civilian waterborne traffic and settlements provide concealment of enemy activity, making control of waterways essential. Water lines of communication dominate a riverine environment. Military movements use air and water transportation extensively due to the lack of suitable land transportation networks.

ORGANIZATION AND COMMAND

4-166. Riverine operations can be joint, undertaken primarily by Army and Navy forces, or conducted by one Service. Regardless, participating forces must coordinate and integrate efforts to achieve a common objective. DOD and Joint Chiefs of Staff directives prescribe joint forces command arrangements to ensure coordination and integration. Joint command organizations centrally direct the detailed action of a large number of commands or individuals and common doctrine among the involved forces. Flexibility in the organization ensures control and coordination of these forces in varying operational environments. Considering the total forces available, riverine operations require a balance between types of forces. A special consideration in task organization for riverine operations is the amount of troop lift and fire support available from Navy, Army aviation, and Air Force units. There are several major factors determining

maritime support requirements, such as the extent to which navigable waters permit moving maritime support to, within, and around the area of operations, the size of forces to be moved, and the availability of other means of transportation.

SECURITY RESPONSIBILITIES

4-167. The Army and Navy elements assign their appropriate share of forces for local base defense as the base commander directs. The main mission of the Navy force in base defense is to provide gunfire support and protection against any threat from the water. During tactical operations, the Army commander provides, plans, and coordinates security elements (ground or air) along the route of the movement. The Navy element commander tactically controls the movement and maneuver of watercraft under the operational control of the Army commander being supported.

4-168. The Navy commander of the riverine force is responsible for moving Navy ships and watercraft between riverine bases and support facilities outside the riverine area. The Army commander in the riverine area is responsible for the security of movement for ships within the entire operational area.

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Chapter 5

Vessel Security and Protection

The purpose of this chapter is to provide information about protection from threats to Army Watercraft that will assist commanders, vessel masters and coxswains with creating and implementing effective port and vessel security and protection programs with development of pre-planned responses. This chapter establishes and maintains watercraft security and protection programs that deter, detect, defend, mitigate and recover from the consequences of enemy attacks via the implementation of coherent baseline security measures.

FORCE PROTECTION CONDITIONS ON WATERCRAFT

5-1. Force protection conditions (FPCON) are a series of measures designed to increase the level of a unit's defense against enemy attacks. FPCONs are not aimed at specific threats, but are selected based on a combination of requirements. Force protection conditions are outlined in Department of Defense Instruction 2000.16, *DOD Antiterrorism Standards*.

5-2. Shipboard measures for each FPCON are found in Appendix A of this manual. The listed measures are the DOD standard for ships and as such may be referred to when developing pre-planned responses that feed into the overall Army vessel force protection plans required for submission to the port authority for Army-operated vessels entering DOD-administered ports.

5-3. Army commanders who understand that threat scenarios are not static will design flexibility in their security plans. Commanders who also maintain a workable balance among competing requirements – mission accomplishment, resource utilization and FPCON posture – will be positioned to execute the most successful port or vessel security operations within theater ROE parameters.

PRE-PLANNED RESPONSES

5-4. Pre-planned responses are developed, exercised actions and measures that are implemented to identify, track, assess, and neutralize enemy attacks. This chapter sets forth specific guidance for commanders and planners to develop pre-planned responses that will be effective mechanisms to counter enemy threats. An online Joint Anti-Terrorism Guide is available as a tool to develop plans in accordance with Department of Defense Instruction 2000.16, *DOD AntiTerrorism Standards*.

5-5. Sea movement, especially aboard military vessels, may provide a false sense of security. Sea operations are certainly more secure than urban patrols; however, ships transiting through restricted waterways such as straits, harbors, or anchored off hostile coastlines are visible and high-risk targets. Crews of ships in harbors need to evaluate each new port and determine possible enemy actions and ship's force counteractions (such as using fire and steam hoses to repel attackers).

5-6. Crew members must be aware of host nation support and responsibilities while in port or anchored in foreign national waters.

5-7. In accordance with Army Regulation 56-9, *Watercraft*, the ship's master is solely responsible for the ship and all those embarked. As a minimum, the master:

- Establishes methods of embarkation and debarkation and watch/patrol activities.
- Identifies vital areas of the ship (for example, engine room, weapons storage, bridge), and assigns security guards as required by the FPCON.
- Coordinates above and below waterline responsibilities.

- Establishes a weapons and ammunition policy and appoints a reaction force (e.g., ships self-defense force, and security teams).
- Coordinates for additional land and waterside security in ports of call.
- Ensures all personnel involved are trained through exercises or drills.

5-8. Army watercraft face threats whether at sea or in port. Likely threats include:

- Small craft armed with individual weapons.
- Vessels ramming.
- Swimmers and mines (floating or submersed improvised explosive devices).
- Pedestrian-carried improvised explosive devices.
- Vehicle or vessel-borne improvised explosive devices.
- Aircraft (ultra-lights, rotary wing).
- Standoff attacks (snipers, missiles, torpedoes).
- Man-portable air defense system, shoulder-fired rockets.
- Chemical, biological, radiological, nuclear and explosive attacks (covert or overt).

5-9. Development of pre-planned responses provides capability to create force protection plans for watercraft. Pre-planned responses are required in message format for entering Navy ports.

5-10. All pre-planned responses are organized by principles that will focus deliberate thinking, by planning considerations that will guide their effective implementation, and by specific actions to take when interacting with or engaging potential threats. However, the material in this chapter should not be considered the only available pre-planned responses against enemy threats. Commanders must always look beyond checklists to think critically and dynamically about potential threats for each mission and for each potential area of vulnerability.

5-11. Preplanned countermeasures to deter threat activities can include installing mechanical devices, varying modes of watch-stander behavior, and employing physical barriers. Effective countermeasures include employment of random security and protection measures such as:

- Roving security patrols (varying size, timing, and routes).
- Sentry watch rotations.
- Military Working Dog teams at Entry Check Points.
- Emplace barriers, roadblocks, and entry mazes.
- Visibly display crew-served weapons and sentries.
- Properly equip sentries with night vision devices, binoculars, thermal imagers, and other vision-enhancement and personnel detection gear to enhance their abilities to detect enemy activity.
- Ensure sentries receive training in detecting suspicious activities and operating vision-enhancement and personnel detection devices.
- Establish sentry posts so that all potential avenues of approach can be observed.

5-12. Although the above countermeasures do not comprise an exhaustive list of preplanned employment capabilities, they will assist personnel with consistently maintaining a vigilant stance. By proactively watching for suspicious activity, observers have the highest chance of deterring threats before attacks can occur.

ESCALATION OF FORCE

5-13. Escalation of force assist Soldiers in the application of force consistent with ROE and mission accomplishment in the operating environment. It guides leaders in the military decision making process, training, rehearsals, and mission execution where the application of force is a critical element. Escalation of force leverages available force options (lethal and nonlethal) to set the conditions for desired outcomes (commander's intent) while reducing unnecessary death and collateral damage during the application of force. Escalation of force allows the following:

- Places no limitations on self-defense and does not apply to declared hostile forces as part of the ROE.

- Follows self-defense rules while minimizing the loss of life and unnecessary suffering, and is part of mission analysis.
- A range of options, not a step-by-step process.

5-14. The inherent right of unit commanders to exercise self-defense in response to a hostile act or demonstrated hostile intent still applies in off-base situations or off-vessel in foreign areas.

5-15. Possible signaling procedures for a target not immediately positively identified as a hostile threat are:

- Daylight signaling procedures – use of:
  - Ship's horn.
  - Loud speaker in local language.
  - Flash-bang munitions.
  - Signs in local language.
  - Colored flags or paddles.
  - Smoke Grenades.
  - Hand and arm signals.
- Night and limited visibility signaling procedures – use of:
  - Spotlights.
  - Laser pointers.
  - Flash/bang munitions.
  - Emergency vehicle lights.
  - Flares.

