NOTE: MIL-STD-1625 has been redesignated as a Standard Practice. The cover page has been changed for Administrative reasons. There are no other changes to this Document.

MIL-STD-1625C(SH)
25 August 1987
SUPERSEDING
MIL-STD-1625B(SH)
31 August 1984
(See 10.3)

DEPARTMENT OF DEFENSE
STANDARD PRACTICE

SAFETY CERTIFICATION PROGRAM FOR DRYDOCKING FACILITIES AND SHIPBUILDING WAYS FOR U.S. NAVY SHIPS

AMSC N/A FSC 1950

DEPARTMENT OF THE NAVY
NAVAL SEA SYSTEMS COMMAND

Washington, DC 20362-5101

Safety Certification Program for Drydocking Facilities and Shipbuilding Ways for U.S. Navy Ships.

1. This Military Standard is approved for use by the Naval Sea Systems Command, Department of the Navy, and is available for use by all Departments and Agencies of the Department of Defense.

2. Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Commander, Naval Sea Systems Command, SEA 55Z3, Department of the Navy, Washington, DC 20362-5101 by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

FOREWORD

1. The Safety Certification Program (SCP) for drydocking facilities and shipbuilding ways, including transfer facilities, has been established to ensure the safety of U.S. Navy ships which are to be drydocked or built on these facilities. The procedure entails an evaluation and approval of data associated with the design, physical condition, and operation of the facilities. This procedure is described in detail in this Military Standard (hereinafter referred to as the "standard").

2. The certification procedures, contents of certification reports, and technical requirements for certification are described in this standard. The SCP description and general certification requirements are provided in section 4. Detailed technical requirements are described in sections 5 through 9.

3. This document is applicable for certifying Navy-operated and commercially-operated drydocking, building, and launching facilities: but does not necessarily reflect all of the design requirements of dry docks, building ways or launch ways which are required by new design ship specifications.

4. The certification of a facility is based upon the evaluation of the facility data provided for certification by the operating activity. The operating activity remains solely responsible for maintaining and operating the facility in a safe manner and condition.

5. Certification of U.S. Navy dry docks leased to commercial operators should be obtained by the operator prior to docking Navy ships. The Navy is not responsible for providing or preparing certification data. Certification of the dock is not required for docking non-Navy ships.

6. In any safety program, there is the need for a strong position regarding the training of personnel. Training programs should ensure that new personnel are adequately qualified to perform their assigned functions and that every person has a sound knowledge of how their work station interacts with others. The programs should also have provisions for qualified personnel to periodically review the responsibilities and qualifications of their work stations, and for retraining or requalification whenever new procedures or operations are introduced.

7. Where terms are used herein such as "submitted", "submitted to the Navy", "provided to the Navy", or "made available for Navy review", the recipient is intended to be:

(a) The Naval Sea Systems Command (Industrial and Facility Management Directorate) when a Navy shore or fleet activity is submitting the certification report for its own drydocking facility.
(b) The supervisor of shipbuilding, or other designated Navy representative, when a U.S. Navy contractor is submitting the certification report for his own or leased drydocking facility.

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1. SCOPE

1.1 Scope of the safety certification program (SCP). The purpose of the SCP is as follows:

1.1.1 Purpose. The purpose of the SCP is to ensure the safety of U.S. Navy ships during docking and undocking operations and while in dock. It also relates to the safety of ships under construction and during launching operations. The capacity of the facility as designed is to be ascertained, as well as the current physical condition of the facility with regard to its foundations, structure, and supporting auxiliary systems, including those for ship protection. Also included is an assessment of operating procedures, manning and personnel qualification procedures, and maintenance procedures supporting operational reliability.

1.1.2 Limitations of SCP scope. The scope of the SCP excludes the following; however, compliance in these areas may be under the cognizance of other Government agencies:

(a) Personnel safety. Requirements of agencies, such as the Occupational Safety and Health Administration.
(b) Mechanical handling system. Safety requirements in the design and operation of equipment, such as cranes.
(c) Pollution control systems. Pollution control systems, such as those required by the Environmental Protection Agency.
(d) Service systems. Facility subsystems which are installed solely to provide habitability and housekeeping services to the ship, such as potable water and steam for heating and galley. The facility subsystem raw and salt water is included in the scope of SCP to the extent that it supports ship protection systems.
(e) Industrial systems. Systems used in industrial services, such as welding or abrasive blasting.

1.2 Facilities included in SCP. Facilities included in SCP should be in accordance with 1.2.1.

1.2.1 Size. There is no lower limit on the size of facilities which may be certified under the SCP. However, in order to provide regulatory flexibility at the lower end of the scale, a two-tier classification is established so that facilities having a capacity of 500 long tons or less have reduced requirements for documentation of Facility Certification Reports (FCRs) and Facility Recertification Reports (FRRs). More extensive requirements for such documentation apply to facilities having a rated capacity of more than 500 long tons. This gradation of documentation requirements does not imply a lessening of safety considerations at any facility.

1.2.2 Type. Floating docks, graving docks, marine railways, vertical lifts, conventional inclined building ways, and building ways employing modular construction methods are included in the SCP.

1.2.2.1 Nonpermanent facilities or facilities of unusual design. Nonpermanent facilities or facilities of unusual design used for performing functions similar to those of the facilities referenced in 1.2.2 are also covered by the SCP. The process leading to certification of nonpermanent facilities or unusual facilities will normally be conducted more expeditiously and economically by submission and review of a preliminary FCR as indicated in 4.3.2.

1.2.3 Facilities located abroad. Facilities located outside the U.S. are included in the SCP only if they are operated by the U.S. Navy.

1.2.4 Facilities for nuclear-powered ships. This standard serves as a certification document for docking U.S. Navy ships. Additional requirements which are appropriate solely to docking nuclear-powered ships will be invoked by the Navy to supplement the requirements herein.

2. REFERENCED DOCUMENTS

2.1 Government documents. The following Government documents form a part of this standard to the extent specified herein.

PUBLICATIONS

NAVAL SEA SYSTEMS COMMAND (NAVSEA)
- 0901-LP-480-0015 - Piping Systems.
- S9086-C6-000/CH096 - Weights and Stability.
- S9086-7G-000/CH997 - Docking Instructions and Routine Work in Drydock.

NAVAL FACILITIES ENGINEERING COMMAND (NAVFAC)
- P-355 - Seismic Design for Buildings.
- P-355.1 - Seismic Evaluation of Supports for Existing Electrical-Mechanical Equipment and Utilities.
- DM-29.1 - Graving Drydocks.
- DM-29.2 - Marine Railways.
- DM-29.3 - Drydocking Facilities Characteristics.

(Copies of publications required by contractors in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting officer.)

2.2 Order of precedence. In the event of a conflict between the text of this standard and the references cited herein, the text of this standard shall take precedence.

3. DEFINITIONS

3.1 Acronyms and abbreviations. The acronyms and abbreviations listed in this standard are defined as follows:

(a) CRC - Certified rated capacity
(b) FCR - Facility certification report
(c) FRR - Facility recertification report

(d) GM - Metacentric height
(e) KG - Vertical center of gravity above the keel
(f) LCG - Longitudinal center of gravity
(g) LCB - Longitudinal center of buoyancy
(h) LT - Long tons
(i) NAVFAC - Naval Facilities Engineering Command
(j) NAVSEA - Naval Sea Systems Command (Industrial and Facility Management Directorate)
(k) NDT - Non-destructive testing
(l) NSTM - Naval Ships' Technical Manual
(m) SCP - Safety Certification Program
(n) SUPSHIP - Supervisor of Shipbuilding, Conversion and Repair, USN
(o) VCG - Vertical center of gravity

3.2 Definitions of special terms. The following definitions shall be used in this standard.

(a) Configuration control procedures. The configuration control procedures are the procedures used to systematically evaluate, coordinate, approve (or disapprove), and accomplish changes after the baseline certification.
(b) Control inspection. A control inspection is an inspection composed of planned and scheduled examinations and tests to determine conditions of a facility and its equipment with respect to their abilities to perform all functions for which they were separately and interrelatedly designed; and to determine the need for repairs, alterations, or changes to ensure the material readiness of a facility to carry out its design functions.
(c) Correction of deficiencies. Correction of deficiencies is the act of restoring a facility to a condition equivalent to its original or design function, capacity, and efficiency by repair, overhaul, replacement or alteration.
(d) Deviation. A deviation is the departure from a specific requirement of this standard when adequate compensating features, as determined by the U.S. Navy, are provided in lieu of meeting this requirement.
(e) Facility. A facility is a physical plant for drydocking or building and launching ships.
(f) Facility operations supervisor. The term facility operations supervisor will be used herein to designate the dockmaster, docking officer, launching superintendent, or other title used to indicate an individual responsible for supervising the operations of a facility covered by this standard.
(g) Graving dock launch pontoon. A graving dock launch pontoon is a pontoon which is captive in a graving dock and never leaves this protective location; it is lowered not by flooding, but by lowering the water in the graving dock. Certain damage, weather, and operational considerations which apply to launch pontoons do not apply to graving dock launch pontoons because of their different construction and operation.

(h) Launch pontoon. A launch pontoon is a floating dry dock utilized for launching ships, that moves from the ship transfer site to a submergence site.

(i) Lay period. A lay period is the period between the docking and undocking evolution, during which a ship is in the facility.

(j) Light dock operating condition. The light dock operating condition for a floating dry dock is the dock with all ballast tanks pumped down to the residual water level. The dock weight in this condition includes the weight of the keel and bilge blocking system up to a horizontal plane formed by the top of the keel blocks at the standard height used for the maximum ship intact stability calculations.

(k) Margin line. A margin line is a line not less than 3 inches below the top wingwall deck at the side, defining the highest permissible location on the side of a floating dry dock of any waterplane in the final condition of sinkage, trim, and heel.

(l) Operator. An operator is a commercial or Naval shipyard, or Naval activity operating a facility, applying for certification.

(m) Preventive maintenance. Preventive maintenance consists of periodic examination, lubrication, minor adjustment, and minor repair of items to ensure the continuous operation and safety of a facility and its equipment.

(n) Seismic zone. A seismic zone is a system for indicating the probability and severity of earthquakes within a designated area. An arbitrary scale of 0 through 4 is used, together with an adjective description of the likely extent of damage. NAVFAC P-355 contains contour maps showing the seismic zone classification of various land areas.

(o) Sill of the stern (or bow) gate of a closed-ended dock. The sill of a gate is the upper surface of the dock structure against which the bottom of the gate makes contact.

(p) Small facility. A small facility is one with a CRC of less than 500 LT.

(q) Survey. A survey is the thorough evaluation of the material condition and operational capabilities of the facilities.

(r) Surveyor. A surveyor is the engineering firm or classification society selected by an operator to perform surveys, tests and trials of the facility.

(s) Ton. A ton is the weight unit used interchangeably with LT in the field of naval architecture; equal to 2,240 pounds.

4. GENERAL REQUIREMENTS

4.1 General. This section provides an overview of the SCP, general requirements for certification of drydocking facilities and building ways, and requirements for operation of certified facilities.

4.2 SCP overview. The SCP is described in 4.2.1 through 4.2.10.

4.2.1 Certification process. The certification process is initiated by submission of a certification report to the Navy by an operator. Based upon an evaluation of the data submitted, the Navy decides to certify or not to certify the facility and so advises the operator. Requirements for the format and contents of a certification report are described in appendix A. These include historical data, design data, maintenance procedures, manning and operating procedures, material condition survey results and proposed repairs. If the Navy's review of the certification report supports certification, a facility certification shall be issued stating the maximum docking capacity for which the facility is certified, loading limitations, duration of the certification period, and the conditions for sustaining certification.

4.2.2 Certification renewal and recertification. If a facility is significantly modified, such as a change which affects docking capacity, if the certification expires, or if it has been determined that the existing certification report is inaccurate, the operator shall reapply for certification by submitting a revised certification report. The certification of a facility may be renewed if an FRR submitted by the operator indicates that the facility remains certifiable. The FRR shall be submitted at least 4 months before the certification expiration date if the recertification is to be completed by the certification expiration date.

4.2.3 Maintenance program. The certification period of a facility may be extended by implementing a maintenance program prepared in accordance with 4.10 and demonstrating that the facility is properly maintained and operated. For Navy owned and operated docking facilities, the maintenance program is compulsory.

4.2.4 Key items in certification: capacity, limitations and duration. Capacities, limitations and duration shall be as follows:

4.2.4.1 CRC. This is the maximum allowable displacement in LT for a Navy ship on a certified facility. There is a certain comparative convenience in expressing capacity in terms of a single number displacement tonnage. However, in addition to tonnage, certain facilities may be described in more refined terms by specifying allowable line loading, such as tons per unit length; or area loading, such as tons per square foot. Use of such additional descriptors may be applicable.

4.2.4.2 Operational limitations for a particular ship docking, building or launching. In conjunction with the CRC, the Navy may impose additional operational limitations on a certified facility if considered necessary to ensure the safety of the ship.

4.2.4.3 Sustaining certification. After certification, the operator shall assure that the facility remains in the "as certified" condition, with full consideration being given to normal wear and tear for the period of certification. Sustaining data may be developed from the data and information obtained from the maintenance program (see 4.10.3). The Navy may require certain facility repairs or modifications to be completed within a specified time frame as a condition for sustaining certification. The Navy retains the right to inspect the facility if information is received which indicates that unsafe conditions exist or that unsafe procedures are in effect.

4.2.4.4 Certification period. The certification period is the duration for which a certificate remains valid. It depends on the condition of the facility, but does not exceed 5 years, commencing from the completion date of the material condition survey. The certification may be either renewed, by submitting an FRR; or extended, by selecting the maintenance program. The certification period for those facilities where the material condition survey is not completed within 1 year will be determined on a case basis.

4.2.5 Changes affecting certification status. Changes affecting certification status are as follows:

4.2.5.1 Policy. The Navy reserves the right to suspend or cancel a facility's certification or to alter it by revising items listed in 4.2.4.1 through 4.2.4.4 under any one of the following conditions:

(a) The facility is damaged or significantly altered after certification to such an extent that safety is impaired or the physical dimensions are modified.
(b) New information emerges which shows that the facility is unsafe.
(c) Conditions described in 4.2.4.1 through 4.2.4.3 are violated.
(d) The manning and operating procedures specified in the approved certification reports are violated.
(e) The reporting requirements of 4.2.7 are not met.

4.2.5.2 Suspension and cancellation of certification. If the Navy determines that a facility certification is to be suspended or cancelled (other than a temporary suspension as described in 4.2.5.3), the Navy will advise the facility operator of its intent to suspend the certification. Normally, the operator will be allowed 2 months to respond. However, the Navy may require a more expeditious reply if the situation warrants. The decision to suspend or cancel the certification will be made by NAVSEA after a review of the facts in the matter and of the operator's response.

4.2.5.3 Temporary suspension of certification. Certification for a facility will be temporarily suspended if a facility is moved from the geographical location for which is was certified; or if the facility is undergoing major repairs or modifications which will significantly alter the facility to such an extent that safety of the ship or dock is affected, the certified capacity is changed, or the physical dimensions are modified.

4.2.5.3.1 Facilities that have been relocated will have their certifications temporarily suspended from the time the facility is moved from the certified site until such time as certification data required for the new location is approved by the Navy. For floating dry docks, this data shall include a report on the post-transit hull inspection, a submergence test, and any applicable changes to the certification report; for example, manning procedures and personnel qualification criteria (see 4.7), operating procedures (see 4.8), protection of a ship during the lay period (see 4.9), electrical power systems (see 5.3.6), communication system (see 5.3.8), mooring and anchoring (see 5.3.11), fire protection system (see 5.3.14), and hydrographic survey (see 5.6.9).

4.2.5.3.2 Facility certification will be temporarily suspended from the commencement of overhaul until review and approval of a post-overhaul report by the cognizant Fleet Commander, SUPSHIP, or Naval Shipyard Commander. (Overhaul is when a drydocking facility undergoes repair to the extent that docking operations are terminated for over 180 calendar days.) The post-overhaul report shall be submitted by the operator via the chain of command and shall include the following:

(a) The material condition is satisfactory to drydock ships within the certification limitations.
(b) The personnel qualification procedures and manning procedures are adequate, and the assigned operating personnel are trained.
(c) The operating procedures are validated.
(d) The methods and procedures for protection of a ship during the lay period are current and adequate.

4.2.6 Facility modifications after certification. If the operator chooses to modify his facility, the following shall be submitted:

(a) An intended design change report describing the proposed change and modification dates and the effect of this change on the facility's capacity.
(b) A revision to the certification report after completion of the change, containing updated design data and new capacity of the facility, as appropriate. In addition, the operator shall submit the revised manning, operational limitations, and operating procedures compatible with the physical modifications.
(c) Report on the completion of the scheduled change, if not included in the revised certification report.

4.2.7 Reporting requirements. The operator of a certified facility shall make a report to the Navy if:

(a) The facility is modified to the extent that the basic design or capacity is changed (see 4.2.6).
(b) Key personnel changes occur (see 4.2.8).
(c) The operating procedures are modified or the manning is revised (see 4.2.9).
(d) Repairs or modifications prescribed in the activity's corrective action and monitoring plan are completed (see 4.5.5).
(e) Incident or accidents occur (see 4.8.3).

4.2.8 Key personnel changes. The operator shall report key personnel changes to the Navy within 2 weeks of any change of status of any individual for whom a facility operations supervisor qualification certificate has been issued or upon the initial designation and certification of any new facility operations supervisor (see 4.7.2).

4.2.9 Changes in operating procedures. Changes in operating procedures shall be reported to the Navy before these changes are put into operation for handling Navy vessels under any of the following conditions:

(a) The procedures are being altered because of changes in facility design and manning.
(b) The procedures are being changed because of an incident of the type described in 4.8.3.1.

4.2.10 Certification alteration. After reviewing any change report, the Navy may, at its discretion, alter or suspend certification as indicated in 4.2.5.

4.3 Certification reports. Certification reports shall be as described in 4.3.1 through 4.3.4.2.

4.3.1 Types. There are three types of certification reports:

(a) A preliminary FCR whose purpose is defined in 4.3.2.
(b) An FCR submitted for the initial certification of a facility.
(c) An FRR submitted for renewal of certification.

4.3.2 Preliminary FCR. Preliminary FCR shall be as follows:

4.3.2.1 Purpose. A preliminary FCR may be submitted to obtain concurrence from the Navy on certification requirements proposed by the operator for certification of nonpermanent facilities or facilities of unusual design. A preliminary FCR may also be submitted to obtain a ruling from the Navy on requested deviations which are considered necessary by the operator and which can be justified as specified in 4.3.2.2. Additionally, a preliminary FCR may be submitted for guidance from the Navy on the contents of the design data package to be generated and included in the FCR, when a significant portion of the facility's original design data is missing.

4.3.2.2 Content. The preliminary FCR shall be written in the form of a concise, self-contained proposal, providing the necessary background information and justification for the proposed requirement changes and FCR content. The initial submittal of the document to NAVSEA shall be as complete as possible in order to keep the time required for a complete review to a minimum. In case of nonpermanent facilities or facilities with unusual design, the operator shall propose certification criteria which reflect the special design and operating conditions of the facility. If deviations are requested, the operator shall demonstrate in the preliminary FCR the necessity for the deviation, shall thoroughly describe compensating design and operating features, and shall demonstrate that safety will be preserved.

4.3.2.3 Format. For format requirements, see appendix A, 20 through 20.5.

4.3.2.4 Submission. For submission requirements, see 4.3.3.5.

4.3.3 FCR. The FCR shall be as follows:

4.3.3.1 Content. FCR contents are described in 30 of appendix A.

4.3.3.2 Responsibility. The operator is responsible for preparation of the FCR and the accuracy of its contents.

4.3.3.3 FCR preparation. For general guidance, typical steps leading to certification are described in appendix B.

4.3.3.4 Proprietary data. None of the data submitted by the contractor solely for the purpose of use by the Government in the certification review of the contractor's dry dock shall be made available to anyone in the Government not having a legitimate interest.

4.3.3.5 FCR submission. The operator of a Navy facility shall submit five copies of the FCR to NAVSEA. The operator of a commercial facility shall submit six copies of the FCR to the cognizant SUPSHIP, who will retain one copy and forward five copies to NAVSEA (the additional copies will permit a more rapid review). For planning purposes, it may be estimated that the Navy review process of an FCR will require 4 months.

4.3.3.6 Revisions. The operator is required to respond to Navy requests for additional data during the FCR review. Additional data shall be submitted to the Navy in a form that can be inserted into the certification report binder similar to a certification report revision described in 30.2.5 of appendix A.

4.3.3.7 Retention. A copy of the certification report shall be retained at the facility at all times and shall be available for use by the facility operations supervisor and other personnel.

4.3.4 FRR. The FRR shall be as follows:

4.3.4.1 Content. The FRR contents shall be derived from appendix A by revising only those sections and enclosures necessary to update information provided in the FCRs and any FRRs previously submitted. As a minimum, the FRR shall include an update of historical data (see appendix A, 30.4.1) and the results of a new material condition survey, including an update of hydrographic data (see appendix A, 30.4.8).

4.3.4.2 Other requirements. The requirements for FRR shall be responsibility, preparation, proprietary data, submission, and revisions as specified in 4.3.3.2 through 4.3.3.6.

4.4. Surveys. Surveys shall be conducted in accordance with 4.4.1 through 4.4.6.

4.4.1 Role of surveys. Review of survey results plays a major role in the Navy's decision on certification.

4.4.1.1 Facilities constructed under the supervision of classification societies or the U.S. Navy. The operator of drydocking facilities which have been constructed within 2 years preceding the date of certification report submission may not have to submit results of a material condition survey unless considered appropriate by NAVSEA. These facilities shall include those constructed under the supervision of an approved classification society which have been issued a certificate of class, or under Navy in-process inspection and inspection by the Board of Inspection and Survey.

4.4.2 Requirements for surveys. The survey requirements shall include:

(a) Surveys of structural components, including soil and foundations, where necessary. Structural analyses with reduced member properties shall be submitted when the material condition survey shows deterioration to such degree that the ability of a facility to function safely at the design capacity is impaired.
(b) Hydrographic surveys.
(c) Surveys of site characteristics and land-based support systems for electrical power supply and fire protection.
(d) Tests and component surveys of:

(1) Electrical and mechanical systems, including pumps, valve mechanisms, closures, and ship handling equipment.
(2) Control systems (such as gauges, indicators and alarms) and communication systems.
(3) Ship transfer systems, where applicable.

(e) Observation of the facility in operation during docking, undocking, launching, or ship transfer, when it can be scheduled.

4.4.2.1 Responsibilities of the operator. The operator shall be responsible for:

(a) Preparing and making available all spaces to be inspected, to enable the survey team to carry out its task efficiently and safely. For floating docks, regardless of the size, bottom plating in every ballast tank and buoyancy chamber shall be exposed for thorough visual inspection and NDT thickness measurement.
(b) Including the survey report in the initial certification report submittal. The maximum allowable time period between the survey and the issue date of certification shall be 2 years. The survey report shall be submitted at least 4 months prior to the requested certification date to allow review by NAVSEA.
(c) Advising NAVSEA at least 30 days in advance of scheduled survey to allow for a concurrent visit by a Navy technical representative, if desired by NAVSEA.

4.4.3 Surveyor. Requirements for the surveyor shall be as follows:

4.4.3.1 Selection. The facility operator shall choose an engineering firm or classification society (hereinafter referred to as the "surveyor") to conduct surveys. If an engineering firm is chosen, the firm and its personnel shall be legally unaffiliated with the facility operator.

4.4.3.2 Tasks. The surveyor's tasks are summarized in appendix B. In addition to conducting surveys, the surveyor shall be responsible for:

(a) Evaluating results of the surveys.
(b) Recommending corrective actions.
(c) Recommending certified rated capacity.

(d) Evaluating the adequacy of the corrective action plan and monitoring plan, if requested by the operator (optional item).

4.4.3.3 Qualifications of surveyor. The qualifications of the surveyor and the members of the survey team shall be stated in the certification report. An individual team member making the survey of a floating dry dock shall have experience in the design of floating dry docks, the operation of such docks, or in ship surveying (steel, concrete, or timber, as appropriate). An individual team member making the survey of a graving dock, marine railway, vertical lift, or building way, shall have experience in the design, operation, or surveying of that type of facility or similar type of structure. An individual with experience in soil mechanics shall be a member of a team surveying a graving dock. An individual team member for the underwater portion of the survey of a floating dry dock shall have experience in at least two of the following areas: underwater salvage work, ship surveying, and underwater maintenance and repair of materials appropriate to the facility. A diver meeting the requirements of a recognized classification society for similar underwater inspection in lieu of drydocking survey shall be considered to be qualified. The team shall be composed of at least one member with experience in at least two of the previously mentioned appropriate areas. The surveyor shall be experienced, qualified, staffed, and equipped to perform tasks described in 4.4.3.2 on facilities of the type to be surveyed. The surveyor may use services of subcontractors specializing in areas such as soil mechanics or underwater surveys. Qualifications of any subcontractor utilized shall be listed in the certification report.

4.4.4 Evaluation of survey results. Survey reports shall be evaluated as follows:

4.4.4.1 Classification of items surveyed. The results of a facility survey shall appear in enclosure VIII (see 30.1 and 30.4.8 of appendix A) of the certification report. Each item listed therein shall be given a classification rating. The items surveyed shall be classified as follows:

(a) Satisfactory. The condition of the item will not result in system damage and, based on measured or estimated deterioration rate, it may be expected to remain satisfactory during the requested certification period.
(b) Unsatisfactory. The condition of the item may cause system damage or loss and must be repaired or replaced prior to handling a Navy ship in the facility.
(c) Marginal. The condition of the item will not result in major damage nor, by itself, will it make the facility unsafe to dock a ship of the certified rated capacity, provided it is repaired or replaced during the certification period in accordance with the corrective action plan submitted by the operator. A number of such items as a group can make the facility unsafe.

4.4.4.2 Surveyor reporting responsibilities. The surveyor shall provide a descriptive comment regarding items classified as marginal or unsatisfactory. The surveyor's recommendations for corrective action regarding each of these items and the CRC shall be provided. The surveyor's reports shall also include a listing of major equipments inoperative at the time of the survey. All survey

reports shall contain a summary evaluation of the material condition of the dock and a statement indicating whether the facility is considered safe or unsafe to dock ships of the recommended CRC. In making this determination, items having a material rating of marginal shall be considered as a group to determine if, collectively, the items constitute an unsafe condition. Material condition of a facility shall not be evaluated as safe or satisfactory if one or more 'unsatisfactory' items appear in the inspection checkoff lists.

4.4.4.3 Corrosion criteria. The acceptance criteria (to determine how much material loss is acceptable) are dependent upon the safety margin in the original design and the rate of material loss. These factors shall be taken into account (and explained by surveyors) in determining if a steel structural member is considered to be satisfactory, marginal, or unsatisfactory. However, in general, steel structural members or portions thereof which have suffered a reduction of 25 percent or greater from their original dimensions shall be considered to be unsatisfactory. The Navy may accept a further reduction of strength members, if the operator can demonstrate in the certification report by detailed calculations that the strength of the facility, with its reduced scantlings, is sufficient to dock ships at the requested CRC.

4.4.5 Documentation of survey results. Survey results shall be documented as indicated in appendix A, 30.4.8.

4.4.5.1 Survey data retention. A copy of the certification report and supporting documentation shall be retained by the operator in his files for at least 5 years. This will aid in future recertification efforts.

4.4.6 On-site visit by a Navy representative. The operator shall notify NAVSEA of the scheduled date for the material condition survey in order to permit arrangement for a concurrent visit by a Navy technical representative, if desired by NAVSEA.

4.5 Corrective action and monitoring plans. Corrective action and monitoring plans shall be in accordance with 4.5.1 through 4.5.5.

4.5.1 Corrective action plan. A corrective action plan, if required, containing a listing and schedule of the proposed facility repairs and modifications and resolution to all marginal or unsatisfactory survey items shall be prepared by the operator to resolve all the recommendations made by the surveyor, and shall be included in the certification report, as specified in appendix A, 30.4.8. The Navy retains the right to withhold certification if unsafe conditions exist.

4.5.2 Monitoring plan. A monitoring plan, if required, shall be prepared. The plan shall contain a listing of the systems to be monitored, system characteristics to be observed or measured, and the deterioration levels at which repairs or replacements will become necessary. The plan shall be prepared by the operator to resolve all the recommendations made by the surveyor and shall be included in the certification report. A typical surveillance program for the monitoring of graving docks might include the following:

(a) Establish a draw down curve during a dewatering cycle by taking piezometer readings every 1/2 hour. Record piezometer readings monthly and compare to the draw down curve. Submit an annual report containing summary data to NAVSEA for evaluation.
(b) Annually, record elevations of the dock's floor, walls, and crane rails in order to determine any differential settlement or heave. Submit summary data in an annual report to NAVSEA.
(c) Annually, and after each earthquake of magnitude 5 or greater on the Richter scale, record cracks in the walls and floor locations. Report any perceived significant increase in seepage to NAVSEA.
(d) Monitor and, if possible, record seepage rates at significant locations. Report any perceived significant increase in seepage to NAVSEA.
(e) Monitor annually the growth of existing voids or the development of new voids under the dry dock floor at existing holes.

4.5.3 Surveyor's endorsement. The surveyor may review and endorse the corrective action plan and monitoring plan.

4.5.4 Responsibility. After the Navy's review and acceptance of the certification report, the actions and schedule specified in these plans become mandatory for the operator. Records of facility repairs and modification and records of observations on monitored systems shall be maintained by the operator for 5 years.

4.5.5 Reporting requirements. The operator of a facility shall report to the Navy when he completes the repairs or modifications prescribed in his corrective action and monitoring plan. A written report of the repairs or modifications shall be made within 45 days of their completion.

4.6 Design data and calculations. Design data and calculations shall be in accordance with 4.6.1 through 4.6.3.

4.6.1 General. Detailed requirements are specified in the following sections:

(a) Floating dry docks - Section 5
(b) Graving docks - Section 6
(c) Marine railways - Section 7
(d) Vertical lifts - Section 8
(e) Building ways - Section 9

4.6.1.1 Nonpermanent facilities or facilities of unusual design. After having reviewed preliminary FCRs prepared in accordance with 4.3.2, the Navy will, if necessary, modify the requirements of 4.6.

4.6.1.2 Design data. If the operator lacks original design data, he may propose inclusion of new drawings, descriptions, and calculations, and may obtain the Navy's guidance by submitting a preliminary FCR, as indicated in 4.3.2. Historical evidence of past performance of the facility is also admissible.

4.6.1.3 Evaluation of the present state of the facility. The scope of calculations needed to demonstrate that the facility is certifiable in its present state shall be determined by the operator and surveyor after having examined the survey results.

4.6.1.4 Deviations. Deviations from the criteria set forth in this standard will be considered on a case-by-case basis and acceptance is at the option of NAVSEA. If deviations are requested, necessary justification for the deviations shall be provided. The justification shall include compensating features which shall ensure that safety will be preserved.

4.6.2 FCR content. Design data and calculations submitted for initial certification shall include the following:

(a) A general description and history of the facility, as indicated in appendix A, 30.3.2.
(b) Drawings, sketches, descriptions, and calculations that describe the facility shall be included as enclosures to the FCR, as indicated in appendix A, 30.4.2, to satisfy the detailed requirements described in sections 5, 6, 7, 8 or 9 (as applicable).
(c) Facility data and calculations which demonstrate that the facility is certifiable in its present state for the rated capacity proposed by the operator shall be included in the report. The scope of these data depends upon the requirements of sections 5, 6, 7, 8 or 9 (as applicable) and evaluation of survey results as specified in 4.4.1.

4.6.3 FRR content. Design data and calculations submitted for certificate renewal shall include the following:

(a) If the facility has been modified since the last certification, drawings, sketches, descriptions and calculations shall be provided to describe the changes in design (see appendix A, 30.4.2).
(b) The design data and calculations submitted shall be as described in sections 5, 6, 7, 8 or 9 (as applicable).

4.7 Manning procedures and personnel qualification criteria. Manning procedures and personnel qualification criteria shall be in accordance with 4.7.1 through 4.7.2.2.

4.7.1 Manning procedure. A manning procedure shall be prepared for the facility. The procedure shall be available to the facility operations supervisor and shall describe the stations to be manned, the functions to be performed, and the qualification criteria for personnel manning those stations during all operating evolutions. The procedure shall include personnel required for casualty or damage control.

4.7.2 Personnel qualification criteria. The operator shall ensure that personnel are qualified through training and experience. The operator shall provide the qualification criteria required for an individual to man the stations described in the procedure required by 4.7.1. As an alternative qualification method, an operator may provide documented qualification criteria by referencing recognized standards, such as personnel qualification standards in the case of Navy operators.

