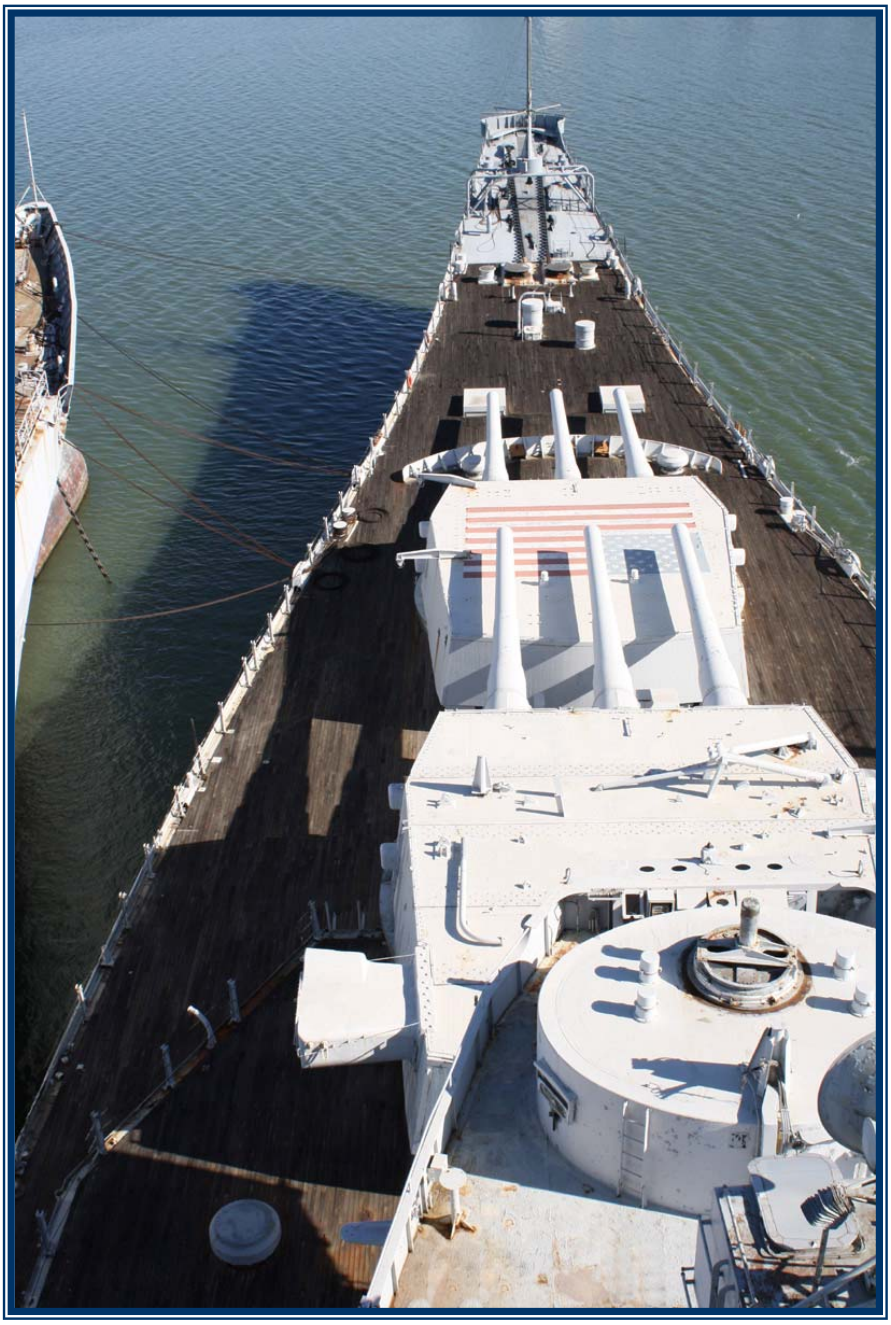
USS IOWA (BB61)

PART B - TECHNICAL PLAN
SECTION 4 – MAINTENANCE PLAN



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A NEW MISSION
61
FOR A LIVING LEGEND
USS IOWA

PART B-4:
USS IOWA MAINTENANCE SUMMARY AND PLAN

Section 4a: EXECUTIVE SUMMARY

The extreme size of the Battleship *IOWA* mandates that a Maintenance Plan be established to assist the vessel's caretakers in the long term planning and care of this historic vessel. A Maintenance Plan allows the caretakers the tools needed to plan properly for the different cycles that will be required through the anticipated life of this ship as a Museum. The contract between the Navy and the Pacific Battleship Center will require that a plan be put forward which will ensure the long term care of *IOWA.*

The Navy requires information on the short term, intermediate and long term care of the ship. Those concerns shall be addressed and be amplified within the body of this text.

The Battleship *IOWA* signifies the best of capital ship design and craftsmanship that the U.S. Navy and the American people brought to bear in a critical period of our country's history. The *IOWA* class vessels are unique in terms of grace, speed and firepower. That the pair of sister ships, *IOWA* and *IOWA*, remain as mobilization assets attests to the value of this class ship when all others of their genre are gone from the world's oceans. The vessel's size and accommodations make her the perfect venue for visitation, overnight encampment programs, office space for the Museum and as a marketable venue for other celebrations (private and civic).

In preparation for acceptance of the ship by Pacific Battleship Center, a large team consisting of former naval architects, construction professionals, and battleship enthusiasts conducted an extensive ship inspection. The findings of these inspections form the basis of this maintenance plan.

IOWA does have some issues, as does every steel vessel constructed for a salt water environment and floating in a brackish water environment. Her great size and mass dictate a need for continuous and creative maintenance procedures; some of those processes will be discussed within the body of this plan; others are addressed in appendices retained by Pacific Battleship Center.

The main problems observed by the PBC Team are as follows:

1. The vessel's topside hamper above the main deck suffers from standing water and drainage issues.

2. The vessel's topside hamper (particularly the armored citadel decks, both masts and one stack) suffers from long term neglect as to paint coatings and as a result, serious

corrosion issues are now present. These conditions are found throughout the vessel's topside hamper.

3. The vessel's teak deck system on main deck and other upper level decks are in need of full replacement as the majority of welded steel attachment studs (of threaded mild steel) are rusted away, allowing water and air to infiltrate and deteriorate the teak planking, seam/bedding caulking and steel deck. The caulking within the seam between both planks has pulled away in most areas of the deck; this will require immediate remediation on the decking. A plan of which is included.

4. The vessel's tanks were not inspected at time of ship check. It can be assumed that there may be some rust/scale and standing water in some of these areas. This will require inspection and remediation at some point.

5. Appendix B-4-4 includes a detailed ship analysis performed by Dreadnaught Consulting.

The vessel's current Maintenance Personnel (Bremerton NISMO and MARAD) have worked wonders in achieving a level of care and preservation to this vessel for the most immediate structural and cosmetic concerns. Indeed, active duty ships suffer to the same degree as Battleship *IOWA.*

The Pacific Battleship Center fully intends, upon accepting this vessel, to continue this high level of care and ship's husbandry.

The Maintenance Plan details:

- A ship preservation plan and maintenance schedule;
- Composition and qualification of professional maintenance staff;
- Information on the cathodic protection system, drip system currently utilized
- A dry-docking plan;
- An underwater inspection plan;
- A plan for responding to fire, flood, or intrusion alarms onboard;
- An emergency response plan;
- A pest control plan; and,
- A security plan, including overall safety principles

The Pacific Battleship Center technical team includes former Long Beach Naval Shipyard employees that were responsible for the reactivation of both the USS Missouri and USS New Jersey during the 1980's. In addition to these personnel, we have included a variety of experts in the construction industry with HVAC design and installation, steel preparation and coatings, carpenters, and numerous other trades.

The Pacific Battleship Center team in one form or another has assisted with the majority of IOWA Class NAVSEA applications, and in some cases ongoing maintenance of USS

Missouri, USS New Jersey, and the USS Iowa effort at Mare Island, and now the effort to place USS Iowa in Los Angeles. We are certain that you will find the PBC plan complete and comprehensive in regards to shipboard maintenance.

Section 4b: GENERAL POLICIES GOVERNING MAINTENANCE PLANNING

Every sound historic vessel preservation project should begin with a plan; a comprehensive, detailed, written plan for preservation treatment that addresses and takes into account the following:

- The historical significance of the vessel, and degree of historic integrity it possesses
- The availability of information that might be required for preservation treatment, such as original construction, changes made during the life of the vessel, etc.
- The physical condition of the vessel, as determined by a competent surveyor
- The environment in which the vessel is to be preserved, and the projected effect of that environment on the vessel
- The intended use of the vessel, and the projected effect of that use on the historic integrity of the vessel
- The work required to implement the proposed treatment, and the sequence in which the work will be performed
- The availability of suitable materials, equipment, and technology to successfully carry out the project
- The availability of competent personnel with the requisite skills and expertise to perform the work
- The availability of a suitable site for carrying out the proposed treatment
- The cost of the proposed treatment, and the source and availability of funding to complete the work.
- Developing, whenever possible, plans for the preservation, maintenance, and compatible use of the vessel.
- Determining through the services of a competent professional marine surveyor experienced with the type of vessel under consideration, the existing condition of the vessel, the extent of work required to implement the proposed treatment plan, the feasibility of the project, and the projected cost.

- Ensuring that adequate funds are available, or can be obtained, to achieve the proposed treatment objective and to maintain the vessel thereafter.

- Ensuring the availability of competent staff with the requisite skills to manage and carry out the project.

Implementation of such a plan is time-consuming and expensive. But it is a vital element in any responsible, long term project.[1]

Documentation

Documentation is the most easily overlooked aspect of a historic vessel preservation project, yet it is arguably the most important.

Timely, complete documentation is vital for three reasons. First, there is always a possibility of partial or total loss of the vessel through fire, collision, mismanagement, neglect, vandalism, etc. If loss should occur, the information collected in the documentation process may be the only surviving record of what once existed.

Second, even if the vessel is successfully preserved, it will never be exactly the same as when built, or when acquired for preservation. Thorough documentation of changes made to the vessel will help to create a better understanding of the vessel as it is in the present and as it evolves in the future.

Finally, documentation of work performed during preservation treatment, including maintenance, material renewals, etc., is useful in the planning and carrying out of later work.

