



**MAINTENANCE
OF
WATERFRONT
FACILITIES**

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FOREWORD

This manual prescribes the criteria and procedures for inspection, maintenance, and repair of waterfront facilities at military installations. It establishes maintenance standards for and provides guidance for the selection, use, and installation of standard materials and equipment that will perform satisfactorily.

The use of the systems and procedures described in this publication, by personnel who have the responsibility for specifications, requisitions, procurement, inspection, storage, issue, application, and safety, should assure uniform, economical, and satisfactory maintenance and repair. When information in this publication varies from that contained in the latest issue of Federal or Military Specifications, the(se) Specification(s) shall apply. Reference to Federal, Military, or other Specifications is to the current issues of these specifications as identified by their basic number(s). In case of doubt, advice concerning any procedure may be obtained from:

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- (2) Department of the Navy Naval Facilities Engineering Command (1013) or its geographic Engineering Field Division (102)
- (3) Department of the Air Force Directorate of Engineering and Services AF/PRE

Recommendations or suggestions for modification, or additional information and instructions that will improve the publication and motivate its use, are invited and should be submitted through appropriate channels to the addresses listed above.

This publication supersedes Army TM-5-622 of 13 June 1946 and NAVDOCKS MO-104 of July 1963. It is certified that it has been reviewed and approved for official use in the Navy in accordance with Secretary of the Navy Instruction 5600.16.

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CHAPTER 1 - INTRODUCTION

SECTION 1. GENERAL

1.1.1 PURPOSE. This manual is a guide for military personnel and civilian forces who are concerned with the maintenance and repair of waterfront structures and related facilities.

1.1.2 SCOPE. This manual, together with References 1-1, 1-2, and 1-3, describes the principal causes of deterioration and failure of waterfront structures and facilities and prescribes measures for the maintenance and repair of these installations to retain them in continuous readiness for use by the Fleet and in military marine operations. The scope of the maintenance and repair shall be governed by the present and proposed future use of the structures and facilities, their anticipated life, and the cost of repair as compared to complete rebuilding.

1.1.3 COOPERATION AND COORDINATION.

1.1.3.1 Intraservice Functions. Cooperation and coordination of waterfront maintenance activities among

the installation departments concerned should be continuous. Programs of properly planned and executed maintenance operations prevent undesirable interruptions of production on military installations. Measures for the protection of supplies in storage must be coordinated with the storage service primarily responsible for the care and preservation of stored items. Supply officers, through normal channels, provide standard items of materials and equipment for waterfront maintenance.

1.1.3.2 Interservice and Interdepartmental Functions. Cooperation and coordination in conducting waterfront maintenance are encouraged at all levels of command. Appropriate liaison should be established and maintained between major commands and installations in a geographical area. Cross-service assistance shall be provided as necessary in the interests of economy and maximum utilization of manpower and equipment.

SECTION 2. JOINT SERVICE RESPONSIBILITY

1.2.1 ARMY. Staff, command, and technical responsibility for maintenance and repair of waterfront structures at Army installations will conform to assignments set forth in AR 420-10 [1-4].

Requests for assistance should be forwarded through channels to the Director of Facilities Engineering, DAEN-FEZ, Office, Chief of Engineers, Forrester Building, Washington, D.C. 20314.

1.2.2 NAVY.

1.2.2.1 Naval Facilities Engineering Command. The Naval Facilities Engineering Command is responsible for the provision of services to the operating forces of the Navy in regard to shore facilities and related engineering material and equipment. This Command provides technical support, advice, and assistance regarding maintenance of grounds, buildings, and structures and related services. This authority is delegated to the Commanders and Commanding Officers of NAVFAC's Engineering Field Divisions (EFDs) who provide overall technical guidance in operations and maintenance matters to these shore installations.

1.2.2.2 Commanding Officer. The Commanding Officer at each Naval shore installation is responsible for providing an adequate maintenance program. These responsibilities are usually delegated to the Public Works Centers or Public Works Departments, as appropriate.