4.7.2.1 Facility operations supervisor. Each operator shall designate at least one facility operations supervisor who is qualified to conduct dockings and undockings or launching operations, as applicable, on each facility for which certification is requested. The facility operations supervisor shall be at the facility or available for immediate recall while a Navy ship is in the facility. Building ways are exempt from this requirement prior to the initial launching or outfitting of a Navy ship.

4.7.2.2 Qualifications and certification of a facility operations supervisor. A facility operations supervisor shall be professionally qualified through training and experience to conduct all evolutions in a safe, proper, and reliable manner. The operator shall provide a certificate of qualification and designation for each facility operations supervisor. The facility operations supervisor certificate, which meets the requirements of appendix C and is approved by the operator's top management, provides the means for making the operator's facility operations supervisor qualification a matter of record. When a Navy ship is drydocked or launched, the certification shall be submitted, whether the operator is performing the work under a master ship repair contract or some other type of Navy contract. Navy docking officers shall be certified. A sample form for facility operations supervisor certification is shown on figure 1. In addition to the certificate of qualification, the operator shall provide a resume of the training and qualifications for each individual designated as a facility operations supervisor. An outline for the requirements of a facility operations supervisor is presented in appendix C.

4.8 Operating procedures. Operating procedures shall be in accordance with 4.8.1 through 4.8.3.2.

4.8.1 General. Complete operating procedures for the docking facility shall be prepared and included in the certification report. These operating instructions, or related portions thereof, shall be available at the appropriate stations and to the facility operations supervisor. Typical requirements for these procedures are as follows:

(a) Procedures for operating the facility shall be prepared and made available in writing to the facility operations supervisor. They shall include a plan for operation and shall assign responsibilities for each phase of the evolution.

(b) Facility operating procedures shall be in step-by-step detail. These procedures shall include checksheets for use in prerequisite checks of dock systems status before facility operations are initiated. Additionally, formal prerequisite checks are required for critical ship interface items, such as underwater appendages and hull fittings. Checksheets shall also be used to ensure that facility systems are properly secured and that ship protection systems are prepared for the ship's lay period.
(c) Verification signature requirements shall be included for critical steps in the operating procedures and in the checksheets for prerequisite and docking or undocking checks.
(d) Calculations of ship stability, prior to drydocking.
(e) Operating procedures shall ensure the provision of vital dockside services which shall include, but shall not be limited to, continuous fire protection for the ship. However, hookup of a hose to the ship to provide fire protection is not required prior to the ship being well landed on the blocks if this hookup would delay the docking sequence or create a problem in controlling the ship's list.
(f) Additional requirements for operating procedures which cover various facility types are specified as follows:

(1) Floating dry docks (see 5.7).
(2) Graving docks (see 6.6).
(3) Marine railways (see 7.7).
(4) Vertical lifts (see 8.6).
(5) Building ways (see 9.6).

4.8.1.1 Emergency procedures. Emergency operating procedures for casualty and damage control during the operation of the facility shall be specified in advance. These procedures are written for conceivable events, or series of events which may be in progress and which will cause damage to equipment unless correct procedural steps are taken immediately. The nature and speed of these events are such that proper and correct procedural steps will serve not only to limit damage to the facility, but also to prevent or minimize damage to the ship. Conceivable events include system or component breakdowns such as structural failures, equipment failures, and power loss situations. The procedures for the following events shall be included in the certification report as a minimum for each facility:

(a) Fire.
(b) Flooding.
(c) Loss of communications.
(d) Power loss situation.
(e) System or component failure.

These procedures shall clearly state, for each casualty event, the initial response actions and the individual or operating station responsible. The appropriate emergency operating procedures shall be posted or readily available at the applicable operating station.

4.8.2 Requirements for operation of a certified facility. The requirements for operation of a certified facility are as follows:

4.8.2.1 CRC. A certified facility shall not be used for docking or building Navy ships whose weights, block loadings or stability calculations exceed the limiting values specified for certification. Also, operational limitation applied to the facility during certification (see 4.2.4.2) shall not be violated. If an operator uses his facility to accommodate a commercial vessel that exceeds the CRC, he shall demonstrate to the Navy that the structural limitations of the facility have not been exceeded and that the facility is safe for the accommodation of Navy ships. One method of demonstrating that the structural and stability limitations of the facility have not been exceeded is to provide calculations in the certification report for a "maximum ship" situation. The "maximum ship" calculations provided in the certification report may then be compared to the loading experienced when accommodating a particular commercial vessel, thus establishing whether or not the facility has been stressed beyond the structural limitations.

4.8.2.2 Requirements for operational limitations and stability considerations for a particular ship. In addition to the requirements for an FCR, operational limitations and stability data shall be determined and made available to the Navy, or documented and submitted when requested, prior to a particular ship being docked, constructed, fleeted or launched. The documentation shall demonstrate that the particular ship and facility is within the constraints imposed as a result of this standard. These requirements vary by type of facility as detailed in subsequent paragraphs. The documentation shall include the principal dimensions of the facility and the ship, loading conditions of the facility and the ship, blocking loads, clearance over the blocks, intact and damage stability and other pertinent data as required to demonstrate that the ship's safety will not be impaired. For floating dry docks, buoyancy and stability limitations including the GM of the ship and dock system shall also be included.

4.8.2.3 Planning. Using the operating procedures specified in the certification report and the pre-docking or pre-launching surveys as a guide, the following shall be prepared for use during docking or launching operations for each Navy ship:

(a) Sequence and description of important steps.
(b) Pumping and flooding plan (where applicable).
(c) Docking logs and checklists showing required data entries and verification signatures for the evolution to be performed; that is, docking, undocking, launching, and so forth.

4.8.2.4 Normal operation. The following requirements shall be met under normal operation of a facility:

(a) The facility shall be operated in strict compliance with the written operating procedures.
(b) The completed and signed logs (see 4.8.2.3(c)) shall be filed and maintained for a period of 5 years.

4.8.2.5 Emergency operation. Emergency operations shall be carried out as follows:

(a) Emergency operations for which procedures have been defined in advance (see 4.8.1.1) shall be carried out in accordance with these procedures.
(b) Emergency operations undertaken for the first time, and for which procedures have not been developed in advance, shall be analyzed and recorded. Records of these operations shall be prepared as required in these procedures and shall be maintained until the next certification report is filed. If necessary, operating procedures shall be revised to prevent recurrence of the emergency, and procedures shall be developed to deal with similar emergencies in the future.

4.8.3 Accident and incident reports. Accident and incident reports shall be as follows:

4.8.3.1 Requirements. The operator shall submit a report to the Navy under any of the following circumstances:

(a) The facility is damaged to such an extent that its ability to operate safely is diminished. This report shall be required whether or not a ship is in the facility at the time damage occurs.
(b) Either a ship, the facility or both, are damaged and the total repair cost is expected to exceed $50,000.
(c) For any incident where unplanned flooding occurs beyond the control of normal drainage procedures for the lay period.

4.8.3.2 Submission. A preliminary incident report describing the extent of damage shall be submitted within 1 week of the incident. Within 1 month after the incident, a detailed written report of the analysis of the occurrence shall be made and shall contain the following information:

(a) Nature and causes of incident.
(b) Effect on facility's capability for safe operation and capacity.
(c) Actions taken or recommendations to preclude future incidents; for example, planned facility repairs and modifications, changes in manning and operating procedures.

4.9 Protection of a ship during the lay period. The requirements for protection of a ship during lay period shall be in accordance with 4.9.1 through 4.9.5.

4.9.1 Applicability. This portion of the standard concerns itself with the capabilities of, and planning by, the operator to protect the ship in the facility during the lay period. For the purpose of this SCP, protection during the docking or undocking operations is specified in 4.8.

4.9.2 Security patrol and fire watch during the lay period. The operator shall provide adequate security and fire watch patrols for protection of the ship. The method of manning these patrols, the frequency of such patrols, the equipment available for emergencies, and the written procedures for these patrols (including their responsibilities) shall be furnished as part of the certification report. Alarms, communications and facility lighting shall be included

in this list of equipment and their use addressed in the procedures. The patrols shall have at their disposal a means for contacting the designated personnel in the event of an emergency.

4.9.3 Systems for the prevention of unauthorized operation and flooding. These systems shall have a positive means of security to prevent unauthorized operations. The operator shall provide a description of these systems. Where flooding may occur, a system description shall also be provided showing the standby systems for the removal of water that may accumulate in the tanks, compartments, pumphouses, dock basin and other places in the facility during the lay period. Standby systems include installed systems with the same functional capability as the primary system or portable and emergency systems. The system description for standby systems shall include the number of units available, individual unit capacities, duration of operating time for fuel available (if applicable), and instructions for their operation and deployment, if applicable.

4.9.4 Disaster planning. Disaster plans shall be furnished in the certification report for the protection of the ship during the lay period. For the SCP, disasters are defined as total shore-power blackouts, floods, storms, fires, hurricanes or typhoons, and earthquakes. These disasters normally follow a natural or man-made catastrophe and necessitate the development of specific actions to prevent or minimize damage to the ship. Disaster plans shall include, but not be limited to, the following:

(a) Plans for providing adequate backup or emergency power for the operation of vital ship and dock systems in the event of a total shore-power blackout. The detailed requirements in sections 5 through 9 outline various backup or emergency power requirements for different types of facilities.
(b) Plans for securing the facility and protecting a Navy ship that cannot be undocked in the event of floods, storms, typhoons or hurricanes.
(c) Plans for combating a fire in the facility.
(d) Plans for ensuring that the ship and dock system can withstand the overturning moments defined in NAVSEA S9086-7G-STM-000/CH997, and earthquake-resisting measures which are required in docking nonnuclear-powered ships in higher seismic areas. Higher seismic areas are considered to be seismic zones 3 and 4 as specified in NAVFAC P-355. Earthquake-resisting measures shall be routinely applied to all nuclear-powered ships (except nuclear-powered aircraft carriers) regardless of facility location (seismic or nonseismic).

4.9.5 Protection of a ship during the lay period for small facilities. Operators of facilities with CRCs of less than 500 LT shall provide a description of equipments available for fire protection and flooding, if applicable.

4.10 Maintenance program. Maintenance programs shall be in accordance with 4.10.1 through 4.10.4.5.

4.10.1 Purpose. The maintenance program provides a means for a facility to sustain certification without periodic submittals of FRRs. For Navy owned and operated docking facilities, the maintenance program is compulsory.

4.10.2 Procedure. Following a certification, an operator may elect to participate in the maintenance program. An operator who elects to participate in the maintenance program shall, within 1 year after certification, advise the Navy of his intent.

4.10.3 General requirements. An operator participating in the maintenance program shall implement a maintenance program, subject to Navy external audits at 2-year intervals with the following stipulations:

(a) A formalized maintenance system exists, is implemented, and is shown to be effective through documentation and on-site verification.
(b) Operating procedures are maintained and documented, with all changes formally controlled and implemented.
(c) Preventive maintenance is implemented and documented on all items vital to the essential performance or operation of the facility.
(d) Control inspections are performed by qualified individuals at the required frequencies, and inspection results are documented.
(e) A system for documentation, tracking, and correction of deficiencies reported from all sources, that is, maintenance personnel, control inspections, operators, and so forth, is implemented and effective.
(f) Configuration control of design and other system changes is effected through a formalized change control board made up of individuals qualified in their respective roles.
(g) Personnel qualification data records are maintained.
(h) Records of accidents or incidents reported in accordance with 4.8.3 are maintained.

The requirements for changes after certification and reports in 4.2.5 through 4.2.10 are still required when the maintenance program is selected.

4.10.4 Detailed requirements. Maintenance programs shall include the following:

4.10.4.1 Preventive maintenance. Preventive maintenance shall be implemented on all items which, if inoperative, would interfere with the essential performance or operation of the facility or would endanger property. Manufacturer's instructions shall be utilized for equipment maintenance procedures and frequencies when available. For Navy drydocking facilities, the criteria established by a planned maintenance system (PMS), if invoked for the dry dock, has precedence. These procedures and frequencies shall be adhered to and shall be performed by qualified personnel.

4.10.4.2 Control inspections. Control inspections as specified herein shall be performed within the following specified periods:

(a) Frequency. It is not necessary that all parts be inspected simultaneously.

(1) Structures shall be inspected within a 2-year period and prior to Navy audit inspection. The inaccessible underwater body of floating dry docks shall be inspected in accordance with 5.6.5. The underwater hull of caissons shall be inspected in accordance with 6.5.4.3.

(2) Mechanical and electrical systems, equipment, and components shall be inspected and operationally tested no less than once a year. Cathodic protection systems shall be inspected where applicable.

(b) Inspection personnel. Control inspections may be made by the operator's personnel, who shall be individually qualified for their respective roles in such inspections.

(c) Forms. Records, schedules, and other associated documentation shall be maintained. Inspection checkoff lists similar to those illustrated in appendix E shall be used to record inspection results. The necessity or urgency for correcting defects found during an inspection shall be explained on the checkoff sheets. Material condition ratings as specified in 4.4.4.1 shall be utilized. Deficiencies of graving docks and marine railways for U.S. Navy activities shall be identified in accordance with the Navy shore facility planning system.

4.10.4.3 Correction of deficiencies. Deficiencies found during control inspection, preventive maintenance, or from any other source shall be reported to the authority responsible for facility maintenance. Unsatisfactory conditions or deficiencies which interfere with the essential operation of the facility or which endanger property shall be corrected immediately, the limitation identified, or operations discontinued. Marginal conditions or other deficiencies, when considered collectively to create an unsafe condition, shall also be corrected immediately. In addition, marginal conditions or deficiencies which will be unsatisfactory within the interval between inspections shall be corrected prior to the subsequent inspection. Corrective actions shall be reported to NAVSEA upon completion. Records shall be maintained of all reported deficiencies and corrective action taken. For uncorrected deficiencies, the records shall indicate when corrective action will be taken or the reason for not taking corrective action.

4.10.4.4 Configuration control procedures. The certification for a facility is granted based on a report which includes design data, system descriptions, material condition, and other documentation. This documentation establishes the baseline of the facility. A formalized configuration change control procedure to control changes which affect the baseline identification shall be implemented. This entails the submission of changes to a configuration control board at the activity for evaluation, coordination, and approval or disapproval. Configuration control board membership shall include personnel knowledgeable in the design, maintenance and operation of the facility. Only after changes are approved are the changes to be made to the facility, and, if

affected, to the operating procedures and other documentation. Documentation shall be maintained, describing the configuration control procedures being followed. Records, drawings, and sketches shall also be maintained of all changes submitted and the disposition of these changes.

4.10.4.5 Operating procedure changes. Changes which affect the procedures shall be formally implemented and controlled. Records shall be maintained describing the process being followed, changes requested, and disposition of all changes.

4.10.5 Biennial audits. Biennial audits shall be as follows:

4.10.5.1 Scheduling. An inspection shall be performed by a Navy team (external to the operator's activity) every 2 years. In Navy activities, external audit and the annual inspection will be conducted concurrently. Audits for commercially operated facilities will be scheduled by consultation with the operator via the cognizant SUPSHIP. The operator shall prepare all spaces of the facility to be inspected to enable the audit team to carry out its task efficiently and safely. The Navy reserves the right to conduct unscheduled audits if a particular situation warrants this action. Participants in the Navy audit team will be designated by NAVSEA. This team will make a full review and audit of the existing facility and supporting documentation. Identified deficiencies will be discussed at an exit interview and will be formalized by a written report to NAVSEA. NAVSEA will forward the results to the operator.

4.10.5.2 Scope. The scope of the audit shall be sufficient to evaluate the effectiveness of the maintenance program, and shall include:

(a) Examination of the facility and of the maintenance program documentation and operational records.
(b) Observation of a docking or undocking evolution whenever possible. In the case of a floating dry dock, this may include a submergence test.
(c) Evaluation of the control, operating and maintenance procedures.
(d) Examination of the actions to resolve deficiencies from the baseline certification or previous audit.

4.10.5.3 Maintenance program documentation. Documentation required to evaluate an activity's maintenance program is as follows:

(a) A brief written description of the activity's system for formally controlling and implementing changes to facility operating procedures and instructions, along with documentation showing the disposition of any implemented or proposed changes.
(b) A brief written description of the facility's preventive maintenance system, and associated maintenance records for each system or equipment including:

(1) Maintenance schedules and frequencies.
(2) Maintenance procedures for each system or equipment.
(3) Maintenance responsibilities (department or shop).
(4) Personnel qualifications required for each maintenance evolution.

(c) A brief written description of the activity's control inspection program which includes inspection responsibilities and qualification criteria for inspection personnel. Control inspection documentation shall include:

(1) Inspection results (including underwater hull survey, if applicable).
(2) Material condition check lists similar to those in appendices E through I, as applicable, with the material condition of each item inspected rated as specified in 4.4.4.1.

(d) A brief written description of the system used for reporting deficiencies; including records showing all reported deficiencies, and methods used for their prioritization, correction, or disposition. Related documentation shall include samples of the methods used for reporting deficiencies observed by:

(1) Maintenance personnel.
(2) Operating personnel.
(3) Control inspections.
(4) Other sources.

(e) A brief written description of the configuration control procedure being followed, which includes qualification criteria for configuration control board members; methods of submission, coordination, and approval or disapproval of proposed changes; and documentation showing the disposition of any proposed changes. A configuration control procedure and qualification criteria for control board members shall be developed by all participating activities, regardless of whether any changes to the facility have been proposed or effected.

4.10.5.4 Evaluation of audit findings. Based on an evaluation of the audit findings, the certification of a facility may be continued, suspended, or altered as specified in 4.2.5.

5. DETAILED REQUIREMENTS FOR FLOATING DOCKS

5.1 General. This section provides detailed technical requirements for floating dry docks.

5.1.1 Types of facilities. Requirements of this section apply to single-section, open and closed-ended docks, multi-section docks, launch pontoons, and other special cases or unusual floating facilities.

5.2 CRC. Navy ships shall be drydocked on floating dry docks only when the CRC of the facility is greater than the displacement of the ships. This CRC may be limited by available blocking capacity, buoyancy, or stability considerations. For a facility where the capacity for commercial use exceeds the Navy CRC, additional calculations may be required to verify that the facility has not been overstressed prior to docking a Navy ship. Inclusion of calculations for a "maximum ship" in the certification report will facilitate future dockings of Navy ships.

5.2.1 Blocking capacity. The blocking capacity, normally specified or described in tons per linear foot of blocking, shall be based on the load-bearing capacity of the blocks and the dock structure supporting the blocks.

5.2.1.1 Alignment of blocks. A pontoon working plane shall be established for setting the height of blocks. This is an optical plane, averaging out the irregularities in the level of the pontoon deck. It is used for establishing and checking blocking levels. This plane is the datum plane for the pontoon deck, from which all blocks are set. This working plane shall be established with the dock in an unstressed condition and shall be reestablished after each drydocking of the dry dock, joining sections afloat or any time the pontoon working plane may have changed.

5.2.2 Available buoyancy. The available buoyancy is the difference between displacement of the floating dry dock at rated freeboard when deballasted (see 5.3.3.1(a)) and the displacement at the light dock operating condition (see 3.2).

5.2.3 Stability. The CRC may be limited by stability considerations, as indicated in 5.3.3.1(b) and (c). Limiting values of vertical moment of weight and sail area moment may be imposed as operational limitations as specified in 4.2.4.2.

5.3 Design data and physical characteristics of the facility. Design data and physical characteristics of the facility shall be in accordance with 5.3.1 through 5.3.15.2.

5.3.1 Certification report content. The design data described in the following paragraphs shall be included in the certification report as specified in 4.6 and appendix A.

5.3.2 General arrangement. A brief description of the facility and its site shall be provided (see appendix A, 30.3.2). Drawings and sketches shall show the watertight compartmentation of the dock, including the vertical extent of the watertight bulkheads.

5.3.3 Stability and buoyancy. The calculated stability and buoyancy characteristics shall be provided as part of the initial facility certification, and need only be updated in the case of changes. The principal dimensions, displacement, and centers of gravity of the assumed "maximum ship" used in the calculations shall be provided. These calculations shall be by an approved method, such as the Ship Hull Characteristics Program. This does not obviate the preparation of stability calculations and a pumping plan for docking a particular ship. When preparing individual U.S. Navy ship pumping plans where the blocking heights differ from the standard, the light dock weight and center of gravity shall be modified as necessary in the calculations. Procedures for preparation of a pumping plan, required to ensure the stability of the ship-dock combination, and a sample format shall be included in the certification document. Guidance for preparation of a pumping plan is provided in appendix D.

5.3.3.1 Stability and buoyancy criteria. The dock shall meet the intact and damaged stability and reserve buoyancy criteria specified below:

(a) Buoyancy requirements. The available buoyancy shall be determined on the basis of the rated freeboard requirements:

(1) Open-ended docks. The minimum rated freeboard at the lowest point of the pontoon deck of the dock (excluding pits) with the ship lifted shall be as graphically depicted on figure 2 and described as follows:

a. For docks of 12,000 tons capacity or less, 12 inches of freeboard.
b. For docks of 18,000 tons capacity or more, 18 inches of freeboard.
c. For docks with capacities of between 12,000 and 18,000 tons, defined by a linear progression of between 12 and 18 inches, respectively, of freeboard.

(2) Closed-ended docks. Minimum freeboard with the ship lifted shall be 12 inches, measured from the sill of the stern (or bow) gates.

(3) Docks in the fully ballasted-down condition. Minimum freeboard in the fully ballasted-down condition measured from the margin line (see 3.2) shall be 3 feet. "Fully ballasted-down" shall mean:

a. Tanks 100 percent full in docks where the bottom of the tank vent terminates at the level of the top of the tank.
b. In docks designed on the isothermal compression principle, to the ballast free surface level in the compressed state. Calculations shall be provided to prove the setting of the vent bottoms will limit submergence. Condition of maximum submergence shall be verified during the submergence test required by 5.6.3.

(b) Intact stability requirements. The intact stability shall be determined for all modes of operation, including the five phases shown on figure 3. Longitudinal stability shall be included for phases 3 and 4. Free surface effects shall be determined and included in the calculations. Intact stability shall meet the requirements stated below:

(1) GM in the phase of minimum stability shall meet the requirement shown on figure 4.
(2) The dock shall withstand the effects of beam winds stated below without heeling more than 15 degrees or submerging the margin line (see 3.2).

a. Determine the angle of heel under 90-knot beam wind, when the ship is fully docked, ship and dock system in phase 5 shown on figure 3.
b. Determine the angle of heel under 20-knot beam wind, when the ship and dock system is in its minimum-stability phase.
c. Determine the wind velocity which would cause 15 degree heel when the ship and dock system is in its minimum-stability phase.

The heeling arm shall be calculated as follows:

Heeling arm due to wind
$= (0.004\ V^2 \times Al \times \cos^2\theta)/(2240 \times \text{displacement})$

Referring to figure 5:

A = combined projected sail area of ship and dock, square feet.
l = lever arm from half draft to the centroid of sail area, feet.
V = nominal wind velocity, knots.
θ = angle of heel.

(c) Damaged stability and reserve buoyancy requirements. The intent of the damaged stability and reserve buoyancy requirements is to provide the dock with the capability to withstand a moderate level of damage and resultant flooding, such as could be the result of improper operation, system failure, physical injury from external hazards and so forth, without unduly endangering the ship. The dock shall withstand the following damage and resultant flooding for the worst combination of sinkage, heel, and trim without heeling more than 15 degrees, trimming more than the lesser of 3 degrees or 20 feet, or submerging the margin line (see 3.2).

(1) In the fully ballasted condition, phase 1 shown on figure 3, the following two types of casualties and resultant flooding shall be assumed:

a. Side shell damage: Damage shall be assumed to occur between main transverse bulkheads with penetration up to but not through the inner wing wall. The safety deck shall be assumed to be ruptured.
b. Bottom shell damage: Damage shall be assumed to occur between main transverse bulkheads such that the complete space between main transverse bulkheads floods. The safety deck may be assumed to remain watertight.

(2) In the deballasted condition with ship on the blocks, phase 5 shown on figure 3, the following two types of casualties and resultant flooding shall be assumed:

a. Side shell damage: Damage shall be assumed to occur on the side shell at a main transverse bulkhead such that the two adjacent tanks or spaces are flooded. Damage shall be assumed to penetrate up to but not through the inner wing wall. The safety deck shall be assumed to be ruptured. For closed-ended docks, the basin shall be assumed flooded.
b. Bottom shell damage: Damage shall be assumed to occur on the dock bottom at the intersection of a main transverse watertight bulkhead and a main longitudinal watertight bulkhead such that all tanks or spaces adjacent to the intersection are flooded. The safety deck shall be assumed to be undamaged. For closed-ended docks, the basin shall be assumed flooded.

If access openings, tank air vents, or other openings which would allow unrestricted flooding into undamaged spaces are below the final damaged waterline, flooding of these spaces shall be taken into account. Utilization of pumping, grounding of the dock, or any contribution of the mooring system to limit sinkage, heel, or trim shall not be considered. When assessing the flooding of a damaged tank (in the deballasted condition), the tank level shall be assumed to be at the residual level. The buoyancy of the docked ship shall not be included.

The above stability and buoyancy requirements shall apply to all docks for which firm orders for construction are placed after the effective date of this document. Docks previously certified to stability and buoyancy requirements other than the above shall continue to be certified to those requirements and shall not be required to meet the above requirements. Docks constructed prior to the effective date of this document for which initial certification is being requested shall meet stability and buoyancy requirements consistent with those applied to certified docks of similar age. As specified in 4.6.2 and 5.3.3.2, calculations and other pertinent design and construction data which demonstrate the ability of the dock to meet the above requirements shall be submitted. The calculations shall be made on the premise that the basin depth is sufficient to allow the maximum calculated sinkage, heel, and trim. If basin depths limit the sinkage, or angle of heel or trim, it shall be reported in the FCR but will not govern certification.

5.3.3.2 Design data. The following design data shall be provided for the facility as designed, if new, or for the facility in its present material condition:

(a) A light dock weight determination - this summary weight estimate shall show the dock in the light operating condition with all ballast tanks at the residual water levels. A correction shall be added for silt accumulation in the tanks.
(b) Curves of form.
(c) Tank capacity tables or curves. These shall include a table, or a set of curves as shown on figure 6, which shows the water levels required in each tank to maintain the dock at a given draft. These curves shall be developed to ensure that the LCB and LCG of the ballasted dock coincide. A combined set of curves that relates the water levels and tank capacities to the external draft of the dock may be presented.
(d) Buoyancy calculations to determine the maximum lift capacity based on the minimum freeboard criteria of 5.3.3.1 and the light dock weight determination. A curve of lift capacity versus LCB may be presented.
(e) Stability calculations to substantiate that the dock meets all intact and damaged stability criteria of 5.3.3.1. A lifting capacity curve of ship's adjusted VCG versus lifting capacity (see figure 7) shall be presented based on the dock in the phase of minimum intact stability with the rated minimum GM from figure 3 and on damage stability for the dock in phase 5 with a ship on the dock. The ship's adjusted VCG is defined on figure 8.

5.3.3.3 Evaluation of present stability and buoyancy condition. The maximum lifting capacity, buoyancy and stability shall be verified by substantiating the weight estimate by a deadweight survey or inclining experiment required by 5.6.2.

5.3.4 Structure. The dock structure shall be as follows:

5.3.4.1 Structural design data. The following structural data shall be provided for the facility as designed, if new, or for the facility in its present material condition:

(a) Maximum allowable bending moment calculation.
(b) Transverse strength calculation substaining the maximum allowable pontoon deck loading in LT per linear foot.
(c) Longitudinal deflection calculation.
(d) Maximum keel block, side block, and hauling block loading calculations.
(e) Maximum pontoon deck loading at other than keel block and side block locations, if different than that of the blocking area.
(f) Structural arrangement and scantlings.
(g) Longitudinal and transverse watertight bulkhead design calculations.
(h) Maximum allowable differential head between tanks.

(i) Maximum allowable differential head between tanks and exterior tank draft.
(j) Data and calculations substaining adequacy of connections between sections of multi-section docks.
(k) Detailed descriptive data and calculations substaining adequacy of mooring attachments on the dock's structure.

5.3.4.1.1 Material strength criteria. The following strength criteria for materials of the principal structural members shall be used:

(a) For American Bureau of Ships (ABS) specified ordinary-strength hull structural steel with minimum yield strength of 34 kilopounds per square inch ($Klbs/in^2$) or equivalent:

(1) Permissible stresses for longitudinal or transverse bending shall be taken as 20.0 $Klbs/in^2$.
(2) Permissible stresses for compression or tension shall be taken as 22.6 $Klbs/in^2$. Buckling shall be considered for members in compression.

(b) For douglas fir, permissible compressive stresses perpendicular and parallel to grain shall be taken as 400 pounds per square inch (lb/in^2) and 1400 lb/in^2 respectively.
(c) For red or white oak, permissible compressive stresses perpendicular and parallel to grain shall be taken as 600 lb/in^2 and 1300 lb/in^2 respectively.
(d) For concrete, permissible compressive stresses shall be taken as 2500 lb/in^2 unless documentation to substantiate actual stress can be provided.
(e) Longitudinal transmission of the pontoon deck loads by the docked ship's hull girder shall not be considered. The hull girder of the docked ship shall not be considered as a means for connection and lining up of sections in multi-sectioned docks.

5.3.4.2 Evaluation of present structural condition. Structural calculations shall be provided for the facility in its present condition, unless adequate justification for use of original design data is submitted. Corrosion allowances and age effects used during preparation of calculations shall be identified.

5.3.5 Ballasting and deballasting systems. Ballasting and deballasting systems shall be as follows:

5.3.5.1 Ballasting and deballasting time. The times required for ballasting and deballasting the dock, both as designed and in its present state, shall be listed.

5.3.5.2 Arrangement. Sketches and diagrams shall be provided which describe the number and arrangement of pumps, piping, valves, indicators and other aspects of the ballasting and deballasting system.

5.3.5.3 Piping systems. Piping system design data shall be provided which show that the following requirements are satisfied on those docks originally designed to have such features:

(a) The suction pipes shall be arranged to permit unrestricted flow from the tank to these pipes.
(b) The overboard discharge lines shall be provided with a positive closing overboard discharge valve located adjacent to the shell of the dry dock and operable from the safety deck. A nonreturn valve shall be located inboard or outboard of the discharge valve.
(c) The flooding valves shall be located close to the shell or inlet sea chest and inlets shall be protected by bar or other type strainers.
(d) Cross flooding, if provided, shall be arranged so that stability is maintained.
(e) The extended pump drives and valve shafts shall be protected from corrosion.
(f) Adequate venting shall be provided.

5.3.5.4 Reliability. The data provided in the certification reports shall demonstrate that failure of a pump will neither put the dock out of operation nor cause damage to either dock or ship in dock.

5.3.5.5 Ballast-deballast control. System descriptions shall be provided showing valve and pump control systems and both normal and emergency methods, demonstrating that the following requirements are met:

(a) Pump-controlled docks. Valves may be manually controlled from the vicinity of the pumps or remotely from a central control station (with manual override control). Operational control of the pumps is preferable from a central control station. Control may be exercised locally if sufficient personnel are available to maintain control and if good communication with the central control station exists.
(b) Valve-controlled docks. It is preferred that valves and pumps be controlled remotely from a central control station. However, control of valves may be exercised locally if sufficient personnel are available to maintain control and if good communication with the control station exists. Valves shall have a manual method of operation in addition to any method of remote operation.

5.3.6 Electric power system. The electric power system shall support a maximum load, developed during simultaneous operation of the dry dock's dewatering pumps, fire protection pumps, valve opening and closing mechanisms, communication equipment, lighting, alarms, and any other support equipment or systems necessary for the safe operation of the dry dock. An adequate alternate power source shall be provided to ensure that a backup capability is available to complete critical docking operations at a reduced rate and to operate alarms, lighting, and fire protection equipments in case the primary power system fails. The dry dock shall have a lighting system in vital spaces which is

automatically actuated in case of main electric power failure. System descriptions and diagrams shall be provided which include a single-line diagram of the power distribution for equipment operation from both the primary and alternate electric power sources.

5.3.6.1 Independently-powered docks. Dry docks which are independent of shoreside power shall be provided with multiple, electric-power-generating units. The generating capacity shall be such that, with one unit inoperable, the dock shall be safe while docking or undocking at a reduced rate, and still provide power for alarms, essential lighting and fire protection equipments. Fuel available for the generating units shall be sufficient for more than one complete docking and undocking cycle. Safe docking conditions include proper operation of valve opening and closing mechanisms, essential lighting, indicators, communications and any other essential support equipments or systems.