SELF DEFENSE

5-16. A unit commander has the authority and obligation to use all necessary means available and to take all appropriate actions to defend the unit, including elements and personnel, or other U.S. forces in the vicinity, against a hostile act or demonstrated hostile intent. In defending against a hostile act or demonstrated hostile intent, unit commanders will use only that degree of force necessary to decisively counter the hostile act or demonstrated hostile intent and to ensure the continued protection of U.S. forces. Commanders have the obligation to ensure that individuals within their respective units are trained on and understand when and how to use force in self-defense. Commanders should ensure Soldier-mariners are trained on their individual and crew-served weapons on land and at sea. Procedures for training on weapons at sea are covered in Training Circular 4-15.51, *Marine Crewman's Handbook.*

5-17. All necessary means available and all appropriate actions may be used in self-defense. (See figure 5-1 on page 5-4 for an example.) The following guidelines apply for individual, unit, national, or collective self-defense:

- Attempt to de-escalate the situation: When time and circumstances permit, the hostile force should be warned and given the opportunity to withdraw or cease threatening actions.
- Use proportional force – which may include nonlethal weapons – to control the situation: When the use of force in self-defense is necessary, the nature, duration, and scope of the engagement should not exceed that which is required to decisively counter the hostile act or demonstrated hostile intent and to ensure the continued protection of U.S. forces or other protected personnel or property.
- Attack to disable or destroy: An attack to disable or destroy a hostile force is authorized when such action is the only prudent means by which a hostile act or demonstration of hostile intent can be prevented or terminated. When such conditions exist, engagement is authorized only while the hostile force continues to commit hostile acts or exhibit hostile intent. See Figure 5-1 for a typical escalation of force scenario.

The vessel master gains or maintains situational awareness using information that is gathered from vessel radar, Joint Capabilities Release, movement tracking system, frequency modulated communications, maps or charts, intelligence summaries, situation reports, and or other available information sources.

The vessel master provides relevant information to the entire crew by radio, sound-powered phone, relay, verbal or hand and arm signals. All crew members share a common picture of the operating environment, via the vessel master's oversight and command. The vessel master communicates supporting fires requirements to designated support units and/or higher headquarters via the most expedient means, with the supporting units providing fire or air support.

All soldiers will immediately share information of a suspicious or potentially suspicious item, person(s), vessel, or vehicle with other members of the crew via any and all means necessary.

Crew responds with appropriate level of force in accordance with rules of engagement.

Vessel master will provide guidance and direction to crew members observing the potential threat to conduct further evaluation of intent and begin escalation of force. The Officer in Charge on site will pass information up and down the chain to the vessel master, team members, or other unit as required.

Figure 5-1. Escalation of force scenario

EMPLOYMENT OF NON-LETHAL EFFECTS

5-18. *Non-lethal weapons* are weapons explicitly designed and primarily employed so as to incapacitate personnel or materiel, while minimizing fatalities, permanent injury to personnel, and undesired damage to property and the environment (Joint Publication 3-28, *Defense Support to Civil Authorities*). Non-lethal weapons are intended to have reversible effects on personnel or materiel."

5-19. Use of non-lethal weapons provides a useful element of use of force that can prevent escalation of the situation without producing irrevocable fatalities. This is provided by fully developed and fully- understood ROE that are backed by extensive training. As a matter of principle, non-lethal weapons should never be employed without adequate lethal support that is clearly displayed to the potential adversary. There must be no doubt in the mind of a potential aggressor that we possess sufficient force to accomplish the mission, and that we are prepared to use that force should the situation so dictate. Further, it should be clearly understood that our Soldiers are not required to use nonlethal force before employing lethal force.

5-20. Non-lethal capabilities are never limiting to the commanders' option to employ lethal force as the situation merits. They are an enabler for measured escalation of force, adaptable as situation merits.

5-21. If equipped with non-lethal effects, Army watercraft will conduct training in accordance with Training Circular 3-19.5, Nonlethal Weapons Training, and adopt the tactics, techniques and procedures found in ATP 3-22.40, *Multi- Service Tactics, Techniques and Procedures for Tactical Employment of Non-Lethal Weapons*.

SMALL CRAFT THREAT

5-22. As the bombing of the USS COLE in October 2000 clearly demonstrated, a small craft can be a lethal weapon. In a matter of minutes, a small craft carrying approximately 500 pounds of explosives approached the port side of the USS COLE, exploded, and left a gaping hole in the ship, causing the death of 17 sailors and many injuries.

SMALL CRAFT DETECTION

5-23. The purpose for developing pre-planned responses to counter small craft attacks is to prevent threats from gaining close proximity to protected assets or areas. The following principles, illustrated in figure 5-2, will guide the development of pre-planned responses to counter a small craft threat:

- Detect and assess all vessels entering a predetermined assessment zone.
- Establish positive identification and determine hostile intent of all vessels in the warning zone. Non-lethal warning devices are ideal for this purpose.
- Prevent unauthorized vessels from entering the threat zone.
- Size of zone is determined by the vessel master in accordance with METT-TC.

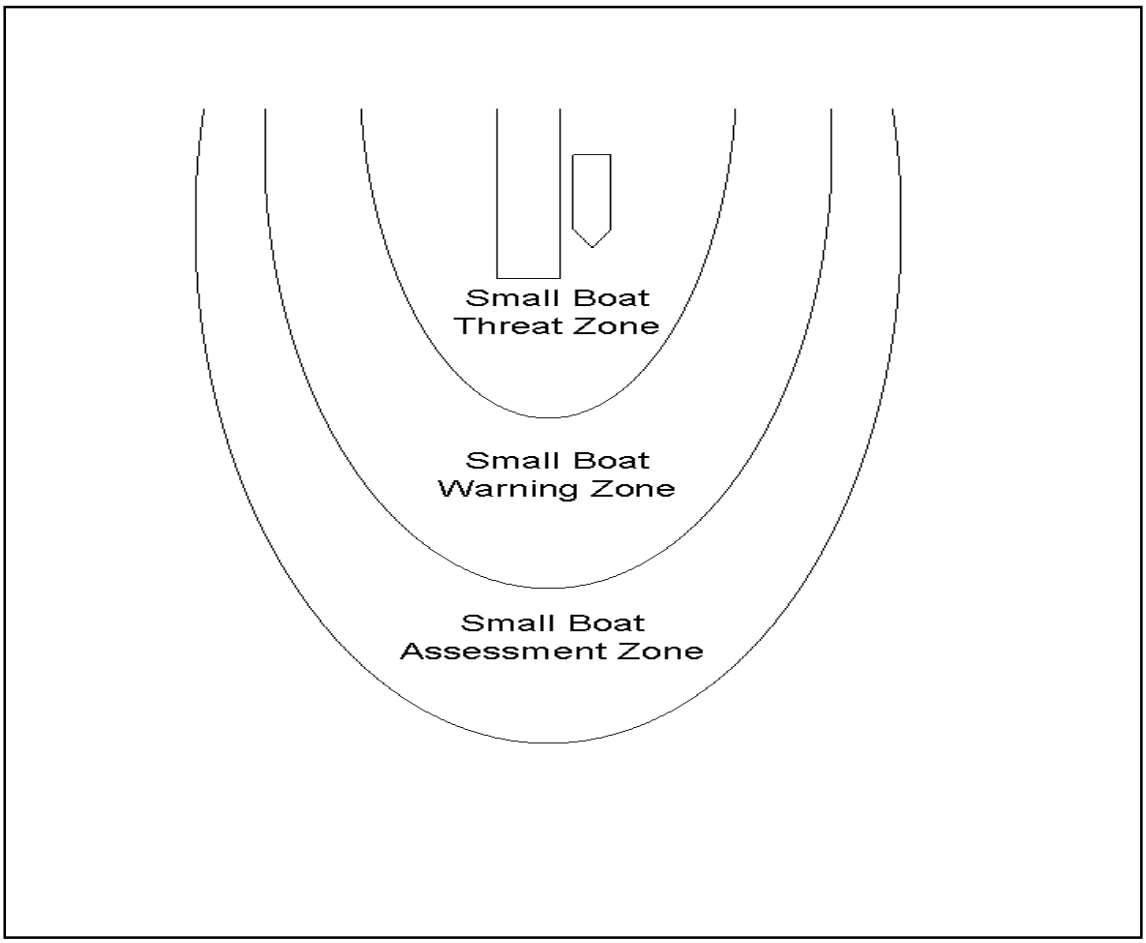

Figure 5-2. Small craft threat zones

SMALL CRAFT DETECTION CONSIDERATIONS

5-24. Small craft threats are one of the most lethal methods of enemy attack. Any craft has the potential to be a threat, it is imperative to determine hostile intent, and neutralize any threats. The continuum of force is a dynamic set of measures to be employed as the situation dictates. The following factors shape security force measures to determine hostile intent:

- Contact actions (e.g., display weapons, aggressively avoid security crafts, ignore warnings).
- Operating area (e.g., small zones limit time and distance to interact with contact).
- Security craft capabilities (e.g., underpowered craft cannot maneuver with contact).
- Restrictive ROE (e.g., cannot use warning shots).
- Host nation restrictions (e.g., only host nation security forces can interact with civilian craft).