1.2.2.3 Public Works Center/Public Works Department. At each Naval and Marine Corps Installation, the Commanding Officer of a Public Works Center or the Public Works Officer is responsible to the activity Commanding Officer for the provision of:

(1) Inspections and surveys to determine and identify defective conditions (NAVFAC MO-322 [1-5] sets up guidelines for inspection. It includes guides, check-off forms, reports, and record systems to be used in the program.)

(2) Recommendations for maintenance standards and procedures that affect industrial production or military operations.

(3) Dynamic Equipment Inspection/ Service (preventive maintenance) programs

(4) Trained and qualified personnel to accomplish effective maintenance

(5) Periodic supervisory personnel training, education, and certification in maintenance programs that utilize work improvement maintenance techniques.

(6) Inspections and instructions to assure that labor, materials, and equipment are used properly and safely in accordance with pertinent regulations, and that operations are planned and supervised by qualified personnel.

(7) Coordination with civilian and other governmental agencies that have similar maintenance capabilities.

1.2.2.4 Engineering Field Divisions. Design and assistance for maintenance and repair are available at NAVFAC's Engineering Field Divisions. They also have special expertise and responsibilities for wood preservation. They can provide the latest available information on specifications and procedures for wood preservatives and treatments.

1.2.3 AIR FORCE.

1.2.3.1 Directives. Policy and standards for the maintenance, repair, and minor construction of waterfront structures are set forth in Air Force Manuals 85-1 and 86-1 [1-6, 1-7].

1.2.3.2 Major Command Level. Design and assistance for maintenance and repair are available at each Major Command. Each major command will:

(1) Insure that effective preventive and corrective maintenance measures are established and accomplished at all installations under its jurisdiction.

(2) Provide qualified technical supervision for personnel engaged in these operations.

(3) Provide for training of personnel engaged in maintenance.

(4) Make certain that base civil engineer personnel engaged in direct field supervision of maintenance operations, or those who function independently of direct supervision, are technically competent and thoroughly familiar with the performance of all phases of this activity, as outlined in this

publication.

1.2.3.3 Air Force Installations. The Base Civil Engineer will:

(1) Plan, initiate, and supervise the execution of maintenance.

(2) Insure that in-house maintenance personnel are trained.

(3) Investigate the occurrence of and reasons for failures and accidents.

(4) Inspect and determine the effectiveness of safety measures.

SECTION 3. MAINTENANCE STANDARDS, POLICIES, AND CRITERIA

1.3.1 STANDARDS. The standards or criteria contained in this manual have been developed by the Army, Navy, and Air Force with the concurrence and approval of the Assistant Secretary of Defense (I&L). Compliance with these standards is mandatory in order that the maintenance of waterfront facilities at military installations will be uniform, will adequately support the operational missions of the installations, and will permit interservice assistance and support, where possible, in the interest of efficiency and economy.

1.3.2 ENGINEERING. The need and accomplishment of major repairs and rehabilitation of existing waterfront facilities will be based on experience, judgment, and/or engineering evaluation. When waterfront structures are in an inactive status, the maintenance policies will be consistent with the anticipated future mission of the installation and in accordance with the inactivation plan.

The services of qualified technical personnel will be used to assist in the establishment of waterfront maintenance programs. A glossary of waterfront terms is provided in the back of this manual.

1.3.3 RELATED PUBLISHED MATERIAL.

Requirements for the design and construction of waterfront facilities are found in References 1-2, 1-3, and 1-8 through 1-13. References 1-14 and 1-15 are manuals prepared by the American Association of Port Authorities on port design and construction and on port maintenance, respectively. Reference 1-16 is especially important relative to inspection of waterfront structures. Reference to other published materials, which provide related or more extensive information on specific areas of waterfront maintenance, is made where appropriate throughout this manual and its Appendixes.