5.3.6.2 Shore-dependent docks. Dry docks dependent on shoreside electric power for the primary source of power shall be provided with an alternate source of power. This alternate power may be provided by an on board generator or from a separate shoreside feeder line. Shoreside feeder lines shall be separated as far as practicable, fully insulated, and shall flex from tidal action. The alternate power source shall have sufficient capability to maintain safe conditions while docking or undocking at a reduced rate. Safe docking conditions include proper operation of valve opening and closing mechanisms, alarms, essential lighting, fire protection equipments, indicators, communications and any other essential support equipments or systems.

5.3.6.3 Distribution. Power distribution shall be arranged so that fire protection and dewatering systems may be operated directly from the primary, as well as the alternate, electric power source. Additionally, fused service disconnect switches or circuit breakers shall be provided for each feeder line in a readily accessible location. These protective devices shall open safely under load or close safely into a fault, either manually or by automatic switching control.

5.3.7 Indicators. The certification report shall demonstrate how the following requirements are met.

5.3.7.1 Draft indicators. Draft indicators shall be provided showing draft of the dock at the four corners of the dock and at the mid-length on port and starboard sides.

5.3.7.2 Trim and heel indicators. Indicators shall be provided so that the dockmaster may be informed continuously of the trim and heel of the floating dry dock during docking and undocking evolutions.

5.3.7.3 Ballast tank level indicators. Ballast tank level indicators shall be provided for controlling ballasting and deballasting. Their accuracy shall be adequate to prevent accidental overstressing of tank bulkheads by excessive differential heads and accidental overstressing of the overall dock structure in shear and bending.

5.3.7.4 Dock deflection indicators. Dock deflection detection systems shall be provided on each wingwall for all floating dry docks with a CRC of 500 tons or greater. However, they shall not be used as the only means for preventing overstressing of the dock. Consequently, they are not to be regarded as substitutes for tank-level indicators. Their accuracy shall be adequate to prevent accidental overstressing of dock and ship structure. Draft boards are not a satisfactory deflection detection system.

5.3.7.5 Ballast system valve indicators. Ballast system valves shall have indicators that indicate the position of the valve. If local and remote indicators are installed, their accuracy shall be calibrated within plus or minus 5 percent.

5.3.8 Communication systems. System diagrams and descriptions shall be provided showing that the system is adequate for bringing the ship in and out of the dock, as well as aligning the ship into the docking position; control of the ballasting and deballasting processes; and dealing with emergency situations. The communication systems shall include both primary and alternate systems, for example:

(a) A ship-to-shore dial telephone system connecting the central control station with dock office and security station.
(b) A sound-powered telephone or portable two-way radio system connecting the central control station with each manned operating station. Additional circuits may be necessary, connecting the central control station with the crane operator.
(c) A public address system, including audible fire alarm and talk-back capability, connecting the central control station with all normally manned spaces.

5.3.9 Essential lighting systems. System descriptions shall be provided for installed lighting systems essential for the safe operation and security of the facility.

5.3.10 Alarms. The certification report shall include a complete listing of the types and locations of all alarms which are installed in the dry dock and shall describe how they are monitored. Typical types of alarms which should appear on the list, if they are installed, are shore-power loss, emergency generator malfunction, flooding, dangerous trim or list levels, smoke and high temperature, fire, carbon dioxide (CO_2) system release and firemain low pressure.

5.3.11 Mooring and anchoring. Detail drawings and description of the mooring arrangement shall be prepared. The operator shall describe the severest weather and seismic conditions that the facility is likely to encounter and shall demonstrate (by calculations) that the mooring system and pier will hold the dock in place when a maximum ship is in dock. It shall be demonstrated that the dock mooring system shall accommodate list and trim without interference with adjacent structures or undue stress causing damage to the dock. If anchors are used for heavy-weather mooring, calculations shall be provided showing the adequacy of the system without one anchor. In protected waters, the calculations may be made for a 50-knot wind, unless winds of higher velocity have been experienced in the past. NAVFAC DM-29.1, DM-29.2 and DM-29.3 may be used for guidance in preparation of these calculations.

5.3.11.1 Seismic characteristics. The following information shall be provided:

(a) Listing of seismic events withstood by the facility in the past.
(b) Active faults within a radius of 1 mile of the facility.

For those facilities which are moored by rigid shore connections (for example, spud mooring or a support grid for a launch pontoon), requirements for additional information, depending on the various seismic zones, are as follows below. Seismic analysis shall be based on resisting collapse when exposed to an earthquake with an 80 percent probability of not being exceeded in 50 years. For existing structures, capacity of 75 percent of the earthquake demand is acceptable.

(c) Seismic zone 1 (Z=3/16):

(1) The one-third increase in allowable working stresses for earthquake loading governs.
(2) No seismic analysis is required.
(3) No concrete coring and testing is required, unless the condition of the concrete is questionable.

(d) Seismic zone 2 (Z=3/8):

(1) A site seismicity study is required.
(2) Rigorous analysis, such as finite element method, is not required. An elastic static load analysis is sufficient.
(3) No concrete coring and testing is required, unless the condition of the concrete is questionable.

(e) Seismic zones 3 (Z=3/4) and 4 (Z=1.0):

(1) A site seismicity study is required.
(2) Soils investigation, including liquefaction potential, is required.
(3) Initially, an elastic static load analysis is required. If structural components are determined to be inadequate by the analysis, an appropriate analysis shall be required, based on a peak ground acceleration (an earthquake with an 80 percent probability of not being exceeded in 50 years), and supported by concrete coring and testing.
(4) Only in cases of nonsymmetrical configuration shall a dynamic analysis be required based on response spectrum or time history.

5.3.11.2 Weather history. If the dock has survived adverse weather conditions in the past which approached the severest weather likely to be encountered, the operator may submit official records of the incident. If the material condition survey indicates the soundness of the mooring systems, the operator may be exempted from the need to submit some of the data required in 5.3.11.

5.3.12 Closures. In the case of docks equipped with watertight stern closures, the structural and mechanical details and analysis, which demonstrate their structural adequacy and reliability, shall be included in the certification report.

5.3.13 Blocking. Descriptions of the docking blocks and block hauling system shall be provided which show the physical characteristics of the blocks, including material and dimensions. Calculations shall be provided in order to verify that the blocks are stable and structurally adequate to withstand the loading used in lifting capacity calculations and that the side blocks (and shores, if used) are adequate in number to provide sufficient bearing area to resist seismic and hurricane overturning moments as specified in NAVSEA S9086-7G-STM-000/CH997. Additional calculations shall be provided if higher blocks are to be used for docking at a lower capacity. Expected arrangement and adequacy of systems used for securing the keel and side blocks in place shall be described.

5.3.14 Fire protection systems. Fire protection systems shall be as follows:

5.3.14.1 Systems description. The fire protection systems installed to combat fire in all areas of the dry dock shall be described in the survey results along with the requirement of 5.6.7.6. This description shall include minimum available water pressure; location of connections; location and size of fire stations; total available pump capacity; redundancies and backup features; and number, type, location, and capacity of portable extinguishers.

5.3.14.2 Requirements for a floating dry dock's fire protection water. The minimum available capacity for supplying a surface ship or submarine firemain (either permanently installed or temporary) shall be at least 300 gallons per minute (gal/min) per 100 feet of maximum docked ship length, except that only 300 gal/min are required for submarines less than 500 feet in length. The capacity available to serve a ship's firemain (either permanent or temporary) may also serve the fire stations in the dry dock, but in no case shall the total capacity be less than 1,000 gal/min. Where the fire protection water supplies to a submarine and the dock are separate, at least 300 gal/min of water shall be supplied to the submarine firemain and a minimum of 1,000 gal/min of water shall be supplied to the dock. Hull insulation fires can best be extinguished with water, preferably applied as a fog. Either of the following shall be available for fire watches assigned to hot work in areas where hull insulation on submarines is endangered.

(a) A portable fresh water extinguisher of either pressure type (NSN 4210-00-720-1815) or pump (NSN 4210-00-251-79041) with a 2.5 gallon minimum capacity; or
(b) A minimum 3/4 inch hose fitted with a fog nozzle supplied from a fresh water source.

Application of a given extinguishing agent to a shipboard fire shall conform to restrictions specified in the current contract or specifications. Fresh water supply and adequate hose for complete coverage shall be available for use in the event a reactor compartment fire cannot be controlled by carbon dioxide

extinguishers. Hose lines for fighting fires in way of the reactor compartment shall be restricted to fresh water sources. The pressure at the pier outlets shall provide a minimum nozzle pressure of 60 lb/in^2 when supplying fire nozzles at the specified capacities at the most remote and highest elevation hose connections. Booster pumps may be used at the dry dock outlets to boost pressure to a ship's firemain (either permanently installed or temporary). A backup pumping capability, such as diesel-driven fire pumps, fire department pumper connections, or alternate power supplies for electric-driven pumps, shall be provided to ensure that the full water capacity for fire protection is available if there is a power interruption or failure of a single pump.

5.3.14.3 Fire stations. Dock fire stations shall consist of 2-1/2 inch hose valves with 2-1/2 inch supply outlets and 1-1/2 inch hose outlets. Fire stations are required in the dry dock so that any area can be reached with a 20-foot fog stream from 100 feet of hose. Fire stations serving the bottom of the dry dock shall preferably be hard piped from the water supply sources. However, portable stations which are securely lashed down and supplied by jumper hoses will be considered satisfactory in meeting this requirement.

5.3.14.4 Liquid fuel and electrical fires. Means shall be provided for combating liquid fuel and electrical fires in the pontoon deck and in the dry dock proper. This requirement may be met by providing portable extinguishers or by installed systems. As a minimum, a 15-pound CO_2 extinguisher shall be located in pumprooms and other spaces having electrical equipment; and a dry chemical extinguisher, 18- or 27-pound type, shall be provided at locations subject to liquid fuel fire (for example, fueling stations and diesel-engine-driven equipment).

5.3.15 Additional requirements for launch pontoons. Launch pontoons shall be as follows:

5.3.15.1 Ship transfer system. The system for transferring a ship from building way to launch pontoon and the method by which pontoon stability and ship alignment are maintained during transfer shall be described, if applicable. The design and load carrying capacity of the system shall be provided.

5.3.15.2 Pontoon transfer system. The method by which the pontoon is moved to and from the submergence site shall be described.

5.4 Operational limitations. Enclosure III of the certification report, described in appendix A, 30.4.3 shall contain the following information:

(a) Wind, tide, and current conditions under which docking and undocking shall not be carried out.
(b) Limits of local, concentrated block loads in LT per block and LT per linear foot of blocking length.
(c) Limits on longitudinal hull deflection.
(d) Maximum differential head permitted on tank bulkheads.
(e) Minimum GM required for ship-dock combination together with a curve of ship's adjusted VCG versus lifting capacity.
(f) Minimum ballasted and deballasted freeboard required for open- as well as closed-ended docks.
(g) Maximum trim and list of dock.

5.4.1 Lifting capacity curves. The curve of ship's adjusted VCG versus lifting capacity (see figure 7), that was described in 5.3.3, shall be contained in the certification report. Additional curves, such as that described below, may be included in the certification report.

5.4.1.1 Effect of ship location on lifting capacity. By analyzing the available buoyancy, required freeboard, and dock strength, a curve may be prepared showing lifting capacity of the dock against the LCG location of a ship with respect to the LCB of the dock, as shown on figure 9.

5.5 Calculations for docking of a particular ship. In addition to the stability, buoyancy, and loading required in the design sections of the certification report, calculations on the stability, buoyancy, and loading of the ship-dock system during the docking of a particular ship shall be available to the Navy on-site representative prior to each individual ship docking. These calculations shall be developed as discussed in 5.3.3. In addition, the following shall be completed:

(a) Calculations for the ship's stability during drydocking shall be prepared in accordance with NAVSEA S9086-7G-STM-000/CH997, which discusses docking operations and calculations for ensuring stability of the ship during docking, stability of side blocks, and loading of knuckle blocks.
(b) Stability calculations as discussed in 5.3 are required. Intact stability calculations shall be for the five phases shown on figure 3. The curve of a ship's adjusted VCG versus lifting capacity shall be checked to ensure that the minimum GM is available in the phase of minimum stability. Damage stability calculations shall be performed in accordance with 5.3.3.1(c) for the particular ship/dock combination with the ballast water level determined by the pumping plan.
(c) A pumping plan shall be prepared for each docking evolution (see appendix D). Enclosure VI of the certification report shall contain procedures for preparing a pumping plan and a format for this pumping plan.

5.5.1 Additional data. Additional contents of enclosure VI shall be provided in accordance with appendix A, 30.4.6.

5.6 Surveys. Surveys shall be in accordance with 5.6.1 through 5.6.11.

5.6.1 Checkoff list. A summary checkoff list for the survey shall be included in the certification report. A sample checkoff list for the material survey is provided in appendix E. This list may be expanded or modified to suit a particular facility.

5.6.2 Light dock weight determination. The light dock operating condition (see 3.2) shall be verified by a deadweight survey or inclining experiment. NAVSEA S9086-C6-STM-000/CH096 provides the procedures for performing both inclining experiments and deadweight surveys and the results shall be included in the survey results. An inclining experiment is required if sufficient design data is not available for performing a weight estimate. If a weight

estimate is available, a deadweight survey shall be conducted to verify the weight estimate. The inclining experiment or deadweight survey shall be used to verify the maximum lifting capacity of the dock at its rated freeboard.

5.6.3 Submergence test. A submergence test shall be conducted and witnessed by a survey firm and the results obtained shall be included in the survey results. The dock shall be ballasted down to maximum submergence for 45 minutes to determine the maximum draft of the dock, to verify the minimum freeboard in this submerged condition, and to check the watertight integrity of the dock. In the case of docks designed to attain the maximum allowable design draft by means of an air cushion system under the safety deck, the distance of the ballast tank vents below the safety deck and the location of these vents with respect to the center of area of the tank top shall be recorded and made a matter of record in the FCR. If the maximum submerged draft cannot be attained or if the dock cannot be submerged to the margin line because of an insufficient amount of available ballast water or a limited basin depth, this fact shall be reported in the FCR, but will not govern certification capacity.

5.6.4 Leakage. Surveys for leaks shall be conducted to determine the watertight integrity of the shell plating, decks, and transverse and longitudinal bulkheads. Tests may be accomplished by visual inspection, air tests, water tests or as conditions warrant.

5.6.5 Structural survey. Structural surveys shall be conducted in accordance with the requirements listed herein. Regardless of the size of the facility, the surveyor shall enter and inspect all ballast tanks, buoyancy chambers, and other spaces which are enveloped by primary structural members.

5.6.5.1 Structural survey of steel docks. Structural surveys of steel docks shall be conducted in accordance with 5.6.5.1.1 through 5.6.5.1.6.

5.6.5.1.1 Special case, initial certification. For special cases, initial certification shall be in accordance with 5.6.5.1.1.1 and 5.6.5.1.1.2.

5.6.5.1.1.1 New docks. For docks that have been constructed within the 2 years preceding the FCR submission, the survey requirements of the following paragraphs may be waived, if surveyed by an independent engineering firm during construction or if built under class of a major classification society, unless visual inspection of the dock provides reason for conducting detailed surveys. The surveyor shall summarize the results of visual surveys and nondestructive tests carried out prior to acceptance of the dock by its owner. These summaries shall include results of NDT of welds carried out by magnetic particle inspection, ultrasonic testing, or radiographic testing.

5.6.5.1.1.2 Facilities recently overhauled. If the floating dock has been docked and overhauled within 2 years preceding FCR submission, the underwater surveys may be deferred until time for the next recertification, but only if a survey was conducted during the overhaul by an independent engineering firm or major classification society and a report prepared by them is submitted, indicating that all deficient items have been corrected.

5.6.5.1.2 Underwater hull survey (steel). An underwater hull survey shall be conducted every 5 years. As part of the survey, all flood water sea chests, intakes, and strainers shall be examined and any intakes with 25 percent or greater restriction shall be cleaned out and reported. In addition, every 10 years, a thorough inspection of the entire underwater portion of the hull shall be conducted by docking or careening. Also, after the dock is 20 years old and every 5 years thereafter, thickness measurements of one complete belt for each 100-foot length of dock shall be taken, utilizing a process which is acceptable to the U.S. Navy. The belts shall be equally spaced, but located at different places along the dock for each survey. For each belt, a minimum of two readings shall be taken on each plate if the plates are longitudinally oriented; three on each if transversely oriented. Additional thickness readings, between belts, shall be taken on locations found or suspected to be deficient by visual inspection. The results shall be included in the survey results. The date of the most recent drydocking or complete careening shall be reported. The underwater hull survey shall consist of one or more of the following methods as required below:

(a) The underwater portion of the hull shall be examined after exposing it by docking, self-docking, or careening.
(b) The underwater portion of the hull shall be examined by systematic audiogauging or ultrasonic testing (see 5.6.5.1.5) of the hull, utilizing a qualified process which is acceptable to the U.S. Navy.
(c) Divers meeting the qualifications in 4.4.3.3 and underwater survey techniques shall be used to examine the submerged surface of the hull.

5.6.5.1.3 Visual inspection. The surveyor shall examine the design data and records of repairs to define areas to be visually inspected. The plating, strength members, joints, foundations, sea chests, areas under blocks, crane rails, and structure associated with mooring, which are chosen for visual surveys, shall be checked. If the preservative coating appears to be blistering, flaking, or peeling, the paint shall be scraped to bare metal, exposing the steel for inspection to determine the extent of corrosion, pitting, thinning of edges, loose rivets, cracked welding, and elongation of bolt holes. Bent, buckled, torn, or otherwise damaged structural elements shall be identified.

5.6.5.1.4 Evaluation of results from visual inspection. The information collected by the visual examination shall be analyzed and, if possible, compared with results of past surveys to determine whether the spot surveys shall be followed up by detailed surveys in any area. If necessary, detailed surveys shall be carried out after proper cleaning and removal of deteriorated coatings. The reasons and results for these detailed surveys shall be included in the certification report.

5.6.5.1.5 Gauging. If visual surveys provide reasons to suspect that the loss of thickness of plates or other structural members is significant, gauging by caliper-type instrumentation or by ultrasonic measurements shall be conducted to determine the extent of deterioration. The reasons for conducting these tests, the process of selection of points where thicknesses were measured, drawings showing the positions of the readings, tables showing original (designed) and

current thicknesses and percentages of wastage, and the conclusions reached by comparing these measurements with the design data shall be included in the certification report. The surveyor shall also demonstrate that the ultrasonic testing procedures employed meet Navy requirements.

5.6.5.1.6 Corrosion criteria. The acceptance criteria (to determine how much material loss is acceptable) are dependent upon the safety margin in the original design, the nature and consequences of the failure of a given structural member, and the rate of material loss. These factors shall be taken into account (and explained in the certification report) in determining if a structural member is considered satisfactory, unsatisfactory (to be corrected prior to the next docking event), or marginal. However, in general, strength members or portions thereof which have suffered a reduction of 25 percent or greater from their original dimensions shall be considered unsatisfactory.

5.6.5.2 Structural survey of timber docks. Structural survey of timber docks shall be in accordance with 5.6.5.2.1 through 5.6.5.2.3.

5.6.5.2.1 Underwater hull survey (timber). An underwater hull survey shall be conducted every 5 years. At least every 10 years, a thorough inspection of the entire underwater portion of the hull shall be conducted by docking the facility and taking off the sheathing. Divers meeting the qualifications in 4.4.3.3 using underwater survey techniques shall be used for a 5-year survey. The internal and external surfaces of the underwater hull shall be examined for rot, marine borers, wear, cracks, and condition of fastening devices. Areas subject to decay caused by rainwater leakage and inadequate ventilation shall be examined. As part of the survey, all flood water sea chests, intakes, and strainers shall be examined, and any intakes with 25 percent or greater restriction shall be cleaned out and reported. Rationale used for selecting specific hull areas for inspection, how the inspections are conducted, and the results of these inspections shall be stated in the survey results. The date of the most recent drydocking shall also be reported.

5.6.5.2.2 Visual inspection of structural members. The strength members, including steel trusses and tie-rods, shall be cleaned and examined for corrosion, buckling, fracture, or damage of any other form. Particular attention shall be given to the examination of fastenings and the condition of preservatives.

5.6.5.2.3 Caulking. The seams of planking shall be examined, noting the condition of caulking, to determine the watertightness of the dock. (This is especially important in the case of side walls that are generally not submerged and which tend to dry out, allowing seams to open.)

5.6.5.3 Structural survey of concrete docks. Structural survey of concrete docks shall be performed in accordance with 5.6.5.3.1 through 5.6.5.3.3.

5.6.5.3.1 Underwater hull survey (concrete). An underwater hull survey shall be conducted every 5 years. As part of the survey, all flood water sea chests, intakes, and strainers shall be examined and any intakes with 25 percent or greater restriction shall be cleaned out and reported. An extensive underwater survey of the external hull surface may not be necessary if, by examining the hull from the inside, it can be determined that there is no leakage in the dock, and if cracking or spalling are not evident. If cracking or leakage is

witnessed, the external hull shall be examined by drydocking or careening (if the dock can be safely careened). At least every 10 years, a thorough inspection of the entire underwater portion of the hull shall be conducted by docking or careening. Qualified divers and qualified underwater survey techniques may be used for a 5-year survey. The date of the most recent drydocking or complete careening shall be reported.

5.6.5.3.2 Visual inspection. A thorough visual examination of the hull from the inside shall be conducted to detect occurrences of cracking, spalling, rust stains, exposed reinforcing bars, and leakage. This examination shall include inspection of foundations and anchor bolts, strainers and sleeves.

5.6.5.3.3 Detailed examination. Detailed examination of slabs, joints, and foundations shall be made if the visual inspections indicate a need for it.

5.6.6 Inspection of blocking. Blocking shall be inspected in accordance with 5.6.6.1 through 5.6.6.4.

5.6.6.1 Wooden blocks. Wooden blocks shall be inspected for deterioration resulting from excessive crushing, warping, cracking, checking, rotting, or damage from dogging. A check shall be made for loss of contact at edges resulting from checking and unequal shrinkage.

5.6.6.2 Composite blocks. Concrete cores of composite blocks shall be inspected for spalling, cracks, and chipped or damaged concrete. Wood of composite blocks shall be inspected for deterioration, as described in 5.6.6.1. The condition of bolts holding timber caps and base blocks to concrete cores shall be noted. Similarly, steel portions of composite blocks shall be inspected.

5.6.6.3 Block securing methods. Except for composite blocks which remain in place because of their weight, all fixed blocking shall be secured in place. Securings, supports, nuts, boltheads, and other fasteners shall be sound. There may be considerable deterioration under blocks which are fixed in place. The inspection of blocking shall include lifting a number of blocks, selected at random, to determine the presence and extent of such deterioration. In the event that the blocking does not land on transverse strength members of the pontoon deck, an investigation shall be made to ensure that provisions have been made to the use of adequate grillage to distribute loading to adjacent strength members.

5.6.6.3.1 Steel dock blocking. Securing and bolt connections through the wood shall be inspected on steel docks where blocks are bolted to clip angles or plates are welded to the pontoon decks. When blocks are set on T-beam supports, the bolts and supports shall be inspected.

5.6.6.3.2 Concrete dock blocking. On concrete docks, the condition of the metal fasteners securing blocks to the bearers shall be reported.

5.6.6.3.3 Wooden dock blocking. On timber docks, the state of preservation of links, staples, angle pieces, lag screws, dogs or other fasteners for securing the blocking to the keel tracks or other support members shall be checked.

5.6.6.4 Hauling blocking. Hauling blocking, if used, shall be checked to see that the hauling mechanism ensures freedom and is adequately supported by the substructure.

5.6.7 Inspection of mechanical and electrical systems. Mechanical and electrical systems shall be inspected in accordance with 5.6.7.1 through 5.6.7.12.

5.6.7.1 Test of piping systems. Vital piping systems such as fire protection and ballast or deballast systems shall be hydrostatically tested to 135 percent of the system's design pressure. As an alternate, ballast and deballast system piping may be visually inspected or ultrasonically tested. Where deterioration of the pipe walls exceeds 25 percent of the original thickness, their continued use shall be substantiated by calculations (see NSTM 0901-LP-480-0015).

5.6.7.2 Tests of ballasting and deballasting systems and gauges. The surveyor shall observe at least one complete ballasting and deballasting cycle and provide a report on the following:

(a) Actual ballasting and deballasting times. If these are markedly different from ballasting and deballasting times for which the system was originally designed, reasons for this variation shall be explained in the survey results (see appendix A, 30.4.8).
(b) Adequacy of the power supply, determine by operating all applicable pumps (and the fire pump, if installed on dock) at the same time.
(c) Smoothness of the operation of all pumps, motors, valves and generators by remote as well as local control.
(d) The accuracy and reliability of water level indicators when compared with actual soundings of the water level in each tank. Variations shall be included in survey results.
(e) A satisfactory deflection system exists on both wingwalls. The deflection targets shall be set at such a height that the zero points on all targets, on both wingwalls, are all in the same plane when the dock is in the unstressed condition.
(f) Tightness of air-cushioned boundaries, if they are required, in the tanks.

5.6.7.3 Detailed inspection of electrical and mechanical systems. If the generators, pumps, motors, and so forth show excessive noise, vibration or other signs of malfunction, they shall be opened and examined in detail. The tests and inspections shall follow criteria and procedures furnished by the equipment manufacturers or technical manuals.

5.6.7.4 Controls. The control systems shall be inspected as follows:

(a) Control panel: Check wiring, relays, bulbs and lenses for dust collection and abrasion of wires.
(b) Motor controls: Check contactors, relays, electrical and mechanical interlocks and manual overrides.
(c) Limit switches: Check panel limit switches and switch activator mechanisms.

5.6.7.5 Communication systems and alarms. The communication systems and alarms shall be checked thoroughly and tested for proper operation.

5.6.7.6 Fire protection systems. The fire protection systems intended for fighting fire on the dock or ship shall be thoroughly checked and tested for conformance to all requirements of 5.3.14. A flow and pressure test shall be conducted and the data submitted.

5.6.7.7 Block handling systems. The block handling system shall be observed in operation and shall be inspected.

5.6.7.8 Crane stops, rails, supports and securing systems. The crane rails, supports, stops and securing systems shall be inspected for structural soundness. The forces on the crane securing systems shall be calculated to verify that these systems are adequate to hold under conditions of maximum list or heel and trim.

5.6.7.9 Mooring and anchoring systems. The mooring and anchoring systems shall be examined thoroughly for adequacy and for signs of local buckling and excessive loading.

5.6.7.10 Electric power systems. The adequacy of both the primary and alternate power supply systems shall be determined. Both the primary and alternate electric power systems shall be inspected.

5.6.7.11 Stern or bow closures. In the case of docks which have stern or bow closures, the operation of the closures shall be observed and the structure and machinery shall be inspected.

5.6.7.12 Ship positioning gear. Bitts, bollards, winches and cleats shall be inspected for fatigue, looseness, or other signs of excessive loading.

5.6.8 Site survey. The site survey shall include inspection of pier and mooring attachments, electrical power supply feeders and fire protection system interfaces. The results of the site survey shall be included in the survey results.

5.6.9 Hydrographic survey. The hydrographic survey shall be conducted underneath the dock and in the approach channel by an adequate number of soundings referenced to Mean Low Water on the Atlantic coast and Mean Lower Low Water on the Pacific coast and a sounding chart shall be included in the survey results. Complete tidal ranges, approach channel width and depth configuration, dredging frequency, and any irregularities shall be noted. Where a history of hydrographic data is available, rates of siltation shall be noted.

5.6.10 Docking or undocking evolutions. The surveyor shall observe one complete docking or undocking evolution in order to determine the effectiveness of the equipment and procedures during ship handling.

5.6.11 Sectional docks and launch pontoons. If it can be scheduled, the surveyor should observe the assembling and disassembling process of dock sections; the connections shall be examined for structural soundness.

5.7 Operating procedures. In addition to the general requirements specified in 4.8.1, the operating procedures shall set forth, in sequence, the actions required by each manned operating station during the docking and transfer cycle. The operating procedures shall list events in step-by-step detail, commencing with prerequisite checks of dock systems, prior to flooding down for entry of the ship, and continuing with the events through the docking of the ship until the ship is secure on the blocks and ready for industrial work. The operating procedures shall also list events, commencing with prerequisite checks prior to the undocking operation, and continuing until the floating dry dock has been pumped dry and secured. Specific flooding and dewatering procedures described herein shall be keyed to a single line diagram of the piping and electrical systems operated. These operating procedures shall describe the methods of communication used between personnel at the various docking stations on the dock, the ship and tugs, as applicable. Information shall also be provided describing alternate communications systems used in case of failure of the primary communications system. Such systems may include: sound-powered telephones, dial telephones, radios, loudspeakers and alarm systems.

5.7.1 Detailed requirements for floating dry docks. The detailed requirements for floating dry docks specified in the following paragraphs shall be incorporated into operating procedures and checksheets. The operator of a floating dry dock shall establish procedures which include:

(a) Instructions for the preparation and implementation of a pumping plan with or without a ship in dock.
(b) Lineup checksheets, for use prior to docking or undocking and at the completion of docking, shall include the requirement for independent checks of the valve and control positions by two individuals for the dewatering and flooding system valves.
(c) Instructions for obtaining and monitoring deflection readings taken during docking and undocking evolutions.

5.7.2 Flooding precautions during the lay period. The operator of a floating dry dock shall prepare a written procedure and shall have qualified personnel readily available to maintain the proper list and trim of the dry dock during the lay period. The procedure shall list the sequence of events; equipment to be used; personnel designated to respond immediately to control potentially hazardous flooding situations on board the dock and the ship in dock; alarms, communications, and facility lighting; methods for recording valve lineup and tank level changes; and descriptions of the systems and equipment available for removal of water from the dry dock ballast tanks, compartments, and the ship in the dock.

6. DETAILED REQUIREMENTS FOR GRAVING DOCKS

6.1 Facility types. The requirements of this section apply to graving docks used for ship repair or ship construction.

6.2 CRC. The CRC of a graving dock shall be substantiated by selecting the largest ship that can be accommodated in the facility and demonstrating by calculations that the supporting structure, including dock blocking, is adequate to carry that capacity.

6.3 Design data and physical characteristics of the facility. Design data and physical characteristics shall be in accordance with 6.3.1 through 6.3.14.

6.3.1 Certification report content. The design data described in the following paragraphs shall be included in the certification report as indicated in 4.6.

6.3.2 General description. The description shall be based on the dock design as presently constructed. Plan views and sections through the dock which show the arrangement and structural characteristics of the dock shall be provided. The structural sections shall show dimensions, including water levels, concrete thickness, reinforcement locations and sizes, foundation details, including description and location of piles and pressure-relief systems.

6.3.3 Site characteristics. The following site characteristics shall be provided with the design data.

6.3.3.1 General geology. A brief description shall be provided of the site's geology and geologic formations.

6.3.3.2 Soil characteristics. A general description of the predominant soil types shall be provided. Where boring logs (soil profiles and laboratory test data) are available, they shall be included in the certification report. Groundwater elevations shall be noted.

6.3.3.3 Results of soil surveys. Where detailed structural analyses are necessary for certification purposes (due to absence of adequate historical data), and where the material condition survey shows signs of distress, survey results and associated laboratory analyses shall be included in the certification report.

6.3.3.4 Results of special geotechnical studies. Results of past geotechnical studies, conducted to determine reasons for settlement, voids, or excessive seepage, shall be included in the certification report. The Navy may require additional geotechnical studies and surveys prior to certification if the survey results presented by the surveyor indicate the necessity for these studies.

6.3.3.5 Tidal ranges and bathymetry. Complete tidal ranges, approach channel depths, and entrance depths shall be provided in the certification report. Where a history of hydrographic data is available, rates of siltation, dredging frequency, and any irregularities indicative of soil movement into or out of the dock area shall be noted.

6.3.3.6 Seismic characteristics. The following information shall be provided:

(a) Listing of seismic events withstood by the facility in the past.
(b) Active faults within a radius of 1 mile of the facility.

Requirements for additional information, depending on the various seismic zones, are as follows below. Seismic analysis shall be based on resisting collapse when exposed to an earthquake with an 80 percent probability of not being exceeded in 50 years. For existing structures, capacity of 75 percent of the earthquake demand is acceptable.

(c) Seismic zone 1 (Z=3/16):

(1) The one-third increase in allowable working stresses for earthquake loading governs.
(2) No seismic analysis is required.
(3) No concrete coring and testing is required, unless the condition of the concrete is questionable.

(d) Seismic zone 2 (Z=3/8):

(1) A site seismicity study is required.
(2) Rigorous analysis, such as finite element method, is not required. An elastic static load analysis is sufficient.
(3) No concrete coring and testing is required, unless the condition of the concrete is questionable.