- Availability of non-lethal effects and warning munitions.

DEEP DRAFT THREAT

5-25. The potential for deep draft ships to inflict devastating damage by ramming is due to their large capacity to hold explosives and to the difficulty friendly forces will face trying to stop an underway vessel. Security forces and crafts can stop hostile small craft by shouldering, ramming or shooting them; while the same measures could be employed against an approaching hostile ship, the likelihood of stopping it is minimal. Additionally, some nations employ gunships that are much better-armed than Army vessels. Use of warning shots toward such a craft may be construed as hostile action, or used as an excuse to escalate the situation. The following principles will guide commanders in forming pre-planned responses to counter a deep draft threat:

- Liaison with Navy, host nation or United States Coast Guard authorities and use COP awareness tools to ensure all deep draft vessels in the area are tracked.
- Detect, assess, and determine hostile intent as far away from the protected asset or area as possible so security forces have time to react.
- Coordinate air fire support assets.

SUBSURFACE THREAT

5-26. The third water transport threat occurs at the subsurface level, carried out by either swimmers or mines, or a combination of the two. Both threats were used successfully during the Vietnam War and remain attractive enemy options because of their relatively low cost and simplicity. The most difficult aspect when planning to defend against subsurface threats is employment of capability to detect them. Small crafts and deep draft vessels are clearly visible and thus provide at least some time to determine hostile intent; security forces may not see a swimmer or mine until it is in the threat zone, if at all. While a mine is clearly a threat and should be acted upon immediately, a swimmer or bubbles in the water are not necessarily indicative of a hostile threat. Subsurface detection technologies should be employed by shore and vessel units, especially if intelligence indicates subsurface threat employment is likely in the area of operations. The following principles will guide the development of pre-planned responses to detect and deter subsurface threats:

- Develop specific guidance for reacting to a surfaced swimmer or bubbles sighting. Such directives are critical because of the likelihood that defenders will get only one look at the swimmer at the water surface. Is any swimmer in the water within a certain distance from the protected asset or area assumed to be hostile? Can concussion grenades automatically be used if a swimmer submerges or bubbles are seen? Pre-planned responses to these questions will ensure security forces are armed with sufficient authority to counter this elusive threat.
- Install barriers at a distance from the protected asset or area if there is a likely threat of mines.
- Use anti-swimmer devices when possible. A variety of commercial anti-swimmer products that either put sound into the water to deter a swimmer, or detect a swimmer with a variant of sonar are increasingly available to U.S. military maritime assets. Non-lethal anti-swimmer munitions may be employed.

AIRCRAFT THREAT

5-27. The short reaction time associated with most enemy attacks is further lessened when countering an aircraft attack. With so much focus on waterborne and land threats, aircraft may go unnoticed. If aircraft are deemed to be hostile and security forces open fire with weapons, there is the added concern of collateral damage from expended rounds. While this risk exists when firing on waterborne and land threats, the potential for collateral damage is greater when firing against an air threat.

5-28. As shown on 11 September 2001, aircraft can be used as a weapon or to deliver another weapon such as a bomb, missile or CBRN threats. Principles when developing pre-planned responses to counter an aircraft threat are as follows:

- Coordinate among all agencies dealing with control in the airspace around the protected asset or area so early assessment of hostile intent can be made.
- Visually assess all aircraft near protected assets or areas.
- Consider firing arcs and select weapons to minimize collateral damage. Responsible local air traffic control and U.S. units should warn suspected hostile aircraft. Noncompliance is not necessarily a hostile act, but if the aircraft continues on a collision course, the decision to engage should be made far enough out to be effective in stopping the potential attack. The ideal weapons for defense against aircraft threats are surface-to-air missiles and crew-served weapons. Although difficult to initially detect, small general aviation aircraft are relatively easy to destroy once hostile intent can be established. Army watercraft may not have capability to determine aircraft hostile intent or employ anti-aircraft weapons. Passive defense measures should be coordinated for and employed when operating in identified high aircraft threat areas. Coordination should be established within the operational area for anti-aircraft threat support for Army watercraft as required.

STANDOFF ATTACK THREAT

5-29. One of the most difficult threats to detect, deter, and defend against is a standoff attack, primarily because close contact is never made between the attacker and security forces. Distance and the likelihood that the threat is in a civilian or concealed area make eliminating the threat more hazardous. The most likely standoff threats are ballistic missiles, snipers, mortars, rocket-propelled grenades, and man-portable air defense weapons. Snipers use rifles against personnel, while mortars and rocket propelled grenades are used primarily against equipment.

5-30. The best way to defeat a standoff threat is to keep it from happening. Close cooperation area naval forces, with civilian or host nation authorities to counter standoff attacks is essential. Principles that guide development of pre-planned responses against a standoff threat are:

- Lessen the number of potential targets by reducing the visibility of critical assets and areas.
- Provide counter-measures capable of passive vessel defense.
- Extend watch standers' focus beyond the area immediately around the asset in order to assess potential standoff threats.
- Maintain a close liaison with civilian or host nation authorities to quickly counter standoff threats.

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Chapter 6

Watercraft Maintenance

Maintenance and operations are inextricably linked. The maintenance status of a vessel or vessels impacts and drives a unit's ability to perform its mission. Operations personnel must continually communicate with maintenance personnel to manage and influence maintenance operations, and subsequently the operational posture of the organization. This chapter describes watercraft maintenance, maintenance organizations, and maintenance reporting procedures.

ARMY WATERCRAFT MAINTENANCE

6-1. The objective of Army watercraft maintenance is to ensure safe, seaworthy, reliable watercraft. Maintenance tasks include any actions that sustain the vessel during an operation or restore a vessel to a mission capable status. Army watercraft maintenance operations are conducted both underway and in port. Maintenance tasks range from simple repairs to complex depot level repairs in fixed shops. Maintenance of Army watercraft follows the Army maintenance system of field level maintenance and sustainment level maintenance.

FIELD LEVEL MAINTENANCE

6-2. Watercraft field level maintenance is comprised of crew and maintainer level maintenance. Crew Level maintenance is characterized by on system maintenance and includes: inspect, test and service of watercraft components, modules, sub-assemblies, assemblies, and systems ensuring the vessels condition is maintained in good working condition. Crew level maintenance actions are performed by watercraft operators and watercraft engineers.

6-3. Maintainer level maintenance is characterized by on/off system maintenance and includes: inspect, test, service, adjust, replace, and repair of watercraft components, modules, sub-assemblies assemblies, and systems returning them to a serviceable condition. Maintainer level maintenance actions are performed by watercraft engineers. In some cases maintainer level maintenance actions are performed, in accordance with the applicable technical manual maintenance allocation chart, by a maintenance contractor using best commercial practices.

6-4. Inspections at the crew and maintainer level are the first step in determining required maintenance issues and repairs. The crew then works on reducing and eliminating discrepancies and identifies field-level repair actions requiring additional parts, tools and manpower that may be provided by the watercraft field maintenance company. Arrangements are made with the designated support element at the Watercraft Inspection Branch for sustainment maintenance support.