Documentation should begin with the earliest stages of project planning, and should continue throughout the process. All available information about the vessel's history, construction, and significance should be researched and recorded, and records should be kept of all preservation and maintenance work performed. Before any preservation treatment is undertaken, however, the vessel should be regarded as primary physical evidence to be recorded in detail. Duplicate copies of the collected body of records, suitably organized, should be carefully protected and stored in separate locations.[2]

Our documentation effort begins with the collection of numerous manuals, studies, surveys and other information regarding the maintenance of ships in general and the *Battleship IOWA* in particular. The documents are on file with our Technical Team and are not included in this application. A few:

- The detailed ship survey

[1] The Secretary of the Interior's *'Standards for Historic Vessel Preservation Projects'*. Department of the Interior, National Park Service.
[2] Ibid.

- Recommended procedures for replacing and maintaining teak decks
- MilSpec documents for teak material
- Paint types, uses and recommendation from our coatings professionals.
- Paint preparation techniques per SSPC guidelines.
- A NAVSEA presentation on hull fouling and paint performance
- Dry-docking information, additional to the plan enclosed here.

Stabilization

In every vessel, the process of decay begins even before construction is complete. Wood rots. Steel, bronze, and aluminum oxidize and corrode. Deterioration is continuous, exacerbated by exposure, the rigors of use, and the harsh marine environment. By the time preservation is considered, much or all of a historic vessel's fabric is likely to have been affected--sometimes severely--by deterioration.

After the physical form, configuration, and condition of a historic vessel at the time of acquisition have been thoroughly documented, measures should be undertaken to stabilize the vessel. Measures include steps to arrest rot and corrosion, to stop leaks, to reinforce or repair structural members, to ventilate and dry out interior spaces, etc.-in short, to halt the deterioration process to the greatest possible degree. This work should be undertaken before the ultimate preservation treatment planned for the vessel is begun.

Stabilization, accompanied and followed by comprehensive maintenance, "buys time" for completion of the preservation process. Too often, stabilization measures at the beginning of a preservation project are either inadequate or non-existent. This almost inevitably results in expensive and time-consuming preservation work having to be redone later. It could even result in loss of the vessel.

Preservation, Restoration, and Rehabilitation

Only after a solid preservation plan has been developed, based on sound knowledge of the vessel's condition, extensive research, thorough consideration and assessment of available technical, material, and economic resources, etc.; only after the vessel has been extensively documented as acquired; and only after stabilization measures have been implemented--only then should work begin on the preservation treatment selected for the vessel.

Whether the chosen treatment is preservation of the vessel as acquired, rehabilitation for a new use, or restoration, good historic preservation practice demands that the preservationist adhere to one basic precept in all work undertaken: to retain and preserve to the greatest extent possible the historic form and fabric of the vessel.

Preservation is the ultimate treatment in any historic vessel preservation project, and it is the most straightforward in theory and in practice.

Restoration should be undertaken only if there is sufficient detailed historical information about the vessel on which to base the restoration work. Selection of the time or period in a vessel's career to be represented by the restoration should be done only after careful consideration of the effects of the restoration on historic fabric from other, possibly more significant, periods in the life of the vessel.

Rehabilitation, because it normally requires more extensive changes to historic fabric and departures from historic methods of construction than other treatments, should be undertaken only after preservation and restoration have been considered as alternatives. Whenever possible, historic fabric should be retained; changes or additions required by the rehabilitation should be reversible, and should be made with the least possible disruption of historic form or fabric.

Section 4c: SHIP PRESERVATION PLAN/SCHEDULE

Preservation Maintenance

Preservation is an unending process and is the single most demanding task of all Museum ship maintenance teams. After the treatment goal selected for a vessel is achieved, every effort must be made to maintain the vessel in its preserved state. This involves regular, thorough inspections of the vessel; "housekeeping" measures such as cleaning; routine maintenance such as tightening, adjusting, lubricating, paint touchup, etc.; cyclic maintenance such as refinishing, material renewal and repair, etc; and ongoing stabilization and emergency work as required.[3] In addition, preservation maintenance practices should include:

- Working from a long-term plan for the preservation, maintenance, and compatible use of the vessel.

- Determining through the services of a competent professional marine surveyor or equivalent experienced with the type of vessel under consideration, the existing condition of the vessel, the extent of work required to implement the proposed treatment plan, the feasibility of the project, and the projected cost.

- Ensuring that adequate funds are available, or can be obtained, to achieve the proposed treatment objective and to maintain the vessel thereafter.

- Ensuring the availability of competent staff with the requisite skills to manage and carry out the project.

PBC has built a staff of experts that were involved with the re-activation of the USS New Jersey and USS Missouri in Long Beach, CA. PBC is in a fortunate position to draw on the expertise of this once enormous shipyard to help perform work required.

Current conditions on board IOWA vary drastically from paint degradation and rust on the exterior, to an almost active condition on the interior and areas recently painted. These areas will be addressed prior to initial opening within the start-up phase. It is understood that once this work is completed, the ship will fall into a “maintenance” category.

The schedule of planned maintenance activities is provided for daily and weekly, annual, and long term actions.

Daily/Weekly Ship Maintenance Schedule

The following items will be performed on an daily/weekly basis:

1. Preparation and painting of exterior topside areas by ship's maintenance team.

2. Daily cleaning of topside and interior spaces by ship's maintenance team.

3. Preparation and painting of interior spaces by ship's maintenance team.

4. Cleaning of interior spaces by ship's maintenance team.

5. Ensure watertight integrity of vessel.

6. Inspect and repair as needed all electrical harnesses, light fixtures, shore power connections and cables. Inspect and properly tag all active circuits; properly tag all circuits and equipment that are not to be energized.

7. Repair/maintenance of vessel's plumbing system.

8. Repair/maintenance of vessel's ventilation (heating & cooling) system.

9. Repair/maintenance of vessel's over-the-side cathodic protection system.

10. Inspection/repair/maintenance of vessel's lifelines and other safety systems (high bilge alarms, fire alarms, pumps, etc.) Inspect all ladders and stairwells for loose fittings.

11. Repair/maintenance of vessel's security systems. Ensure a proper space lock system is in place.

12. Visually inspect condition of vessels mooring chains, pad eyes and pier head facilities.

13. Repair/maintenance of Museum's grounds and building.

14. Prepare/maintain vessel's exhibits.

15. Prepare/maintain new spaces within the ship opened to public visitation.

16. Prepare daily work plan and budgets needed to implement Maintenance Plan.

17. Prepare ongoing maintenance data into a central planning effort.

18. Repair/replace teak decking as needed. Ensure proper drainage of topside spaces and piping.

19. Inspect/tag fire extinguishers throughout vessel.

20. Plan for annual budget tasking; submit input for Annual and Long Term Maintenance Planning.

21. Establish ship's library of structural drawings, reference publications and ship's manuals for quick/easy reference.

Annual/Intermediate Ship Maintenance Schedule

Along with the items listed in the Daily/Weekly maintenance Schedule, conduct the following:

1. Perform annual repair/maintenance of vessel's plumbing system and sewerage holding tank system.

2. Consider flushing piping systems, cleaning/replacement of filters and traps, inspection of piping joints and support hangers. Inspect toilet/shower facilities and repair as needed.

3. Repair/maintenance of vessel's HVAC ventilation (heating & cooling) system. Cleaning of ducts, fan units, heating elements, periodic replacement of filters (as needed).

4. Repair /maintenance of vessel's cathodic protection system. During annual dive inspection of hull bottom, inspect, clean and replace (as needed) the systems anodes. Ensure divers inspect bases of sheet pile walls, concrete abutments, and mooring chain (and weights) that are drooped into the water.

5. Perform annual tests on other safety systems (high bilge alarms, fire alarms, pumps, etc. Ensure local fire department, ambulatory crews and other safety/security personnel are walked through vessel and are familiar with vessel lay-out and emergency procedures.

6. Perform test vessel's security systems.

7. Prepare plans for repair/maintenance of Museum's grounds and buildings.

8. Have divers survey vessel's underwater shell plating and appendages. Perform underwater inspection and cleaning/replacement of anodes for cathodic protection system.

9. Conduct annual environmental testing for PCBs, asbestos, lead and air quality as required under the EPA Agreement.

10. Prepare ongoing Annual and Long Term maintenance data into a central planning effort.

11. Repair teak deck as needed. Prioritize teak deck repair tasking and include extraordinary teak deck repairs/replacement into Long Term Maintenance Plan. Investigate the teak market for best pricing and procure teak wood (or composite varieties) in stock on an annual basis.

12. Sound all of the vessel's fuel and/or ballast tanks from locations provided within the Ship's Information Book.

13. Inspect/tag fire extinguishers throughout vessel.

14. Update Museum's Emergency Procedures Manual as needed.

15. Test vessel's electrical systems under full load conditions for the spaces utilized and make adjustments to vessel's load carrying capacity by adding or subtracting circuits as needed throughout ship. Decommission all unutilized circuitry by removing fuses from panels and tagging.

16. Prioritize areas of the exterior that require painting, obtain estimates from Contractors.

17. Prioritize areas of the interior that require painting, obtain estimates from Contractors.

18. Develop priority budgetary planning and tasking for Long Term Maintenance.

Long Term Ship Maintenance Schedule

The following items will be performed on a long term basis:

1. Prepare and implement vessel dry-docking.

2. Consider viability of existing HVAC, CHT, DH (de-humidification) and fresh water plumbing systems. Plan for systems replacement/augmentation.

3. Prepare tasking and planning needed for shoreside and mooring structures. Repair/replace mooring chains and tie-downs as needed.

4. Inspect and repair/replace as needed the vessel's shore power cables and hangers.

5. Inspect and repair/replace as needed the vessel's fendering.

6. Perform hydrographic survey of berth sire when ship is in dry-dock and dredge berth to a depth 4 feet below keel.

7. Complete prioritizing of teak deck replacement, investigate best method of preserving existing deck, install teak plank replacements as needed. Ensure environmental aspects of this tasking are not overlooked.

8. Establish grant writing team/specialist(s) to work with vessel's maintenance supervisor and management to develop emergency/intermediate/long term funding of projects aboard this vessel.

Section 4d: Composition and Qualification of the Professional Maintenance Team

To ensure the proper long term longevity of the vessel and to ensure that ongoing repairs are completed in a timely and safe manner, a dedicated, full-time maintenance team will be required for this ship. Given the experience of other historic ships, typically battleship museums (MASSACHUSETTS, NEW JERSEY & MISSOURI, etc.) have one (1) full-time Engineer/Shipboard manager and eight (8) full time or full time equivalent maintenance personnel (highly skilled and trained in their particular fields) as the minimum number of personnel required to carry out the Plan. There are additional plans for ramp up of personnel following stabilization of revenue.