(e) Seismic zones 3 (Z=3/4) and 4 (Z=1.0):

(1) A site seismicity study is required.
(2) Soils investigation, including liquefaction potential, is required.
(3) Initially, an elastic static load analysis is required. If structural components are determined to be inadequate by the analysis, a finite element method of analysis shall be required, based on a peak ground acceleration (an earthquake with an 80 percent probability of not being exceeded in 50 years) and supported by concrete coring and testing.
(4) Only in cases of nonsymmetrical configuration shall a dynamic analysis be required based on response spectrum or time history.

6.3.4 Structural analyses. Calculations made as a part of the certification report or a summary of the original calculation shall be appended to document the structural capacity of the dock. The following paragraphs describe the evaluation criteria and the structural analysis required. Also, any deterioration noted during the material condition survey that will affect the capacity of a component shall be considered in the analysis.

6.3.4.1 Applied loads. Discussions and drawings shall be provided which indicate values, or range of values, used for lateral earth and hydrostatic pressure and hydrostatic uplift pressures. These values shall be based on parameters presented in site characteristics (see 6.3.3), but any other data necessary to develop and substantiate these values shall be presented. If values are based on tests, there will be sufficient variance to warrant use of a maximum and a minimum value for lateral and uplift pressures. The estimate of lateral

earth pressures shall consider the rigidity of the dry dock walls (consider at-rest lateral earth pressures for rigid type docks where wall rotation is negligible). Ship loading shall be based on the actual blocking arrangements of the heaviest ships in the current Navy fleet for which the dock is to be certified. A check shall be made of smaller ships which may produce a limited extent line loading larger than the maximum ship. Discussion shall state how ship weight is distributed to blocks, magnitude and spacing of actual line loads used in dock analysis, and what portion of blocking arrangement is represented by line loads. In general, line loads located near the centerline of the dock will represent the more critical loading condition. Localized forces, such as moving loads, cranes and trucks, tend to be insignificant due to the extensive longitudinal distribution provided by the dock walls; but for small docks, these forces may be important and may require consideration.

6.3.4.2 General analysis methods. The method used to determine structural capacity of dock components (that is, ultimate strength method, working stress method, and so forth) shall be described. The method used to determine pile capacity from data presented in the site condition shall be described. The strength of construction materials, including basis for these values (original drawings, specifications, sample tests, assumed, and so forth) shall be identified. The analysis technique used shall be discussed. For most dry docks, the analysis shall consider a typical transverse section; however, for unusual loading conditions (such as a center caisson) a longitudinal analysis may also be necessary. The analysis of the dock floor would normally be based on classical elastic foundation techniques; however, foundation pressure distributions could be assumed, but it shall be demonstrated that assumptions are conservative for all dock loading cases. It is suggested that the foundation stiffness (modulus) be based upon deflections measured when the dock is flooded.

6.3.4.3 Dock walls. The critical loading combinations and resultant factors of safety or comparison of actual stresses with allowable stresses, including a statement concerning adequacy of walls shall be discussed. Since wall thickness and reinforcing typically vary, a number of critical locations throughout the height of the wall shall be investigated.

6.3.4.4 Dock floor. The critical loading combinations and resultant factors of safety provided by floor slab or comparison of actual stresses with allowable stresses shall be discussed. Maximum soil pressure and pile load shall be determined and compared with allowable values. Adequacy of slab foundation shall be indicated and any resulting limitations on ship loading noted.

6.3.4.5 Uplift stability. Calculations shall be provided which demonstrate the uplift resistance furnished by the dock, including how resistance supplied by adjacent soil was determined. Uplift resistance of piles and how tension capacity was determined shall be indicated. Total uplift pressure that can be resisted and factor of safety provided against actual uplift pressure shall be noted. Adequacy of uplift resistance shall be discussed. If seismic events are considered significant, how uplift resistance is determined for this condition shall be discussed and its adequacy demonstrated.

6.3.5 Flooding systems. The following information shall be provided on the flooding systems:

(a) Designed flooding time.
(b) Flooding tunnels. Arrangement of tunnels, air vents, access.
(c) Stop logs or other features which serve as backup to flooding valves. Arrangement, method of operation, possibility of operation under differential head (following sluice gate failure), corrosion protection, and seals.
(d) Flooding valves and gates. Arrangement, structure, calculations showing structural adequacy, operation, corrosion prevention, seals, and adequacy of stems. Also, power required for operation of sluice gates and possibilities of manual operation in the event of power or equipment failure.
(e) Draft gauges.
(f) Super flooding features, if applicable.
(g) A line diagram of the flooding system.

6.3.6 Dewatering and drainage systems. Dewatering and drainage systems shall be in accordance with the following:

6.3.6.1 General data. Drawings or sketches shall be provided which show pumphouse configuration with equipment, piping and valve arrangement, discharge tunnel and controls. This may be in the form of a line diagram. In any case, a line diagram of the whole system shall be provided. If the system serves several docks, the entire system shall be described as follows:

(a) Pumps and piping. The following information shall be provided for dewatering, drainage, and sump pumps: number of pumps, types of pumps, capacity, head rating, lubrication systems, power requirements, and controls. Valves and piping shall be described by type, size, function and how controlled.
(b) Discharge tunnels. The size, number and arrangement shall be provided for tunnels, grated inlets, and discharge end of the tunnels. If the tunnels show signs of degradation, evaluation shall be made of structural adequacy. A description of backup or redundant features shall be provided.
(c) Controls. A description of both primary and backup controls shall be provided.
(d) Alarms. A description of all alarm systems shall be provided.

6.3.7 Power supply. Sketches, diagrams, and descriptions shall be provided showing that the primary power supply is adequate for normal operation and that adequate alternate power capacity is available for the operation of all essential equipment; that is, power-operated communications, alarms, lights, fire protection systems, auxiliary drainage systems, and vital shipboard equipment (where applicable).

6.3.8 Flooding protection systems. The dock shall be isolated from all potential flooding sources, such as flooding and dewatering systems, by two methods of protection. One of these protective methods shall be a positive means of closure which can be operated under dynamic or static conditions. Both methods shall be utilized (except on those systems necessary for normal operations, such as the removal of drainage and underdrainage water, of the dock or interconnecting docks). The systems without two methods of protection

in place at all times shall be provided with a constant monitoring capability, along with provisions for a quick emergency-response capability to combat a system casualty. Docks for which firm orders for construction are placed after the effective date of this document shall include provisions for installing two methods of protection in all systems in which a potential flooding threat exists, as specified in 6.3.8.1 or 6.3.8.2.

6.3.8.1 Flooding protection for docks flooded through sluice gates. Docks flooded through sluice gates shall have a backup sluice gate installed in each flooding tunnel. If the design of the facility precludes the installation of backup sluice gates, stop logs or similar closure devices shall be installed over the inlet of each flooding tunnel. Locks shall be provided and shall be used to secure sluice gate operators or controllers prior to the completion of each docking operation. Operators or controllers shall be locked or electrically isolated in the closed or off position and shall be tagged out until the next scheduled flooding operation. Individual control functions and positions shall be identified and clearly labeled on control consoles and other operating stations. Activities shall exercise discretion in the distribution and stowage of keys to locks securing any of the above systems or controllers or operators. The installation or operation and securing of flooding protection systems shall be reflected in the operating and maintenance procedures.

6.3.8.2 Flooding protection for docks flooded through the caisson. Docks flooded through the caisson shall utilize a secondary method to ensure isolation of the dock from each flooding source. Secondary or backup flood valves shall be installed in each flooding tube. If the design of the facility precludes the installation of secondary flood valves, blank covers, drop gates or other suitable means shall be installed in or over each flooding tube. Locks shall be provided for controls or disconnects to the flooding valves. Prior to the completion of each docking operation the controls or disconnects shall be locked or electrically isolated in the closed or off position and shall be tagged out until the next flooding operation. Individual control functions and positions shall be identified and clearly labeled on control consoles and other operating stations. Activities shall exercise discretion in the distribution and stowage of keys to locks securing any of the above systems or controllers or operators. The installation or operation and securing of flooding protection systems shall be reflected in the operating and maintenance procedures.

6.3.9 Fire protection systems. The fire protection systems installed to combat fire in all areas of the dry dock, including the pump room, control station, and on the ship, shall be described in the survey results along with the requirements of 6.5.7.3. This description shall include minimum available water pressure, location of connections, location and size of fire stations, total available pump capacity, redundancies and backup features, and number, type and capacity of portable extinguishers.

6.3.9.1 Requirements for a graving dock's fire protection water. The minimum available capacity for supplying a surface ship or submarine firemain (either permanently installed or temporary) shall be at least 300 gal/min per 100 feet of maximum docked ship length, except that only 300 gal/min are required for submarines less than 500 feet in length. The capacity available to

serve a ship's firemain (either permanent or temporary) may also serve the fire stations in the dry dock, but in no case shall the total capacity be less than 1,000 gal/min. Where the fire protection water supplies to a submarine and the dock are separate, at least 300 gal/min of water shall be supplied to the submarine firemain and a minimum of 1,000 gal/min of water shall be supplied to the dock. Hull insulation fires can best be extinguished with water, preferably applied as a fog. Either of the following shall be available for fire watches assigned to hot work in areas where hull insulation on submarines is endangered:

(a) A portable fresh water extinguisher of either pressure type (NSN 4210-00-720-1815) or pump (NSN 4210-00-251-7904) with a 2.5 gallon minimum capacity; or
(b) A minimum 3/4-inch hose fitted with a fog nozzle supplied from a fresh water source.

Application of a given extinguishing agent to a shipboard fire shall conform to restrictions specified in the current contract or specifications. Fresh water supply and adequate hose for complete coverage shall be available for use in the event a reactor compartment fire cannot be controlled by carbon dioxide extinguishers. Hose lines for fighting fires in way of the reactor compartment shall be restricted to fresh water sources. The pressure at the pier outlets shall provide a minimum nozzle pressure of 60 lb/in^2 when supplying fire nozzles at the specified capacities at the most remote and highest elevation hose connections. Booster pumps may be used at the dry dock outlets to boost pressure to a ship's firemain (either permanently installed or temporary). A backup pumping capability, such as diesel-driven fire pumps, fire department pumper connections, or alternate power supplies for electric-driven pumps, shall be provided to ensure that the full water capacity for fire protection is available if there is a power interruption or failure of a single pump. Electrical installations shall conform to NFPA-20.

6.3.9.2 Fire stations. Dock fire stations shall consist of 2-1/2 inch hose valves with 2-1/2 inch supply outlets and 1-1/2 inch hose outlets. If fire protection is supplied to aircraft carriers through hose to the carriers' salt water systems, then 4-inch outlets are required. Fire stations are required in the dry dock so that any area can be reached with a 20-foot fog stream from 100 feet of hose. Fire stations serving the bottom of the dry dock shall preferably be hard piped from the water supply sources. However, portable stations which are securely lashed down and supplied by jumper hoses will be considered satisfactory in meeting this requirement.

6.3.9.3 Liquid fuel and electrical fires. Means shall be provided for combating liquid fuel and electrical fires in the dry dock. This requirement may be met by providing portable extinguishers or by installed systems. As a minimum, a 15-pound CO_2 extinguisher shall be located in pump rooms and any other spaces having electrical equipment; and a dry chemical extinguisher, 18- or 27-pound type, shall be provided at locations subject to liquid fuel fire (for example, near diesel-engine-driven equipment).

6.3.10 Communication systems and alarms. System diagrams and descriptions shall be provided showing that the system is adequate for: bringing the ship in and out of the dock, as well as aligning the ship into the docking position; control of both flooding and dewatering; and dealing with emergency situations. The

communication systems shall include both primary and backup systems, for example, telephone and portable two-way radio systems connecting the dock control station with each manned operating station and with security and fire personnel. The certification report shall include a complete listing of the types and locations of all alarms which are installed in the dock and shall describe how they are monitored.

6.3.11 Essential lighting systems. System descriptions shall be provided for lighting systems essential for the safe operation and security of the facility. Lighting systems shall provide approximately 2 foot-candles of illumination for security.

6.3.12 Caisson. The following information, as applicable to the caissons, shall be provided:

(a) General arrangement showing type, size, compartmentation and seats.
(b) Structural material, fabrication process, corrosion protection system (both protective coating and cathodic protection, if applicable).
(c) Ballast-deballast systems, including pumps, piping, valves, and valve operating mechanisms.
(d) Power supply.
(e) Systems for through-the-caisson flooding, flooding protection and super flooding.
(f) Seals.
(g) Controls, indicators, alarms and communications systems.
(h) Systems for removing and positioning the caisson in place.
(i) In the event that a spare caisson exists at this site, its material condition and the date it was last utilized shall be described.
(j) Backup and redundant features shall be described.
(k) A line diagram of the pumps, valves, and piping system shall be provided.

6.3.13 Blocking. Descriptions of the docking blocks and block hauling system shall be provided which show physical characteristics of the blocks, including material and dimensions. Calculations shall be provided in order to verify that the blocks are stable and structurally adequate to withstand the loading used in the docking capacity calculations and that the side blocks (and shores, if used) are adequate in number to provide sufficient bearing area to resist seismic and hurricane overturning moments as required by NAVSEA S9086-7G-STM-000/CH997. Additional calculations shall be provided if higher blocks are to be used for docking at a lower capacity. Expected arrangement and adequacy of systems used for securing the keel and side blocks in place shall be described.

6.3.14 Seismic effects. In the case of docks located in seismic zones 2 or above, the operator shall demonstrate that equipment foundations, cable and pipe supports shall withstand seismic shocks. For guidance, see NAVFAC P-355 and NAVFAC P-355.1.

6.4 Operational limitations. Operational limitations shall be described as indicated in appendix A, 30.4.3. These shall consist of, but not be limited to, the following:

(a) Wind, tide, and current conditions under which docking and undocking shall not be carried out.
(b) Limits of local, concentrated block loads in LT per linear foot of blocking length.

6.5 Surveys. Surveys shall be conducted in accordance with 6.5.1 through 6.5.8.

6.5.1 Checkoff list. A summary checkoff list shall be included in the certification report. A sample checkoff list for use by the surveyor is provided in appendix F. This list shall be expanded or modified to suit a particular facility.

6.5.2 Observation of docking and undocking. The surveyor shall observe at least one complete flooding and dewatering evolution, either docking or undocking, if possible. The operation of the caisson, flooding and dewatering of the dock, and use of capstans and fittings in hauling and centering the ship shall be observed. The operation of the caisson, time required for flooding and dewatering, and the smoothness with which a ship can be hauled in or out and centered shall be determined. Operation of electrical, mechanical, control and communication systems shall be observed and any malfunctions shall be identified.

6.5.3 Examination of operating logs. The operating logs shall be examined to determine if there has been an increase in pumping requirements for removal of leaking water.

6.5.4 Basic dock, concrete caisson and pump house structure. The walls, floor, concrete caisson, caisson seat, tunnels, altars, pump house and other concrete work shall be inspected for the following:

(a) Significant cracks: Estimate size, depth, location and probable cause (shrinkage, structural, and so forth).
(b) Leakage estimate: Estimate flow rate gal/min and location, note evidence of silt or sediment in seepage.
(c) Spalling: Estimate depth and area, note lack of density, exposure and condition of structural steel and reinforcing bars.
(d) Evidence of inward or outward movement of vertical surfaces.
(e) Evidence of upward displacement or settlement of floor.
(f) Evidence of settlement of soil around dock.
(g) Evidence of possible voids under dock floor.

6.5.4.1 Pressure relief system. The number of relief wells and estimate flow rate of seepage water shall be indicated. In docks with separate underdrainage pumps, actual flow rate shall be determined and history of seepage flow shall be studied. If this flow has increased over the years, the cause of the increase shall be searched for and possible cavities under the dock floor shall be looked for. Sediment content of seepage water shall be estimated and clogged holes reported.

6.5.4.2 Caisson structure. The caisson shall be inspected for the following, as applicable:

(a) Plating: Material thickness (in, above and below splash zone), fastener condition and defects (sheared rivet heads, weld cracks, and so forth), corrosion protection (paint, bitumastic material, cathodic protection), and extent of marine fouling.
(b) Structural framing: General size of members, average flange thickness over 4 feet in length, web condition, type and condition of end connection, fastener defects, buckling or other defects, drainage and internal corrosion of tubular members, and joint distortion due to corrosion buildup.
(c) Bulkheads: Type, plate, and framing (same as (a) and (b) above).
(d) Fixed ballast: Type of material and general condition.
(e) Seals: Facing condition, gasket material type and condition, and backing material type and condition.
(f) Deck and catwalk. General condition.
(g) Gratings, vents, inclinometers, water level indicators, and other fittings: General condition.

6.5.4.3 Caisson or entrance closure underwater hull survey. An underwater hull survey shall be conducted every 5 years by either docking, NDT inspection, diver inspection, or by inspecting one side when the dry dock is dry, rotating the caisson or entrance closure during a docking evolution, if practical, and inspecting the other side. At least every 6 years, a thorough inspection of the entire underwater portion of the hull shall be conducted by drydocking. The date of the most recent drydocking shall be reported. After a steel caisson or entrance closure is 20 years old, and every 10 years thereafter, gaugings shall be taken, utilizing approved methods. The entire hull shall be gauged and readings shall be taken in a grid pattern with individual readings on approximately 8-foot centers (minimum required). Additional readings may be required in areas of heavy corrosion or deterioration. The gauging results, along with original thickness, shall be included in the certification report. Corrosion criteria of 4.4.4.3 shall apply.

6.5.5 Soil borings and piezometric surveys. Soil borings shall be carried out if either the visual inspections or records of past structural repairs indicate a significant likelihood of major structural damage, or if the design data and records of past dockings are inadequate to justify facility certification for the rated capacity desired by the operator. The piezometric survey shall be carried out in pressure-relieved graving docks. Water levels in all piezometers, when dock is dry and when it is wet shall be recorded. Standpipes may also be used to measure the pore water table. Water levels in floor vent holes when dock is dry shall be recorded. If these surveys are carried out for obtaining certification, the planning, techniques, and results of the surveys shall be summarized in the certification report.

6.5.6 Inspection of blocking. The type of blocking, bearing area, means of buildup, cribbing and shoring shall be noted.

6.5.6.1 Wooden blocks. Wooden blocks shall be inspected for deterioration resulting from excessive crushing, warping, cracking, checking, rotting or damage from dogging. A check shall be made for loss of contact at edges resulting from checking and unequal shrinkage.

6.5.6.2 Composite blocks. Concrete cores of composite blocks shall be inspected for spalling, cracks and chipped or damaged concrete. Wood of composite blocks shall be inspected for deterioration, as described in 6.5.6.1. The condition of bolts holding timber caps and base blocks to concrete cores shall be noted. Similarly, steel portions of composite blocks shall be inspected.

6.5.6.3 Hauling blocks. Hauling blocks, if used, shall be checked to see that the hauling mechanism ensures freedom and is adequately supported by the substructure.

6.5.7 Inspection of electrical and mechanical systems. Electrical and mechanical systems shall be inspected in accordance with 6.5.7.1 through 6.5.7.10.

6.5.7.1 Detailed examination of electrical and mechanical systems. Controls, pumps, motors, capstans, and so forth in the dock, pump house, and caisson shall be opened for inspection only if, after observing them in operation, the operator has noted abnormal behavior that justifies this action.

6.5.7.2 Controls. The control systems shall be inspected for the following:

(a) Control panel: Check wiring, relays, bulbs and lenses. Check for dust collection and abrasion of wires.
(b) Motor controls: Check contactors, relays, electrical and mechanical interlocks, and manual overrides.
(c) Limit switches: Check panel limit switches and switch activator mechanisms.

6.5.7.3 Fire protection equipment. Fire protection equipment shall be checked during the surveys for conformance to the requirements of 6.3.9. A flow and pressure test shall be conducted and the data submitted. The test data shall be described, indicating where and under what conditions pressure and flow were measured.

6.5.7.4 Communication systems and alarms. Communication systems and alarms shall be checked during the surveys.

6.5.7.5 Flooding and pumping systems. Pumps, valves, sluice gates, sluice valves, check valves and stop logs or gates shall be inspected and tested for proper operation. Trash racks and intake screens shall be inspected.

6.5.7.6 Block handling system. The block handling system shall be observed in operation and shall be inspected.

6.5.7.7 Electric power systems. The adequacy of both primary and alternate power supply systems shall be determined. Both the primary and alternate electric power systems shall be inspected.

6.5.7.8 Draft gauges. The legibility and accuracy of the draft gauges shall be determined.

6.5.7.9 Mooring systems. The capstans, cleats, bollards, bitts, chocks and roller chocks shall be examined for adequacy.

6.5.7.10 Ventilation systems. The adequacy of the ventilation system shall be determined.

6.5.8 Evaluation of survey results. The operator shall review the survey results and take the following action:

(a) Determine whether there is a significant likelihood of major structural failure.
(b) Develop a systematic plan for monitoring the soil and groundwater conditions.

6.6 Operating procedures. In addition to the general requirements specified in 4.8.1, the operating procedures shall set forth, in sequence, the actions required by each manned operating station during the docking cycle. The operating procedures shall list events in step-by-step detail, commencing with prerequisite checks of dock systems, prior to flooding the dock, and continuing with the events through the docking of the ship until the ship is secure on the blocks and ready for industrial work. The operating procedures shall also list events, commencing with prerequisite checks prior to the undocking operation, and continuing until the graving dock has been pumped dry and secured. Specific flooding and dewatering procedures described herein shall be keyed to a single-line diagram of the piping and electrical systems operated. These operating procedures shall describe the methods of communication used between personnel at the various docking stations on the dock, the ship, and tugs, as applicable. Information shall also be provided describing alternate communications systems used in case of failure of the primary communications system. Such systems may include sound-powered telephones, dial telephones, radios, loudspeakers, and alarm systems.

6.6.1 Detailed requirements for graving docks. The detailed requirements for graving docks specified in the following paragraphs shall be incorporated into operating procedures and checksheets. The operator of a graving dock shall establish procedures which include:

(a) Lineup checksheets for use prior to docking or undocking, at the completion of docking, and during the lay period shall be prepared and shall include the requirement for independent checks of the valve position by two individuals for valves of the dewatering, flooding, and drainage systems.
(b) Valves on sluice gates interconnecting graving docks and valves utilized for ballasting or deballasting the caisson shall be included in these checksheets.

6.6.2 Flooding precautions during the lay period. The operator of a graving dock shall prepare a written procedure and shall have qualified personnel readily available to maintain the dry condition of the ship and dock during the

lay period. The procedure shall list the sequence of events; equipment to be used; personnel designated to respond immediately to control potentially hazardous flooding situations on board the dock and on board the ship in the dock; alarms, communications, and facility lighting; methods for recording valve lineup; and descriptions of the systems and equipment available for removal of water from the dry dock basin, caisson, pump house, and the ship in the dock.

7. DETAILED REQUIREMENTS FOR MARINE RAILWAYS

7.1 Facility types. The requirements of this standard apply to side-haul and end-haul marine railways.

7.2 CRC. The CRC of a railway shall be determined by the limiting capacity of the weakest component, whether piles, groundways, cradle, chain, wheels, rollers or hauling machinery and gear. The structural adequacy shall be demonstrated by calculations.

7.3 Design data and physical characteristics of the facility. Design data and physical characteristics shall be in accordance with 7.3.1 through 7.3.18.

7.3.1 Certification report content. The design data described in the following paragraphs shall be included in the certification report as indicated in 4.6.

7.3.2 Site characteristics. The following characteristics of the site shall be included in the certification report:

(a) A general layout drawing showing tracks, water depth and associated structures, such as catwalks.
(b) Silt accumulation rates and track cleaning procedures.
(c) Prevailing wind and current and tidal variations.
(d) Soil profiles, if available.

7.3.2.1 Seismic characteristics. The following information shall be provided:

(a) Listing of seismic events withstood by the facility in the past.
(b) Active faults within a radius of 1 mile of the facility.

Requirements for additional information, depending on the various seismic zones, are as follows below. Seismic analysis shall be based on resisting collapse when exposed to an earthquake with an 80 percent probability of not being exceeded in 50 years. For existing structures, capacity of 75 percent of the earthquake demand is acceptable. In addition to the seismic analysis of the structure, stability of the ship on the blocks; of the ship and blocks on the cradle; and of the ship, blocks, and cradle on the groundways shall be included.

(c) Seismic zone 1 (Z=3/16):

(1) The one-third increase in allowable working stresses for earthquake loading governs.
(2) No seismic analysis is required.

(d) Seismic zone 2 (Z=3/8):

(1) A site seismicity study is required.
(2) Rigorous analysis, such as finite element method, is not required. An elastic static load analysis is sufficient.

(e) Seismic zones 3 (Z=3/4) and 4 (Z=1.0):

(1) A site seismicity study is required.
(2) Soils investigation, including liquefaction potential, is required.
(3) Initially, an elastic static load analysis is required. If structural components are determined to be inadequate by the analysis, an appropriate analysis shall be required, based on a peak ground acceleration (an earthquake with an 80 percent probability of not being exceeded in 50 years).

7.3.3 General arrangement. Drawings and sketches shall be provided showing the structure and arrangement of groundways and their foundations, structural arrangement of cradle and equipment for block handling, rollers, chain guides, and machinery room.

7.3.4 Cradle weight. Cradle and blocking weight estimate shall be provided.

7.3.5 Stability. The stability calculations for the maximum ship shall be submitted. For the ship-cradle system shown on figure 10, the maximum wind load (F) and current load (P) shall be calculated. The overturning moment h(F+P) shall be less than the stabilizing moment Wb/2.

7.3.6 Blocking. Descriptions of the docking blocks and block hauling system shall be provided which show physical characteristics of the blocks, including material and dimensions. Calculations shall be provided to verify that the blocks are stable and structurally adequate to withstand the loading used in the lifting capacity calculation and that the side blocks (and shores, if used) are adequate in number to provide sufficient bearing area to resist seismic and hurricane overturning moments as specified by NAVSEA S9086-7C-STM-000/CH997. Additional calculations shall be provided if higher blocks are to be used for docking at a lower capacity. Expected arrangement and adequacy of systems used for securing the keel and side blocks in place shall be described.

7.3.7 Cradle structure. Calculations shall be provided showing the structural adequacy of the cradle and trusses to transmit the loads caused by the maximum ship, via blocking, to the rollers or wheels, the adequacy of the wing structure to withstand wind and current loads on the maximum ship transmitted via the breast lines; and loads that might be caused as the maximum ship is being positioned over the blocks. The cradle structural connection to the inhaul chains or cables shall be shown.

7.3.8 Rollers, wheels and bearings. Calculations shall be provided demonstrating that the rollers or wheels and bearings are adequate to carry the weight of the cradle and maximum ship.

7.3.9 Groundways structure. Calculations shall be provided for the groundways structure and foundations, taking into account any deterioration of structure or foundations noticed during the material condition survey.

7.3.10 Essential lighting systems. System descriptions shall be provided for lighting systems essential for safe operation and security of the facility.

7.3.11 Fire protection systems. The fire protection systems installed to combat fire in all areas of the marine railway and on the ship shall be described in the survey results along with the requirements of 7.6.6.4. This description shall include minimum available water pressure, location of connections, location and size of fire stations, total available pump capacity, description of redundancies and backup features, and number, type, location and capacity of portable extinguishers.

7.3.11.1 Requirements for marine railways with a CRC of 500 tons or more. The minimum available capacity for supplying the ship's firemain shall be at least 300 gal/min per 100 feet of maximum docked ship length. The pressure at the fire plug outlets shall provide a minimum nozzle pressure of 60 lb/in^2 when supplying fire nozzles at the specified capacities at the most remote and highest elevation hose connections. A backup pumping capability, such as diesel-driven fire pumps, fire department pumper connections, or alternate power supplies, shall be provided to ensure that the full water capacity for fire protection is available with a power interruption or failure of a single pump.

7.3.11.2 Requirements for marine railways with a CRC under 500 tons. Two independent sources of fire protection water, such as a primary and a backup source, shall be provided, with a minimum capacity of 500 gal/min. The pressure at fire plug outlets shall provide a minimum nozzle pressure of 60 lb/in^2 when supplying fire nozzles at the most remote and highest elevation hose connections.

7.3.11.3 Fire stations. In addition to the pumping capacity, fire stations shall be required so that any area can be reached with a 100-foot length of 1-1/2 inch hose.

7.3.11.4 Liquid fuel and electrical fires. Means shall be provided for combating liquid fuel and electrical fires near the marine railway and in the machinery room. This requirement may be met by providing portable extinguishers or by installed systems. As a minimum, a 15-pound CO_2 extinguisher shall be located in machinery rooms and other spaces having electrical equipment and a dry chemical extinguisher, 18- or 27-pound type, shall be provided at each location which is subject to liquid fuel fire (for example, near diesel-engine-driven equipment).

7.3.12 Inhaul chains or wire rope. Calculations shall be provided showing that the inhaul chains or wire rope are adequate to withstand the imposed loads.

7.3.13 Inhaul machinery. The operator shall provide adequate information on the inhaul machinery and controls to demonstrate that it can safely haul the maximum ship under normal conditions. The behavior of the machinery under overloading, power failure, and voluntary or involuntary sudden stops shall be described.

7.3.14 Power load analysis. Power load analysis shall be provided demonstrating that the primary power supply is adequate for hauling the carriage with a maximum ship on it, together with simultaneous operation of power-operated alarms, communications, lighting and fire protection systems.

7.3.15 Communication systems and alarms. Communication systems and alarms installed in the machinery room and on the cradle shall be described.

7.3.16 Bilge block handling systems. The design and operation of the block handling systems shall be described in the certification report.

7.3.17 Equipment for ship handling. The equipment used for aligning and moving the ship (before docking occurs) shall be described. Any fittings, structure, or foundations associated with this equipment which are located on the carriage shall be shown to be structurally adequate.

7.3.18 Transfer system. The design and load carrying capacity of the system used for transferring a ship from railway to the work site and vice versa, shall be provided, if applicable.

7.4 Operational limitations. Operational limitations shall be described as indicated in appendix A, 30.4.3. These shall consist of, but not be limited to, the following:

(a) Wind, tide, and current conditions under which docking and undocking shall not be carried out. This shall include any stability limitations as determined in 7.3.5.
(b) Limits of local, concentrated block loads in LT per linear foot of blocking length.

7.5 Pre-docking calculations. Procedures for stability calculations shall be developed in accordance with 7.3.5.

7.6 Surveys. Surveys shall be performed in accordance with 7.6.1 through 7.6.8.

7.6.1 Checkoff list. A summary checkoff list shall be included in the certification report. A sample checkoff list for material surveys is provided in appendix G. This list shall be expanded or modified to suit the needs of a particular facility.

7.6.2 Observation of a marine railway in operation. The surveyor shall observe at least one inhaul or one outhaul operation to note problems associated with:

(a) Rough movement of carriage on tracks, indicating possibility of track distortion, lack of stability, binding of rollers, and so forth.
(b) Positioning and placement of rollers.
(c) Movement of chains and wire rope.
(d) Movement, positioning and securing of blocks.
(e) Inhaul machinery.
(f) Braking systems.
(g) Controls and communication systems.
(h) Where applicable, type of provisions to prevent overturning during an earthquake.

7.6.3 Line and grade survey. The surveyor shall conduct a line and grade survey and shall inspect all underwater components of the ways.

7.6.4 Structural survey. Structural surveys shall be conducted in accordance with the following requirements:

(a) Piles and caps: Check above-water portion, splash zone, and underwater portion. Study type, size and spacing. Determine soundness of basic structure and connections.
(b) Stringers: Check above-water portion, splash zone and underwater portion.
(c) Tracks and rail plate: Check general condition, measure size to determine deterioration, check condition of fasteners. Check track gauge and identify variations.
(d) Cross bracings: Check material condition and condition of fasteners.
(e) Chain paths and guides: Check spacing and material conditions.

7.6.4.1 Cradle. Size, width and spacing of the cradle, pony rail, and fantail shall be studied and the following shall be inspected:

(a) Steel frames: Measure sizes and determine extent of deterioration of webs and flanges. Check cracks or other defects in welding. Identify buckled or bent frames. Determine adequacy of corrosion prevention systems.
(b) Wooden frames: Study general condition, study evidence of rot, overstress, and attack by marine borers. Inspect condition of fasteners.
(c) Block bearers: see (a) or (b) above.
(d) Elevated framework and walkway: Inspect all structural items for soundness and condition of fasteners.
(e) Drawhead girder: Inspect for structural soundness and condition of fasteners and welded joints.
(f) Bottom chord: Inspect shoe-plate or rail and fasteners.

7.6.5 Inspection of blocking. The type of blocking, bearing area, means of buildup, cribbing, and shoring shall be reported.