SUSTAINMENT LEVEL MAINTENANCE

6-5. The procedures for requesting sustainment level maintenance of all Army watercraft through the watercraft national maintenance point are as follows: All requests for sustainment maintenance are accomplished through the Standard Army Management Information System automated process. Manual forms may only be used when the automated system is not available or in emergency situations; however, when manual forms are used the work order will be entered into the Standard Army Management Information System at the earliest opportunity for maintenance tracking. Commanders ensure all maintenance activities adhere to guidelines set forth by U.S. Army Tank Automotive Command (TACOM) through the Watercraft Inspection Branch. This includes all pre-on condition cyclic maintenance surveys, warranty claims, interim surveys, un-programmed repairs, and emergency maintenance requests. Emergency repairs will not be delayed for work order submission but a work order will be required no later

than completion of emergency repairs. Procedures for submission of sustainment level work orders will be dictated by TACOM through the Watercraft Inspection Branch external standard operating procedures and Army Regulation 750-1, *Army Materiel Maintenance Policy*. When operational conditions dictate, TACOM may authorize lower level maintenance activities to perform repairs beyond their authorized level of repair action. The quality assurance and work order data responsibility remains as designated in the maintenance allocation chart.

6-6. Maintenance that requires extensive resources such as special equipment, machinery or dry-dock facilities characterizes watercraft sustainment maintenance. Under certain conditions, such as when a short-notice mission occurs and the vessel is in a non-operational status, the vessel's chief engineer is authorized to direct the crew to affect a sustainment level repair. In order to do so, several conditions must exist – the field- level operators or maintainers must have the training to conduct the repair, the parts must be on hand, and the tools must be available, and TACOM must approve the repair.

6-7. Sustainment level maintenance of watercraft is a Title 46 of the Code of Federal Regulations responsibility and is defined as a "depot level service" involving a series of inspections, certifications and condition based maintenance actions that are designed to ensure that a watercraft's structure, machinery, and other equipment are maintained in an operational, seaworthy and safe condition. The major components of watercraft sustainment maintenance are the actions and functions grouped under the term on condition cyclic maintenance. The primary focus of on condition cyclic maintenance includes dry-docking, bottom cleaning, underwater painting, overhauls, replacement of major components, application of major modification work orders (MWO)s, emergency repairs, load line, and quadrennial certifications.

6-8. The Watercraft Inspection Branch provides an annual schedule for all watercraft due on condition cyclic maintenance to commands with watercraft assets. Units with watercraft due on condition cyclic maintenance during the upcoming year generate a pre- on condition cyclic maintenance work order requesting a survey inspection no later than 180 days of the shipyard due date or 18 months after the vessel's last refloat for interim surveys. It is the responsibility of the unit to submit a sustainment level work request to initiate action from the Watercraft Inspection Branch for this survey. The Watercraft Inspection Branch will host a pre- on condition cyclic maintenance round table meeting to discuss results of the survey and a follow on round table at a location and method of their choice to ensure completion of all field maintenance prior to start of on condition cyclic maintenance.

6-9. Before a vessel is accepted into sustainment maintenance, units/crews are required to complete all field level maintenance tasks identified during the pre-shipyard technical inspection. Units are responsible for funding all field level maintenance not associated with a sustainment level task. It is not cost effective to leave tasks undone during a sustainment maintenance period. Vessel masters, chief engineers and appropriate members of the crew as determined by the chain of command, in accordance with Army Regulation 56-9, *Watercraft* will accompany their vessels to the shipyard during sustainment maintenance periods. As a minimum, vessel masters and chief engineers will accompany vessels to the shipyard. This becomes the identified crew members' places of duty. Their responsibility during this period is to assist the Watercraft Inspection Branch marine surveyor with vessel-related matters, capture and record demand data related to maintenance man-hour information for field level maintenance performed and repair parts installed during the maintenance period.

6-10. Watercraft safety equipment, including firefighting, dewatering, and lifesaving equipment, is maintained by the crew in accordance with FM 4-01.502, Army *Watercraft Safety*. Hard-mounted, wired systems that are an inherent part of the vessel are maintained by a combination of operator/crew for field-level and TACOM Watercraft Inspection Branch for sustainment level. For example, the general alarm system may be tested by the crew, but the wiring of the system may require sustainment level repair.

EMERGENCY REPAIR/UNDERWAY/DEPLOYED AWAY FROM HOME PORT MAINTENANCE

6-11. Emergency repairs are immediate maintenance actions required to return the watercraft to a seaworthy, safe, and operable condition. The vessel master is authorized to perform any level of maintenance when engaged in sailing operations (underway and/or deployed away from home port) when faults or deficiencies occur which are outside their authorized level of repair. This decision will be based

upon the availability of resources at sea, the skill of the crew, and the impact of repairs to seaworthiness and operability.

6-12. Materiel repaired under emergency conditions must be inspected by work order to the appropriate maintenance activity as designated by the MAC for determination of the proper repair in accordance with Technical Manual 10 and 20 series standards. This inspection will be requested as communications are available with that activity. Vessel configuration control will be maintained. Any deviations to the original configuration will be reported through the departure from specifications process per DA Pam 750–8, *The Army Maintenance Management System (TAMMS) User Manual*.

ON CONDITION CYCLIC MAINTENANCE

6-13. On condition cyclic maintenance begins with a materiel condition survey performed 180 days prior to the scheduled on condition cyclic maintenance. This survey provides the basis for written specifications by which it is accomplished. This is a dockside inspection utilizing the services of qualified divers when possible to ascertain the condition of the watercraft's hull and appendages below the deep load waterline. A second materiel condition survey is performed at the time of dry-docking to identify additional repair/maintenance requirements not observable at the time of the 180–day inspection. These inspections are performed at the direction of the Watercraft Inspection Branch with assistance from the American Bureau of Shipping. On condition cyclic maintenance intervals for all vessels are shown in table 6-1.

Table 6-1. Maintenance Intervals

Vessel		***Inspections & Certifications***	***Run Ups, Trials & Annual Maintenance***	***Phased Maintenance***
AC & RC	All Vessels Except BDs	Annual	Annual (Maintenance Only)	Every 3 Years
	BD	Annual	Annual (Maintenance Only)	Every 4 Years
APS-3	BD 115T	Weekly, Monthly, Annual	Monthly & Annual	Every 4 years
	Wet Stored – LCU & LT	Weekly, Monthly, Annual	Quarterly & Annual	Every 5 Years
	Dry Stored – BG, LCM, ST, MWT & SLWT	Weekly, Monthly, Annual	Quarterly, Semi-Annual & Annual	Every 6 Years

Legend:
AC=active component
APS-3=Army prepositioned stock afloat
BD=barge derrick
LCM=landing craft, mechanized
LCU=landing craft, utility
LT=large tug
MWT=modular warping tug
SLWT=side loading warping tug
ST=small tug

6-14. The scope of work accomplished during on condition cyclic maintenance varies, depending upon watercraft condition, resource limitations, class of vessel, and other factors. As a minimum, the following maintenance and repair actions are accomplished during on condition cyclic maintenance:

- Bottom cleaning and painting up to the deep-load waterline per Technical Bulletin 43–0144, *Painting of Watercraft*.
- All repairs below the deep-load waterline as identified during dry-dock inspection/underwater hull survey.

- Overhaul/replacement/renewal of all major components identified for overhaul at the depot level as determined through diagnostic testing, hours of operation, and inspection of internal components.

STORED VESSEL MAINTENANCE

6-15. A stored vessel is a pre-positioned vessel or operational vessel placed in extended command-designated administrative storage. Vessels in storage are stored at 10/20 standards in accordance with AR 750-1 but will require activation. Pre-positioned vessels require periodic (weekly, monthly, semi-annual) maintenance to critical systems and sub-systems, annual technical inspections and re-certifications.

EXERCISING VESSELS

6-16. Vessels are "exercised" to maintain and verify readiness. Exercise includes a minimum of eight continuous hours with all vessel systems and subsystems operating underway. Complete all annual certifications and recertification required to maintain regulatory compliance. Exercise of a BD requires recertification of quadrennial permit, exercise of all hoists through 100% range of motion, with a minimum 25% working load. Prior to exercising a vessel:

- MWOs are completed and hull husbandry is conducted.
- All other maintenance and/or repairs identified by the marine/ship surveyor required to affect a permanent change in the watercraft's condition, to ensure capability of operating in an unrestricted manner for the purposes intended is conducted.
- Capability of the vessel being maintained and operated per all applicable regulations, rules, laws, policies and sustainability of acceptable rates of watercraft readiness between on condition cyclic maintenance is ensured.