Pacific Battleship Center plans the following staff to support the maintenance of the battleship:

Maintenance Supervisor/Ship's Engineer
Electrician I
Electrician 2 (position after stabilized revenue)
Pipe Fitter 1
Pipe Fitter 2 (position after stabilized revenue)
Ship Fitter 1
Ship Fitter 2
Carpenter 1
Carpenter 2 (position after stabilized revenue)
HVAC Tech 1
HVAC Tech 2
Painter 1
Painter 2 (position after stabilized revenue)

We have received numerous inquiries for these positions and have been developing contact lists for interviews.

An example of the Ship Engineers job description is included.

- **Maintenance Supervisor/Ship's Engineer Classification**

  Description:
  Skilled supervisory work involving the supervision and coordination of maintenance crews performing maintenance operations for the Battleship IOWA
  Essential Functions:
  - Supervises the daily operations of crews by providing training and guidance, developing work standards, assigning and monitoring work, tracking production and conducting performance evaluations.

- Plans and schedules maintenance programs, performs inspections and monitors inventory.
- Administrates contracts by preparing specifications and ensuring that work is performed correctly.
- Submits requisitions, reviews shipping and receiving invoices and assists with budget contract administration
- Requires thorough knowledge of OSHA regulations and safety practices.
- Evaluates and prepares testing and training program policies and procedures to effectively test and control ship systems and components; ensuring successful integration of the test program with production activities. Plans and prepares test procedures, which contain testing instructions, requirements, and sequences, ensuring compliance with contract specifications, military specifications, system diagrams, equipment drawings, etc. Writes or revises test policies and procedures to control testing and system operations. Directs shipboard testing performed by hourly or salaried Museum staff. Monitors the performance of tests and identifies and resolves system operational issues. Analyzes test data and determines operational conditions and design appropriateness. Works collaboratively with outside design engineers to resolve design issues.
- Ability to stand/walk for extended periods of time, hear, climb, crawl, bend, stoop, push, pull, and lift heavy objects from ground to above the shoulder, and perform tasks requiring manual dexterity.
- Coordinates internal departmental services by maintaining safety and security, undertaking damage assessment and record/file management, and maintenance, equipment and capital purchasing and vessel maintenance and repairs.
- Assists with the development of the unit budgetary requirements related to ship needs by tracking accounts to ensure expenditures are within budget limits, verifying purchase requests before acquisition, and preparing requests for proposals.
- Directs the daily maintenance operations of the ship by monitoring staff requirements, conducting vessel inspections to ensure that all systems are operational.
- Assists with the prioritization, budgeting and management of all major and minor construction projects aboard the vessel, ensuring that they are completed according to all City regulations and applicable laws.
- Oversees all existing ship engineering systems, including HVAC, boilers, chillers, lighting, plumbing, electrical and other mechanical systems.
- Schedules and plans all vessel maintenance programs, including the development of a PM program that prioritizes the ongoing care of existing systems and structures.
- Understands and utilizes the Secretary of the Interior's 'Standards for Historic Vessel Preservation Projects' guidelines.
- Performs personnel functions such as assisting with the selection, scheduling, training, disciplining, evaluation, and professional development of staff.

- Must possess ability to deal tactfully and effectively with subordinates, City Officials, and the general public.
- Requires ability to effectively communicate both orally and in writing and the ability to read and interpret construction plans, surveys and specifications.
- Must possess valid driver's license and HVAC certification.

Education/Experience:
Requires equivalent to associates degree in pre-engineering or other related science curriculum. The preferred candidate will possess knowledge of the maintenance and upkeep of an inactive naval vessel and also have a minimum of five years of supervisory experience. U.S. Navy Shipyard training a plus.

Unusual Demands: Subject to "call back" in emergencies.

Terms of Employment: Annual salary as established.

Section 4e: Cathodic Protection System

The vessel currently is utilizing an over the side cathodic protection system. This system was reviewed during a PBC ship check, and determined to be in great condition. PBC will continue to utilize this system, with the eventual goal of replacing anodes and rectifiers for the CAPAC impressed current system installed during the 1980's modernization. This work will be performed during the next dry-dock period. An inspection performed by US Filter determined that 5 of the 12 anodes were ground and not in functional condition.

The hull is freely eroding at the waterline (although minimally) where the paint system has been breached. Hull conditions on board IOWA were reviewed by an underwater diving company (without diving), and it was believed that the IOWA hull was most likely in very good shape. An underwater inspection will determine the ultimate condition of the vessel's bottom paint system.

Section 4f: Dry-Docking Plan

Situations in which dry-docking may be required for the vessel:

1. OVERHAUL - Scheduled overhauls as established by vessel's managers. Typical extended periods for dry-docking a Museum ship are anywhere between 20 and 50 years for a large capital ship.

2. EMERGENCIES - Serious hull damage following a collision, grounding, or interior degradation of overboard piping systems. Often necessary to prevent the ship from sinking.

3. REPAIRS TO UNDERWATER FITTINGS - Any underwater work beyond the capacity of divers.

4. REMOVE FOULING OF THE HULL - Marine growth resulting in loss of paint system and subsequent shell plate loss.

Schedule for Dry-docking Operations (Planned for 2023)

12 MONTHS PRIOR TO DOCKING

1. Inspect all overboard valves at the skin of the ship. Chain and lock.

2. Order any replacements for skin valves.

3. Inspect hull bottom for areas of shoaling that would prevent movement of ship from berth.

4. Initiate detailed planning for next dry-dock progression.

6 MONTHS PRIOR TO DOCKING

1. Conduct inspection of interior of the ship to determine condition of all spaces. Notate any spaces with standing water and investigate causes.

2. Conduct ship survey and develop 'Trip & Tow' list of items requiring completion prior to rigging tow.

3. Ensure that all ship's drawings (including the Docking Plan), Ship's Information Books, Damage Control Books and Tank Tables are available.

4. Ensure that periodic readings of vessel's tanks are up to date.

5. Determine what spaces/tanks are utilized for ballasting and make preparations for adding ballast (to allow ship to rest evenly on the keel blocks when the dry-dock is pumped out) and de-ballasting ship when in dry-dock.

6. Prepare Shipyard Specification Package and offer same to yards for bidding on a line-by-line basis.

2 MONTHS PRIOR TO DRY-DOCKING

1. Obtain bids for towing, line handlers, pilotage for movement of the vessel.

1 MONTH PRIOR TO DOCKING

1. Conduct Docking Planning Conference
    a. Docking Arrangements. All details are worked out in advance by the Docking Master, towing contractors and vessel's representative. The following details are considered primary issues when considerations for docking are made:
        i. Time and date of docking
        ii. Tugs and pilot to be used
        iii. Whether bow or stern enter the dock first
        iv. Proper conditions of list and trim
        v. Handling of lines
        vi. Record of tank soundings before the ship is dry-docked
        vii. Gangways to be used
        viii. Utilities to be furnished to the ship, such as electric power, steam, and water
        ix. Sanitary services to be provided
        x. Garbage and refuse disposal facilities needed
        xi. Dry-dock safety precautions
        xii. Pumping plans or other instructions or operating directives for ballasting/de-ballasting dry-dock with or without ship in basin.
        xiii. Fleeting of vessel.
    b. Docking Information. The vessel's representative shall furnish the Docking Master with the following information:
        i. Place and date of last docking
        ii. Last docking position
        iii. Date and file number of last docking report
        iv. Paint history for last complete painting
        v. History of touch-up painting
        vi. Ship weight distribution (including tank sounding report)
    c. Offload supplies and hazardous stores
    d. Lock screws in dry-dock position
    e. Have 0° list and no excessive trim.

PRIOR TO DOCKING

1. Ensure dry-dock movement planned completed.
    a. Provide last plan to Docking Officer
    b. Ship has no List
    c. Ship has less than 1% Trim
    d. Retract all moveable hull appendages
    e. Minimize Free Surface Effect - all tanks full or empty
    f. Deliver list of all hull fittings below the waterline to the Docking Officer.

2. Project manager & dry-dock management meet prior to both docking and undocking with Shipyard & vessel's representative. Review Docking plan, Hull History, and Hull Penetrations Drawings

DOCKING

1. Responsibility for the ship shifts from the vessel's Pilot to the Docking Officer when the first part of the ship crosses the plane of the dry-dock sill.

2. Once the ship is positioned in dry-dock, dewatering of the dock begins. As the ship just touches down on the blocks, pumping is stopped. Divers will verify that the ship is properly resting on the blocks, and that the blocks are in the correct location. Upon verification, dewatering will continue.

3. When the dock is pumped dry, members of the hull board conduct an inspection with the Docking Officer.
    a. Ensure ship is positioned properly in the dock
    b. Ensure all shores in place
    c. Note condition of propellers, rudders, overboards, intakes, and other projections
    d. Note condition of impressed current zincs/cathodic protection anodes and consider the possibility of reactivating the ICCP system.
    e. Note details of any known or observed damage

4. Docking Master to ensure adequate shoring and side blocking is installed to resist earthquake or hurricane forces.

WHILE IN DRY-DOCK

1. Vessel's representative will maintain Dry Weight Log, a log of all weight shifts, additions, and removals in excess of 500 lbs.

2. Ensure all removed skin valves are replaced with blank flanges and that no liquids are discharged to the dock without consent of the Docking Officer.

UNDOCKING

1. Prior to undocking, the Hull Board will:
   a. Inspect compartments and tanks below the waterline to verify tightness.
   b. Ensure all valves below the waterline are secured.
   c. Thoroughly inspect hull and projections.
   d. Inspect dry-dock for chemicals or debris which might pollute the environment, clog intakes, or cause other damage as the ship is refloated.