7.6.5.1 Wooden blocks. Wooden blocks shall be inspected for deterioration resulting from excessive crushing, warping, cracking, checking, rotting, or damage from dogging. A check shall be made for loss of contact at edges resulting from checking and unequal shrinkage.

7.6.5.2 Block securing methods. Fixed blocking shall be secured in place. Securings, supports, nuts, boltheads and other fasteners shall be sound. There may be considerable deterioration under blocks which are fixed in place. The inspection of blocking shall include lifting a number of blocks, selected at random, to determine the presence and extent of such deterioration.

7.6.5.3 Hauling blocking. Hauling blocks, if used, shall be checked to see that the hauling mechanism ensures freedom and is adequately supported by the substructure.

7.6.6 Inspection of electrical and mechanical systems. Electrical and mechanical systems shall be inspected in accordance with 7.6.6.1 through 7.6.6.7.

7.6.6.1 Wheels, rollers and roller frames. Wheels, rollers and roller frames shall be inspected as follows:

(a) Check lubrication, axle diameter, wheel diameter and flange size, bearings, and grease grooves, or oil lines.
(b) Check roller size and diameter, and determine evidence of uneven wear and other defects.
(c) Inspect material condition of frames and spacers.

7.6.6.2 Chains and wire rope. Inhaul and outhaul chains and wire rope shall be inspected to determine the status of cleaning, lubrication, fit and percentage of wear. The inhaul, outhaul and transfer sheaves shall be checked for defects and deterioration. The condition of bearings and the means of anchoring shall be determined.

7.6.6.3 Hauling gear. The hauling machinery shall be inspected for condition, lubrication, fit and method of anchoring. Items to be inspected shall include:

(a) Electric motor: Check horsepower, voltage, phases, revolutions per minute.
(b) Diesel or gas engine.
(c) Steam or compressed air drives.
(d) Gears.
(e) Wildcat: Check for sprocket wear, chain slippage and other defects.
(f) Wire rope drum: Check wire rope lay and defects in spool and flange.
(g) Locking pawls: Check pin connection.
(h) Speed controllers, circuit breakers, and switches: Check wiring, water tightness, and evidence of overheating.
(i) Electric and hand brakes: Check lining and shoe or disc.

7.6.6.4 Fire protection system. The fire protection systems intended for fighting fire on the dock or ship shall be thoroughly checked and tested for conformance to all requirements of 7.3.11. A flow and pressure test shall be conducted and the data submitted.

7.6.6.5 Block handling systems. The block handling system shall be observed in operation and shall be inspected.

7.6.6.6 Electric power system. The adequacy of the power supply shall be determined.

7.6.6.7 Communication systems and alarms. Communication systems and alarms shall be checked during the survey.

7.6.7 Draft markers. The legibility and accuracy of the draft markers shall be checked.

7.6.8 Mooring equipment and fittings. The adequacy of cleats and ringbolts shall be determined.

7.7 Operating procedures. In addition to the requirements specified in 4.6.1, the operating procedures shall set forth in sequence the actions required by each manned operating station during the docking cycle, for example, dockmaster, hoistman, line handlers, and so forth. The operating procedures shall list events in step-by-step detail, commencing with prerequisite checks of the railway subsystems, prior to outhauling the cradle for receiving the ship and continuing with the events through landing of the ship and inhaul until the ship is secured on the marine railway and ready for industrial work. The operating procedures shall also list events, commencing with prerequisite checks, prior to the outhaul operation, and continuing until the empty cradle has been retrieved. These operating procedures shall describe the methods of communication used between personnel at the various stations on the marine railway, the ship, and tugs, as applicable. Information shall also be provided describing alternate communication systems used in case of failure of the primary systems. Such systems may include sound-powered telephones, dial telephones, two-way radios, loudspeakers, and alarm systems.

8. DETAILED REQUIREMENTS FOR VERTICAL LIFTS

8.1 Types of facilities. The requirements of this section apply to facilities that lift a ship vertically by mechanical means rather than buoyancy.

8.2 CRC. The CRC of a vertical lift shall be substantiated by selecting the largest ship that can be accommodated in the facility and demonstrating that the platform, blocking, hoist mechanism, and ship transfer system are adequate for lifting or hauling and supporting the chosen ship.

8.3 Design data and physical characteristics of the facility. Design data and physical characteristics shall be in accordance with 8.3.1 through 8.3.17.

8.3.1 Certification report content. The design data described in the following paragraphs shall be included in the certification report as indicated in 4.6.

8.3.2 Site arrangement. A general layout of site shall be provided which shows the water depth, vertical lift and land structures. The rate of silt accumulation and dredging procedures and frequency shall be stated. Tidal variations shall be defined.

8.3.2.1 Seismic characteristics. The following information shall be provided:

(a) Listing of seismic events withstood by the facility in the past.
(b) Active faults within a radius of 1 mile of the facility.

Requirements for additional information, depending on the various seismic zones, are as follows below. Seismic analysis shall be based on resisting collapse when exposed to an earthquake with an 80 percent probability of not being exceeded in 50 years. For existing structures, capacity of 75 percent of the earthquake demand is acceptable.

(c) Seismic zone 1 (Z=3/16):

(1) The one-third increase in allowable working stresses for earthquake loading governs.
(2) No seismic analysis is required.

(d) Seismic zone 2 (Z=3/8):

(1) A site seismicity study is required.
(2) Rigorous analysis, such as finite element method, is not required. An elastic static load analysis is sufficient.

(e) Seismic zones 3 (Z=3/4) and 4 (Z=1.0):

(1) A site seismicity study is required.
(2) Soils investigation, including liquefaction potential, is required.
(3) Initially, an elastic static load analysis is required. If structural components are determined to be inadequate by the analysis, an appropriate analysis shall be required, based on a peak ground acceleration (an earthquake with an 80 percent probability of not being exceeded in 50 years). It shall be assumed that the lift is in the locked position.

8.3.3 General arrangement. Sketches and drawings shall be provided which show the platform, hoists, structure, foundations supporting the hoists, blocks and equipment for block handling and control stations.

8.3.4 Blocking. Descriptions of the docking blocks and block hauling system shall be provided which show physical characteristics of the blocks, including material and dimensions. Calculations shall be provided to verify that the blocks are stable and structurally adequate to withstand the loading used in the lifting capacity calculation and that the side blocks (and shores, if used) are adequate in number to provide sufficient bearing area to resist seismic and hurricane overturning moments as required by NAVSEA S9086-7G-STM-000/CH997. Additional calculations shall be provided if higher blocks are to be used for docking at a lower capacity. Expected arrangement and adequacy of systems used for securing the keel and side blocks in place shall be described.

8.3.5 Platform. Drawings shall be furnished showing the material and dimensions of platform structure. Calculations shall be submitted showing the load that the platform can carry per foot of length. This value shall be compared with the maximum load per foot of length exerted by the maximum ship.

8.3.6 Hoists. The design of the hoist shall be described, including the following characteristics:

(a) Lifting capacity.
(b) Lifting speed.
(c) Method of synchronization of lifting speeds of all motors.
(d) Overload protection.

8.3.7 Wire rope and chains. The strength of the wire rope and chains shall be defined and their adequacy determined in withstanding dynamic loading caused by sudden changes in speed. The corrosion-prevention system shall be described.

8.3.8 Braking systems. The design and capabilities of the braking system shall be described in the certification report.

8.3.9 Structure supporting hoists. Drawings shall be provided which show the structure supporting the hoists, including foundations.

8.3.10 Transfer system. The design and load carrying capacity of the system used for transferring a ship from platform to the work site and vice versa, shall be provided, if applicable.

8.3.11 Control systems and alarms. The control systems and alarms shall be described.

8.3.12 Power supply. Primary and alternate power sources shall be described in the certification report. It shall be demonstrated that the primary power source is adequate for simultaneous operation of the hoists, controls, power-operated communications, alarms, essential lighting and fire protection systems.

8.3.13 Communication systems. System diagrams and descriptions shall be provided showing that the system is adequate for bringing the ship in and out of the lift, as well as aligning the ship into the docking position, control of both lifting and lowering, and dealing with emergency situations. The communication systems shall include both a primary and backup system, for example, telephone and portable two-way radio systems connecting the control station with each manned operating station and with fire and security personnel.

8.3.14 Essential lighting systems. System descriptions shall be provided for lighting systems which are essential for the safe operation and security of the facility.

8.3.15 Fire protection systems. The fire protection systems installed to combat fire in all areas of the lift, transfer, and work berth including the control station, and on the ship, shall be described in the survey results along with the results as specified in 8.5.9. This description shall include minimum available water pressure, location of connections, location and size of fire stations, total available pump capacity, descriptions of redundancies and backup features, and number, type, location and capacity of portable extinguishers.

8.3.15.1 Requirements for vertical lifts with a CRC of 500 tons or more. The minimum available capacity for supplying a ship's firemain shall be at least 300 gal/min per 100 feet of maximum docked ship length. The pressure at the fire plug outlets shall provide a minimum nozzle pressure of 60 lb/in^2 when supplying fire nozzles at the specified capacities at the most remote and highest elevation hose connections. A backup pumping capability, such as diesel-driven fire pumps, fire department pumper connections, or alternate power supplies, shall be provided to ensure that the full water capacity for fire protection is available with a power interruption or failure of a single pump.

8.3.15.2 Requirements for vertical lifts with a CRC under 500 tons. Two independent sources of fire protection water, such as a primary and a backup source, shall be provided, each with a minimum capacity of 500 gal/min. The pressure at fire plug outlets shall provide a minimum nozzle pressure of 60 lb/in^2 when supplying fire nozzles at the most remote and highest elevation hose connections.

8.3.15.3 Fire stations. Fire stations shall be required so that any area can be reached with a 100-foot length of 1-1/2 inch hose.

8.3.15.4 Liquid fuel and electrical fires. Means shall be provided for combating liquid fuel and electrical fires in the platform. This requirement may be met by providing portable extinguishers or by installed systems. As a minimum, a 15-pound CO_2 extinguisher shall be located in spaces having electrical equipment, and a dry chemical extinguisher, 18- or 27-pound type, shall be provided at each location which is subject to liquid fuel fire (for example, near diesel-engine-driven equipment).

8.3.16 Deflection measuring system. A description of the platform deflection measuring system, if applicable, shall be included in the certification report.

8.3.17 Equipment for ship handling. The equipment for accomplishing the alignment of a ship during docking on the platform shall be described. The structure and associated fittings of the transfer cradle and carriage shall be shown to be structurally adequate. The transfer towing equipment shall also be described.

8.4 Operational limitations. Operational limitations shall be described as indicated in appendix A, 30.4.3. These shall consist of, but not be limited to, the following:

(a) Wind, tide and current conditions under which docking and undocking shall not be carried out.
(b) Limits of local, concentrated block loads in LT per linear foot of blocking length.
(c) Limits on dock deflection, if applicable.
(d) Limits for electrical current being drawn by machinery.

8.5 Surveys. Surveys shall be conducted in accordance with 8.5.1 through 8.5.10.

8.5.1 Checkoff list. A summary checkoff list shall be included in the certification report. A sample checkoff list for material condition surveys is provided in appendix H. This list shall be expanded or modified to suit the needs of a particular facility.

8.5.2 Observation of a vertical lift in operation. At least one complete docking, undocking, and ship transfer cycle shall be observed by the surveyor.

8.5.3 Hoists. Unusual running noises, status of means for corrosion prevention, lubrication and damage or misaligned parts shall be noted. Lubrication and preservation of wire rope shall be inspected. Wire rope with two or more broken wires shall be considered unsatisfactory. The wire rope on one hoist shall be pull tested until it breaks. If it breaks at 90 percent or less of the designed breaking strength, it and all wire rope of equal age shall be considered unsatisfactory. One hoist shall be weight tested. If the hoist will not lift a design capacity load, it shall be considered unsatisfactory. Additional hoists shall be tested to satisfy the surveyor that the system will safely lift the certified rated capacity. Bearings, pawl mechanisms, brakes, and gears shall be inspected. Soundness of bolts and foundation shall be checked.

8.5.4 Platform. Soundness of basic structure and effectiveness of means for corrosion prevention shall be checked. A test of 110 percent of CRC of the facility shall be observed by the surveyor.

8.5.5 Controls. The control systems for the following shall be inspected:

(a) Control panel: Check wiring, relays, bulbs and lenses. Check for dust collection and abrasion of wires. Inspect cams and check their operation.
(b) Motor control: Check contactors, relays, electrical and mechanical interlocks, and motor cables.
(c) Limit switches: Check panel limit switches and switch actuator mechanisms.

8.5.6 Inspection of blocking. The type of blocking, bearing area, means of buildup, cribbing and shoring shall be noted.

8.5.6.1 Wooden blocks. Wooden blocks shall be inspected for deterioration resulting from excessive crushing, warping, cracking, checking, rotting or damage from dogging. A check shall be made for loss of contact at edges resulting from checking and unequal shrinkage.

8.5.6.2 Block securing methods. Fixed blocking shall be secured in place. Securings, supports, nuts, boltheads and other fasteners shall be sound. There may be considerable deterioration under blocks which are fixed in place. The inspection of blocking shall include lifting a number of blocks, selected at random, to determine the presence and extent of such deterioration.

8.5.6.3 Hauling blocks. Hauling blocks, if used, shall be checked to see that the hauling mechanism ensures freedom and is adequately supported by the substructure.

8.5.6.4 Block handling systems. The block pulling mechanism shall be observed in operation and shall be inspected.

8.5.7 Electric power system. The adequacy of the power supply shall be determined.

8.5.8 Communication and alarm systems. Communication and alarm systems shall be checked during the survey.

8.5.9 Fire protection system. The fire protection systems intended for fighting fire on the dock or ship shall be thoroughly checked and tested for conformance to all requirements. A flow and pressure test shall be conducted and the data presented.

8.5.10 Deflection measuring system. If installed, the deflection measuring system shall be inspected and its accuracy shall be determined.

8.6 Operating procedures. In addition to the general requirements specified in 4.8.1, the operating procedures shall set forth, in sequence, the actions required by each manned operating station during the docking cycle (for example, dockmaster, lift operator, electrician). The operating procedures shall list events in step-by-step detail, commencing with prerequisite checks of the vertical lift subsystems prior to lowering the platform for receiving the ship and continuing with the events through landing the ship, lifting the platform, transferring the ship to the work berth, and, finally, securing the operation for industrial work. The operating procedures shall also list events, commencing with prerequisite checks prior to the undocking operation, and continuing through transfer, lowering the platform to refloat the ship, and, finally, raising the platform to its secured position. These operating procedures shall describe the methods of communication used between personnel at the various docking stations on the vertical lift, the ship, and tugs, as applicable. Information shall also be provided which describes alternate communication systems used in case of failure of the primary communication system. Such systems may include sound-powered telephones, dial telephones, two-way radios, loudspeakers and alarm systems.

9. DETAILED REQUIREMENTS FOR BUILDING WAYS

9.1 Facility types. The requirements of this section apply to permanent or non-permanent facilities which consist of conventional inclined building ways for end launching or side launching, to building ways using modular construction, and for launching with launch pontoons. For building ways employing modular construction methods, only that area where the final assembly of the ship takes place prior to launching, including the transfer system used to move the ship to the launching area or launchway (if applicable), is subject to the requirements of this standard. Data for non-permanent facilities shall be provided except where specifically stated otherwise. However, NAVSEA has the prerogative of invoking any of these requirements that may affect the safety of the ship.

9.2 CRC. The CRC of a building way shall be determined by the load bearing capability of the blocks and the supporting structure. The load bearing capability shall be substantiated by calculations and historical data. In the case of conventional launching ways, the capacity may be stated in terms of the permissible load in LT per linear foot of the launching way. In the case of the horizontal building ways used for modular construction, the capacity shall be stated in terms of the permissible load per square foot of area of the building way.

9.3 Design data and physical characteristics. Design data and physical characteristics shall be in accordance with 9.3.1 through 9.3.13.

9.3.1 Certification report content. The design data described in the following paragraphs shall be included in the certification report as indicated in 4.6.

9.3.2 General description. In the general description section (see appendix A, 30.3.2), a plan view and section shall be provided which show the structural arrangement and layout of the facility, including arrangement of tracks for cranes and ship and module transfer systems, if applicable. The structural arrangement descriptions shall include information on concrete slab thickness, reinforcement location and sizes, foundation details on type and sizes, location of piles, and the inclination or camber of ways, if applicable.

9.3.3 Site characteristics. The following site characteristics shall be furnished with the design data.

9.3.3.1 General geology. A brief description shall be provided of the geology and geologic formations of the site for all permanent facilities.

9.3.3.2 Soil characteristics. A general description of the predominant soil types shall be provided for permanent and nonpermanent facilities. Boring logs (soil profiles and laboratory test data) shall be included in the certification report for permanent facilities.

9.3.3.3 Geotechnical studies. Results of past geotechnical studies conducted to determine reasons for settlement or voids shall be included in the certification report. Geotechnical studies are not required for nonpermanent facilities.

9.3.3.4 Tidal ranges and bathymetry. In the case of the conventional launching ways, hydrographic data shall be submitted for the launch site.

9.3.3.5 Seismic characteristics. The following information shall be provided for permanent facilities.

(a) Listing of seismic events withstood by the facility in the past.
(b) Active faults within a radius of 1 mile of the facility.
(c) Special effects in launch preparation.

Requirements for additional information, depending on the various seismic zones, are as follows below. Seismic analysis shall be based on resisting collapse when exposed to an earthquake with an 80 percent probability of not being exceeded in 50 years. For existing structures, capacity of 75 percent of the earthquake demand is acceptable.

(d) Seismic zone 1 (Z=3/16):

(1) The one-third increase in allowable working stresses for earthquake loading governs.
(2) No seismic analysis is required.

(e) Seismic zone 2 (Z=3/8):

(1) A site seismicity study is required.
(2) Rigorous analysis, such as finite element method, is not required. An elastic static load analysis is sufficient.
(3) No concrete coring and testing is required, unless the condition of the concrete is questionable.

(f) Seismic zones 3 (Z=3/4) and 4 (Z=1.0):

(1) A site seismicity study is required.
(2) Soils investigation, including liquefaction potential, is required.
(3) Initially, an elastic static load analysis is required. If structural components are determined to be inadequate by the analysis, an appropriate analysis shall be required, based on a peak ground acceleration (an earthquake with an 80 percent probability of not being exceeded in 50 years) and supported by concrete coring and testing.

9.3.4 Structural analyses. Structural analyses which show that the facility is certifiable in its present state shall be included in the certification report.

9.3.4.1 Loads. Load estimates used in analyses shall be documented. Special loads, such as the pivoting loads on the launching ways, shall be defined.

9.3.4.2 Properties of structural materials. Properties of structural materials used in analyses shall be included in the certification report.

9.3.4.3 Acceptance criteria. Justification shall be provided for the allowable stresses and deflections used in evaluating results of analyses.

9.3.5 Keel tracks, blocks and bilge cribbing. Information on keel tracks, blocks and bilge cribbing shall be submitted as follows:

(a) Typical designs of keel tracks, blocks, and bilge cribbing shall be provided.
(b) Load-bearing capabilities of the keel tracks, blocks and bilge cribbing shall be substantiated.
(c) Typical arrangement of these ship supports, in relation to the pile locations and pivot loads, shall be described.
(d) Systems for settlement detection shall be described.

9.3.6 Groundways and launching ways. Typical designs of groundways and launching ways shall be provided, including ship weight transfer systems such as sand blocks or companion wedges in bilge cribs. Specific information on the kinds and amounts of lubricants, method of application, and estimated coefficients of static and sliding friction shall also be submitted.

9.3.7 Triggers. The design and arrangement of triggers or burn-off plates shall be provided. Safety features shall be described.

9.3.8 Carriages for ship and module transfer. In the case of building ways designed for modular construction, the design of carriages shall be described and their load-bearing capabilities substantiated, if applicable.

9.3.9 Fire protection systems. The fire protection systems installed to combat fire in all areas of the building way and on the ship shall be described in the survey results along with the requirement specified in 9.5.4.2. This description shall include minimum available water pressure, location of connections, location and size of fire stations, total available pump capacity, description of redundancies and backup features, and number, type, location and capacity of portable extinguishers.

9.3.9.1 Requirements for building way's fire protection water. The minimum available capacity for supplying a ship's firemain shall be at least 300 gal/min per 100 feet of maximum ship length. The pressure at the fire plug outlets shall provide a minimum nozzle pressure of 60 lb/in^2 when supplying fire nozzles at the specified capacities at the most remote and highest elevation hose connections. A backup pumping capability, such as diesel-driven fire pumps, fire department pumper connections, or alternate power supplies, shall be provided to ensure that the full water capacity for fire protection is available with a power interruption or failure of a single pump.

9.3.9.2 Fire stations. Fire stations shall be required in the building way so that any area can be reached with a 100-foot length of 1-1/2 inch hose.

9.3.9.3 Liquid fuel and electrical fires. Means shall be provided for combating liquid fuel and electrical fires in the facility. This requirement may be met by providing portable extinguishers or by installed systems. As a

minimum, a 15-pound CO_2 extinguisher shall be located in spaces having electrical equipment and a dry chemical extinguisher, 18- or 27-pound type, shall be provided at each location which is subject to liquid fuel fire (for example, near diesel-engine-driven equipment).

9.3.10 Communication systems and alarms. System diagrams and descriptions shall be provided which show that the communication systems and alarms are adequate for all operations. This is not required for a nonpermanent facility.

9.3.11 Essential lighting systems. System descriptions shall be provided for lighting systems essential for the safe operation and security of the facility. This is not required for a nonpermanent facility.

9.3.12 Electric power system. The electric power system shall be described and diagrams shall be provided. The power supply and system shall support the maximum load. This is not required for a nonpermanent facility.

9.3.13 Drainage system. The drainage system and its capabilities shall be described. This is not required for a nonpermanent facility.

9.4 Operational limitations. Operational limitations shall be described as indicated in appendix A, 30.4.3. These shall consist of, but not be limited to, the following:

(a) Wind, tide and current conditions under which launching or undocking shall not be carried out.
(b) Safe carriage speeds for ship transfer, if applicable.
(c) Deceleration systems, such as drag chains, if applicable.
(d) Limits of local, concentrated block loads in LT per linear foot of blocking length.

9.5 Surveys. Surveys shall be performed in accordance with 9.5.1 through 9.5.4.7.

9.5.1 Checkoff list. A summary checkoff list shall be included in the certification report. Sample checkoff lists are provided in appendix I. These lists may be expanded or modified to suit the facility.

9.5.2 Observation. If it can be scheduled, the surveyor should observe a ship launching and transfer of a ship from the building way to the launch pontoon, if applicable.

9.5.3 Structural survey. Structural surveys shall be performed in accordance with 9.5.3.1 through 9.5.3.3.

9.5.3.1 Slabs. Slabs shall be checked for evidence of cracking, spalling, settlement, or upward movement. Causes shall be investigated and the need for detailed examination of soil and foundations shall be assessed.

9.5.3.2 Tracks. Split rails, head separation, and soundness of joints shall be checked. Deflections and settlement of tracks and pavement shall be examined.

9.5.3.3 Blocking. Keel track, blocks, bilge cribbing and bearing area shall be checked.

9.5.4 Survey of electrical and mechanical systems. Electrical and mechanical systems surveys shall be performed in accordance with 9.5.4.1 through 9.5.4.7.

9.5.4.1 Detailed examination of electrical and mechanical systems. Pumps, motors, and so forth shall be opened for inspection only if the surveyor has noted abnormal conditions that justify this action after having observed them in operation.

9.5.4.2 Fire protection equipment. Fire protection equipment shall be checked during the survey for conformance to the requirements of 9.3.9. A flow and pressure test shall be conducted and the data submitted. Data from the test shall be described, indicating where and under what conditions pressure and flow were measured.

9.5.4.3 Communication systems and alarms. Communication systems and alarms shall be checked during the survey. This is not required for nonpermanent facilities.

9.5.4.4 Electrical systems. Electrical equipment shall be observed in operation. The adequacy of the power supply and distribution system shall be determined. This is not required for nonpermanent facilities.

9.5.4.5 Transfer systems. Carriage, frames, wheels, rollers and propulsion systems shall be checked for adequacy, if applicable.

9.5.4.6 Material handling systems. Crane supports, rails, stops, and securings shall be inspected for adequacy, if applicable. This is not required for a nonpermanent facility.

9.5.4.7 Launching mechanism and mooring system. Connections to the shipway and the trigger assemblies or burn-off plates shall be inspected. The adequacy of the mooring system shall be checked.

9.6 Operating procedures. The operator of a building way shall prepare operating procedures which set forth in sequence the actions required to launch a ship, and which also indicate the manned stations which are to perform those actions. The operating procedures shall list the events in step-by-step detail, commencing with pre-launch checks. These procedures shall describe the methods of communication between personnel at the various launching stations on the building ways, the ship and tugs, as applicable. They shall also include procedures for removing blocks and shores, for removing grease irons, for wedging up and for letting go.

10. NOTES

10.1 Guidance documents. The documents listed below provide useful information on facility design, maintenance, and operation. This information may be utilized in preparing the certification reports and defining survey requirements.

NAVAL FACILITIES ENGINEERING COMMAND (NAVFAC)

DM-2.1 - Structural Engineering General Requirements.
DM-2.2 - Structural Engineering Loads.
DM-2.3 - Structural Engineering Steel Structures.
DM-2.4 - Structural Engineering Concrete Structures.
DM-2.5 - Structural Engineering Timber Structures.
DM-3 (Series) Mechanical Engineering.
DM-3.5 - Compressed Air and Vacuum Systems.
DM-3.8 - Exterior Distribution of Utility Steam, High Temperature Water, Chilled Water, Gas and Air.
DM-4.1 - Electrical Engineering Preliminary Design Considerations Design Manual.
DM-4.2 - Electrical Engineering Electrical Power Distribution Systems Design Manual.
DM-4.3 - Electrical Engineering Switchgear and Relaying Design Manual.
DM-4.4 - Electrical Engineering Electrical Utilization Systems Design Manual.
DM-4.6 - Electrical Engineering Lightning and Cathodic Protection Design Manual.
DM-4.07 - Electrical Engineering Wire Communications and Signal Systems Design Manual.
DM-5.2 - Civil Engineering Hydrology and Hydraulics Design Manual.
DM-5.3 - Civil Engineering Drainage Systems Design Manual.
DM-5.4 - Civil Engineering Payments Design Manual.
DM-7.1 - Soil Mechanics.
DM-7.2 - Soil Mechanics Foundations and Earth Structures.
DM-7.3 - Soil Dynamics Deep Stabilization and Special Geotechnical Construction.
DM-8 (Series) Fire Protection Engineering.
DM-25.1 - Piers and Wharves.
DM-25.4 - Seawall, Bulkheads, and Quaywalls.
DM-25.6 - General Criteria for Waterfront Construction.
DM-26 (Series) Harbor and Coastal Facilities.
DM-26.1 - Harbor and Coastal Civil Engineering.
DM-26.2 - Harbor and Coastal, Coastal Protection.

10.2 Subject term (key word) listing.

Building ways
Floating docks
Graving dock launch pontoon
Launch pontoon

10.3 Changes from previous issue. Asterisks are not used in this revision to identify changes with respect to the previous issue due to the extensiveness of the changes.

Preparing activity:
Navy - SH
(Project 1950-N006)

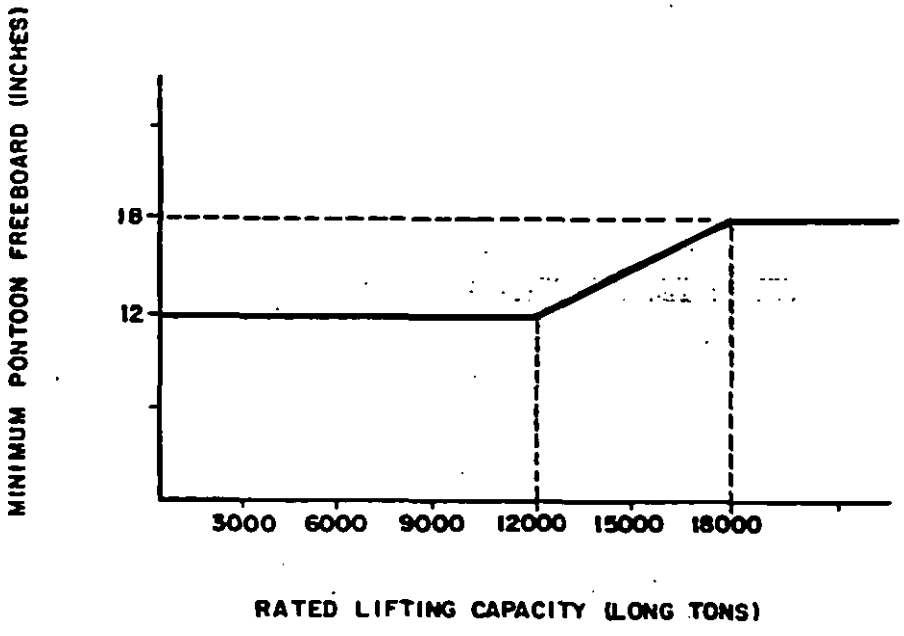
FACILITY OPERATIONS SUPERVISOR CERTIFICATION

I, _____(Authorized Management Representative)_____, hereby certify that _____(Name)_____, the facility operations supervisor in charge of launching or docking/undocking evolutions (as appropriate), is professionally qualified, through training and experience, to conduct these evolutions in a safe and reliable manner. Attachment (A) is a resume of the facility operations supervisor's training and experience, fulfilling the requirements of appendix C of MIL-STD-1625(SH), upon which I have based my certification.

_____ _____
(Signature of Authorized Representative) Date of Signature

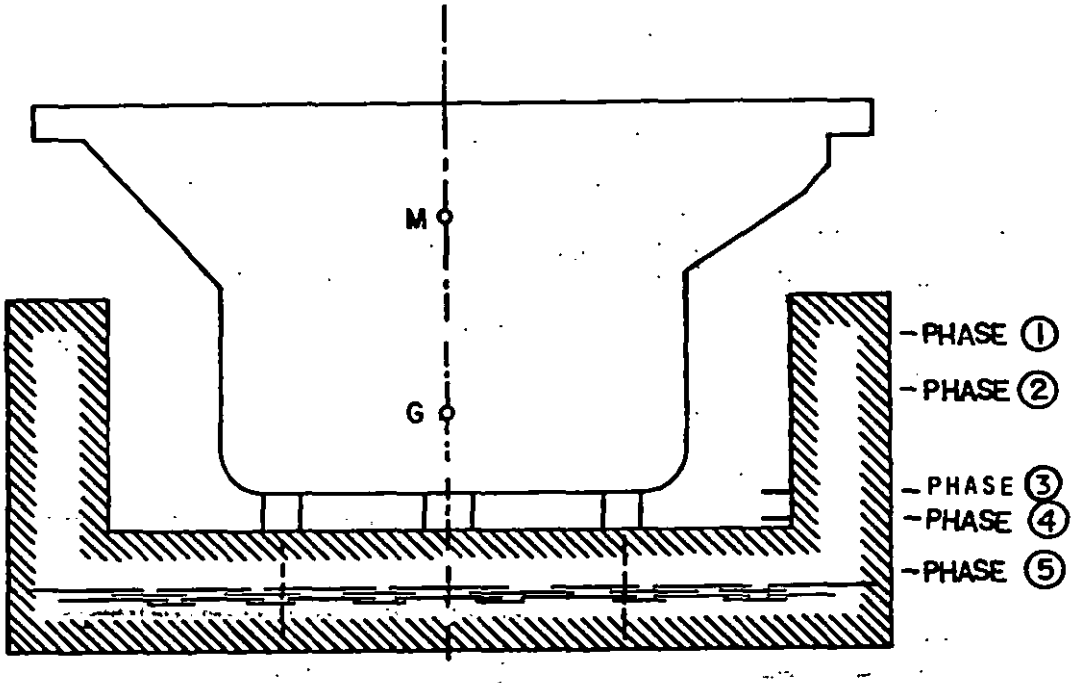
_____ _____
(Typed Name of Authorized Representative) (Title of Authorized Representative)

FIGURE 1. Sample facility operations supervisor certificate.



SH 12373

FIGURE 2. Minimum pontoon freeboard versus rated lifting capacity.



Phase 1 - Fully ballasted-down condition. In this phase, the ship is floating independently and the dry dock is in the submerged condition before the ship bears on the blocks.

Phase 2 - Partial liftoff. This phase begins as the ship starts bearing on the blocks and part of the ship's weight is supported by the floating dock.