SECTION 4. TERMINOLOGY

1.4.1 PRIMARY CONSIDERATIONS. The upkeep of waterfront structures and other harbor facilities falls into the following areas of consideration: (1) Inspection, (2) Maintenance, (3) Repair and Reconstruction, and (4) Control of Marine Organisms.

1.4.1.1 Inspection. Inspection is the act of checking, visually and mechanically, the condition of facilities. This inspection should be performed on a routine basis, as indicated in this manual. The evaluation of the inspections will determine the degree of hazard involved with each structure. This degree of hazard will be used to determine the priority sequence of repair and the extent of repair required.

1.4.1.2 Maintenance. Maintenance is the recurrent day-to-day, periodic, or scheduled work that is required to preserve or restore a facility to such a condition that it can be effectively utilized for its designed purpose. It includes work undertaken to prevent damage to or deterioration of a facility that otherwise would be more costly to restore. Drainage is the single most important maintenance procedure. Water on, in, below, above, or anywhere near a structure creates special maintenance problems.

1.4.1.3 Repair and Reconstruction. Repair is the restoration of a facility to such a condition that it can be effectively utilized for its designed purpose. The repair is accomplished by overhaul, reprocessing, or replacement of constituent parts or materials that have deteriorated by action of the elements or usage and have not been corrected through maintenance. Repair can be incorporated in a concurrent modernization program.

1.4.1.4 Control of Marine Organisms. This control begins with the use of materials resistant to marine organisms when waterfront structures and other harbor facilities are designed and constructed. The control is a continuing requirement involving the taking of all known corrective measures and providing effective countermeasures to inhibit the growth of destructive organisms in waterfront facilities.

1.4.2 TYPES OF STRUCTURES. Waterfront facilities are structures and facilities that provide service for:

- (1) Transferring ordnance, other cargo, and passengers
- (2) Refueling ships
- (3) Storing goods
- (4) Supplying utilities to home-based vessels
- (5) Berthing, constructing, overhauling, and repairing ships
- (6) Conducting military marine operations
- (7) Protecting the shoreline

1.4.2.1 Pier. A pier (Figure 1-1) is a deck structure supported above the water on piles (open type), a solid-fill structure retained by bulkheads (closed type with apron), or a combination of the two. It extends outward from the shore into a harbor or other navigable waters to permit berthing along one or both sides of its length.

1.4.2.2 Wharf. A wharf or quay (Figure 1-2) is a deck structure supported above the water on piles (open type),

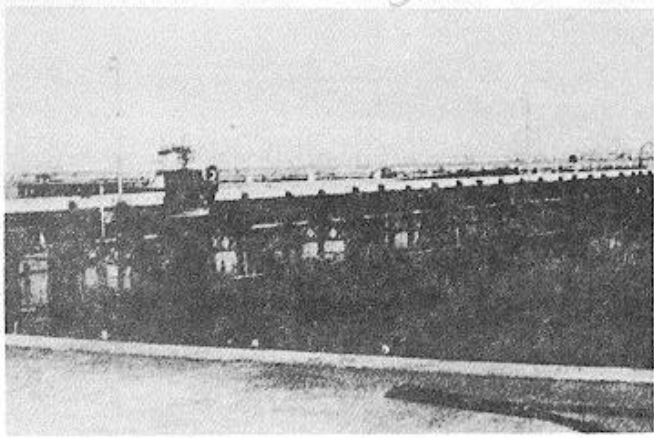


Figure 1-1. Open-type pier.

a solid-fill structure retained by bulkheads (closed), or a combination of the two. It runs parallel to the shore and is connected to it at more than one point (usually continuously) to provide berthing normally along one side.