2. The following spaces are continuously checked for flooding as the ship is refloated:
   a. Spaces in contact with the keel and side blocks
   b. Tanks and voids
   c. Any space with external hull fittings

Cost Analysis for 20 Year Dry-Docking Cycle

Preparation of Vessel for Movement to Shipyard

1.) Un-rigging Ship (shore power, brows, water, sewer hook-ups, Mooring chain) with crane service & labor……..	150,000
2.) Tow service to San Francisco Dry Dock	500,000
3.) Harbor pilot(s) with Docking Master……	3,000
4.) Line handlers …….	18,000
5.) Trip & Tow Survey, COFR/Trip insurance, USCG Inspections, etc.	50,000
6.) Rentals (diesel generator (s), pumps/hoses, food service, EMT, etc.)…….	25,000
	$ 746,000

Dry-docking of Vessel

1.) Setting of blocking on dry-dock floor	500,000
2.) Move into dry-dock (lease of dock for shipyard work & fleeting Of ship……	930,000
3.) Hydro-blast hull of debris, sandblast hull to near-white metal From sheer to keel, prime and paint hull…….	2,900,000
4.) Incidentals (divers, inspection and re-plating of sea valves and covers, replacement of zincs or impressed cathodic anodes, etc.)…….	150,000
	$ 4,480,000

Preparation of Vessel from Shipyard to Berth 87

1.) Rigging Ship (shore power, brows, water, sewer hook-ups, mooring chain) with crane service & labor……..	150,000
2.) Tow Service to Berth 87	500,000
3.) Harbor pilot(s) with Docking Master……	3,000

4.) Line handlers (20)…….	18,000
5.) Trip & Tow Survey, COFR/Trip insurance, USCG Inspections, etc.	50,000
6.) Rentals (diesel generator (s), pumps/hoses, food service, EMT, etc.)…….	25,000
	$ 746,000

Totals Dry-docking	$ 5,972,000

Section 4g: Underwater Hull Inspection Plan

It is the intention of the Museum to inspect the vessel's hull below the waterline prior to acceptance of the vessel and thereafter on a semi-annual basis to conduct an underwater inspection by OSHA-certified industrial dive team (under 29 CFR requirements) to inspect the following areas on the hull bottom:

1.) Inspect and report on all through-hull valves and covers,
2.) Inspect and report on all cathodic protection system anodes (to be cleaned as needed),
3.) Inspect and report condition of struts, propulsion shafting and propellers, and shaft annuluses,
4.) Inspect and report on condition of the pair of rudders,
5.) Inspect and report on the effects of shoaling with affected locations noted and quantities of material determined if possible.
6.) Inspect and report (with possible photographic/movie display) the general condition of paint system on bottom shell plating,
7.) Inspect and report on the vessel's mooring chains and mooring system below the waterline. This would include the existing steel sheet pile wall and concrete casements.

We plan to contract with Muldoon Marine. This company has shown interest in providing us reduced cost services, and has already reviewed the current hull condition of IOWA.

October 25, 2010

MULDOON
Marine Services, Inc.

Robert Kent
President
Pacific Battleship Center
615 Centre Street #301
San Pedro, CA 90731

Dear Robert:

I appreciate your interest in Muldoon Marine and performing work on the USS Iowa for Pacific Battleship Center. This letter is to provide my professional opinion on the hull condition of USS Iowa.

Based on my prior experience with similar conditions and review of information provided, I find that the hull condition of the USS Iowa to be excellent. Unlike USS Iowa's sister ships, IOWA has been the only vessel of the class with a consistently maintained "drip" cathodic protection system, dehumidification system, and completely sealed environment. In addition, the vessel has been in brackish water for over 10 years and received repainting of the hull from the waterline up in the past 5 years.

It is reasonable to project that ex-IOWA should be able to go an additional 10 years or longer before dry-docking will be required.

Sincerely,

Richard Barta
President

MULDOON MARINE SERVICES
PO Box 7457, Long Beach, CA 90807
562-432-5670

Section 4h: Teak Deck Maintenance/ Repair/ Intentions

Teak has been used for centuries in both land and nautical construction. Teak is easily worked and has natural oils that make it suitable for use in exposed locations, where it is durable even when not treated with oil or varnish. Teak cut from old trees grown slowly in natural forests is more durable and harder; teak from young trees grown in plantations is more prone to splitting and water damage.

For ship decks, teak can last almost indefinitely with only salt-water rinsing and re-caulking. Like all wood, teak expands when wet and shrinks when dry. If you allow it to dry, the caulking between the planks has to expand as the teak dries putting the mating surfaces in tension. If the surfaces are well adhered, the caulking will stretch, but any weak points will pull away, opening up a fresh leak. It has been said that re-caulking of teak decks is a continuous process which commences about 10 minutes after the deck was first laid and continues until the ship is abandoned. Inevitably, the deck seams will leak and the trapped water will rust the steel beneath, causing it to swell and lift the teak off. Untreated seam leakage also causes rot to begin on the underside of the teak planks.

A daily salt water rinse leaves a fine salt deposit which will absorb moisture out of the air, especially at night and help keep the wood from drying out. It also reduces mildew and algae growth.

Deck replacement is required where the leaks have been unattended for so long that the wood rots or the deck below rusts, buckles and damages the teak. Additionally, the bung plugs that cover steel bolts holding the deck planks in place are key indicators of water damage, as they lift from their holes as water leaks in.

Onboard Battleship *IOWA*, teak decks have been repaired upon reactivation in the 1980s. including replacement with douglas fir. Intermittent maintenance during periods of inactivity inevitably leave teak decks in need of attention.

Pacific Battleship Center intends to use a laminated system, such as those utilized by the COLUMBIA placed at Disneyland Park. Pacific Battleship Center has been in preliminary discussions with the company that invented this process, and is testing the viability of the system.

We plan to budget and spend $275,000 per year for deck replacement with the completion planned at 10 years.

Intentions

It is recognized that the decks of the USS Iowa are completely degraded and in need of full replacement on the teak decks. It is the intent of Pacific Battleship Center to immediately cover the existing deck with 5/8" tongue and groove marine grade plywood. This plywood will be caulked at the seams and painted with grey paint and anti-slip additive on the surface to further seal the surface from additional water penetration. The cost of this work with labor and materials will be $150,000. It is our intent to leave a few areas of the better conditioned decks open for viewing by the public.

We will then begin our phased approach to teak deck replacement with the goal of having the entire deck replaced within a 10 year period.

See Appendix B-4-6 and B-4-8.

Section 4i: Ship Painting

An exterior and interior ship painting schedule is part of the maintenance requirements for the battleship. We intend to perform a complete exterior painting as part of start-up expenses. Detailed recommendations from Pacific Battleship Center paint experts regarding paint type, application, and cost can be found in Appendix B-4-3.

Section 4j: Fire, Flood, Intrusion Alarm Plan

Alarms

The ship is equipped with electrical power, fire, intrusion and flooding alarms that currently alert directly to the MARAD Facility in Suisun Bay, CA. As part of the donation transition, those alerts will be rerouted to the Pacific Battleship Center 24 hour Security Guard station.

Colored lights on the mast of the ship indicate an alert. The lit white light indicates the ship has electricity, the red indicates a fire, and green is for flooding and intrusion. There is also an amber rotating light forward of the alarm lights that indicates there is no electrical power or that the fire, flooding or intrusion alarms are alerting. The Pacific Battleship Center security guard will monitor the amber light via the security camera system.

For a fire alarm, the PBC Security Guard will notify the appropriate Operations Manager by radio and call 911 immediately.

For a flooding/intrusion alarm, the security guard will notify the Operations Manager by radio and notify police for response and investigation. The Operations Manager will notify the Facilities Manager. After police response determines there are no intruders, the maintenance staff will investigate the source of the alarm, secure watertight hatches and electrical power as necessary, and attempt to isolate the source of any flooding.

The Operations Manager will also notify the Executive Director and the Public Relations/Marketing Director of the situation.

Evacuation

There will be rare times when visitors on the ship will need to leave quickly. Examples of these times are adverse weather, safety, or security, such as a bomb threat.

The Executive Director, Facilities Manager, or Ship's Maintenance Supervisor will notify the quarterdeck watch via radio to evacuate the ship.

The quarterdeck watch will notify maintenance staff, docents and tour guides by radio to evacuate the ship. All staff will assist in guiding visitors off the ship by the nearest gangway, either the aft brow or forward walkway. All emergency egress points will be unlocked during normal visiting hours.

The quarterdeck watch will sweep the ship to ensure all visitors have left the ship.

Notification of Emergency Situations

The quarterdeck watch will keep the Executive Director and Facilities manager (Operations Manager during weekends) informed of any emergency situations.

The Pacific Battleship Center Security Guard will keep the Facilities Manager and the Executive Director informed of emergency situations (Operations Manager after hours or weekends).

Section 4k: Emergency Response Plan

Man Overboard

A staff member or visitor falling off the ship or brow is a possibility that must be taken very seriously.

If you see someone go overboard: DO NOT GO INTO THE WATER AFTER THEM.

1. Assign the nearest person to point to the person in the water, and keep pointing;
2. Throw the person a life ring with a line attached;
3. Call the quarterdeck watch by radio. Quarterdeck watch will notify Security to call 911.
4. Have a staff member or docent/guide, with another life ring, go down to the area surrounding the basin to get closer to the person.
5. If possible, direct the person to one of the ladders located around the basin walkway.

If you do not see the person overboard, ask people to try to sight the person. Start a visual search from the last known sighting. Notify Security via radio to call 911.

Life rings are located on the superstructure bulkheads. A bullhorn is located at the quarterdeck.

Additional staff and docents should be assigned to keep extra persons away from the rescue area.

The Director or Facilities Manager (Operations Manager on weekends) will determine whether the ship should be evacuated, based on police recommendations.

The quarterdeck watch will write an incident report.

The Facilities Manager or Ship's Maintenance Supervisor will obtain a copy of the police report.

Medical Emergencies

First Aid kits are located at the quarterdeck and other locations convenient to tours and events. A wheelchair for emergency use is also located at the quarterdeck.

Staff and docents may assist adults or parents/guardians of children with minor injuries, such as a scraped knee. If possible limit your assistance to helping adults to apply a dressing. If required to apply dressing yourself, ensure you are wearing gloves provided in the kits.

If a serious injury or medical emergency occurs, notify the quarterdeck by radio. The quarterdeck will notify Security to call 911. If the injured person has fallen, do not attempt to move them. Call for assistance by radio. Try to keep the person calm and reassure them that help is on the way. Keep other visitors away from the area.

The quarterdeck watch will write an incident report.

The lay berth area is located 1 berth north from Fire Station #112 and 1 ½ miles from Fire Station #110. These stations are equipped are staffed around the clock with trained medical personnel. A major medical complex is located approximately 5 ½ miles from the site.

Fire Response Section

The response time is less than 3 minutes for the two nearest Los Angeles Fire Stations #112 and #110. Fire Station #112 is equipped with the following apparatus:

- E – Fire Engine
- PA – Paramedic Rescue Ambulance
- EM – EMS Battalion Captain
- BT2 – 2 Fireboats including the world's most powerful fireboat – Warner Lawrence

Fire station #110 is equipped with following apparatus:

- BT5 – 5 fireboats

There is additional equipment available through the 114 City of Los Angeles Fire Department. There are 3 fire hydrants on the pier side of berth 87. The City of Los Angeles has pump units in the event dewatering needs to be performed. The City of Los Angeles has its own emergency response team, in addition to the Disaster Preparedness Division located within 1 mile of berth 87.