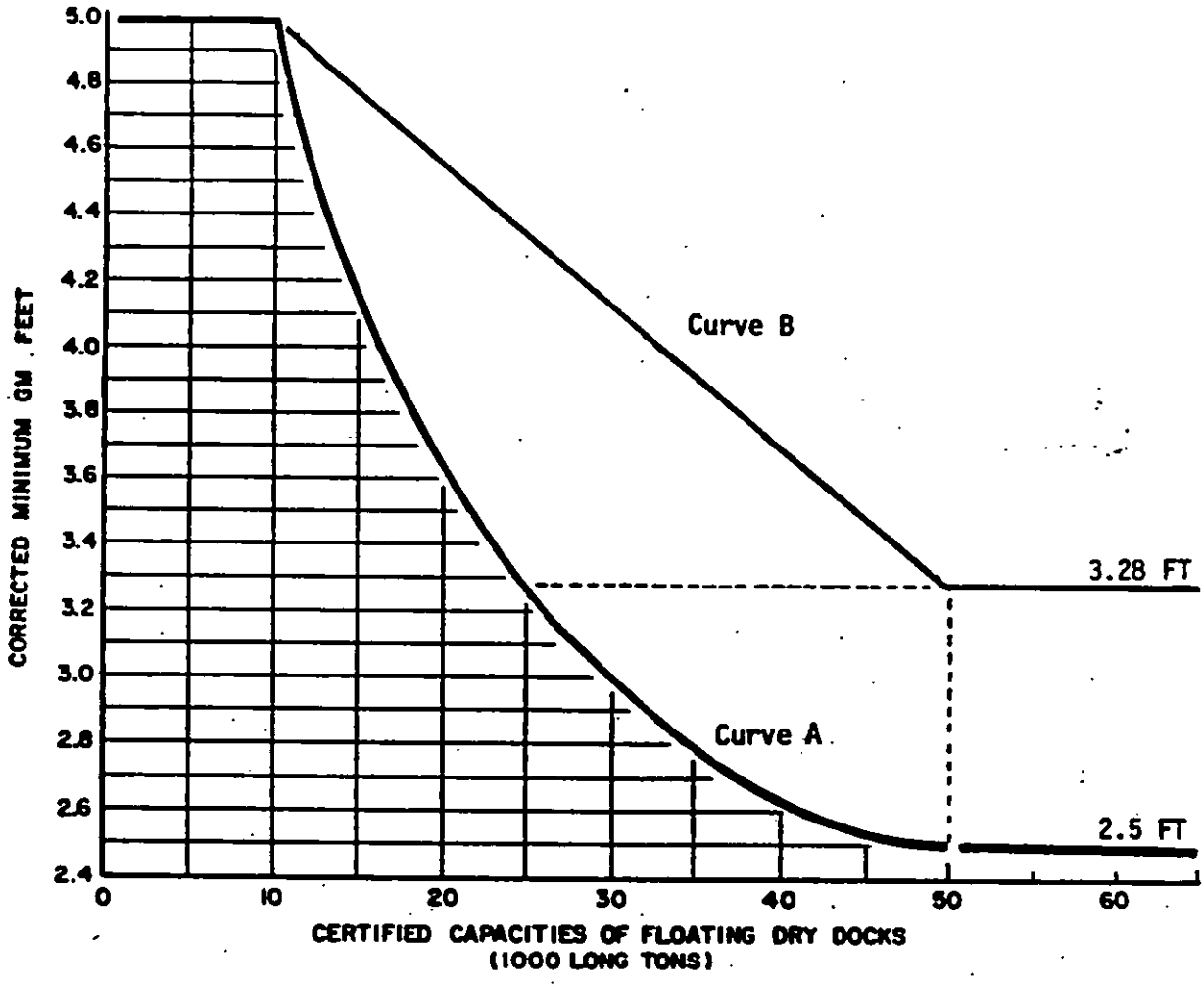
Phase 3 - Ship keel at water level. This phase begins when the ship's keel is about to leave the waterplane.

Phase 4 - Top of pontoon at water level. This phase is when the water level between the wing walls is just above the top of the pontoon.

Phase 5 - Normal operating condition. Top of pontoon is above the water level. Liquid ballast is at a minimum.

SH 12374

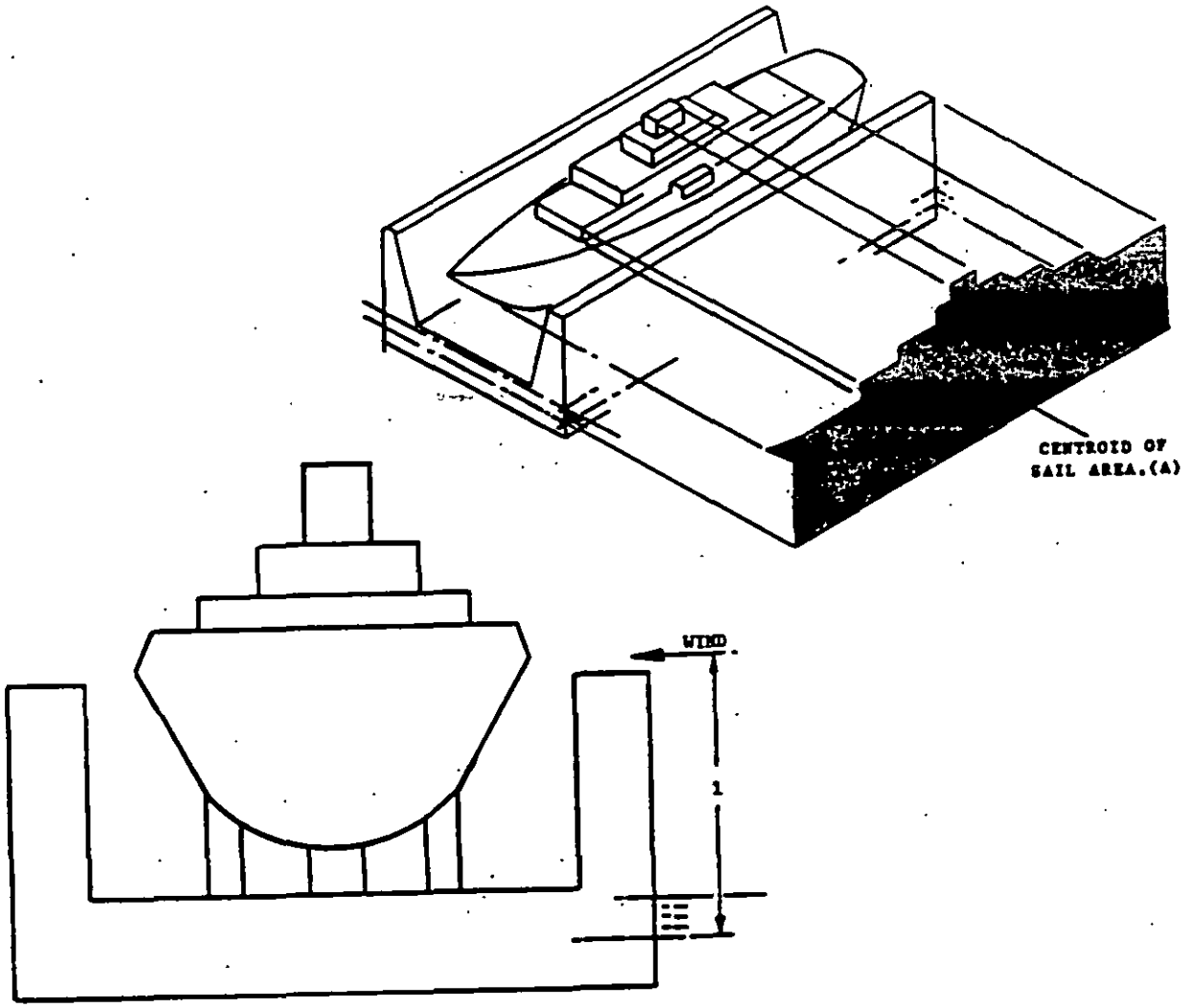
FIGURE 3. Phases in the docking evolution for stability calculations.



Curve A applies to all docks placed in operation on or before the effective date of MIL-STD-1625C(SH).
Curve B applies to all docks placed in operation after the effective date of MIL-STD-1625C(SH).

SH 12375

FIGURE 4. Minimum GM versus CRC of floating dry docks.



A = Projected sail area of ship and dock exposed to wind, ft^2 (SHADED AREA)

l = Lever arm from half draft to centroid of sail area, feet

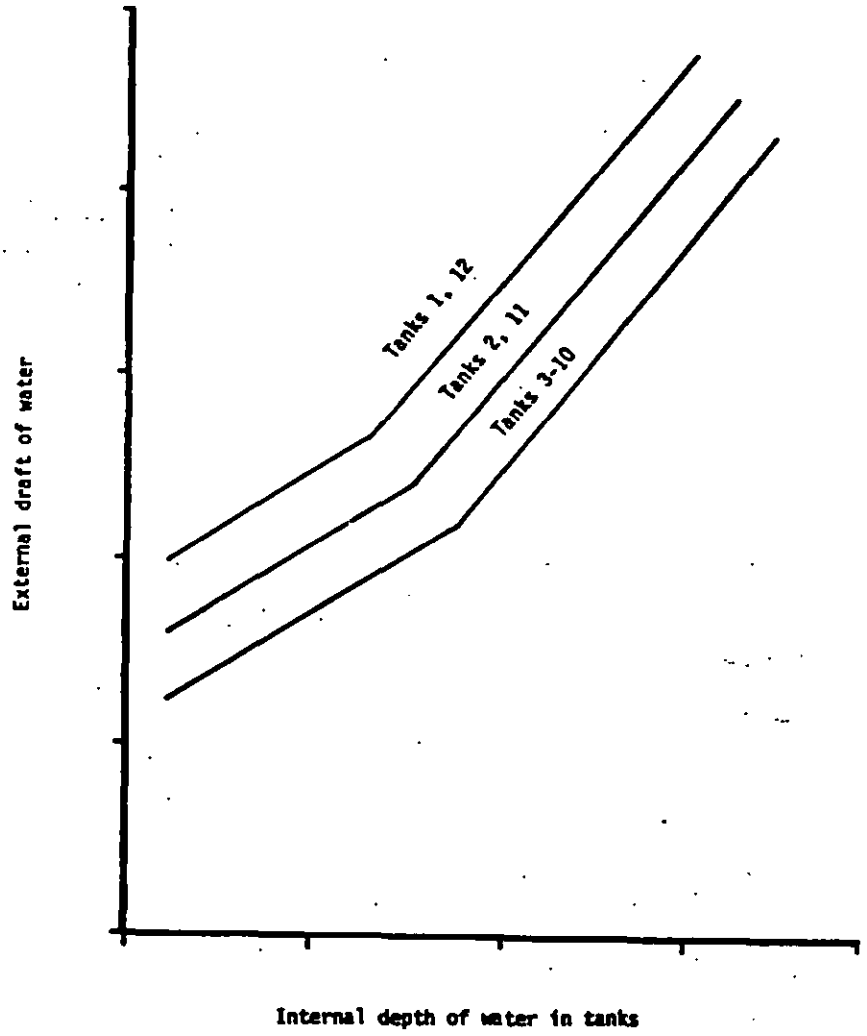
p = Unit pressure due to wind, $lb/ft^2 = 0.004\ V^2$

V = Nominal wind velocity, knots

Sail area moment = A x l x p

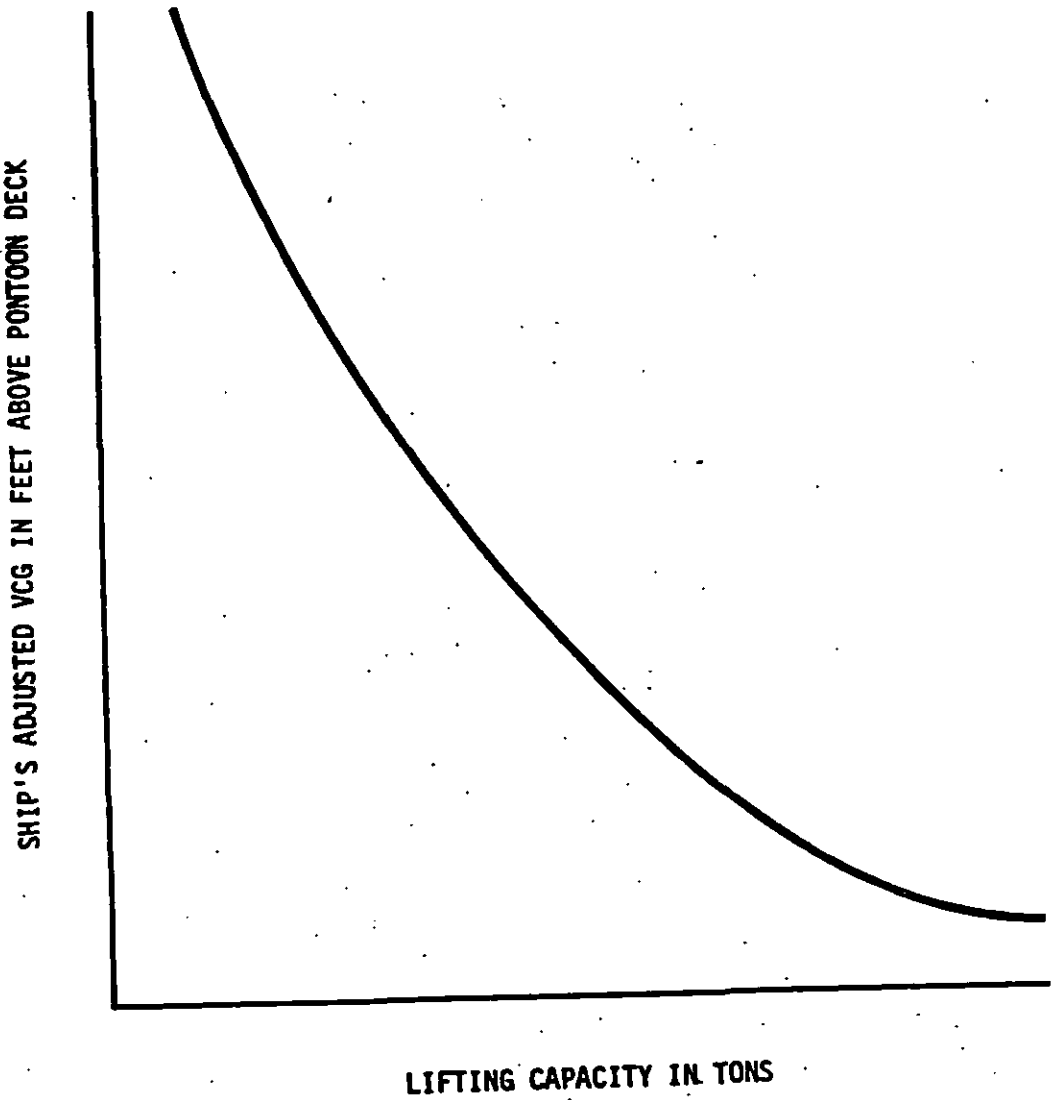
SH 12376

FIGURE 5. Sail area moment due to the ship and dock.



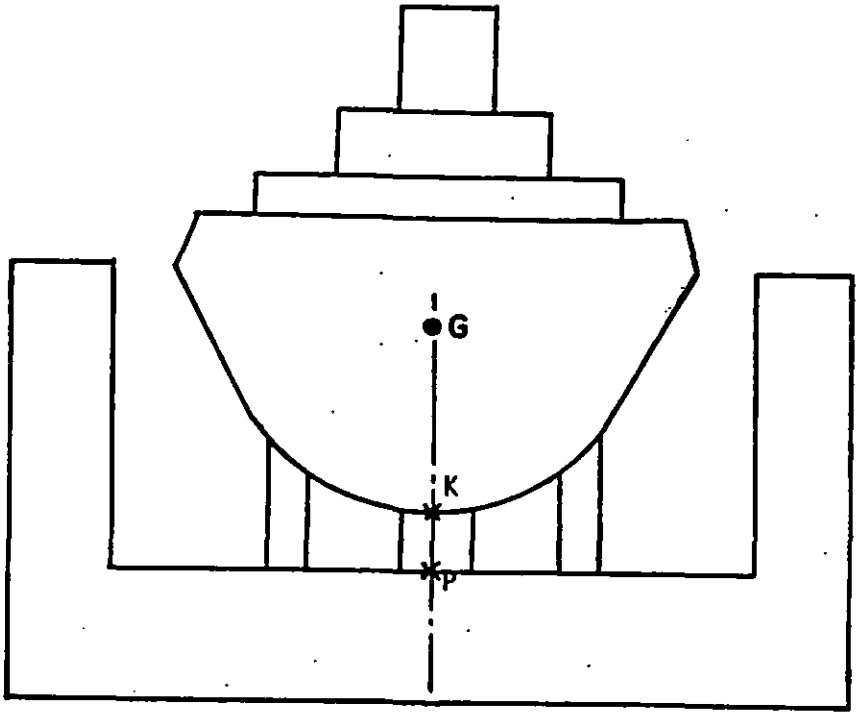
SH 12377

FIGURE 6. Ballast distribution for lifting dock without ship.



SH 12378

FIGURE 7. Limiting curve of ship's adjusted VCG versus lifting capacity.



W = Weight of the ship in long tons.

KG = Height of vertical center of gravity for ship's weight above the keel (K) of ship in feet.

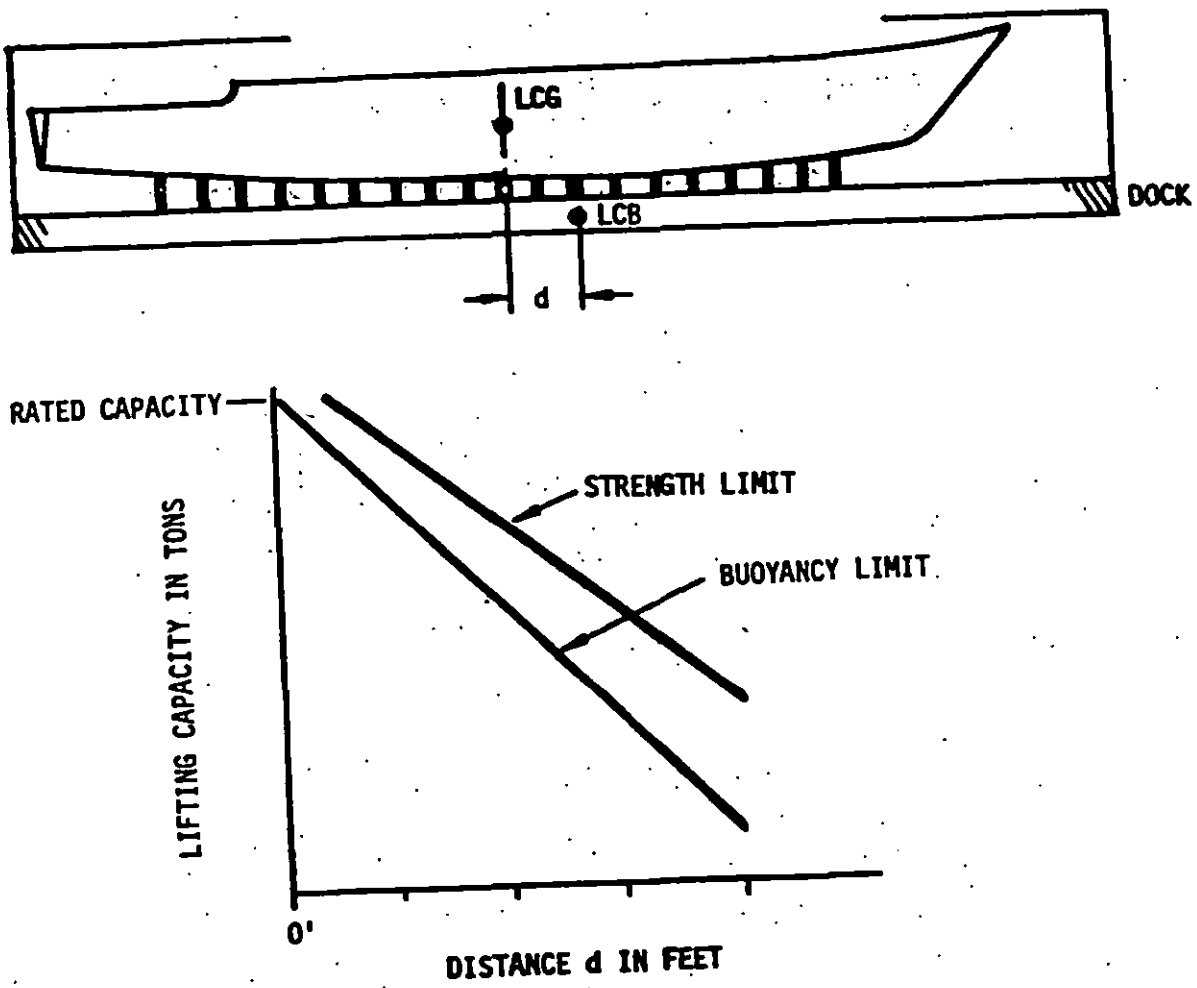
PK = Height of keel blocks.

PG = Ship's adjusted VCG in feet above pontoon deck.

Vertical moment = W x PG in foot-tons.

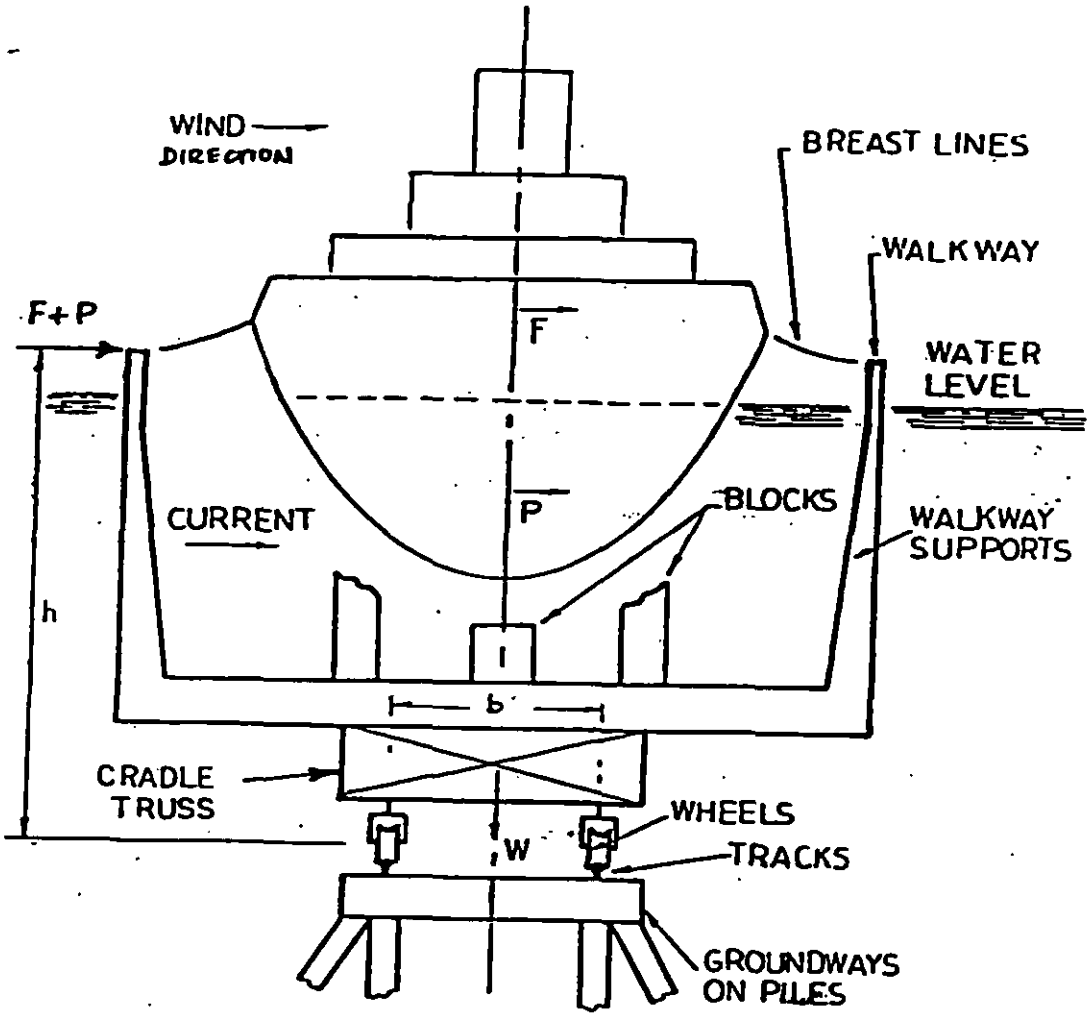
SH 12379

FIGURE 8. Vertical moment.



SH 12380

FIGURE 9. Lifting capacity variation with ship location.



h = Height of breast lines above top of tracks
b = Width of track
M_o = Overturning moment
M_s = Stabilizing moment
F = Wind load
P = Current load
W = Weight of cradle
F+P = Total load, assumed to be acting at the breast line

$$M_o = h(F+P) \quad M_s = \frac{Wb}{2}$$

SH 12381

FIGURE 10. Forces on cradle during docking.

APPENDIX A

CONTENTS OF THE CERTIFICATION REPORT

10. General. This appendix provides requirements for the presentation of material in the certification report. The paragraphs below describe the format for the general requirements explained in section 4. These requirements are amplified by facility type in sections 5 through 9. Paragraphs 20 through 30.4.10 describe the format for facilities with capacities over 500 LT, and 40 through 40.2 describe the format for reduced data requirements specified for facilities with capacities of 500 LT or less.

20. Format. The certification report and enclosures shall be prepared in such a way that they may be filed in 8-1/2 by 11-inch size, three-ring binders. There are two options regarding drawings: They may be folded and packeted together at the end of the report, or they may be reduced in size, if detail is not obliterated, and presented as foldouts in the three-ring binders.

20.1 Changes and additions. Changes and additions that are made in the certification report, either during late stages of report preparation or after Navy review, shall be documented as a certification report change and shall be prepared as inserts in the three-ring binders.

20.2 Uniformity of style. Uniformity of style for enclosures shall not be required. Thus, in the case of items such as the operating procedure, if one has an existing document that contains the required information, the document may be included in the enclosure without its having to be retyped. This document shall be cross-referenced to the requirements of this standard.

20.3 Typing. Text in the certification report and enclosures shall be neatly typed, but neatly handwritten calculations, with textural portions written in the English language, are acceptable.

20.4 Sketches and drawings. Sketches and drawings shall be of professional quality; blueprints and reproductions shall be clear and legible.

20.5 Numbering. Sections, paragraphs, figures, tables and enclosures shall be numbered. Pages shall be numbered either sequentially or separately for each section (for example, 2-1, 2-2, 2-3, ... for section 2). Pages inserted after each revision may be numbered as follows: 25a, 25b, 25c, and so forth if inserted after page 25.

30. Contents. Contents shall be in accordance with 30.1 through 30.4.10.

30.1 General organization of contents. The contents shall be organized in three parts, as shown on figure 11. The contents of each part are described in the following paragraphs.

30.2 Front matter. Front matter shall be in accordance with 30.2.1 through 30.2.6.

30.2.1 Cover sheet. The cover sheet shall be prepared as illustrated on figure 12.

30.2.2 Cover letter. A cover letter, similar to those illustrated on figures 13 and 14 (as applicable), shall follow the cover sheet.

30.2.3 Proprietary data list (optional). If the report contains data considered proprietary by the operator, the sheet following the cover letter shall contain a notation similar to that shown on figure 15; listing sections or pages of the certification report which contain proprietary data.

30.2.4 Surveyor's endorsement (optional). The next sheet in the FCR shall contain a surveyor's endorsement similar to that shown on figure 16. If the surveys are carried out by personnel from two or more firms, the endorsement shall be signed by officials of each firm.

30.2.5 Certification report revision sheet. The surveyor's endorsement sheet shall be followed by a list of revised pages as shown on figure 17.

30.2.6 Table of contents. The table of contents shall list sections and paragraphs, figures, tables and enclosures.

30.3 Main body of the certification report. The main body of the certification report shall be written in the English language, shall describe the facility and its intended use, and shall demonstrate that the facility is certifiable in its present condition, provided that the proposed repairs are carried out and that the facility is operated in accordance with the stated operating procedures. Note that the detailed facility data items shall be provided in the enclosures, as described in 30.4, not in the main body of the report.

30.3.1 Summary. Contents of the summary section shall be similar to those listed in 30.2.6.

30.3.2 General description of the facility. A brief description of the facility and its site shall be provided; including plan view, elevation, sections showing dimensions, docking block arrangements, and any other pertinent features of the facility.

30.4 Enclosures. Enclosures described below shall be provided with the FCR. Additional enclosures may be provided, if necessary.

30.4.1 Enclosure I: Historical data. This enclosure shall provide the following information in the case of FCR:

(a) Dates of initial design and construction.
(b) Role of classification societies in design approval or surveys, if any.
(c) Nature, dates and drawings of facility modifications which have affected the capacity of the facility.

(d) Major storms and earthquakes and their effects as experienced by the facility, including maximum water levels and maximum seismic intensity.

(e) Nature and dates of incidents which resulted in a change to the facility and which affected its capability for safe operation, or those incidents which resulted in damage exceeding $50,000 in repair costs. Technical drawings which depict the repairs or modifications of the facility as a result of the incident shall be provided. Steps taken to prevent recurrence of these incidents shall be described.

(f) Past use of the facility, dates and displacement or docking weight, and type of ships docked or built.

In the case of the FRR, similar historical data shall be provided for the period since last certification. Status of repairs and modifications required during the last certification period shall be reported.

30.4.2 Enclosure II: Design data. For FCRs, the design data, as required by the detailed requirements sections, shall substantiate that the facility as designed and built, and in its present condition, considering material deterioration and modifications, has the capability to safely handle a ship with a displacement equal to the certified rated capacity. For FERs, similar data shall be provided if any facility modifications have been undertaken during the past certification period.

30.4.3 Enclosure III: Operational limitations. Operational limitations which are necessary for safe operation of the facility (taking into account the design of the facility, its intended use, and its material condition) shall be listed in this enclosure (see 4.2.4.2). Appropriate operational limitations shall be posted at the control station.

30.4.4 Enclosure IV: Organization and manning. This enclosure shall contain information as specified in 4.7.

30.4.5 Enclosure V: Normal maintenance schedule and procedures. A brief description shall be provided of the major maintenance schedule and procedures. For floating docks, it shall describe the procedures used for underwater hull inspection and maintenance.

30.4.6 Enclosure VI: Operating procedures. This enclosure shall describe operating procedures as required by 4.8 and as amplified by the applicable detailed requirements sections. The procedures described in this enclosure shall be consistent with the operational limitations specified in enclosure III and with the manning described in enclosure IV.

30.4.7 Enclosure VII: Protection of the ship during the lay period. This enclosure shall contain information as specified in 4.9 or 4.9.5, as applicable.

30.4.8 Enclosure VIII: Survey results. This enclosure shall be typed on company letterhead, signed by the chief surveyor or the chief executive of the firm, and shall contain the following information:

(a) Experience and qualifications of organizations that conducted the surveys.
(b) Experience and qualifications of surveyors and divers in areas of specialty as related to the task.
(c) Dates and major milestones in surveys.
(d) Scope of the survey effort; reasons for this choice.
(e) Conclusions drawn from the survey results, supported by inclusion of the relevant survey data and evaluation of survey results. A summary evaluation of the material condition of the facility and a recommended CRC shall be included in the survey report.
(f) Recommendations on required repairs, facility modifications, changes in operational limitations, and changes in the operating procedures and supporting rationale.
(g) Listing of items that should have been surveyed or tested, but were not checked because of scheduling difficulties. Recommended actions, if any, concerning these items.
(h) Summary checkoff lists with a description of marginal and unsatisfactory items. Summary checkoff lists shall also be annotated accordingly.

Note that this enclosure is not a repository for raw survey data. The raw data shall be maintained by the facility operator for a period of 5 years.

30.4.9 Enclosure IX: Corrective action plan. This enclosure shall provide a list and schedule for:

(a) Facility repairs and modifications which are to be completed before the next use of the facility for docking a Navy ship.
(b) Facility repairs and modifications which will be undertaken during the certification period.

30.4.10 Enclosure X: Monitoring plan. This enclosure shall provide brief descriptions and proposed schedules for the monitoring items described in 30.4.8.

40. Documentation for small facilities. This paragraph is applicable to facilities with a CRC of 500 long tons or less. Its purpose is to set forth the reduction in requirements for certification documentation, as compared with the large facilities whose requirements have been listed in 20 through 30.4.10.