6-17. All minimum maritime safety inspections, tests and drills required by Army watercraft are listed in Army Regulation 56-9, including those required by regulatory documents of American Bureau of Shipping; Title 46 Code of Federal Regulation, *Shipping*, (parts 41–69); and International Convention for Safety of Life at Sea, 1974 to maintain the load-line documentation in a current status.

CARE OF SUPPLIES IN STORAGE MAINTENANCE

6-18. Care of supplies in storage maintenance encompasses all aspects of field level maintenance and initiation of all sustainment maintenance actions. Every effort shall be made to incorporate MWOs, maintenance advisory messages, and safety of use messages during exercise periods.

INSPECTIONS AND CERTIFICATIONS

6-19. Unit commanders/maintenance managers are responsible for initiating all required tests, inspections, and certifications and will correct deficiencies that may prevent certification. Annual inspections may be conducted during phase or condition based maintenance, when determined by TACOM to be more advantageous to the Army.

6-20. The Watercraft Inspection Branch will monitor and report compliance with test, inspection and certification requirements. Inspections and certifications include but are not limited to:

- Annual fixed firefighting systems.
- Annual load test of all lifting devices.
- Annual revalidation of quadrennial inspections.
- Annual load line inspection.
- Life rafts.
- Hydrostatic releases.
- Self Contained breathing apparatus.
- Compressed air pressure vessels.
- Boilers.

- Confined space entry equipment.
- Test, measurement and diagnostic equipment.
- Radio stations.
- Annual DOD Information Assurance Certification and Accreditation Process.

WARRANTY CLAIMS

6-21. Owning units will be given a memorandum and supporting documents identifying the warranty beginning and end dates. The warranty shall identify any specific items with a warranty deviating from the standard 90-day warranty period. Watercraft warranty claims will be processed through the nearest Watercraft Inspection Branch field support offices.

6-22. Warranties for Army Watercraft shall start at government acceptance in accordance with AR 700-139, *Army Warranty Program*. Components acquired in performance of field or sustainment operations or MWOs shall have warranties in accordance with AR 700-139.

WATERCRAFT MAINTENANCE ORGANIZATION

6-23. The watercraft field maintenance company consists of modular maintenance teams capable of deploying worldwide in support of deployed watercraft with a modified modular tool set stocked with watercraft-specific parts and special tools. For maximum effectiveness, the watercraft maintenance unit is assigned to brigade or higher as part of a theater opening/port opening package. Army watercraft field maintenance organizations and procedures consist of:

- Onboard vessel equipment and crew capable of performing maintenance and repairs while underway.
- A modular maintenance surge team located within the same theater of operations, ashore or at a sea-base capable of performing maintenance tasks not able to be performed underway or that requires additional personnel, fault correction, condition-based repair, or replacement.

6-24. The watercraft field maintenance company is trained and equipped to provide supplemental field level maintenance to all Army watercraft. Funding is provided by the supporting command (i.e. Forces Command) for additional specialized certifications and Duty Performance Test licensing on supported vessels. Unit personnel formed into field maintenance platoons that are divided into squad sized maintenance support teams (MST). These teams can and will deploy aboard Army vessels to provide additional man-hours for field level preventative and unscheduled maintenance. They will also perform sustainment level maintenance tasks when authorized. The MSTs should be regularly included in planning for garrison and deployed operations by higher headquarters and its support is requested by watercraft units. The Command Maintenance Program must include ensuring team members are certified, trained and licensed on the equipment they will be servicing, including use of special equipment.

6-25. Sustainment level tasks are normally the responsibility of TACOM. However, this responsibility will fall to the vessel Chief Engineer when craft are individually deployed, and the higher headquarters marine maintenance officer when the watercraft field maintenance company is deployed. The MSTs deploy with an expeditionary shelter (providing in- transit billeting and administrative space when required) and a mobile contact vehicle for mobility. Once on station, the expeditionary shelters may be consolidated ashore to provide the MST office and billet space. When required, the watercraft field maintenance company will deploy the maintenance operations section and MSTs together via air, sea or a combination of deployment methods. The watercraft field maintenance company headquarters will deploy with expeditionary shelters providing work and storage space ashore and power generation capability, as METT-TC requires.

6-26. When the watercraft field maintenance company is deployed, the MSTs will be under the command and control of the unit headquarters. When the company headquarters is not deployed and multiple maintenance support teams are onboard vessels operational or tactical control may transfer to a HD as mission dictates. When deployed independently aboard a vessel an MST receives its direction from the vessel master/chief engineer. The team may also be under tactical or operational control of a watercraft unit or detachment when the watercraft unit/detachment is deployed in total and an MST is deployed individually.

6-27. TACOM is responsible for ensuring adequate support worldwide for the accomplishment of sustainment maintenance and support during system failures that are beyond the capability of the crew. Coordination for sustainment level maintenance support is accomplished through one of several means. The watercraft field maintenance company coordinates directly with the Watercraft Inspection Branch when the entire company is deployed, much like the home station process. Alternatively, when several MSTs are deployed without the company headquarters, the HD can request support via the Watercraft Inspection Branch representative or reach back capability. When vessels are deployed independently the vessel's chief engineer can coordinate directly for TACOM support. For additional information on watercraft maintenance, see chapter 7 of ATP 4-33, *Maintenance Operations*.

Chapter 7

Watercraft Accident Reporting and Investigation

Watercraft operations encompass many variables that add danger and risk to operations. This chapter describes the responsibilities for reporting watercraft accidents, different types of watercraft accidents and responsibilities of the investigating officer. This chapter also describes the 4 classes of watercraft accidents.

7-1. The vessel master/operator is responsible for recording details and reporting the accident as soon as possible. The local chain of command ensures all required notifications are made to high headquarters and the watercraft safety office.

7-2. Commander with general court martial jurisdiction (or unit responsible for operation, personnel or materiel involved in the accident): For accidents requiring a DA Form 285, *Technical Report of U.S. Army Ground Accident*, appoint an investigating officer. The investigating officer:

- Preserves evidence and conducts the investigation in accordance with Department of the Army Pamphlet 385-40, *Army Accident Investigations and Reporting*.
- Fills out the detailed DA Form 285 report.
- Forwards DA Form 285 through the installation safety office to the Army Safety Center for recording in the Army Safety Management Information System within 30 days of the accident.

WATERCRAFT ACCIDENTS

7-3. A watercraft accident is an unplanned event or series of events, involving watercraft under that results in one or more of the following:

- Accidents occurring while loading, off-loading, or receiving services at dockside.
- Damage to Army property (including government-furnished material, government property, or government-furnished equipment provided to a contractor).
- Accidents occurring during amphibious or on-shore warfare training.
- Fatal or nonfatal injury to military personnel on or off duty.
- Fatal or nonfatal injury to on-duty Army civilian personnel, including non-appropriated fund employees and foreign nationals employed by the Army, incurred during performance of duties while in a work compensable status.
- Fatal or nonfatal occupational injury or illness to Army military personnel, Army civilian employees, non-appropriated fund employees, or foreign nationals employed by the Army.
- Fatal or nonfatal injury or illness to non-Army personnel or damage to non-Army property.

7-4. Watercraft accidents do not include accidents that are reportable as aviation (Class E or F) accidents or incidents. When two or more type vehicles are involved (i.e. An LCM and a Stryker), the type of equipment operated by the individual deemed the most responsible will determine the accident type.

INVESTIGATING AND REPORTING ACCIDENTS

7-5. Watercraft accidents are reported and investigated to identify problem areas (deficiencies) as early as possible in order to prevent further damage to equipment or loss/injury of personnel. Changes, corrections, and countermeasures can be developed and implemented. If an accident is never reported, the local command and required DA agencies will not know there is a problem. Unreported accidents lead to repeat occurrences.

7-6. All watercraft accidents must be reported by the master/operator, regardless of class, to the local command, commands of concern, and Transportation Branch Marine Safety Office within 24 hours of

occurrence via any means available. The local command must insure the Transportation Branch Marine Safety Office and Commander, United States Army Combat Readiness Center are notified if not previously reported by the master/operator.

7-7. Only certain accidents require completion and submission of DA Form 285 (U.S. Army Accident Report) by the investigating officer. These recordable accidents include Classes A, B, C, and D accidents (see AR 385-10, *The Army Safety Program* for details).