Intruder Response

All intruders will be dealt with in accordance with local, state and federal government laws and statutes. To ensure protection of the vessel, the City of Los Angeles has a dedicated port police force with both Bike Patrol Officers and patrol cars on duty. Due to our close location to an active cruise terminal, the area remains under close watch by the local Port Police Force. The position of the lay berth provides ease of visibility for the entire length of the vessel to be covered by these patrols.

Loss of Power Response

In the event of a general power failure, Pacific Battleship Center will immediately notify the Department of Water and Power so that the appropriate actions can be taken.

Whenever the ship loses electrical power, the quarterdeck watch will suspend all below-decks activities, including tours. Any visitors inside the ship will be located and escorted to the nearest weather deck, where the visitor may choose to remain or leave the ship.

No overnight camping or special event may be conducted below decks without electrical power.

The Executive Director, the Facilities Manager, and the Ship's Maintenance Supervisor will be notified. The Facilities Manager or the Ship's Maintenance Supervisor will determine whether the power failure is limited to the ship (internal fault) or is more general (external fault). In the event of an internal fault, the ship will be evacuated until the ship's electrician repairs the fault or determines there is no fire or electric shock hazard.

Heavy Weather Response

The berth and mooring for Battleship *IOWA* have been made to withstand a 100 year storm without damage to the ship. In this area, a 100-year storm means winds up to 66 miles per hour. Mooring lines are designed with a minimum safety factor of 5; that is, the mooring is designed to withstand a pulling force three times that required to hold the ship in position.

In the event heavy weather (gale force winds or greater) is forecast, the Executive Director will determine when the ship will be closed to visitors and evacuated. For hurricanes or tropical storms, this should be at least 12 hours prior to the storm's predicted arrival. All special events will be cancelled.

The ship's maintenance supervisor will inspect all moorings to ensure the berth is prepared for the storm.

On board:

- All weather-tight hatches and portholes will be secured.
- All loose gear on deck will be stored inside the ship, including any tents or awnings.
- All external air circulation vents will be closed.
- If possible, and time permits, all canvas rigging will be unrigged and stored inside the ship.
- All ceremonial and signal flags will be taken down and stored.
- All tour signage not permanently attached to the ship will be removed from weather decks and stored.
- Air-conditioning equipment will be secured.
- All computers and electronic displays on board will be shut off.
- All other electrical equipment will be secured, to the extent possible, leaving only the alarm and fire detection systems powered.
- No one will be permitted to "ride out the storm" on board.

After the storm, the maintenance supervisor or Facilities Manager must ensure the ship is safe before restoring electrical power. The Facilities Manager or Maintenance Supervisor must report the ship's readiness for visitation to the Executive Director prior to opening the ship to any personnel other than maintenance crew. The Executive Director will then decide when the ship may be reopened to the public.

Section 4l: Pest Control

The appearance of the USS Iowa will be (and is) and extremely important priority. Pacific Battleship Center grounds and the Battleship *IOWA* will be kept clean by museum staff and sub-contracted venders where needed; this will discourage pest intrusion. A daily garbage clean-up schedule will be incorporated into the maintenance job description and all museum personnel are encouraged to pick up loose debris. In addition, staff will also be responsible for onboard pest detection and inspections. The on board team will strategically place sticky pest traps to monitor on an ongoing basis for pests. If pest species are discovered on the ship, management will be informed and a pest control firm will exterminate the problem.

Section 4m: Security Plan

Physical Security Plan

Because the mooring site is located in an active city environment, Pacific Battleship Center envisions meeting the security specifications listed in the solicitation, while still preserving the unique character of this city environment. Pacific Battleship Center plans to work with the US Coast Guard and local authorities with a focus on the cruise ship activity on the next piers north. This plan will be developed in accordance with the maritime security standards outlined in Title 33 Code of Federal Regulations (CFR) Part 105. This plan will in part address the positioning and access areas surrounding the Battleship *IOWA*.

Communications, telephone, and alarm systems will be provided in the security control room. These services will be available to security staff on a 24 hour basis. The guards are provided with two-way radios that have a minimum of two working frequencies. The alarm system will be silent and capable of contacting local police or other authorities as required.

Exterior Lighting: Exterior lighting will light the ship's bow, exits and the adjacent roadway. Security lighting consists of bollard lighting fixtures mounted along the perimeter of the weather decks and flood-lighting fixtures on the superstructure. The lighting intensity level on the weather decks shall be average of two-foot candles with a minimum of one-foot candle. Roadway pole lighting fixtures are also present. Lighting is provided inside the control room.

Screening Equipment: If deemed necessary for public access, Pacific Battleship Center may utilize a combination of its x-ray and metal detecting equipment to provide additional safety and security for the Battleship *IOWA*.

Pacific Battleship Center will ensure that all security equipment and systems are in good working order and are inspected, tested, calibrated and maintained according to the manufacturer's specifications and recommendations.

Perimeter Barrier System

The berth will have the entire length of the ship exposed to the berth space, but is surrounded by high fences already in place. There is a lockable gate at the main entry, thus eliminating unauthorized walk-on access.

Additional pedestrian barricades may be utilized to provide supplemental security around the perimeter of the Battleship *IOWA*.

Guard Service

A combination of contracted security professionals and trained in-house staff members will provide security services for the Battleship *IOWA.* This contracted service will be supplemented and strengthened by the utilization of trained staff members. These staffers will also have a keen understanding of all the monitoring and security equipment and play a vital role in securing the site during cruise ship activity.

Security Guard coverage will be provided 16 hours a day, seven days a week. The overnight period will be covered by local police forces on their normal patrol.

Security guards will be on post for eight-hour shifts. During each shift, the security guard will be required to monitor each closed circuit television (CCTV) screen to ensure a safe environment for the vessel. Periodic patrols shall be made outside of the control room to ensure the surrounding grounds are also secure. During these patrols, a panic alarm button shall be carried. The security guards will also be required to make entries into a daily log, noting any discrepancies or abnormal actions.

Control Room

The Battleship *IOWA* will be monitored 24/7 by eight CCTV monitors positioned inside a 6'- 10" x 9'- 9" environmentally conditioned room. This control room is also equipped with a time-lapse recorder, personal computer and telephone. Cameras located in strategic locations will provide the guard with a full view of the entire ship from this location.

Silent Alarm

The designated security guard will be equipped with two-way radios compatible to the Los Angeles Fire and Paramedic and Police Departments. A silent alarm system will be provided and is capable of notifying a monitoring station in the event of an alert. The monitoring station will then notify local authorities.

General Safety

The following safety items will be accomplished relative to the berthing of the vessel:

1. A shipboard personnel training program will be initiated regarding hazardous materials, enclosed and confined space entry, electrical safety requirements, firefighting and ambulatory procedures.

2. The local police, fire and ambulatory services will be made familiar with shipboard lay-out and systems.

A ship's PROCEDURES MANUAL will be created giving all staff immediate information regarding emergency procedures for fire, flooding, ambulatory, intruder, electrical, and plumbing situations. Also, contact agencies, critical personnel and employees will have their names and pertinent phone numbers and other relative information within this manual.

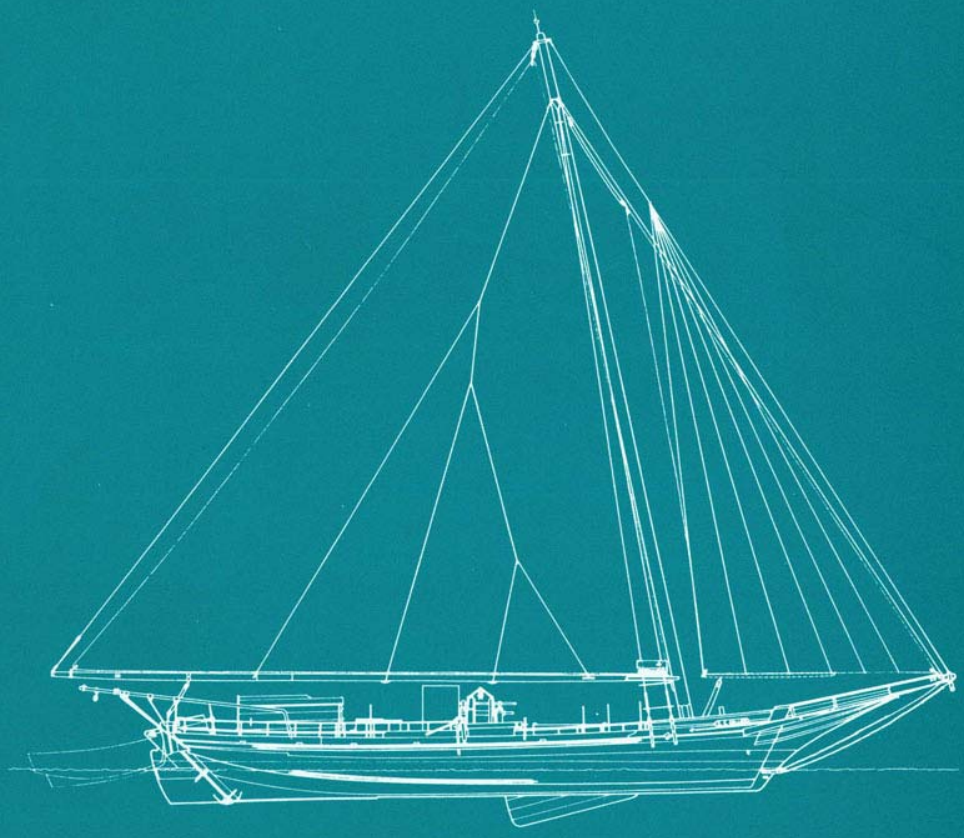
Appendix B-4-1
HNSA Standards for Historic Vessel Preservation Projects – Dept. of Interior

Department of the Interior
National Park Service
National Maritime Initiative

The Secretary of the Interior's

Standards for Historic Vessel Preservation Projects

with Guidelines for Applying the Standards



The document was developed by Michael Naab, under contract to the National Park Service. A committee of five maritime preservation professionals, Don Birkholz, Jr., preservation consultant, Tri-Coastal Marine, Inc.; Maynard Bray, private maritime consultant; Norman Brouwer, curator of ships, South Street Seaport Museum; Dana Hewson, Vice President for watercraft preservation and programs, Mystic Seaport Museum; and Walter Rybka, preservation consultant, Tri-Coastal Marine; extensively reviewed the various drafts. Others participating in the review were Roger Allen, Peter Neill, Anne Witty, Marcia Myers, David Gillespie, Clare Adams, Merrill Hesch, and Michael Lynch. Within the National Park Service, Glennie Wall, Steve Hyman, Steve Hastings, Karl Kortum, H. T. McGrath, Ron Oakes, James P. Delgado, Kevin Foster, Edwin Bearss, Randall Biallas, Gary Hume, Beth Savage, D. Patterson Tiller, Lawrence Aten, and Carol Shull reviewed the document.