40.1 Small facility certification report format. The operator of a small facility may prepare a certification report by adhering to the provisions of 20. However, the operator is invited to take advantage of the following relaxation of requirements. The original documentation only shall be submitted instead of multiple copies, as required by 4.3.3.5. Drawings, technical manuals, brochures, and photographs which may have been prepared for other purposes, but which are handily available and serve to describe the facility in its present condition, shall be utilized.

40.2 Small facility certification report content. The operator of a small facility may prepare a certification report by meeting the minimum requirements listed below:

Item		Minimum requirement	Notes
Front matter:			
Cover sheet		no	The body of the cover letter may be used to narrate all the required items of front matter.
Cover letter		yes	
Proprietary data		no	
Survey endorsement		no	
List of revised pages or enclosures		yes	
Table of contents		yes	
Main body:			
Summary		yes	
General description		yes	
Enclosures:			
I	Historical data	yes	
II	Design data	yes	
III	Operational limitations	yes	
IV	Organization and manning	yes	
V	Normal maintenance schedule and procedures	yes	
VI	Operating procedures	no	
VII	Protection of the ship during the lay period	yes	(reduced, see 4.9.5)
VIII	Survey results	yes	
IX	Corrective action plan	yes	
X	Monitoring plan	no	

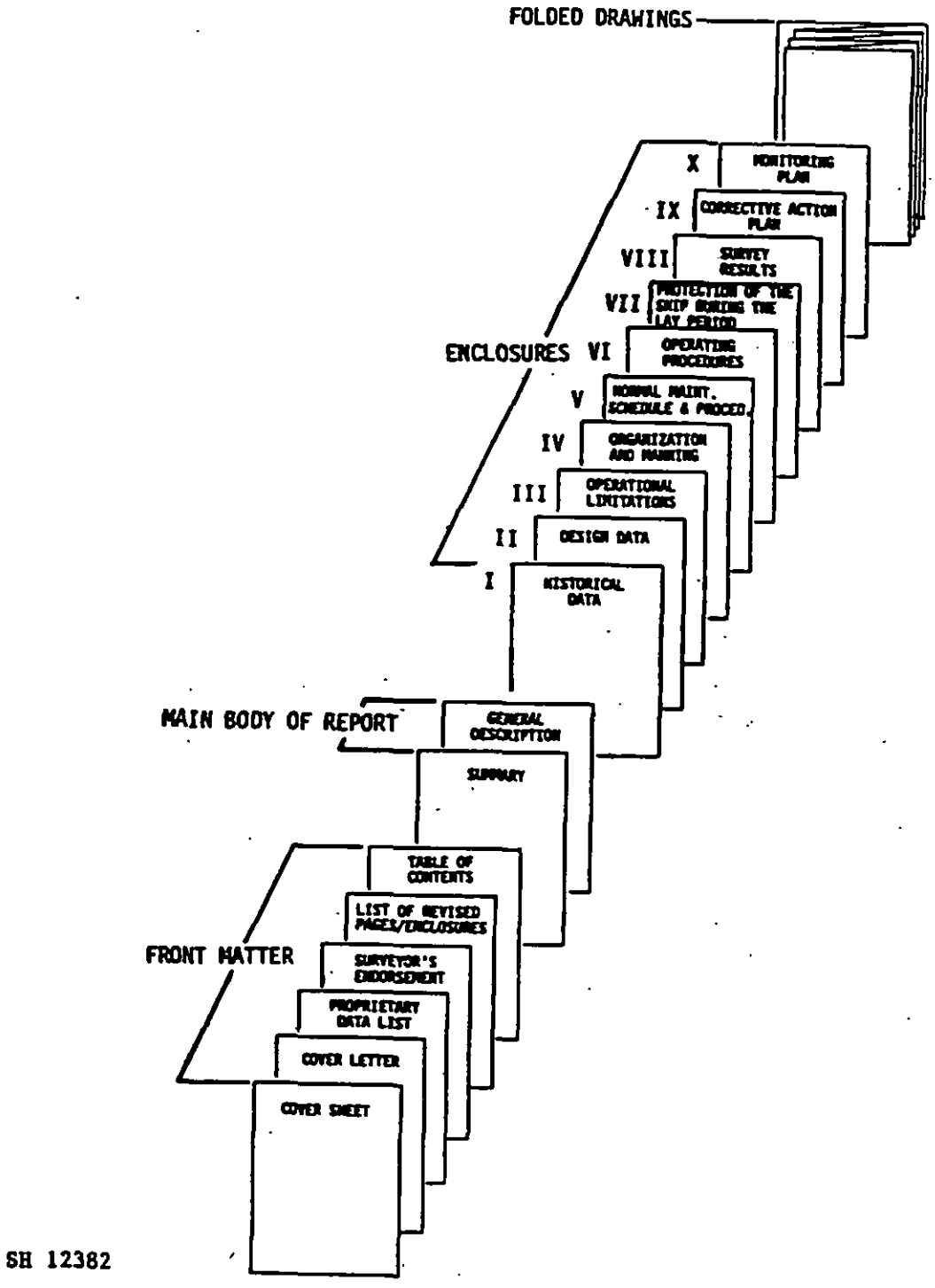


FIGURE 11. Facility certification report and facility recertification report contents.

FACILITY CERTIFICATION/RECERTIFICATION REPORT

for

DRY DOCK NO. 3

Operated by

XYZ Shipbuilding Corp.
12 Washington Blvd.
Smalltown, AB 12345

Leased from

U.S. Navy
for period (if applicable)
1/80 - 1/90

Submitted

1 June 1984

Current certification expires

1 January 1985 (if applicable)

FIGURE 12. Sample cover sheet for certification reports.

Department of the Navy
Sometown Naval Shipyard
Sometown, ST 12345

From: Commander, Sometown Naval Shipyard
To: Commander, Naval Sea Systems Command
(Industrial and Facility Management Directorate)

Ref: MIL-STD-1625C(SH) Safety Certification Program for Drydocking Facilities and Shipbuilding Ways

1. This Facility Certification Report (Facility Recertification Report) is submitted for the initial certification of Dry Dock No. 3 (for recertification of Dry Dock No. 3, whose current certification expires 1 Jan 1985), for a rated capacity of 10,000 tons.

2. The historical data and design data for Dry Dock No. 3 are included as enclosures I and II. Enclosures III through VII describe Sometown Naval Shipyard's existing operational limitations and procedures; organization and manning; maintenance schedule and procedures; and methods for protecting the ship during the lay period. The material condition survey results are provided in enclosure VIII.

3. The facility repairs and modifications, proposed to be undertaken by the Sometown Naval Shipyard, are described in enclosure IX of this report. The monitoring plan is described in enclosure X.

Date _____

Sgd. John Smith
By direction

FIGURE 13. Sample cover letter for a Navy-operated facility.

XYZ Shipbuilding Corp.
12 Washington Blvd.
Smalltown, AB 12345

Supervisor of Shipbuilding, Conversion and Repair
United States Navy
Smalltown, AB 12345

Subj: Facility Certification per MIL-STD-1625C(SH)

Sir:

1. This Facility Certification Report (Facility Recertification Report) is submitted for the initial certification of Dry Dock No. 3 (for recertification of Dry Dock No. 3, whose current certification expires 1 Jan 1985), for a rated capacity of 10,000 tons.

2. The historical data and design data for Dry Dock No. 3 are included as enclosures I and II. Enclosures III through VII describe XYZ Shipbuilding Corp.'s existing operational limitations and procedures; organization and manning; maintenance schedule and procedures; and methods for protecting the ship during the lay period. The material condition survey results are provided in enclosure VIII.

3. The facility repairs and modifications, described in enclosure IX of this report, will be carried out on the proposed schedule.

4. Reports of accidents or incidents, changes in design, manning or operating procedure revisions, and completion of repairs which are specifically required by the Government during certification shall be submitted in accordance with MIL-STD-1625C(SH).

Date _____

Sgd. James Smith
President, XYZ Shipbuilding Corp.

FIGURE 14. Sample cover letter for a commercially-operated facility.

PROPRIETARY DATA LIST

Pages 25-36, II.5-II.16, and VI.1-VI.27, contain proprietary data.

FIGURE 15. Sample proprietary data list.

ALPHA ENGINEERING, INC.
5 River Drive, Forestville, ST 54321

SURVEYOR'S ENDORSEMENT

1. Dry Dock No. 3, operated by XYZ Shipbuilding Corporation, was surveyed between January and March 1980. Results of the survey are provided in enclosure VIII of this report.

2. We have reviewed the Corrective Action Plan and the Monitoring Plan contained in enclosures IX and X of this report. We consider the material condition of this facility adequate for ensuring ship safety.

3. We endorse XYZ Shipbuilding Corporation's request for certification (recertification) of this facility for a rated capacity of 10,000 tons, and block loading of 50 tons/ft.

4. We recommend a certification period of 5 years.

Sgd. A. B. Dick
President
Alpha Engineering, Inc.

FIGURE 16. Sample of surveyor's endorsement.

List of revised pages/enclosures			
Pages/enclosures	Effective date of revision	Description of revision	Date entered
3-16 through 3-22	01 Mar 80	Added disaster plan for earthquake	10 Mar 80
2-8	03 May 80	Revised manning procedures to include line handler qualifications	01 Jun 80
2-2, 2-4, 2-5, 3-1 through 3-20, Fig. 2-1, Fig. 3-1, Fig. 3-2	01 Mar 84	New data for facility recertification	05 Mar 84
Enclosure (I)	04 Apr 84	Facility recertification new enclosure (I) (Historical data)	10 Apr 84
Enclosure (VIII)	04 Apr 84	New enclosure (VIII) (Material condition survey results)	10 Apr 84

FIGURE 17. Sample list of revised pages.

APPENDIX B

SUMMARY OF STEPS LEADING TO FACILITY CERTIFICATION

10. General. Typical steps leading to certification or certificate renewal of a facility are listed in the following paragraphs.

10.1 Preliminary FCR. When the operator desires to obtain Navy guidance on the necessary content of the design data package, the following steps shall be taken:

(a) The facility operator assembles available facility data to satisfy appendix A requirements.
(b) A surveyor reviews facility data and conducts a preliminary survey.
(c) The facility operator proposes the CRC and also specifies deviations considered necessary. He shall forward the preliminary FCR package to NAVSEA via SUPSHIP, where applicable.
(d) NAVSEA will review the preliminary FCR and rule upon the deviation requests and requirement changes. NAVSEA will respond to the operator via SUPSHIP, where applicable.

10.2 Certification report preparation. When the operator desires to obtain certification, the following steps shall be taken:

(a) The facility operator assembles the necessary facility data to satisfy appendix A requirements.
(b) The operator notifies NAVSEA of the scheduled date for a material condition survey in order to permit arrangement for a concurrent visit by a NAVSEA technical representative, if desired by NAVSEA.
(c) A surveyor conducts the necessary surveys of the facility (that is, site, soil, hydrographic, structural, and so forth).
(d) A surveyor conducts tests, observes operation of the facility, and evaluates the survey results. A summary evaluation of the material condition of the facility shall be included in the survey report.
(e) The operator reviews the survey results, lists corrective actions to be taken, and provides a schedule for the accomplishment of those actions.
(f) The operator reviews the survey results, defines operational limitations, and prepares operating procedures.
(g) The operator prepares corrective action and monitoring plans.
(h) A surveyor (at the option of the operator) reviews the adequacy of the corrective action and monitoring plans, and prepares a surveyor's endorsement.
(i) The operator assembles the certification package and forwards it to NAVSEA via SUPSHIP, where applicable.

10.3 Certification report review and certification. When NAVSEA receives a certification request, the following steps shall be taken:

(a) NAVSEA initially reviews the request package for completeness of required information and, if necessary, requests the operator to provide any omitted data.
(b) NAVSEA evaluates the certification report with special regard to: CRC, operational limitations, operating procedures, manning, corrective action plan and monitoring plan. If necessary, NAVSEA requests the operator to revise portions of these items.
(c) NAVSEA issues a facility certification to the operator, which defines CRC, the certification period, and the conditions for sustaining certification.

10.4 Operation of a certified facility. During the certification period the operator shall:

(a) Complete repairs and modifications needed prior to the next docking of a Navy ship.
(b) Prepare facility repair reports and forward these reports to NAVSEA via SUPSHIP, where applicable.
(c) Operate the facility in accordance with procedures described in the certification report.
(d) Implement and adhere to provisions of the corrective action plan and the monitoring plan.
(e) Report to NAVSEA via SUPSHIP, where applicable, when any of the following occurs: accidents or incidents; design changes; key personnel changes; operating procedure or manning revisions; repair or modification completions, as specified in this standard.
(f) Initiate action for recertification (an FRR) with an appropriate lead time prior to expiration of the current certification period, if an uninterrupted certification is necessary.

APPENDIX C

FACILITY OPERATIONS SUPERVISOR QUALIFICATION DOCUMENTATION

10. General. As specified in 4.7.2.2, the operator shall provide a resume of the training and experience of each individual designated by him as a facility operations supervisor. This appendix outlines the requirements for such a resume.

10.1 Training. Training shall be in accordance with 10.1.1.

10.1.1 Mathematics. It shall be demonstrated that the designee has received formal schooling in the mathematics of stability calculations within the previous 5 years or has utilized such mathematics within the previous 3 years. As an alternative, evidence shall be provided that the designee has the support of an individual or agent who meets either of the above criteria.

10.2 Work experience. It shall be demonstrated that a dockmaster or launch supervisor designee (as applicable) meets one of the following criteria:

(a) Served as a dockmaster on the type of facility in which qualified for a period during which time a total of at least 10 dockings or undockings were accomplished, one of which shall have been conducted within the previous 6 months. Additionally, supervised or assisted in the docking or undocking of at least two ships with a large deadrise and one using high blocking (high block 8 feet or over).

(b) Serving under a dockmaster in an apprentice or assistant role, operated a facility for a period during which time a total of at least 20 dockings or undockings were accomplished, 10 of which shall have been completed in the type of dock in which qualified. One docking or undocking shall have been conducted within the previous 6 months. Additionally, assisted in the docking or undocking of at least two ships with large deadrises and one using high blocking.

(c) Served as a launch supervisor, for at least three previous successful launchings of ships, with comparable or greater tonnage, prior to the launching of a U.S. Navy ship. One launching shall have been conducted within the previous 3 years.

10.3 Retaining qualification. Retaining qualification shall be as follows:

(a) To remain qualified, a facility supervisor shall participate in at least one docking every 2 years on the type of facility for which he is qualified. This qualification requires the review of a docking plan and checking corresponding build-up requirements, as well as active involvement in the actual docking and undocking operation. Facility supervisors who fail to maintain their qualifications in accordance with the requirements of this standard shall requalify prior to docking a U.S. Navy ship by assisting in the docking and undocking of a minimum of 2 ships in the type of facility he is operating.

(b) To remain qualified, a launching supervisor shall participate in at least one launching every 3 years on the type of facility for which he is qualified. Launching supervisors who fail to maintain their qualification in accordance with the requirements of this standard shall requalify prior to launching a U.S. Navy ship by assisting in the launching of a minimum of one ship.

10.4 Operational experience. For dockmasters, types of ships that the dockmaster has docked during his career shall be listed. Additionally, the number, types of ships, and approximate displacements of ships docked under the designee's supervision within the past 2 years shall be indicated.

APPENDIX D

PUMPING PLAN FOR FLOATING DOCKS

10. General. Preparation of a pumping plan is a prerequisite for each docking of a U.S. Navy ship in a floating dock. Procedures for preparation of a pumping plan are required to be included in the certification report. These procedures shall be prepared to include items described in this appendix.

20. Objectives. The pumping plan shall be prepared to satisfy the following objectives:

(a) Ensure that the dock has the required lifting capacity to lift the ship in its desired longitudinal position with respect to the dock, taking into account the residual silt and water in the tanks.
(b) Ascertain that, during the docking evolutions, neither the ship by itself nor the ship-dock combination will become unstable.
(c) Ensure that structural integrity of the dock will be maintained during the docking evolution:

(1) The longitudinal bending moment and deflection remain within the acceptable range.
(2) In case of multi-section docks, the connections are not overstressed.
(3) The bulkheads forming tank boundaries will not be overstressed because of excessive differential loading.
(4) The dock blocking is not overloaded.

20.1 Plan content. In order to satisfy these objectives, the pumping plan shall define:

(a) The water levels in tanks after completion of docking.
(b) Water levels in the tanks at intermediate drafts of the dock at which ship status shall be checked.
(c) Observation to be made in the ship at intermediate drafts mentioned in item (b).
(d) Deflection gauge readings and other items to be checked at the intermediate drafts.

20.2 Critical stages. When developing a pumping plan, in addition to determining the tank levels for the five phases of operation on figure 3, special attention shall be given to the stages when:

(a) The ship touches the blocks.
(b) Stability of the ship becomes critical.
(c) Stability of ship-dock system becomes critical.

30. Pumping plan development. A pumping plan shall be prepared in accordance with 30.1 through 30.2.4.

30.1 Planning. The following steps shall precede preparation of a pumping plan:

(a) Examination of ship data, including its docking drawing, curves of form, and light-ship weight distribution.
(b) Ship survey, including information on variable weights, ship's drafts, and abnormalities (such as heavy list, trim, or hull damage).
(c) Calculation of the ship's displacement and LCG at the time of docking, using current ship's draft readings. Calculations of required changes in the variable weights in the ship to correct list, trim, and excessive free-surface effects. Calculations shall include stability calculations described in 5.3.3.
(d) Dock survey, to determine effects of accumulated silt in tanks on available lifting capacity.
(e) Examination of the required blocking, which determines the longitudinal location of the ship with respect to the dock and its center of gravity above the pontoon deck.

30.2 Distribution of lifting capacity (pumping plan). If strength and stability requirements are not violated, the amount of water that shall be removed from each tank may be calculated (see 30.2.3). Note that a pumping plan is for guidance only. The docking officer or master must monitor the deflection and drafts of the dock to ensure that they are within limits and are appropriate for the phase of operation. For large or sectional docks, or when docking a ship with extremely high loading at one end, consideration of moments between tanks or dock sections may have to be taken into account in preparing the pumping plan. A properly prepared pumping plan can make the docking operation much safer.

30.2.1 Distribution of ship weight. The distribution of the ship's weight as shown on the longitudinal strength drawing (20 station weight) will indicate how the ship's weight is distributed on the dock. General types of loading are:

(a) Keel bearing is uniform and continuous.
(b) Keel bearing is nonuniform, such as a ship with a partial bar keel, long overhangs, highly concentrated weight in some compartments of the ship, or keel bearing interrupted by hull projections or by use of a separate docking skeg.

30.2.2 Calculations of ship loading on the dock. For loadings that are not continuous and uniform, a more rigorous method to determine the load distribution may be required. Figure 18 depicts a ship on a dry dock. For this very general case, the blocking is assumed to be continuous and uniform and the load distribution may be approximated as follows (see figure 18):

If A < B, load distribution is trapezoidal:

$$\text{Load max} = \frac{W}{L_k}\left(1 + \frac{A}{B}\right)$$

$$\text{Load}_{min} = \frac{W}{L_k}\left(1 - \frac{A}{B}\right)$$

$$\text{Slope} = \frac{\text{Load}_{max} - \text{Load}_{min}}{L_k}$$

If A > B, load distribution is triangular:

$$W_E = W$$

L_E = length of effective keel bearing = $1.5\ L_k - 3A$

$$\text{Load}_{max} = \frac{4\ W_E}{3(L_k - 2A)}$$

$$\text{Slope} = \frac{\text{Load}_{max}}{L_E}$$

NOTE: For the condition just after keel contact, the keel loading is regularly triangular and the above may be used to calculate the loading by:

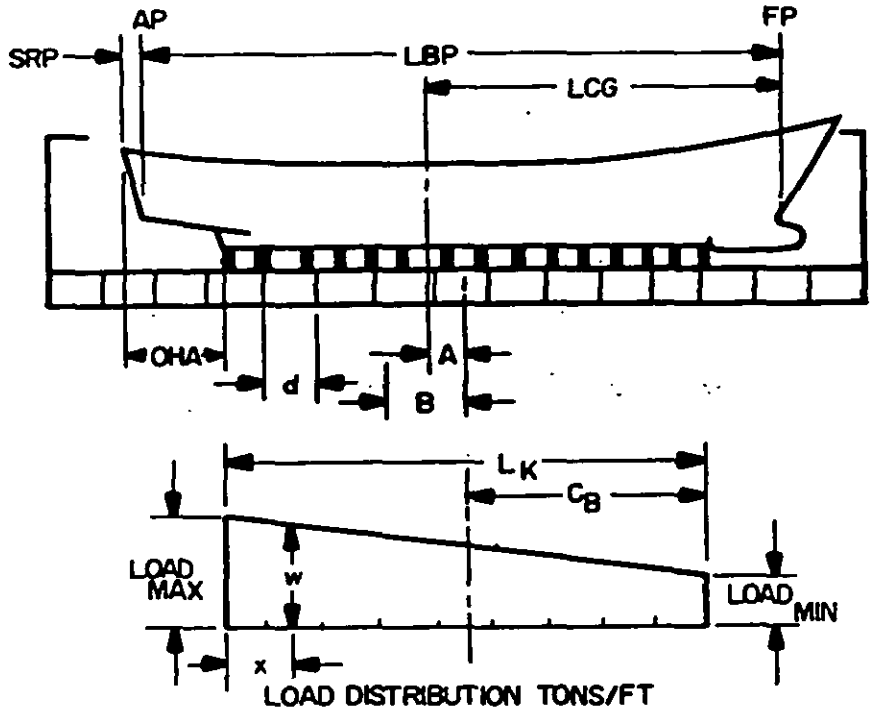
$W_E = W$ (displacement at trimmed waterline 2 feet below the docking draft.)

30.2.3 Amount of water to be removed from a tank. The amount of water to be removed from a tank to lift the ship may be determined from the load distribution shown on figure 18 as follows:

x = distance to the center of gravity of a given tank from the after end of the keel blocking.
w = average loading over a tank = $\text{Load}_{max}\left(1 - \frac{X}{L_k}\right) + \text{Load}_{min}\left(\frac{X}{L_k}\right)$.
d = length of keel blocking over a tank.
wd = weight of water to be removed from a tank.

Figure 19 depicts an alternate method of determining the amount of water to be removed from the tanks by using a table.

30.2.4 Adjusted tank water levels to lift ship. Using the curves of ballast distribution for lifting the dock without a ship (see figure 6), the amount of water each tank must contain to hold the dock at a specified draft may be determined. Adjust these values for the amount of water to be removed to lift the ship by either the method shown on figure 20 or on a form such as depicted on figure 21. These adjusted water levels for the five phases of operation, together with any critical stages, make up the pumping plan to dock the ship. Note that this discussion addresses properly lifting the ship such that only those tanks which support the ship's weight are adjusted. The other tanks would be at the required levels for lifting the dock without a ship. However, adjustment to these tank levels may be necessary to correct moments between tanks or sections, or to adjust the list, trim, or deflection of the dock.



LBP = length between perpendiculars of ship

SRP = distance from after perpendicular (AP) to point from which distance to keel blocks is measured

LCG = distance from forward perpendicular (FP) to ship's longitudinal center of gravity

OHA = length of overhang from SRP to first after keel block

W = displacement of ship

L_K = length of keel blocking

$C_B = \frac{L_K}{2}$ = distance from the end of keel blocking to the center of blocking

$B = \frac{L_K}{6}$ = distance from center of blocking to the approximate center of the loading trapezoid

$A = C_B - (LBP-SRP-LCG-OHA)$ = distance from ship's LCG to the center of blocking

d = length of keel blocking over a tank

w = average loading over a tank

x = distance from the after end of keel blocking to the center of gravity of a tank

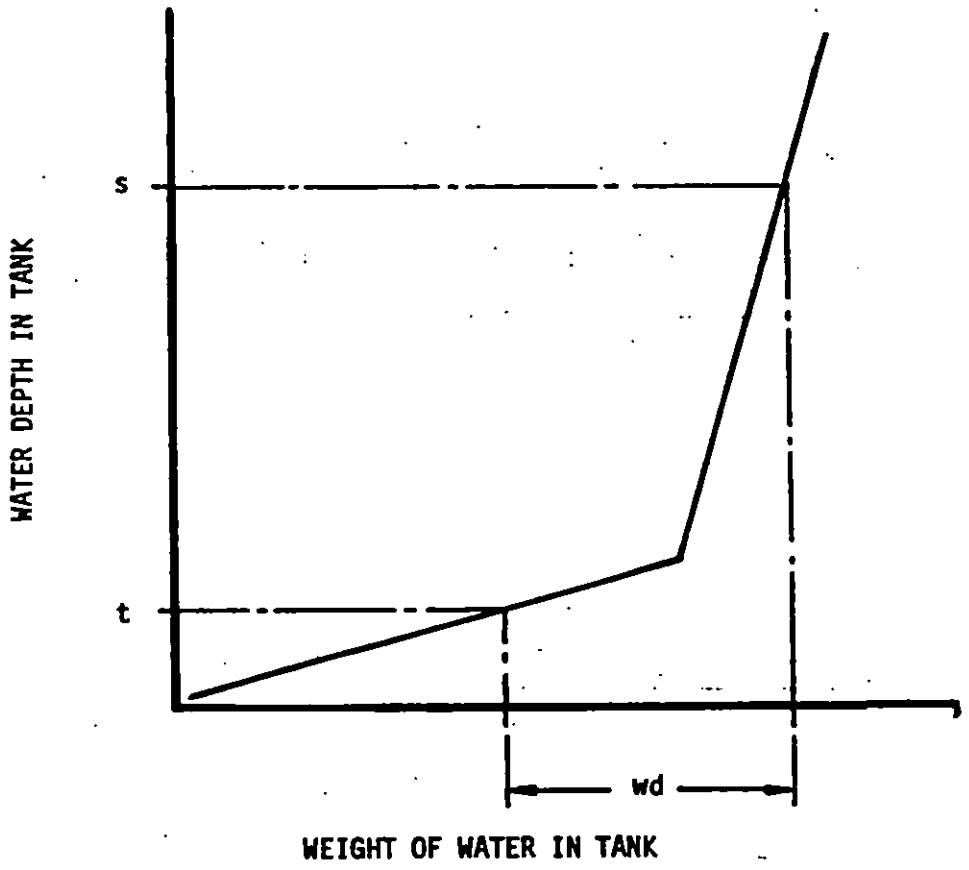
SH 12383

FIGURE 18. Ship load distribution on dock.

① Tank	② Bulkhead	③ Distance from 1st KB to BKD	④ Slope of load curve	⑤ ③ x ④	⑥ Load/point L aft - ⑤ 2/	⑦ Distance btwn load pts in ⑥	⑧ Ave load per tank $\frac{L_a + L_f}{3/2}$	⑨ Weight/tic ⑦ x ⑧	⑩ Specific volume of water 4/	⑪ Gallons of water to be removed
10	1st keel block 1/									
	10,9									
9	9,8									
8	8,7									
7	7,6									
6	6,5									
5	5,4									
4	4,3									
3	3,2									
2	2,1									
1	Last keel block 1/									

1/ For shorter keel blocking lengths, the block may not extend across all tanks. In these cases, the first keel block and last keel block points are referenced over the tanks on which they are located.
2/ Load/points are the first keel block, tank bulkheads and last keel block.
3/ L_A = aft load point over tank and L_F = forward load point over tank.
4/ Fresh water 269.3 gal/ton and salt water 261.8 gal/ton.

FIGURE 19. Sample table for water to be removed from tank for lifting a ship.



s = TANK SOUNDING FOR LIFTING EMPTY DOCK

t = TANK SOUNDING FOR LIFTING SHIP IN DOCK

wd = WEIGHT OF WATER TO BE REMOVED TO LIFT THE SHIP

SH 12384

FIGURE 20. Tank sounding calculation.

DRAFT _____

Tank	Tank level	Gallons per sounding	Water -1/2 out	Gallons per sounding	Tank level
10P					
10S					
9P					
9S					
8P					
8S					
7P					
7S					
6P					
6S					
5P					
5S					
4P					
4S					
3P					
3S					
2P					
2S					
1P					
1S					

FIGURE 21. Sample format for required tank levels.

APPENDIX E

SUMMARY CHECKOFF LIST FOR FLOATING DOCKS

10. SCOPE

10.1 Scope. This appendix contains a sample floating dry dock inspection checkoff list to be included in the certification report.

SUMMARY CHECKOFF LIST FOR FLOATING DOCKS

Sheet No. _____ of _____
Date _____

FACILITY NO. _____

Inspection Checkoff List

ITEMS INSPECTED	CONDITION S	U	M	REMARKS 1/ (Additional Remarks Use Other Side)
DEWATERING/FLOODING SYSTEMS				
Main Dewatering Pumps				
Motors for Dewatering Pumps				
Motor Controllers				
Lubrication				
Piping				
Drainage Pumps				
Suction Valves & Valve Operators				
Discharge Valves & Valve Operators				
Flooding Valves & Valve Operators				
Check Valves & Valve Operators				
Sluice Valves & Valve Operators				
Cross-Connection Valves & Valve Operators				
Tank Level Indicator System				
Draft Indicator Systems				
Deflection Detection System				
Inclinometers				
POWER SYSTEMS				
Engine Gen. Sets				
Shore Pwr for Main Pwr Source				
Elect Pwr Distr System				
Shore Pwr for Back-up Source				
COMMUNICATION SYSTEMS				
Sound Powered				
Dial Telephone				
Public Address System				
Fire Alarm				
FIRE PROTECTION SYSTEMS				
Fire Pump				
Firemain				
Fire Stations - Hoses, Nozzles and Connections				
CO_2 Extinguishers				

S = Satisfactory U = Unsatisfactory M = Marginal

1/ Required for all marginal and unsatisfactory items.

_____
Signature of Inspector

_____
Firm

Floating Dry Dock (Mechanical/Electrical)
Inspection Checkoff List (1 of 2)

SUMMARY CHECKOFF LIST FOR FLOATING DOCKS

Sheet No. _____ of _____
Date _____

FACILITY NO. _____

Inspection Checkoff List

ITEMS INSPECTED	CONDITION			REMARKS 1/ (Additional Remarks Use Other Side)
	S	U	M	
Dry Chemical Extinguishers				
MISCELLANEOUS				
Alarms - Flooding, etc.				
Mooring & Anchoring - Spuds,				
Chains, Anchors & Connections				
Capstans				
Block Handling Systems				
Crane Stops and Securing System				
Stern or Bow Closure Machinery				
Cathodic Protection System				
Air Compressors & Distribution Sys				
Deck & Breasting Winches				
Lighting for Operations & Security				

S = Satisfactory U = Unsatisfactory M = Marginal

1/ Required for all marginal and unsatisfactory items.

_____
Signature of Inspector

_____
Firm

Floating Dry Dock (Mechanical/Electrical)
Inspection Checkoff List (2 of 2)

SUMMARY CHECKOFF LIST FOR FLOATING DOCKS

Sheet No. _____ of _____
Date _____

FACILITY NO. _____

Inspection Checkoff List

ITEMS INSPECTED	CONDITION S	U	M	REMARKS 1/ (Additional Remarks Use Other Side)
BASIC STRUCTURE				
Pontoon Transv Trusses or Frames				
Pontoon Inter Transv Frames				
Wing Wall Transv Trusses or Frames				
Pontoon Col's on CL				
Bottom Plating 2/				
Pontoon & Girder				
Bottom & Girder				
Bottom Longitudinals				
Pontoon Deck Long Members				
Plating WT BHD No. 3/				
Framing WT BHD No. 3/				
Plating Swash BHD				
Framing Swash BHD				
Pontoon Pass'way Bottom Plating				
Pontoon Pass'way Bottom Framing				
Buoyancy Chamber Plating				
Trim Tank Plating				
Trim Tank Framing				
Crane Column				
Hull Openings Underwater				
Preservative Coating				
SIDES				
Shell Plating Above WL				
Shell Plating Below WL				
WING WALLS				
Plating				
Longitudinals				
Reinforcement for Attachments				
Fastening of Attachments				
Hawsepipe & Reinforcement				
Fender Supports				
ENDS				
Shell Plating Above WL				

S = Satisfactory U = Unsatisfactory M = Marginal

1/ Required for all marginal and unsatisfactory items.
2/ Note under REMARKS last drydocking date.
3/ For each bulkhead.