7-8. The Army classifies accidents by severity of injury and property damage. These classes (A through D) are used to determine the appropriate investigative and reporting procedures.

- Class A accident has a total cost of reportable damage of $2,000,000 or more; destroys an Army aircraft, watercraft, missile, or spacecraft; or has an occupational illness that results in a fatality or permanent total disability.
- Class B accident has a total cost of reportable property damage of $500,000 or more, but less than $2,000,000; an injury and/or occupational illness that results in permanent partial disability, or three (3) or more people hospitalized as inpatients.
- Class C accident has a total cost of property damage of $50,000 or more, but less than $500,000; a nonfatal injury that causes one (1) or more days away from work or training beyond the day or shift on which it occurred; or a disability at any time (lost time case).
- Class D accident has a cost of property damage of $20,000 or more, but less than $50,000; or a nonfatal injury or illness resulting in restricted work, transfer to another job, medical treatment greater than first aid, needle stick injuries and cuts from sharps that are contaminated with another person's blood or other potentially infectious material, medical removal under medical surveillance requirements of an Occupational Safety Health Administration standard, occupational hearing loss, or a work-related tuberculosis case.
- Class E ground accident. An Army accident in which the resulting total cost of property damage is $5,000 or more but less than $20,000.

GROUNDED VESSEL REPORTING REQUIREMENTS

7-9. In addition to the DA Form 285 report, watercraft accidents invoking grounding that creates a hazard to navigation or watercraft safety or any occurrence that affects the watercraft's seaworthiness or fitness for service (including, but not limited to fire, flooding, or damage to fixed fire extinguishing systems, life saving equipment, or bilge pumping systems) will be reported to the Transportation Branch Marine Safety Office within 24 hours. The following additional information will be included with the report:

- Time and place of commencement of voyage and destination.
- Direction and force of current.
- Direction and force of wind.
- Visibility in yards.
- Tide and sea conditions.
- Name of person in charge of navigation and names of people on the bridge.
- Name and rank of lookout and where stationed.
- Time when bridge personnel and lookouts were posted on duty.
- Course and speed of watercraft.
- Number of passengers and crew on board.
- Names of passengers and crew.
- Copies of all pertinent log entries.
- List of the witnesses names and addresses.
- Date steering gear and controls were last tested.
- Date and place where compasses were last adjusted and deviation, if any, at the time of the accident.
- Statement of any outside assistance received.
- Diagrams of damage and pertinent documents.

- Photos of damage.
- Any other details not covered above.

COLLATERAL INVESTIGATION REPORTS

7-10. A collateral investigation is required in many cases for Class A, B, or C accidents to record and preserve the facts for litigation, claims, and disciplinary and administrative actions. These investigations are conducted in accordance with AR 15-6, *Procedures for Investigating Officers and Boards of Officers*. All fatal accidents require a collateral investigation. Those accidents that generate a high degree of public interest or may result in litigation against the government also require a collateral investigation.

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Appendix A

Shipboard Security Measures

The shipboard measures are tailored to assist commanding officers and ship masters in reducing the effect of enemy and other security threats to DOD combatant and non-combatant vessels, including U.S. Army vessels worldwide. The Navy labels all ships that do not actively conduct warfare from the sea as "non- combatant". In this context, the term as used in this Appendix applies to Army watercraft.

A-1. Shipboard force protection conditions (FPCON) levels are design to be implemented progressively in anticipation of or in response to a threat or attack. FPCON is the principal means through which commanders decide on how to best defend against a threat or attack. FPCON consists of five progressive levels of increasing protective measures. Shipboard FPCON levels are described in the following paragraphs.

FPCON NORMAL MEASURES

A-2. NORMAL 1: Brief crew on the port-specific threat, the antiterrorism and security plans, and security precautions to be taken while ashore. Ensure all hands are knowledgeable of FPCON requirements and that they understand their role in implementation of these measures.

A-3. NORMAL 2: Remind all personnel to be suspicious and inquisitive of strangers, be alert for abandoned parcels or suitcases and for unattended vehicles in the vicinity. Report unusual activities to the Officer of the Watch, Master, or Mate on watch as applicable.

A-4. NORMAL 3: Secure and periodically inspect spaces not in use.

A-5. NORMAL 4: Review security plans and keep them available.

A-6. NORMAL 5: Review pier and shipboard access control procedures including land and water barriers.

A-7. NORMAL 6: Ensure sentries, Officer of the Watch, roving patrols, the quarterdeck watch, and gangway watch have the ability to communicate with one another.

A-8. NORMAL 7: Coordinate pier and fleet landing security requirements with collocated forces, and/or husbanding agent. Identify anticipated needs for mutual support and define methods of implementation and communication.

FPCON ALPHA MEASURES

A-9. ALPHA 1: Muster, arm, and brief security personnel on the threat and ROE. Keep key personnel who may be needed to implement security measures on call.

A-10. ALPHA 2: DOD non-combatant ships in a non-U.S. government controlled port, request husbanding agents to arrange and deploy barriers to keep vehicles away from the ship (100 feet in U.S. ports and 400 feet outside the United States as the minimum standoff distances).

A-11. ALPHA 3: (U.S. Navy combatant ship-specific – Army vessel crews may be requested to provide personnel to assist on piers at which they are berthed). Randomly inspect vehicles entering pier.

A-12. ALPHA 4: Randomly inspect hand-carried items and packages before they are brought aboard. ALPHA 5: Regulate shipboard lighting as appropriate to the threat environment.

A-13. ALPHA 6: When in a non-U.S. government controlled port, rig hawse pipe covers and rat guards on lines, cables, and hoses. Consider using an anchor collar.

A-14. ALPHA 7: When in a non-U.S. government controlled port, raise accommodation ladders and ramps when not in use.

A-15. ALPHA 8: Increase frequency of security drills.

A-16. ALPHA 9: Establish internal and external communications, including connectivity checks with the local operational commander, agencies, and authorities that are expected to provide support, if required.

A-17. ALPHA 10: Establish procedures for screening food, mail, water, and other supplies and equipment entering the ship.

FPCON BRAVO MEASURES

A-18. BRAVO 1: Continue or introduce all measures of lower FPCON level.

A-19. BRAVO 2: Set material condition YOKE (secure all watertight door and hatches), main deck and below.

A-20. BRAVO 3: Consistent with local rules, regulations, and/or any applicable status of forces agreement, post armed pier sentries as necessary.

A-21. BRAVO 4: Restrict vehicle access to the pier. Discontinue parking on the pier. Consistent with local rules, regulations, and/or any applicable status of forces agreement, establish unloading zones and move all containers as far away from the ship as possible (100 feet in the United States, 400 feet outside the United States as the minimum stand-off distance).

A-22. BRAVO 5: Consistent with the local rules, regulations, and/or any applicable status of forces agreement, post additional armed watches as necessary. Local threat, environment, and fields of fire should be considered when selecting weapons.

A-23. BRAVO 6: Post signs in local language to establish visiting and loitering restrictions.

A-24. BRAVO 7: When in a non-U.S. government controlled port, identify and randomly inspect authorized watercraft, such as workboats, ferries, and commercially rented liberty launches, daily.

A-25. BRAVO 8: When in a non-U.S. government controlled port or anchorage, and using shuttle vessels, direct liberty boats to make a security tour around the ship upon departing from and arriving at the ship, with particular focus on the waterline and under pilings when berthed at a pier.

A-26. BRAVO 9: Before allowing visitors aboard, inspect all their hand-carried items and packages. Where available, use baggage scanners and walk-through or handheld metal detectors to screen visitors and their packages prior to boarding the ship.

A-27. BRAVO 10: Implement measures to keep unauthorized craft away from the ship. Authorized craft should be carefully controlled. Coordinate with host-nation's husbanding agent or local port authority, as necessary, and request their assistance in controlling unauthorized craft.

A-28. BRAVO 11: Raise accommodation ladders, etc., when not in use. Clear ship of all unnecessary stages, camels, barges, oil donuts, and lines.

A-29. BRAVO 12: Review liberty policy in light of the threat and revise it as necessary to maintain safety and security of ship and crew.

A-30. BRAVO 13: All DOD ships avoid conducting activities that involve gathering a large number of crewmembers at the weather decks. Where possible, relocate such activities inside the skin of the ship.