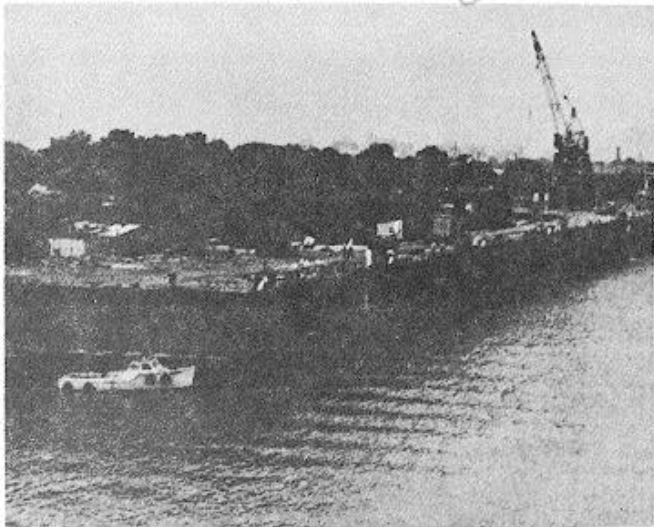


Figure 1-2. Example of a wharf.

1.4.2.3 Dolphin. A dolphin (Figure 1-3) is a structure usually consisting of one or a group of piles. It is placed near piers and wharves or in turning basins and ship channels (1) to guide vessels into their moorings, (2) to fend vessels away from structures, shoals, or the shore, (3) to support navigation aids, or (4) to moor a vessel.

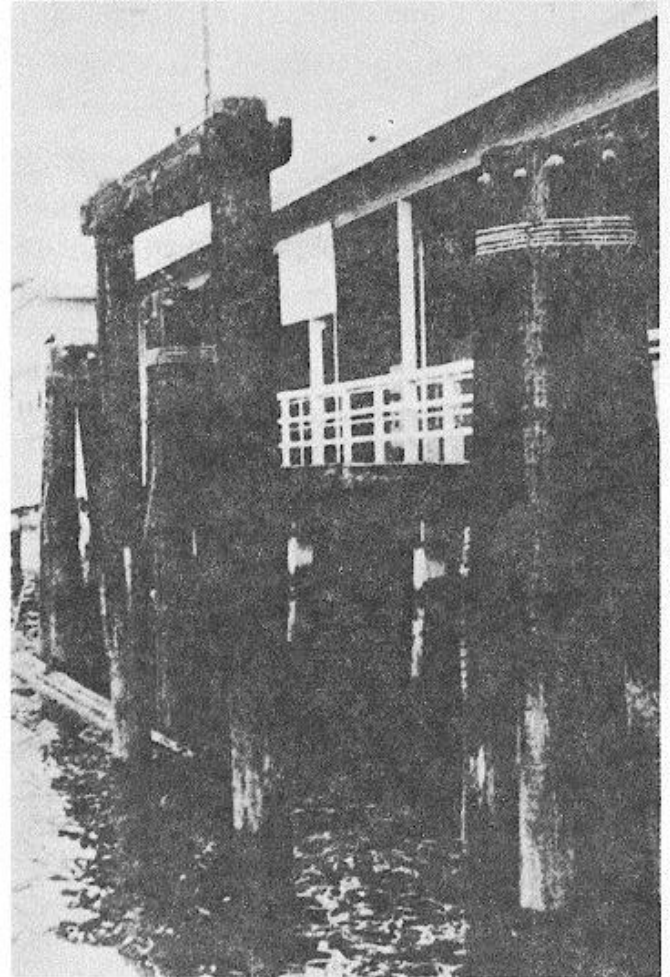


Figure 1-3. Example of a dolphin.

1.4.2.4 Fleet Mooring. A fleet mooring is an offshore ship anchoring system that consists of a ground tackle arrangement of chain or cable, sinkers, and anchors or other holding devices placed on the bottom of an anchorage. It is connected by means of a riser chain (or chains) to a buoy (riding on the surface of the water) whereby a ship can be made fast to the buoy. Maintenance of fleet moorings is described in Reference 1-17; it is mentioned in this manual only to identify fleet moorings as an important type of waterfront structure requiring regular maintenance.

1.4.2.5 Drydocking System. A drydocking system is a facility for exposing the normally underwater portion of a ship for construction, inspection, modification, repair, or

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