_____
Signature of Inspector

_____
Firm

Floating Dry Dock (Steel Hull)
Inspection Checkoff List (1 of 4)

SUMMARY CHECKOFF LIST FOR FLOATING DOCKS

Sheet No. _____ of _____
Date _____

FACILITY NO. _____

Inspection Checkoff List

ITEMS INSPECTED	CONDITION S	U	M	REMARKS 1/ (Additional Remarks Use Other Side)
Shell Plating Below WL				
Pontoon Framing				
Gudgeon & Pintle Dock Connections				
Wing Wall Framing				
Reinforcement for Attachments				
Fastening of Attachments				
Shear Connections				
Aligning Connections				
Rubbing Plating & Connections				
TOP DECK (NO. 1)				
Plating				
Reinforcement for Attachments				
Fastening of Attachments				
Longitudinals				
Crane Rail & Supports				
Crane Rail Bumper				
Covering and/or Painting				
SAFETY DECK				
Plating				
Reinforcement for Attachments				
Fastening of Attachments				
Longitudinals				
Covering and/or Painting				
PONTOON DECK				
Plating				
Framing				
Reinforcement for Attachments				
Fastening of Attachments				
Longitudinals				
Coating or Painting				
Machinery Hatch Cover				
MACHINERY DECK				
Plating				
Reinforcement for Attachments				

S = Satisfactory U = Unsatisfactory M = Marginal

1/ Required for all marginal and unsatisfactory items.

_____
Signature of Inspector

_____
Firm

Floating Dry Dock (Steel Hull)
Inspection Checkoff List (2 of 4)

SUMMARY CHECKOFF LIST FOR FLOATING DOCKS

Sheet No. _____ of _____
Date _____

FACILITY NO. _____

Inspection Checkoff List

ITEMS INSPECTED	CONDITION S	U	M	REMARKS 1/ (Additional Remarks Use Other Side)
Fastening of Attachments				
Longitudinals				
Coating or Painting				
FRAMING CONNECTIONS				
Welds, Rivets, Bolts				
PLATE-TO-FRAMING CONNECTION				
Welds, Rivets, Bolts				
PLATE-TO-PLATE CONNECTION				
Welds, Rivets, Bolts				
OUTRIGGER				
Planking				
Framing				
Connections				
Connection to Dock				
BOW OR STERN CLOSURES				
Structures				
Connection to Dock				
FUEL OIL TANKS				
Plating				
Framing & Connections				
TRIM TANKS				
Plating				
Framing & Connections				
Preservative Coating				
Davits				
Davit Connections				
BLOCKING				
Keel Blocks				
Bilge Blocks				
Hauling Blocks				
MOORING & ANCHORING				
Mooring Spuds & Connections				
Mooring Chains				
Anchors				

S = Satisfactory U = Unsatisfactory M = Marginal

1/ Required for all marginal and unsatisfactory items.

_____
Signature of Inspector

_____
Firm

Floating Dry Dock (Steel Hull)
Inspection Checkoff List (3 of 4)

SUMMARY CHECKOFF LIST FOR FLOATING DOCKS

Sheet No. _____ of _____
Date _______________

FACILITY NO. __________

Inspection Checkoff List

ITEMS INSPECTED	CONDITION S	CONDITION U	CONDITION M	REMARKS1/ (Additional Remarks Use Other Side)
FITTINGS				
Cleats				
Bollards				
Chocks				
Gratings				
Platforms				
Watertight Doors, Hatches, Air Ports and Manholes				
Access for Operations & Security				

S = Satisfactory U = Unsatisfactory M = Marginal

1/ Required for all marginal and unsatisfactory items.

____
Signature of Inspector

____
Firm

Floating Dry Dock (Steel Hull)
Inspection Checkoff List (4 of 4)

SUMMARY CHECKOFF LIST FOR FLOATING DOCKS

Sheet No. _____ of _____
Date _____

FACILITY NO. _____

Inspection Checkoff List

ITEMS INSPECTED	CONDITION			REMARKS 1/ (Additional Remarks Use Other Side)
	S	U	M	
BASIC STRUCTURE				
PONTOON				
Deck Beams				
Intermediate Uprights				
Center Blocks Below Deck				
Bottom Chocks for Trusses				
Diagonal Braces				
Laminated Top Chord				
Long. WT Bulkheads				
Long. Swash Bulkheads				
Transv WT Bulkheads				
Bottom Backlogs				
Bottom Sheathing				
Bottom Planking				
Center Long. Above Deck				
Bottom Long. Keelsons				
Laminated Bottom Chords				
Fishplates				
Tie Rods				
Marine Growth				
Caulking (Underwater)				
Underwater Preservative Coating				
SIDES				
Sheathing				
Planking				
Uprights				
Longitudinals at Bottom				
Blocking for WT Bulkheads				
Bulkheads				
Bulkhead Blocking				
Fishplates				
Caulking				
Tar Coating				
Sheathing Felt				

S = Satisfactory U = Unsatisfactory M = Marginal

1/ Required for all marginal and unsatisfactory items.

_____
Signature of Inspector

_____
Firm

Floating Dry Dock (Timber)
Inspection Checkoff List (1 of 4)

SUMMARY CHECKOFF LIST FOR FLOATING DOCKS

Sheet No. _____ of _____
Date _____

FACILITY NO. _____

Inspection Checkoff List

ITEMS INSPECTED	CONDITION S	U	M	REMARKS 1/ (Additional Remarks Use Other Side)
Preservative Coating				
Marine Growth				
Shoring Platforms				
Davits				
Sleeves Above WL				
Sleeve Attachments				
Fastening of Attachments				
Split Rings				
Bolts				
Boat Spikes				
Underwater Preservative Coating				
Hull Openings Below WL				
ENDS				
Sheathing				
Planking				
Uprights				
Blocking				
Caulking				
Tar Coating				
Sheathing Felt				
Preservative Coating				
Marine Growth				
Attachment Fastenings				
Fishplates				
Split Rings				
Bolts				
Boat Spikes				
Underwater Preservative Coating				
Caulking				
WING WALLS				
Planking				
Uprights				
Diag. Cross Bracing Bet. Frames				
Diag. Cross Bracing at Frames				

S = Satisfactory U = Unsatisfactory M = Marginal

1/ Required for all marginal and unsatisfactory items.

_____
Signature of Inspector

_____
Firm

Floating Dry Dock (Timber)
Inspection Checkoff List (2 of 4)

SUMMARY CHECKOFF LIST FOR FLOATING DOCKS

Sheet No. _____ of _____
Date _____

FACILITY NO. _____

Inspection Checkoff List

ITEMS INSPECTED	CONDITION S	U	M	REMARKS 1/ (Additional Remarks Use Other Side)
Transv Beams				
Top Longitudinals				
Transv Bulkheads				
Tie Rods				
Caulking				
Tar Coating				
Sheathing Felt				
Preservative Coating				
Reinforcement for Attachments				
Fastening of Attachments				
Split Rings				
Bolts				
Wood Borers (Ballast Compt)				
TOP DECK				
Planking				
Covering and/or Painting				
Caulking				
Preservative Coating				
Bolts				
Boat Spikes				
Derrick Attachment				
Crane Rail & Supports				
Storage Tanks				
Storage Tank Supports				
Fastening of Attachments				
Reinforcement for Attachments				
Hoist Attachment				
MAIN DECK				
Deck Sheathing				
Deck Planking				
Preservative Coating				
Caulking				
Sheathing Felt				
Reinforcement for Attachments				

S = Satisfactory U = Unsatisfactory M = Marginal

1/ Required for all marginal and unsatisfactory items.

_____
Signature of Inspector

_____
Firm

Floating Dry Dock (Timber)
Inspection Checkoff List (3 of 4)

SUMMARY CHECKOFF LIST FOR FLOATING DOCKS

Sheet No. _____ of _____
Date _____

FACILITY NO. _____

Inspection Checkoff List

ITEMS INSPECTED	CONDITION S	U	M	REMARKS 1/ (Additional Remarks Use Other Side)
Fastening of Attachments				
Rubbing Platform Attachment				
Bolts				
Boat Spikes				
Wood Borers (Ballast Compt)				
BLOCKING				
Keel Blocks				
Bilge Blocks				
Hauling Blocks				
MOORING & ANCHORING				
Mooring Spuds				
Mooring Spud Attachment				
Mooring Chains				
Anchors				
FITTINGS				
Cleats				
Bollards				
Chocks				
Gratings				
Platforms				
Watertight Doors, Hatches, Air Ports, & Manholes				
Access for Operations & Security				

S = Satisfactory U = Unsatisfactory M = Marginal

1/ Required for all marginal and unsatisfactory items.

Signature of Inspector

Firm

Floating Dry Dock (Timber)
Inspection Checkoff List (4 of 4)

SUMMARY CHECKOFF LIST FOR FLOATING DOCKS

Sheet No. _____ of _____
Date _____

FACILITY NO. _____

Inspection Checkoff List

ITEMS INSPECTED	CONDITION S	U	M	REMARKS 1/ (Additional Remarks Use Other Side)
BASIC STRUCTURE				
Pontoon Transv Frames				
Pontoon Slab Above WL				
Pontoon Slab Below WL				
Wing Wall Transv Frames (UP)				
Wing Wall Transv Frames (LOW)				
Wing Wall Side Slabs				
Wing Wall End Slabs				
Transv WT BHD Beams				
Transv WT BHD Slabs				
Storage Tank Beams				
Storage Tank Slabs				
Access Trunk Frames				
Access Trunk Slabs				
Compartment Frames				
Compartment Slabs				
TOP DECK A				
Slab				
Fastening of Attachments				
Covering and/or Painting				
Crane Rail & Supports				
B DECK				
Slab				
Fastening of Attachments				
Covering and/or Painting				
C DECK (PONTOON)				
Slab				
Propeller Pit Slab				
Fastening of Attachments				
Hatch Frame Attachments				
Bent Rubbing Plate				
SIDES				
Fastening of Attachments				
Fill. & Discharge Sleeves				

S = Satisfactory U = Unsatisfactory M = Marginal

1/ Required for all marginal and unsatisfactory items.

_____
Signature of Inspector

_____
Firm

Floating Dry Dock (Concrete)
Inspection Checkoff List (1 of 2)

SUMMARY CHECKOFF LIST FOR FLOATING DOCKS

Sheet No. _____ of _____
Date _____

FACILITY NO. _____

Inspection Checkoff List

ITEMS INSPECTED	CONDITION S	U	M	REMARKS 1/ (Additional Remarks Use Other Side)
SW Sleeves				
Hawsepipe Fastening				
Ant. Mast Fastening				
Fenders				
MISC-WT SLEEVES				
Hull Below WL				
Hull Above WL				
Wing Walls				
BLOCKING				
Keel Blocks				
Bilge Blocks				
Hauling Blocks				
MOORING & ANCHORING				
Mooring Spuds & Connections				
Mooring Chains				
Anchors				
FITTINGS				
Cleats				
Bollards				
Chocks				
Gratings				
Platforms				
Watertight Doors, Hatches, Air Ports & Manholes				
Access for Operations & Security				

S = Satisfactory U = Unsatisfactory M = Marginal

1/ Required for all marginal and unsatisfactory items.

_____
Signature of Inspector

_____
Firm

Floating Dry Dock (Concrete)
Inspection Checkoff List (2 of 2)

APPENDIX F

SUMMARY CHECKOFF LIST FOR GRAVING DOCKS

10. SCOPE

10.1 Scope. This appendix contains a sample checkoff list for use by the surveyor to be included in the certification report.

SUMMARY CHECKOFF LIST FOR GRAVING DOCKS

Sheet No. _____ of _____
Date _____

FACILITY NO. _____

Inspection Checkoff List

ITEMS INSPECTED	CONDITION S	U	M	REMARKS 1/ (Additional Remarks Use Other Side)
BASIC STRUCTURE				
Coping				
Walls				
Galleries				
Altars				
Service Tunnels				
Floor				
Apron				
Caisson Seats				
Drainage Culverts				
Drainage Tunnels				
Flooding Tunnels				
Discharge Tunnels				
General Appearance				
Pressure Relief System				
FITTINGS				
Cleats				
Bollards				
Roller Chocks				
Gratings				
Crane Rails & Supports				
Draft Gauges				
BLOCKING				
Keel Blocks				
Bilge Blocks				
Hauling Bilge Blocks				
MECHANICAL EQUIPMENT				
CAPSTAN NO.				
1 2 3 4 5 6 7 8 9				
SLUICE GATES				
Sluice Gate Leaf				
Sluice Gate Guides				

S = Satisfactory U = Unsatisfactory M = Marginal

1/ Required for all marginal and unsatisfactory items.

_____
Signature of Inspector

_____
Firm

Graving Dry Dock
Inspection Checkoff List (1 of 2)

SUMMARY CHECKOFF LIST FOR GRAVING DOCKS

Sheet No. _____ of _____
Date _____

FACILITY NO. _____

Inspection Checkoff List

ITEMS INSPECTED	CONDITION S	U	M	REMARKS 1/ (Additional Remarks Use Other Side)
Sluice Gate Operator				
Sluice Gate Controller				
Hydraulic Operating Gear				
Lubrication System				
Preservation				
CHECK VALVES				
Valve Leaves				
Swing Mechanism				
Non-slam Mechanism				
Lubrication				
Preservation				
STOP LOGS OR GATES				
Guide Slot				
Log or Gate Body				
Hoisting Equipment				
Preservation				
Intake Screens & Trash Racks				
FIRE PROTECTION SYSTEM				
Fire Pump				
Firemain				
Fire Stations - Hoses, Nozzles, Connections				
CO_2 Extinguishers				
Dry Chemical Extinguishers				
POWER SYSTEMS				
Shore Pwr for Main Pwr Source				
Back-up Pwr Source				
Electrical Pwr Distr. System				
MISCELLANEOUS				
Access for Operations & Security				
Lighting for Operations & Security				

S = Satisfactory U = Unsatisfactory M = Marginal

1/ Required for all marginal and unsatisfactory items.

_____
Signature of Inspector

_____
Firm

Graving Dry Dock
Inspection Checkoff List (2 of 2)

SUMMARY CHECKOFF LIST FOR GRAVING DOCKS

Sheet No. _____ of _____
Date _____

FACILITY NO. _____

Inspection Checkoff List

ITEMS INSPECTED	CONDITION S	U	M	REMARKS 1/ (Additional Remarks Use Other Side)
BASIC STRUCTURE				
Shell Plating				
Structural Framing				
Bulkheads				
Deck Plating				
Top Deck Covering				
Fenders				
Backing for Seals				
Seals				
Exterior Preservation				
Interior Preservation				
Fixed Ballast				
Ballast Compartment Preservation				
General Condition				
FITTINGS				
Hatches				
Cleats				
Chocks				
Gratings				
Air Ports				
Compressed Air Piping				
Compressed Air Cont. Valves				
Inclinometers				
Water Level Indicators				
MECHANICAL EQUIPMENT				
Capstans				
Motors				
Motor Controllers				
Main Dewatering Pumps				
Motors				
Motor Controllers				
Valves & Valve Operators				
Trimming Pumps				
Motors				

S = Satisfactory U = Unsatisfactory M = Marginal

1/ Required for all marginal and unsatisfactory items.

_____
Signature of Inspector

_____
Firm

Graving Dry Dock (Caisson)
Inspection Checkoff List (1 of 2)

SUMMARY CHECKOFF LIST FOR GRAVING DOCKS

Sheet No. _____ of _____
Date _____

FACILITY NO. _____

Inspection Checkoff List

ITEMS INSPECTED	CONDITION S	U	M	REMARKS 1/ (Additional Remarks Use Other Side)
Motor Controllers				
Discharge Valves & Valve Operators				
Flooding Valves & Valve Operators				
Equalizing Valves & Valve Operators				
Vent Blower				
Blower Motor				
Motor Operator				
Power Leads (Portable)				
Transformers				
Control Panel				
Alarms				

S = Satisfactory U = Unsatisfactory M = Marginal

1/ Required for all marginal and unsatisfactory items.

Signature of Inspector

Firm

Graving Dry Dock (Caisson)
Inspection Checkoff List (2 of 2)

SUMMARY CHECKOFF LIST FOR GRAVING DOCKS

Sheet No. _____ of _____
Date _____

FACILITY NO. _____

Inspection Checkoff List

ITEMS INSPECTED	CONDITION S	U	M	REMARKS 1/ (Additional Remarks Use Other Side)
BASIC STRUCTURES				
Roof				
Walls				
Floor				
Pump Pit				
Suction Chamber				
Suction Bells				
General Preservation				
FITTINGS				
Gratings				
Hatches				
MECHANICAL EQUIPMENT				
Pump No. 1 2 3 4				
Pump Motor				
Motor Controller				
Shaft & Coupling				
Guide Bearing				
Impeller				
Wearing Ring				
Pump Casing				
Packing Gland				
Lubrication System				
Flanges & Gaskets				
Preservation				
Drainage Pumps				
Sump Pumps				
Pump Motors				
Motor Controllers				
Suction Valves, Operators & Controllers				
Discharge Valves, Operators & Controllers				

S = Satisfactory U = Unsatisfactory M = Marginal

1/ Required for all marginal and unsatisfactory items.

_____
Signature of Inspector

_____
Firm

Graving Dry Dock (Pumphouse)
Inspection Checkoff List (1 of 2)

SUMMARY CHECKOFF LIST FOR GRAVING DOCKS

Sheet No. _____ of _____
Date _____

FACILITY NO. _____

Inspection Checkoff List

ITEMS INSPECTED	CONDITION S	U	M	REMARKS 1/ (Additional Remarks Use Other Side)
Check Valves, Operators & Controllers				
Lubrication System				
AIR BLOWER				
Blower Motor				
Blower Controller				
SERVICES				
Compressed Air Piping & Valves				
Power Distribution System				
Communication System				
Ventilation System				
Dry Chemical Extinguishers				
CO_2 Extinguishers				
ELECTRICAL EQUIPMENT				
Control Panel				
Selector Switches				
Pushbutton Controls				
Indicating Lights				
Feeder Controls				
Valve Indicators				
Water Level Indicators				
Transfer Switches				
Trouble Indicator				
Trouble Horn				
Reset Buttons				
Relays				
Voltmeters				
Ammeters				
Temperature Indicator				
Transformers				
Circuit Breakers				

S = Satisfactory U = Unsatisfactory M = Marginal

1/ Required for all marginal and unsatisfactory items.

_____
Signature of Inspector

_____
Firm

Graving Dry Dock (Pumphouse)
Inspection Checkoff List (2 of 2)

APPENDIX G

SUMMARY CHECKOFF LIST FOR MARINE RAILWAYS

10. SCOPE

10.1 Scope. This appendix contains a sample checkoff list for material surveys to be included in the certification report.

SUMMARY CHECKOFF LIST FOR MARINE RAILWAYS

Sheet No. _____ of _____
Date _____

FACILITY NO. _____

Inspection Checkoff List

ITEMS INSPECTED	CONDITION S	U	M	REMARKS 1/ (Additional Remarks Use Other Side)
CRADLE				
General Condition				
Decking				
Block Bearers				
Elevated Framework				
Underdeck Framework				
Drawhead Girder				
Bottom Chord				
Bitumastic Enamel on Steel				
Preservative on Wood				
Wheel Bearing Supports				
GROUNDWAYS & RAILS				
Settlement of Track				
Condition of Piles				
Condition of Stringers				
Condition of Cross Bracing				
Track Plates & Fasteners				
Rails & Fasteners				
Condition of Chain Guides				
Preservation				
Rail Alignment				
Mud & Silt Condition				
Wheels				
Wheel Bearings				
Rollers				
Roller Spindles				
Roller Frames				
Spacer Blocks				
Wood Filler Pieces				
FITTINGS				
Cleats				
Ringbolts				

S = Satisfactory U = Unsatisfactory M = Marginal

1/ Required for all marginal and unsatisfactory items.

_____
Signature of Inspector

_____
Firm

Marine Railway
Inspection Checkoff List (1 of 3)

SUMMARY CHECKOFF LIST FOR MARINE RAILWAYS

Sheet No. _____ of _____
Date _____

FACILITY NO. _____

Inspection Checkoff List

ITEMS INSPECTED	CONDITION S	U	M	REMARKS 1/ (Additional Remarks Use Other Side)
Bilge Block Hauling Chain				
Bilge Block Locking Pawls				
Bilge Blocks				
Keel Blocks				
Draft Marks				
CHAINS & SHEAVES				
Inhaul Chains or Cable				
Outhaul Chains				
Inhaul Sheaves				
Outhaul Sheaves				
Chain Connecting Links				
Sheave Fasteners				
Preservation				
Chain Slack & Fit				
HAULING MACHINERY				
Gearing				
Shafting				
Bearings				
Sprockets on Wildcat				
Cable Drum				
Frame				
Anchor Bolts				
Electric Brake				
Handbrake				
Locking Pawl				
Clutch				
Safety Guards				
Lubrication				
Preservation				
Electric Motor				
Diesel/Gas Engine				
Steam/Compressed Air Drives				
Controller				
Speed Limit Device				

S = Satisfactory U = Unsatisfactory M = Marginal

1/ Required for all marginal and unsatisfactory items.

_____
Signature of Inspector

_____
Firm

Marine Railway
Inspection Checkoff List (2 of 3)

SUMMARY CHECKOFF LIST FOR MARINE RAILWAYS

Sheet No. _____ of _____
Date _____

FACILITY NO. _____

Inspection Checkoff List

ITEMS INSPECTED	CONDITION			REMARKS 1/ (Additional Remarks Use Other Side)
	S	U	M	
Control Board				
Switches				
Safety Devices & Alarms				
FIRE PROTECTION SYSTEMS				
Fire Pump				
Firemain				
Fire Stations - Hoses, Nozzles, Connections				
CO_2 Extinguishers				
Dry Chemical Extinguishers				
COMMUNICATION SYSTEMS				
Public Address System				
Radios				
Fire Alarm				
MECHANICAL EQUIPMENT				
Bilge-Block Hauling Equipment				
Warping Winches				
Head Capstan				
WINCH HOUSE				
General Condition				
MISCELLANEOUS				
Lighting for Operations & Security				
Access for Operations & Security				

S = Satisfactory U = Unsatisfactory M = Marginal

1/ Required for all marginal and unsatisfactory items.

_____
Signature of Inspector

_____
Firm

Marine Railway
Inspection Checkoff List (3 of 3)

APPENDIX H

SUMMARY CHECKOFF LIST FOR VERTICAL LIFTS

10. SCOPE

10.1 Scope. This appendix contains a sample checkoff list for material condition surveys to be included in the certification report.

SUMMARY CHECKOFF LIST FOR VERTICAL LIFTS

Sheet No. _____ of _____
Date _____

FACILITY NO. _____

Inspection Checkoff List

ITEMS INSPECTED	CONDITION S	U	M	REMARKS 1/ (Additional Remarks Use Other Side)
HOISTS				
Motors				
Gears				
Brakes				
Wire Ropes				
Bearings				
Drums				
Foundation Platform				
Anchorage				
Piles				
Pawls				
Lubrication				
Preservation				
Wiring				
PLATFORM				
Main Transverse Beams				
Secondary Transverse Beams				
Longitudinal Beams				
Stiffeners				
Decking				
Sheaves				
Bearings				
Sheaves Housing				
Lubrication				
Tracks				
Preservation				
Pins				
CRADLES				
Main Transverse Beams				
Secondary Transverse Beams				
Stiffeners				
Longitudinal Beams				
Wheels/Rollers/Roller Plates				
Roller Spindles/Wheel Axles				

S = Satisfactory U = Unsatisfactory M = Marginal

1/ Required for all marginal and unsatisfactory items.

_____
Signature of Inspector

_____
Firm

Vertical Lift
Inspection Checkoff List (1 of 3)

SUMMARY CHECKOFF LIST FOR VERTICAL LIFTS

Sheet No. _____ of _____
Date _____

FACILITY NO. _____

Inspection Checkoff List

ITEMS INSPECTED	CONDITION S	U	M	REMARKS 1/ (Additional Remarks Use Other Side)
Block Bearers				
Preservation				
COMPRESSED AIR				
Compressor/Receivers				
Air Dryers				
Valves and Piping				
Controls				
CONTROLS				
Circuit Breakers				
Motor Starters				
Disconnect Switches				
Cams				
Limit Switches				
Load Sensors				
Load Indicators				
Ammeters				
Voltmeters				
Push Buttons				
Drums Controllers				
Electrical Interlocks				
Mechanical Interlocks				
Relays				
Indicating Lights				
Alarms				
TRANSFER SYSTEM				
Tracks				
Hauling Device				
LOAD BEARERS				
Cradles				
Tracks				
BLOCKING				
Keel Blocks				
Bilge Blocks				
Block Pulling Mechanism				

S = Satisfactory U = Unsatisfactory M = Marginal

1/ Required for all marginal and unsatisfactory items.

_____
Signature of Inspector

_____
Firm

Vertical Lift
Inspection Checkoff List (2 of 3)

SUMMARY CHECKOFF LIST FOR VERTICAL LIFTS

Sheet No. _____ of _____
Date _____

FACILITY NO. _____

Inspection Checkoff List

ITEMS INSPECTED	CONDITION S	U	M	REMARKS 1/ (Additional Remarks Use Other Side)
FIRE PROTECTION SYSTEM				
Firemain				
Fire Station - Hoses, Nozzles, Connections				
CO_2 Extinguishers				
Dry Chemical Extinguishers				
COMMUNICATION SYSTEMS				
Public Address System				
Radio				
Dial Telephone				
Alarms				
POWER SYSTEMS				
Main Power Supply				
Backup Power Supply				
Electrical Power Distribution System				

S = Satisfactory U = Unsatisfactory M = Marginal

1/ Required for all marginal and unsatisfactory items.

_____
Signature of Inspector

_____
Firm

Vertical Lift
Inspection Checkoff List (3 of 3)

APPENDIX I

SUMMARY CHECKOFF LIST FOR BUILDING WAYS

10. SCOPE

10.1 Scope. This appendix includes a sample checkoff list to be included in the certification report.

SUMMARY CHECKOFF LIST FOR BUILDING WAYS

Sheet No. _____ of _____
Date _____

FACILITY NO. _____

Inspection Checkoff List

ITEMS INSPECTED	CONDITION S	U	M	REMARKS 1/ (Additional Remarks Use Other Side)
BASIC STRUCTURE				
Piling				
Pile Caps				
Grade Beams				
Blocking Lines				
Platten Settlement				
BLOCKING				
Keel Blocks				
Bilge Blocks				
Shoring Material				
TRANSFER SYSTEM & RAILS				
Settlement of Rails				
Track Plates & Fasteners				
Rails & Fasteners				
Rail Alignment				
Carriage Frames				
Wheels, Rollers & Roller Frames				
Wheel Bearings				
Carriage Propulsion System				
Mooring Equipment				
Transfer Platform				
Mud & Silt Conditions				
ELECTRICAL SYSTEMS				
Shore Pwr for Main Pwr Source				
Electrical Pwr Distribution System				
Welding Ground System				
Communication Systems & Alarms				
Lighting for Operations & Security				
FIRE PROTECTION SYSTEM				
Firemain				
Fire Pumps				
Fire Stations - Hoses, Nozzles, Connections				
Dry Chemical Extinguishers				

S = Satisfactory U = Unsatisfactory M = Marginal

1/ Required for all marginal and unsatisfactory items.

_____
Signature of Inspector

_____
Firm

Building Ways
Inspection Checkoff List (1 of 2)

SUMMARY CHECKOFF LIST FOR BUILDING WAYS

Sheet No. _____ of _____
Date _________________

FACILITY NO. __________

Inspection Checkoff List

ITEMS INSPECTED	CONDITION S	CONDITION U	CONDITION M	REMARKS 1/ (Additional Remarks Use Other Side)
CO_2 Extinguishers				
MATERIAL HANDLING SYSTEM				
Crane Support Foundations				
Crane Rail Supports				
Crane Rail Settlement				
Crane Rail Alignment				
Crane Rail Plate & Fasteners				
MISCELLANEOUS				
Access for Operations & Security				

S = Satisfactory   U = Unsatisfactory   M = Marginal

1/ Required for all marginal and unsatisfactory items.

____
Signature of Inspector

____
Firm

Building Ways
Inspection Checkoff List (2 of 2)

SUMMARY CHECKOFF LIST FOR BUILDING WAYS

Sheet No. _____ of _____
Date _____

FACILITY NO. _____

Inspection Checkoff List

ITEMS INSPECTED	CONDITION S	U	M	REMARKS 1/ (Additional Remarks Use Other Side)
INCLINED LAUNCHWAYS				
BASIC STRUCTURE				
Piling				
Pile Caps				
Grade Beams				
SUPPORT MEMBERS				
Columns - Steel				
Columns - Concrete				
Base Plates				
Anchor Bolts				
DECK FRAMING MEMBERS				
Support Beams				
Connections				
BLOCKING LOCATIONS				
Structural Members				
Deck Area				
LAUNCHWAYS (PERMANENT)				
Forward End				
Groundways				
Submerged Area				
Guides				
LAUNCHWAYS (SLIDING)				
Structural Condition				
End Connections				
Bolts				
LAUNCHING MECHANISM				
Connections to Shipway				
Trigger Assembly/Burn-Off Plate				
BLOCKING				
Keel Blocks				
Bilge Blocks				
Launching Shores				
ELECTRICAL SYSTEMS				
Shore Pwr for Main Pwr Source				

S = Satisfactory U = Unsatisfactory M = Marginal

1/ Required for all marginal and unsatisfactory items.

_____
Signature of Inspector

_____
Firm

Building Ways (Inclined Shipway)
Inspection Checkoff List (1 of 2)

SUMMARY CHECKOFF LIST FOR BUILDING WAYS

Sheet No. _____ of _____
Date _____

FACILITY NO. _____

Inspection Checkoff List

ITEMS INSPECTED	CONDITION S	U	M	REMARKS 1/ (Additional Remarks Use Other Side)
Electrical Pwr Distribution System				
Welding Ground System				
Communications & Alarm Systems				
Lighting for Operations & Security				
FIRE PROTECTION SYSTEM				
Firemain				
Fire Pumps				
Fire Stations - Hoses, Nozzles,				
Connections				
Dry Chemical Extinguishers				
CO_2 Extinguishers				
MATERIAL HANDLING SYSTEM				
Crane Support Foundation				
Crane Rail Supports				
Crane Rail Settlement				
Crane Rail Alignment				
Crane Rail Plates & Fasteners				
MISCELLANEOUS				
Access for Operations & Security				

S = Satisfactory U = Unsatisfactory M = Marginal

1/ Required for all marginal and unsatisfactory items.

_____
Signature of Inspector

_____
Firm

Building Ways (Inclined Shipway)
Inspection Checkoff List (2 of 2)

SUMMARY CHECKOFF LIST

Sheet No. _____ of _____
Date ________________

FACILITY NO. __________

Inspection Checkoff List

ITEMS INSPECTED	CONDITION			REMARKS 1/ (Additional Remarks Use Other Side)
	S	U	M	

S = Satisfactory U = Unsatisfactory M = Marginal

1/ Required for all marginal and unsatisfactory items.

____
Signature of Inspector

____
Firm

Inspection Checkoff List

INSTRUCTIONS: In a continuing effort to make our standardization documents better, the DoD provides this form for use in submitting comments and suggestions for improvements. All users of military standardization documents are invited to provide suggestions. This form may be detached, folded along the lines indicated, taped along the loose edge *(DO NOT STAPLE)*, and mailed. In block 5, be as specific as possible about particular problem areas such as wording which required interpretation, was too rigid, restrictive, loose, ambiguous, or was incompatible, and give proposed wording changes which would alleviate the problems. Enter in block 6 any remarks not related to a specific paragraph of the document. If block 7 is filled out, an acknowledgement will be mailed to you within 30 days to let you know that your comments were received and are being considered.

NOTE: This form may not be used to request copies of documents, nor to request waivers, deviations, or clarification of specification requirements on current contracts. Comments submitted on this form do not constitute or imply authorization to waive any portion of the referenced document*(s)* or to amend contractual requirements.

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DEPARTMENT OF THE NAVY
WASHINGTON, DC 20362 - 5101

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NAVAL SEA SYSTEMS COMMAND (SEA 55Z3)
DEPARTMENT OF THE NAVY
WASHINGTON, DC 20362 - 5101

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

(See Instructions – Reverse Side)

1. DOCUMENT NUMBER	2. DOCUMENT TITLE
MIL-STD-1625C(SH)	SAFETY CERTIFICATION PROGRAM FOR DRYDOCKING FACILITIES AND

3a. NAME OF SUBMITTING ORGANIZATION	4. TYPE OF ORGANIZATION *(Mark one)*
SHIPBUILDING WAYS FOR U.S. NAVY SHIPS	☐ VENDOR ☐ USER ☐ MANUFACTURER ☐ OTHER *(Specify)*: _____
b. ADDRESS *(Street, City, State, ZIP Code)*	

5. PROBLEM AREAS

a. Paragraph Number and Wording:

b. Recommended Wording:

c. Reason/Rationale for Recommendation:

6. REMARKS

7a. NAME OF SUBMITTER *(Last, First, MI)* – Optional	b. WORK TELEPHONE NUMBER *(Include Area Code)* – Optional
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