A-31. BRAVO 14: Ensure an up-to-date list of bilingual personnel for the area of operations is readily available. Maintain warning tape, in both the local language and English, in the bridge, pilot house, or quarterdeck, for use on the ship's announcing system to warn small craft to remain clear.

A-32. BRAVO 15: If they are not already armed, arm the quarterdeck, gangway or mate on watch.

A-33. BRAVO 16: If they are not already armed, consider arming the sounding and security patrol.

A-34. BRAVO 17: Review procedures for expedient issue of firearms and ammunition to the shipboard security reaction force and other members of the crew, as deemed necessary by the commanding officer/master.

A-35. BRAVO 18: Instruct watches to conduct frequent, random searches of the pier, including pilings and access points.

A-36. BRAVO 19: Conduct visual inspections of the ship's hull and ship's boats at intermittent intervals and immediately before it is put to sea using both landside personnel and waterside patrols.

A-37. BRAVO 20: Hoist ship's boats aboard when not in use.

A-38. BRAVO 21: Terminate all public visits. In U.S. government controlled ports, host visits (family, friends, small groups sponsored by the ship) may continue at the commanding officer's/master's discretion.

A-39. BRAVO 22: After working hours, reduce entry points to the ship's interior by securing infrequently used entrances. Safety requirements must be considered.

A-40. BRAVO 23: In non-U.S. government-controlled ports, use only one brow/gangway to access the ship (remove any excess brows/gangways). Very large ships may use two as required, when included in an approved anti-terrorism Plan specific to that port visit.

A-41. BRAVO 24: In non-U.S. government-controlled ports, maintain the capability to get underway on short notice or as specified by standard operating procedures.

A-42. BRAVO 25: In non-U.S. government-controlled ports, consider the layout of fire hoses. Brief designated crew personnel on procedures for repelling boarders, small boats and ultra-light aircraft.

A-43. BRAVO 26: Where applicable, obstruct possible helicopter landing areas.

A-44. BRAVO 27: Where possible, monitor local communications (ship-to-ship, television, radio, police scanners).

A-45. BRAVO 28: As appropriate, inform local authorities of actions being taken as FPCON increases.

A-46. BRAVO 29: If the threat situation warrants, deploy small boats to conduct patrols in the immediate vicinity of the ship. Brief boat crews and arm them with appropriate weapons considering the threat, the local environment, and fields of fire.

FPCON CHARLIE MEASURES

A-47. CHARLIE 1: Continue or introduce all measures of lower FPCON levels.

A-48. CHARLIE 2: Consider setting material condition Zebra (secure all access doors and hatches), main deck and below.

A-49. CHARLIE 3: Cancel liberty. Execute emergency recall.

A-50. CHARLIE 4: Prepare to get underway on short notice. If conditions warrant, request permission to sortie/get underway.

A-51. CHARLIE 5: Block unnecessary vehicle access to the pier.

A-52. CHARLIE 6: Coordinate with host-nation husbanding agent and/or local port authorities to establish a small boat exclusion zone around ship.

A-53. CHARLIE 7: Deploy the ship response force to protect command structure and augment posted watches. Station the ship self defense force to provide 360-degree coverage of the ship.

A-54. CHARLIE 8: Energize radar and/or sonar, rotate screws, and cycle rudder(s) at frequent and irregular intervals, as needed to assist in deterring, detecting, or thwarting attacks.

A-55. CHARLIE 9: Consider staffing repair locker(s). Be prepared to staff one repair locker on short notice. Ensure adequate lines of communications are established with damage control central.

A-56. CHARLIE 10: If available and feasible, consider use of airborne assets as an observation/force protection platform.

A-57. CHARLIE 11: If a threat of swimmer attack exists, activate an anti-swimmer watch.

A-58. CHARLIE 12: In non-U.S. government-controlled ports and if unable to get underway, consider requesting armed security augmentation from area combatant commander.

FPCON DELTA MEASURES

A-59. DELTA 1: Fully implement all measures of lower FPCON levels.

A-60. DELTA 2: Permit only necessary personnel topside.

A-61. DELTA 3: If possible, cancel port visit and get underway.

A-62. DELTA 4: Employ all necessary weapons to defend against attack.

Appendix B

Crew Requirements by Platform

This appendix provides crew/personnel requirements for each Army watercraft vessel, the harbormaster detachment and the watercraft operations section of the terminal battalion. Total number of personnel listed is required for 24-hour vessel operation.

Table B-1. Class A2 LSV Detachment

DUTY TITLE	*GRADE*	*SKILL*	*REQUIRED*
Vessel Master	W4	880A2	1
Chief Engineer	W4	881A2	1
Chief Mate	W3	880A2	1
First Assistant Engineer	W3	881A2	1
Mate	W2	880A1	2
Assistant Engineer	W2	881A1	2
Detachment Sergeant (Senior Navigator)	E7	88K40	1
Marine Maintenance Non-Commissioned Officer	E7	88L40	1
Boatswain (Navigator)	E6	88K30	1
Junior Marine Engineer (Rover)	E6	88L30	1
Leading Seaman (Navigator)	E5	88K20	1
Senior Marine Engineman	E5	88L20	2
Emergency Care Sergeant	E5	68W20	1
Food Operations Sergeant	E6	92G30	1
Radio Operator-Maintainer	E4	25C10	1
Seaman	E4	88K10	4
Marine Engineman	E4	88L10	2
Cook	E4	92G10	1
Seaman	E3	88K10	3
Marine Engineman	E3	88L10	2
Cook	E3	92G10	1
Total			**31**

Table B-2. Class A2 Large Tug (LT 128')

DUTY TITLE	*GRADE*	*SKILL*	*REQUIRED*
Vessel Master	W4	880A2	1
Chief Engineer	W4	881A2	1
Chief Mate	W3	880A2	1
First Asst Engineer	W3	881A2	1
Mate	W2	880A1	2

Table B-2. Class A2 Large Tug (LT 128') (continued)

Assistant Engineer	W2	881A1	2
Boatswain	E7	88K40	1
Marine Maintenance Non-Commissioned Officer	E7	88L40	1
Leading Seaman	E5	88K20	1
Senior Marine Engineman	E5	88L20	1
Emergency Treatment Non-Commissioned Officer	E5	68W20	1
First Cook	E5	92G20	1
Seaman	E4	88K10	2
Marine Engineman	E4	88L10	2
Seaman	E3	88K10	2
Marine Engineman	E3	88L10	2
Cook	E4	92G10	1
Total			**23**

Table B-3. Class A1 Landing Craft Utility (LCU)

DUTY TITLE	***GRADE***	***SKILL***	***REQUIRED***
Vessel Master	W2	880A1	1
Chief Engineer	W2	881A1	1
Mate	E7	88K40	1
Assistant Engineer	E7	88L40	1
Boatswain	E6	88K30	1
Jr Marine Engineer	E6	88L30	1
Leading Seaman	E5	88K20	1
Senior Marine Engineman	E5	88L20	1
Seaman	E4	88K10	1
Marine Engineman	E4	88L10	1
Seaman	E3	88K10	1
Marine Engineman	E3	88L10	1
Cook	E4	92G10	1
Total			**13**

Table B-4. Class B Small Tug (ST)

DUTY TITLE	***GRADE***	***SKILL***	***REQUIRED***
Vessel Master	E7	88K40	1
Chief Engineer	E7	88L40	1
Boatswain	E6	88K30	1
Asst Marine Engineer	E6	88L30	1
Leading Seaman	E5	88K20	1

Table B-4. Class B Small Tug (ST) (continued)

Seaman	E4	88K10	2
Marine Engineman	E4	88L10	2
Seaman	E3	88K10	1
Marine Engineman	E3	88L10	1
Cook	E5	92G20	1
Total			**12**

Table B-5. Class B Landing Craft Mechanized (LCM) Mod 1

DUTY TITLE	*GRADE*	*SKILL*	*REQUIRED*
Coxswain	E5	88K20	2
Seaman	E4	88K10	1
Marine Engineman	E4	88L10	1
Seaman	E3	88K10	1
Marine Engineman	E3	88L10	1
Total (3 per shift for 24 hour operations)			**6**