Final production and distribution of this document was coordinated by the National Maritime Initiative. The Initiative was created under a 1984 Congressional request to the National Park Service, asking it to "conduct a survey of historic maritime resources, recommend standards and priorities for the preservation of those resources; and recommend appropriate Federal and private sector roles in addressing those priorities." In 1987, a special office within the History Division in Washington, D.C., was created to conduct activities associated with the Initiative. The Initiative is a cooperative effort involving the Service's numerous cultural resource programs, other Federal Agencies dealing with cultural resources, State Historic Preservation Offices, the National Trust for Historic Preservation, and the maritime community at large. For more information, contact National Maritime Initiative, History Division (418), National Park Service, P.O. Box 37127, Washington, DC 20013-7127.

Cover Illustration: *E. C. Collier* a two sail bateau (skipjack) under restoration at the Chesapeake Bay Maritime Museum, St. Michaels, Maryland, was recorded by the Historic American Engineering Record in 1989.

The Secretary of the Interior's

Standards for Historic Vessel Preservation Projects

with Guidelines for Applying the Standards

U.S. Department of the Interior
National Park Service
National Maritime Initiative
May 1990

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CONTENTS

Compartments, Trunks, Passageways, etc., with
Appurtenant Joinery, Trim, Furnishings, and Fittings

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Introduction to the Standards and Guidelines

This document is intended to answer a longstanding need for uniform standards that may be applied to preservation projects involving historic vessels. Together with the accompanying Guidelines, the Standards provide a framework for responsible preservation practice that recognizes the unique problems of historic preservation in a maritime context.

The Standards set forth herein were inspired by and follow the format of the *Secretary of the Interior's Standards for Historic Preservation Projects*. Guidelines for Applying the Standards have been prepared with the advice and participation of professionals representing a broad range of experience and expertise in maritime preservation, and with heavy reliance on guidelines published in conjunction with the *Secretary's Standards*.

This document is not a manual for maritime preservation. Rather, its purpose is to clearly define ideal maritime preservation practice (through the Standards) and to illuminate that ideal and suggest ways of achieving it (through the Guidelines).

Note on Coast Guard Certification

Depending on their use, some historic vessels may require a certificate of inspection from the Coast Guard. Certificates of Inspection are required for vessels that carry freight or passengers for hire, or are "attraction" vessels. Coast Guard marine inspectors should become involved in the rehabilitation of a historic vessel to be certified, witnessing repairs and alterations. Any question about Coast Guard requirements may be directed to the U.S. Coast Guard Marine Safety Office in the zone where the vessel will be operated. Locations of these offices may be obtained from local telephone directories or by calling the Merchant Vessel Inspection and Documentation Division (G-MVI) of U.S. Coast Guard Headquarters at (202) 267-1942.

DEFINITIONS AND STANDARDS

Definition of Historic Vessel

A nautical vessel, generally excepting reconstructions and reproductions, is considered historic if it is eligible for listing in the National Register of Historic Places at a local, regional, national, or international level of significance. To be eligible for the National Register of Historic Places, a vessel must be significant in American history, architecture, archeology, engineering, or culture, and possess integrity of location, setting, materials, workmanship, feelings, and association. To be considered significant, the vessel must meet one or more of the four National Register criteria:

A. be associated with events that have made a significant contribution to the broad patterns of our history; or
B. be associated with the lives of persons significant in our past; or
C. embody characteristics that are distinctive of a type, period, or method of construction; or that represent the work of a master; or that possess high artistic value; or represent a significant and distinguishable entity whose components may lack individual distinction; or
D. have yielded, or may be likely to yield, information important in prehistory or history.

For additional guidance, please consult National Register Bulletin #20, "Nominating Historic Vessels and Shipwrecks to the National Register of Historic Places," available by writing the National Register of Historic Places, National Park Service, P.O. Box 37127, Washington, DC 20013-7127.

Definitions for Treatments of Historic Vessels

The following definitions are provided for treatments that are appropriate in historic vessel preservation projects:

***Acquisition*:** the act or process of acquiring ownership of, or responsibility for, a vessel.

***Protection*:** the act or process of applying measures designed to affect the physical condition of a vessel by defending or guarding it from deterioration, loss, or attack, or to cover or shield the vessel from danger or injury. Such treatment is generally of a temporary nature and anticipates further historic preservation treatment.

***Stabilization*:** the act or process of applying measures designed to arrest, retard, or prevent deterioration of a vessel, and to assure its structural integrity. This may include rendering the vessel weather resistant and watertight. The essential form of the vessel shall be maintained during this process.

***Preservation*:** the act or process of applying measures to sustain the existing form, integrity, and material of a vessel. It may include initial stabilization work, where necessary, as well as ongoing maintenance.

***Rehabilitation*:** the act or process of returning a vessel to a state of utility through repair or alterations that make possible an efficient contemporary use while preserving those features of the vessel that are significant to its historical, naval architectural, technological, and cultural values.

***Restoration*:** the act or process of accurately recovering the form and details of a vessel as it appeared at a particular time by removal of later work, or by replacement of missing or substantially deteriorated earlier work.

Other Key Definitions

Conversion: (1) the act or process of altering or rebuilding an existing vessel to effect a representation of or a resemblance to another vessel or type or class of vessel; (2) a vessel that is the product of such a process.

***Historic Fabric*:** material remains of a historic vessel or object, whether original materials or materials incorporated in a subsequent historically significant period.

***Integrity*:** the authenticity of a vessel's historic identity, as evidenced by the survival of characteristics such as plan, hull form, rigging, use of materials and/or craftsmanship, which existed during the vessel's historic period.

***Reconstruction*:** (1) the act or process of creating by new construction the accurate form and detail of a particular vessel as it appeared at a specific period of time; (2) a vessel, or part thereof, that is the product of such a process.

***Reproduction*:** (1) the construction or fabrication of an *approximate copy of an object*; (2) an object that is the result of such a process.

[When applied to a vessel, the term, "reproduction" or "replica," denotes: (1) the act or process of recreating by new construction the *general form and appearance* of a particular vessel or type of vessel; or (2) a vessel that is the product of such a process.]

General Standards for Treatment of Historic Vessels

1. A historic vessel shall be put to a use, either continuing or new, that requires minimal change to its historic qualities and appearance.

2. The defining characteristics of a vessel shall be retained and preserved. The removal of historic materials or alteration of features and spaces that characterize a vessel shall be avoided.

3. Each vessel shall be recognized as a physical record of its time, place, and use. Changes that create a false sense of historical development, such as adding conjectural features or architectural elements from other vessels, shall not be undertaken.

4. Most vessels change over time; those changes that have acquired historical significance in their own right shall be retained and preserved.

5. Distinctive features, finishes, and construction techniques or examples of craftsmanship that characterize a vessel shall be preserved.

6. All vessels shall be subject to a program of preventive maintenance. Deteriorated historic features and their materials shall be repaired rather than replaced. Where the severity of deterioration requires removal of a distinctive feature, the replacement shall match in design, color, texture, and other visual qualities; and, where possible, material. Replacement of missing features shall be substantiated by historical, physical, or pictorial evidence.

7. Every reasonable effort shall be made to protect and preserve physical evidence of features previously removed, replaced, altered, or otherwise affected in the course of a vessel's history.

8. Chemical or physical treatments, such as sandblasting, that cause damage to historic materials shall not be used. The surface cleaning of vessels, if appropriate, shall be undertaken using the gentlest means possible.

Specific Standards for Treatment of Historic Vessels

The following specific standards for each treatment are to be used in conjunction with the general standards and, in each case, begin with number 9. For example, in evaluating acquisition projects, include the eight general standards plus the two specific standards listed under Standards for Acquisition.

Standards for Acquisition

9. Careful consideration shall be given to the type and extent of ownership rights that are required to assure the preservation of the historic vessel. The preservation objectives shall determine the exact rights of ownership to be acquired.

10. Clear title to a vessel shall be acquired when absolute ownership is required to ensure its preservation.

Standards for Protection

209. Protection shall safeguard the physical condition of a vessel from further

deterioration or damage caused by weather or other natural, animal, or human intrusions.

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210. If any historic material or features are removed, they shall be properly recorded and, if possible, stored for future study or reuse.

Standards for Stabilization

211. Stabilization shall reestablish the structural integrity of a vessel through the reinforcement of structural members or by arresting material deterioration leading to structural failure. Stabilization shall also reestablish weather-resistant conditions for a vessel exposed to weather, and watertight integrity for a vessel afloat.

Standards for Preservation

9. Preservation shall maintain the existing form, integrity, and materials of a vessel. Substantial restoration of missing features generally is not included in a preservation undertaking.

10. Preservation shall include techniques of arresting or retarding the deterioration of a vessel through a program of ongoing maintenance.

Standards for Rehabilitation

9. Alterations or additions to a historic vessel shall be undertaken only when such alterations or additions will not have a serious impact on the historic fabric of the vessel, and only when the alterations or additions are compatible with the size, scale, color, material, and character of the vessel.

10. Wherever possible, alterations to vessels shall be done in such a manner that if such alterations were to be removed in the future, the essential form and integrity of the vessel would be unimpaired.

Standards for Restoration

9. Restoration work shall be based upon verifiable historical, pictorial, or physical evidence, rather than upon conjecture.

10. Restoration decisions shall be made only after careful consideration has been given to the availability of substantiated historical information about the form and configuration of the vessel at the time to be represented by the restoration; the historical, cultural, and technological significance of the vessel in the period selected; and the degree to which the vessel's historic fabric will be affected by restoration to a particular period.

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The Process of Historic Vessel Preservation

Preservation of historic vessels is more than "ship saving," more than rescuing a vessel from the knacker's torch or from an ignominious scuttling as part of a breakwater. Responsible historic vessel preservation is a thoroughly planned and documented, systematic, four-phase process guided by the Standards set forth in this document.

Phase I of this process has these elements: development of a realistic plan for preservation, use, and long term maintenance of the vessel; acquisition of the vessel; protection from damage or loss; and documentation (recording in detail the physical form, structure, configuration, and condition of the vessel as it exists at the time of acquisition, and collection of all available information about the vessel's history, original construction, use, associations, etc.).