Table B-6. Class B Landing Craft Mechanized (LCM) Mod 2

DUTY TITLE	*GRADE*	*SKILL*	*REQUIRED*
Coxswain	E5	88K20	2
Seaman	E4	88K10	1
Senior Marine Engineman	E5	88L20	2
Marine Engineman	E4	88L10	1
Seaman	E3	88K10	1
Marine Engineman	E3	88L10	1
Total (4 per shift for 24 hour operations)			**8**

Table B-7. Class B Causeway Ferry (CF)

DUTY TITLE	*GRADE*	*SKILL*	*REQUIRED*
Marine Operations Non-Commissioned Officer	E7	88K40	2
Boatswain	E6	88K30	2
Coxswain	E5	88K20	2
Senior Marine Engineman	E5	88L20	2
Seaman	E4	88K10	3
Marine Engineman	E4	88L10	2
Seaman	E3	88K10	3
Total (24 hour operations)			**16**

Table B-8. Class B Floating Causeway (FC) Pier

DUTY TITLE	*GRADE*	*SKILL*	*REQUIRED*
Main Segment:			
Marine Operations Non-Commissioned Officer	E7	88K40	1
Boatswain	E6	88K30	1
Leading Seaman	E5	88K20	2
Seaman	E4	88K10	6
Senior Forklift Operator	E5	88H20	1
Seaman	E3	88K10	6
RT Forklift Operator	E4	88H10	1
Subtotal Main Segment			*18*
Warping Tug Crew (two Tugs)			
Coxswain	E5	88K20	4
Senior Marine Engineman	E5	88L20	2
Seaman	E4	88K10	6
Marine Engineman	E4	88L10	2
Seaman	E3	88K10	6
Subtotal 2 Warping Tug Crews			*20*
Total for 24 hour operations			**38**

Table B-9. Class B Roll on/Roll off Discharge Platform (RRDF)

DUTY TITLE	*GRADE*	*SKILL*	*REQUIRED*
Main Segment (two crews):			
Marine Operations Non-Commissioned Officer	E7	88K40	2
Boatswain	E6	88K30	2
Leading Seaman	E5	88K20	4
Senior Forklift Operator	E5	88H20	2
Rough Terrain Forklift Operator	E4	88H10	2
Seaman	E4	88K10	12
Seaman	E3	88K10	12
Subtotal Main Segment			*36*
Warping Tug Crew (two Tugs)			
Coxswain	E5	88K20	8
Marine Engineman	E4	88L10	4
Seaman	E4	88K10	12
Marine Engineman	E4	88L10	4
Seaman	E3	88K10	12
Subtotal 2 Warping Tug Crews			*40*
Total for 24 hour operations			**76**

Table B-10. Class A1 Barge Derrick, (BD) 115 ton

DUTY TITLE	*GRADE*	*SKILL*	*REQUIRED*
Chief Engineer	W2	881A1	1
Boatswain	E6	88K30	1
Senior Marine Engineman	E5	88L20	1
Seaman	E4	88K10	2
Marine Engineman	E4	88L10	2
Seaman	E3	88K10	2
Marine Engineman	E3	88L10	2
Senior Crane Operator	E5	88H20	1
Crane Operator	E4	88H10	1
Cook	E5	92G20	1
Total for 24 hour operations			**14**

Table B-11. Harbormaster Detachment Headquarters

DUTY TITLE	*GRADE*	*SKILL*	*REQUIRED*
Harbormaster	W3	880A0	1
Detachment Sergeant	E7	88K40	1
Supply Sergeant	E5	94Y20	1

Table B-12. Harbormaster Operations Section

DUTY TITLE	*GRADE*	*SKILL*	*REQUIRED*
Section Sergeant	E6	88K30	1
Watercraft Non-Commissioned Officer	E6	88K30	1
Coxswain	E5	88K20	1
Dispatcher	E5	88K20	1
Marine Safety Non-Commissioned Officer	E5	88K20	1
Seaman	E4	88K10	2
Seaman	E3	88K10	2

Table B-13. Harbormaster Marine Maintenance Section

DUTY TITLE	*GRADE*	*SKILL*	*REQUIRED*
Maintenance Officer	W3	881A2	1
Marine Maintenance Non-Commissioned Officer	E7	88L40	1
Marine Maintenance Sergeant	E6	88L30	1
Wheel Vehicle Mechanic	E4	91B10	1

Table B-14. Terminal Battalion Watercraft Operations Branch

DUTY TITLE	*GRADE*	*SKILL*	*REQUIRED*
Operations Sergeant	E7	88K40	1
Watercraft Non-Commissioned Officer	E6	88K30	1
Movement Supervisor	E6	88N30	1
Transportation Management Coordinator	E4	88N10	1

Table B-15. Terminal Battalion S6 Section

DUTY TITLE	*GRADE*	*SKILL*	*REQUIRED*
Senior Information Systems Specialist	E5	25B20	1
Local Area Network Manager	E4	25B10	1
Signal Information Services Specialist	E4	25U10	1
Local Area Network Manager	E3	25B10	1
Signal Support Systems Specialist	E3	25U10	1

Glossary

SECTION I – ACRONYMS AND ABBREVIATIONS

ADP	Army doctrine publication
APS-Afloat	Army prepositioned stock afloat
AR	Army regulation
ATP	Army techniques publication
BD	barge derrick
C4I	command, control, communications, computers and intelligence
CBRN	chemical, biological, radiological and nuclear
CEN	communication, electronic and navigation
CF	causeway ferry
CMF	containerized maintenance facility
CONUS	continental United States
DA	Department of the Army
DOD	Department of Defense
FC	floating causeway
FM	field manual
FPCON	force protection condition
GMDSS	Global Maritime Distress and Safety System
HCCC	harbormaster command and control center
HD	harbormaster detachment
JLOTS	joint logistics over-the-shore
LCM	landing craft, mechanized
LCU	landing craft, utility
LOTS	logistics over-the-shore
LSV	logistics support vessel
LT	large tug
M	meters
MACOM	major command
METT-TC	mission, enemy, terrain and weather, troops and support available-time and civil considerations
MSI	modified surf index
MST	maintenance support team
MWO	modification work order
ORP	ocean reception point
RO/RO	roll-on/roll-off
ROE	rules of engagement
RRDF	roll-on/roll-off discharge facility
ST	small tug
USATACOM	United States Army Tank and Automotive Command

TBX	Transportation brigade (expeditionary)
TSC	theater sustainment command
TTOE	transportation theater opening element
U.S.	United States
USAMC	United States Army Materiel Command

SECTION II – TERMS

anticipation

The ability to foresee operational requirements and initiate actions that satisfy a response without waiting for an operations order or fragmentary order (ADP 4-0).

continuity

The uninterurupted provision of sustainment across all levels of war (ADP 4-0).

Defense Transportation System

The portion of the worldwide transportation infrastructure that supports Department of Defense transportation needs in peace and war (JP 4-01).

host nation

(DOD) A nation which receives the forces and/or supplies of allied nations and/or North Atlantic Treaty Organization organizations to be located one, to operate in, or transit through its territory (JP 3-57).

host nation support

(DOD) Civil and/or military assistance rendered by a nation to foreign forces within its territory during peacetime, cirses or emergencies, or war based on agreements mutually conducted between nations (JP 4-0)

improvisation

The ability to adapt sustainment operations to unexpected situations or circumstances affecting a mission. (ADP 4-0)

joint logistics over-the-shore operations

(DOD) Operatiosn in which Navy and Army logistics over-the-shore forces conduct logistics over-the-shore operations together under a joint force commander. Also called JLOTS operations (JP 4-01.6).

lighterage

The process in which small craft are used to transport cargo or personnel from ship-to-shore using amphibians, landing craft discharge lighters, causeways, and barges (JP 4-01.6).

logistics over-the-shore operations

(DOD) The loading and unloading of ships without the benefit of deep draft-capable, fixed port facilities; or as a means of moving forces closer to tactical assembly areas dependent on threat force capabilities. Also called LOTS operations (JP 4-01.6).

operational reach

(DOD) The distance and duration across which a joint force can successfully employ military capabilities (JP 3-0).

responsiveness

The ability to react to changing requirements and respond to meet the needs to maintain support (ADP 4-0).

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By Order of the Secretary of the Army

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