Phase II consists of implementation of stabilization measures: arresting, insofar as possible, decay and deterioration; reinforcing the vessel's structure if necessary; sheltering the vessel from weather; establishing watertight integrity; etc. During this phase, a detailed comprehensive work plan for achieving the treatment goal, based on condition surveys, etc., will be completed.

Phase III is the implementation of the selected treatment goal: restoration, rehabilitation, or preservation.

Phase IV is preservation maintenance: routine, cyclic, and emergency work performed to mitigate deterioration of the preserved vessel.

A brief discussion of the elements of historic vessel preservation follows:

Project Planning

Every sound historic vessel preservation project should begin with a plan; a well thought out, detailed, written plan for preservation treatment that addresses and takes into account the following:

- the historical significance of the vessel, and degree of historic integrity it possesses

- the availability of information that might be required for preservation treatment, such as original construction, changes made during the life of the vessel, etc.

- the physical condition of the vessel, as determined by a competent surveyor

- the environment in which the vessel is to be preserved, and the projected effect of that environment on the vessel

- the intended use of the vessel, and the projected effect of that use on the historic integrity of the vessel

- the work required to implement the proposed treatment, and the sequence in which the work will be performed

- the availability of suitable materials, equipment, and technology to successfully carry out the project

- the availability of competent personnel with the requisite skills and expertise to perform the work

- the availability of a suitable site for carrying out the proposed treatment

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- the cost of the proposed treatment, and the source and availability of funding to complete the work.

Development of such a plan is time-consuming and, inevitably, expensive. But it is a vital element in any responsible preservation project.

Acquisition

Acquisition of a vessel for preservation will normally be an element in a previously developed project plan. In some cases, however, the vessel might be acquired with the intent to preserve it before a detailed plan for preservation treatment can be developed. (For example, a vessel of particular historic significance might be discovered to be threatened by demolition, etc. If a "stay of execution" cannot be arranged, immediate acquisition of the vessel might be seen as the only way to save it from destruction).

In any event, **preservationists should regard acquisition of a historic vessel as a firm commitment to responsible stewardship and good preservation practice** as prescribed by the Standards.

Protection

Once a vessel is acquired for preservation–even while the process of acquisition is going on–the preservationist should safeguard the vessel from damage or loss. Safe and secure mooring arrangements; installation of pumps, alarms, and fire protection; protection from vandalism and theft, etc.–these and any other measures to protect the vessel, before and during preservation treatment, should be implemented.

Documentation

Documentation is the most easily overlooked aspect of a historic vessel preservation project, yet it is arguably the most important.

Timely, complete documentation is vital for three reasons. First, there is always a possibility of partial or total loss of the vessel through fire, collision, mismanagement, neglect, vandalism, etc. If loss should occur, the information collected in the documentation process may be the only surviving record of what once existed.

Second, even if the vessel is successfully preserved, it will never be exactly the same as when built, or when acquired for preservation. Thorough documentation of changes made to the vessel will help to create a better understanding of the vessel as it is in the present and as it evolves in the future.

Finally, documentation of work performed during preservation treatment, including maintenance, material renewals, etc., is useful in the planning and carrying out of later work.

Documentation should begin with the earliest stages of project planning, and should continue throughout the process. All available information about the vessel's history, construction, and significance should be researched and recorded, and records should be kept of all preservation and maintenance work performed. Before any preservation treatment is undertaken, however, the vessel should be regarded as primary physical evidence to be recorded in detail. Duplicate copies of the collected body of records, suitably organized, should be carefully protected and stored in separate locations.

It may be determined, after thorough examination of the vessel, that preservation or rehabilitation is impractical or unachievable. In such cases, the vessel should be documented as thoroughly as possible before disposition. For further guidance on documenting historic vessels, consult *Standards and Guidelines for Documenting Historic Vessels*, prepared by the Historic American Building Survey/Historic American Engineering Record (HABS/HAER), 1988. Single copies of this publication are available by writing HABS/HAER, National Park Service, P.O. Box 37127, Washington, DC 20013-7127.

Stabilization

In every vessel, the process of decay begins even before construction is complete. Wood rots. Steel, bronze, and aluminum oxidize and corrode. Deterioration is continuous, exacerbated by exposure, the rigors of use, and the harsh marine environment. By the time preservation is considered, much or all of a historic vessel's fabric is likely to have been affected–sometimes severely–by deterioration.

After the physical form, configuration, and condition of a historic vessel at the time of acquisition have been thoroughly documented, measures should be undertaken to stabilize the vessel. Measures include steps to arrest rot and corrosion, to stop leaks, to reinforce or repair structural members, to ventilate and dry out interior spaces, etc.-in short, to halt the deterioration process to the greatest possible degree. This work should be undertaken before the ultimate preservation treatment planned for the vessel is begun. Stabilization, accompanied and followed by comprehensive maintenance, "buys time" for completion of the preservation process. Too often, stabilization measures at the beginning of a preservation project are either inadequate or non-existent. This almost inevitably results in expensive and time-consuming preservation work having to be redone later. It could even result in loss of the vessel.

Preservation, Restoration, and Rehabilitation

Only after a solid preservation plan has been developed, based on sound knowledge of the vessel's condition, extensive research, thorough consideration and assessment of available technical, material, and economic resources, etc.; only after the vessel has been extensively documented as acquired; and only after stabilization measures have been implemented–only then should work begin on the preservation treatment selected for the vessel.

Whether the chosen treatment is preservation of the vessel as acquired, rehabilitation for a new use, or restoration, good historic preservation practice demands that the preservationist adhere to one basic precept in all work undertaken: to retain and preserve to the greatest extent possible the historic form and fabric of the vessel.

Preservation is the ultimate treatment in any historic vessel preservation project, and it is the most straightforward in theory and in practice.

Restoration should be undertaken only if there is sufficient detailed historical information about the vessel on which to base the restoration work. Selection of the time or period in a vessel's career to be represented by the restoration should be done only after careful consideration of the effects of the restoration on historic fabric from other, possibly more significant, periods in the life of the vessel.

Rehabilitation because it normally requires more extensive changes to historic fabric and departures from historic methods of construction than other treatments, should be

undertaken only after preservation and restoration have been considered as alternatives. Whenever possible, historic fabric should be retained; changes or additions required by the rehabilitation should be reversible, and should be made with the least possible disruption of historic form or fabric.

A vessel might be preserved exactly as found or acquired, or it might be preserved as it has evolved through restoration or rehabilitation.

Preservation Maintenance

Preservation is an unending process. After the treatment goal selected for a vessel is achieved, every effort must be made to maintain the vessel in its preserved state. This involves regular, thorough inspections of the vessel; "housekeeping" measures such as cleaning; routine maintenance such as tightening, adjusting, lubricating, paint touchup, etc.; cyclic maintenance such as refinishing, material renewal and repair, etc; and ongoing stabilization and emergency work as required. All preservation maintenance work should be performed in accordance with the Standards.

Interpretation

Interpretation is not an essential element in a historic vessel preservation project, but it is highly desirable. Scholars and experts may learn a great deal from studying an uninterpreted preserved vessel, but the general public's understanding and appreciation of a vessel will largely be determined by the degree and effectiveness of the interpretation provided.

There is no particular method or style of interpretation that is universally superior for conveying information about a preserved vessel. Good design and concise, clearly delivered information, readily accessible and uniform in approach, are the key elements here, as in any interpretation program.

The historic significance of the vessel; its cultural, economic, architectural, and technological context; the people who designed, built, owned, and operated the vessel; the cargoes it carried or the service in which it was engaged; even the preservation process itself–any or all of these themes are appropriate subjects for interpretation of a historic vessel.

The one absolutely essential requirement for interpretation of any preserved vessel is identification of what is original or historic, and what is not. New, non-original, or non-historic materials and features, as well as departures from historic form or configuration, must be clearly identified. Additions or replacements that are based on incomplete information or conjecture must be identified as such, and features installed or employed for reasons of security, access, safety, lighting, interpretation, etc., should be clearly differentiated from those elements, whether original or otherwise, that are appropriate to the historic character of the vessel.

Approach to Treatment–Preserving Integrity

Overall, integrity is characterized by location, design, setting, materials, workmanship, feeling, and association. Optimum integrity is preserved by retention of as much original fabric as possible. Approaches to preservation treatment will, in every case, be determined by the conditions under which a vessel is to be preserved. A vessel that is out of water, in a protected environment such as a building, can be treated in virtually the same manner as any museum artifact. Given adequate structural support, protection, and environmental control, such a vessel, once stabilized, can be preserved

indefinitely. Renewal or replacement of historic fabric might be required only if restoration or rehabilitation is undertaken.

Vessels that are preserved afloat, or vessels that are out of water but exposed to the elements, call for a different approach. Under these conditions the basic goal of preservation–maintaining intact a vessel's historic form, integrity, and material–must be tempered by the **ABSOLUTE REQUIREMENT** that the vessel be kept structurally sound, weather resistant, and (in the case of a vessel afloat) watertight. To do less is to jeopardize not only the preservation effort, but the vessel itself.

Under such conditions, then, preservation in perpetuity of all the historic fabric incorporated in a vessel is patently impossible. Historic fabric will, of necessity, be replaced in the course of maintaining a sound, weather-resistant, watertight structure. The integrity of materials of a vessel, however, can be retained if historic fabric is replaced by new material of the same size, composition, texture, color, and appearance as that which is replaced and if the methods of replacement are historically appropriate to the vessel. For other considerations on maintaining the integrity of a historic vessel, please see National Register Bulletin #20, pp. 8-9.

Regarding Reconstructions, Reproductions, and Conversions

These Standards and Guidelines do not address construction or management of reconstructions or reproductions of historic vessels, nor do they apply to conversions that are intended to represent historic vessels. Regardless of their quality or use, and notwithstanding the degree to which they might serve the purposes of historic preservation, reconstructions, reproductions, and conversions do not meet the criteria of the definition of a historic vessel.

There are, nevertheless, numerous sound justifications for the existence of reconstructions and reproductions. Building them affords an opportunity for study and practice of historic construction methods. Traditional seafaring skills can be learned and historic practices divined from their use as training and demonstration vessels. Through effective interpretation, reconstructions and reproductions can provide for the public tactile and visual illumination of social, economic, and technological aspects of maritime history. (This is particularly valuable in cases where the original historic vessel, or an example of a historic vessel type, no longer exists or, for conservation reasons, cannot be made available for the public experience.) Finally, reconstructions and reproductions can be effective, tangible symbols through which public awareness of a particular historic event, or a maritime heritage in general, can be crystallized.

Leaving aside considerations of use (sail training/sea experience, exhibition, etc.), reconstructions and reproductions should be judged on the degree to which they capture the essence of the historic vessels they represent. In every detail, builders and managers of such vessels should strive for exactness in duplication of the form, color, texture, and appearance of the original. Interpretation should clearly indicate which features are based on conjecture, which are non-historically based concessions to modern use, and which employ modern methods or materials in their construction. Above all, interpretation should make clear that a reconstruction or reproduction is not a historic vessel, but a copy or representation of one.

Conversion of a non-historic vessel to represent a particular historic vessel or an example of a historic vessel type should be avoided, unless alteration or rebuilding recreates in detail the form, color, texture, and appearance of the vessel represented. Conversion of one historic vessel to represent another historic vessel, even if of the same class or type, is not an acceptable treatment.

Part II: GUIDELINES FOR APPLYING THE STANDARDS

The following guidelines are designed to facilitate the interpretation and application of the Standards for Historic Vessels Preservation Projects and to assist individual vessel owners in formulating plans for management of historic vessels in a manner consistent with the intent of the standards. While the guidelines do not address every problem that could be encountered in every preservation project, they may be applied to vessels of all construction types, periods, and materials.

In Part II, guidelines are given for each of the treatments defined in Part I of the Standards document. Preservation approaches, materials, and methods consistent with the intent of standards are prefaced with *Recommended* on the following pages. Not all recommendations listed under a treatment will apply to each project proposal. In addition, a project may consist of more than one treatment. Preservation approaches, materials, and methods which may adversely affect a vessel's architectural, historical, or archeological qualities, and are therefore not consistent with the Standards, are prefaced with *Not Recommended*.

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GUIDELINES FOR ACQUISITION

General Guidelines

- APPLICABLE TO ALL VESSELS –

Recommended	*Not Recommended*
Developing, whenever possible, plans for the preservation, maintenance, and compatible use of the vessel prior to purchase of the vessel.	Proceeding without a well-developed plan for management and use of the vessel and/or a firm commitment to the best possible preservation practice.
Determining through the services of a competent professional marine surveyor experienced with the type of vessel under consideration, the existing condition of the vessel, the extent of work required to implement the proposed treatment plan, the feasibility of the project, and the projected cost.	Proceeding without adequate information and resources to reasonably ensure success of the project.
Ensuring that adequate funds are available, or can be obtained, to achieve the proposed treatment objective and to maintain the vessel thereafter.	
Ensuring the availability of competent staff with the requisite skills to manage and carry out the project.	
Obtaining, in cases where adequate funds for purchase are not on hand, legal option to purchase title to the vessel for a period sufficient to secure required funding and/or to develop a preservation plan.	
Obtaining, when necessary, permission or agreement from the owner to protect and stabilize the vessel during the option period.	
In the event that sufficient funds for acquisition and treatment cannot be obtained, or that preservation is determined to be impracticable, obtaining permission to thoroughly document the vessel.	

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GUIDELINES FOR PROTECTION

General Guidelines

- APPLICABLE TO ALL VESSELS –

Recommended	*Not Recommended*
Making a thorough assessment of the hazards to which the vessel may be subjected before and during treatment (e.g.: storms, vandalism, theft and pilferage, damage by other vessels, going adrift, leaking hull or decks, etc.).	Damaging or altering distinctive features or historic fabric in installation of temporary protective measures.
Providing adequate secure mooring in a location that affords as much protection as possible from surge, storms, grounding, passing vessels, etc.	Failing to make adequate provisions for ventilation in securing openings.
Installing bilge alarms and pumps and providing for emergency power to operate them.	
Keeping an adequate watch over the vessel so that leaks, fires, and other potentially catastrophic conditions are detected in a timely manner.	
Fabricating secure, temporary covers for hatches, ports, and other accessible hull openings.	
Fabricating covers over the vessel to prevent incursion of rainwater through leaking decks, cabin tops, etc.	
Providing for air circulation below decks through use of fans, blowers, windsails, etc.	
Removing and safely storing, after careful documentation, pilferable items such as lamps, fittings, furniture, ship's documents, etc.	
Installing temporary security and fire protection systems in such a manner that no damage is caused to the historic fabric.	

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GUIDELINES FOR DOCUMENTATION

General Guidelines

- APPLICABLE TO ALL VESSELS –

Recommended	*Not Recommended*
Thoroughly researching and recording the history of the vessel, including information on its designer, builder, owners, its significance in the context of maritime technology, the service or trades in which it was employed, cargoes, masters and crews, modifications, association with significant events and individuals or groups, etc.	Failure to incorporate thorough bibliographical references to sources.
Searching out and preserving written and graphic representations of or references to the vessel, such as photographs, paintings and drawings, letters, newspaper accounts, logbooks, crew accounts, official histories, etc. Collecting and preserving information and materials on sister ships or similar vessels of the same period.	Failure to make written transcriptions of audio recordings to guard against loss or degradation of recordings themselves.
Conducting and recording oral history interviews with former masters, crew members, shipyard workers, aid others associated with the vessel.	Failure to properly store and conserve original records to guard against misplacement, theft, damage, or deterioration.
Collecting and preserving builders' contracts, specifications, plans, models, bills of materials, etc., for the vessel and/or for similar vessels built by the same yard or comparable builders. Collecting similar information on subsequent modifications to the vessel.	Failing to document areas of the vessel that are affected when any work, **including emergency repair**, is performed. Failure to preserve to make all new records (measured drawings, photographs, and written data) on archivally stable, acid-free materials.
Researching and recording information on original methods and materials used in the vessel's construction, rigging, and outfitting.	
Thoroughly recording the form and condition of the vessel on archivally stable materials at the time of acquisition for preservation treatment. Information collected should include:	

GUIDELINES FOR DOCUMENTATION

General Guidelines (continued)

- APPLICABLE TO ALL VESSELS –

Recommended	*Not Recommended*
- detailed measurements of the existing vessel, including construction drawings, hull lines, indication of hogging and other deformations.	- Failure to base drawings on accurate measurements. Failure to preserve field sketches, notes, and dimensions on which measured drawings were based for future verification of the finished drawings.
- extensive description of materials, methods, and details of construction.	- Failure to preserve field notes on which measured drawings were based. Failure to date, label, and catalog all photographs.
- measured drawings and photographs of distinctive and character-defining features.	- Failure to preserve samples of finishes themselves as part of their documentation.
- notations of physical evidence of changes made over time, such as removal/addition of bulkheads, equipment, etc.	- Failure to provide “exploded” or assembly drawings and/or photographs of features where such information is key to construction or operation of a feature in preparation for its preservation, maintenance, replacement, or interpretation.
- notation and sampling of original, subsequent, and existing paint colors and other finishes.	Failure to properly catalog and file such records for future study and reference. Failure to protect records against misplacement, theft, damage, or deterioration.
- notation and description of existing original or historic fabric.	
- notation and description of methods of fastening, etc.	
- notation and description of furnishings, fittings, machinery and equipment, etc., with indication of their location, placement, and function.	
- notation of miscellaneous items discovered on board the vessel during treatment.	
Thoroughly recording all work performed on the vessel in the course of treatment, with notations of method and materials used in the work, original fabric affected by the work, and the reasoning or justification for the work.	
Keeping records of regular maintenance and cleaning of the vessel.	
Thoroughly recording damage to the vessel from external causes, as well as changes over time in the	

form or condition of the vessel, such as hogging, etc.

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GUIDELINES FOR STABILIZATION

General Guidelines

- APPLICABLE TO ALL VESSELS –

Recommended	*Not Recommended*
Identifying, retaining, and preserving to the greatest extent possible original or historic fabric, as well as material, elements, and features that are important in defining the historic character of the vessel.	Irreversibly altering the essential form of the vessel during the stabilization process.
Thoroughly documenting the existing conditions of any affected part of the vessel, including location, size, composition, method and pattern of fastenings, etc., of the affected elements, before performing work of any kind, **including emergency repairs**.	Failing to document affected areas or elements before performing stabilization work or emergency repairs, so that knowledge of conditions existing before commencement of work is lost.
Retaining and protecting, whenever possible, original material and finishes that may be affected when reestablishing structural stability or arresting deterioration.	Failing to provide proper protection of features and finishes during work so that they are gouged, scratched, dented, or otherwise damaged.
Carefully documenting material or features displaced, removed, obscured, or otherwise affected during stabilization treatment, even if the material is not of historic significance.	Failing to assign a high priority to treatment of rot or pest infestation, thus ensuring further contamination.
Treating areas or pockets of active rot or pest infestation in wood with appropriate chemical fungicides, insecticides, preservatives, etc.	Applying fungicides or other chemical treatments that are hazardous to humans or the natural environment after application.
Removing rot- or pest-infected wood when adjacent areas are threatened with contamination, if stabilization measures such as chemical treatment, ventilation and drying, etc., cannot be effected with a reasonable time.	Failing to remove wood beyond the area of infestation when removal is required, thus permitting continued spread of contamination. Failing to thoroughly document removal of any material or features, including the reason for removal, composition, size, finish, method of fastening, and location of the material removed.

GUIDELINES FOR STABILIZATION

General Guidelines (continued)

- APPLICABLE TO ALL VESSELS –

Recommended	*Not Recommended*
Treating new wood with chemical preservatives before incorporation into the vessel, preferably by pressure treatment (*after* shaping, drilling, and fitting). Using fungicidal bedding compounds where appropriate in reinstallation of new wood or reinstallation of old wood.	Treating one material with chemical products that could have an adverse reaction with other materials in proximity.
Clearly and unobtrusively marking by branding, metal stamping, affixing welded tabs, or other permanent means, the date of installation on any new or replacement material that is incorporated into the vessel.	Failing to thoroughly document repairs or replacement of material, with the reasons for action taken.
Removing loose scale or corrosion from metal surfaces; sealing and coating with appropriate protective coating.	Leaving metal surfaces unscaled or untreated, especially between or behind structural members.
Treating severely corroded metals with chemical metal stabilization or consolidation products.	Failing to ensure that all surfaces, whether wood or metal, receive proper preparation before application of coatings. This may include scaling, grit blasting, degreasing, deacidifying, etching, drying, priming, etc.
Applying appropriate paint or other coating systems to metals or alloys after cleaning. When repainting, using colors that are historically appropriate.	Treating one material with chemical products that could have an adverse reaction with other material in proximity.
Removing loose, unsound coatings from painted or varnished wood surfaces; coating with appropriate finishes.	Failing to reapply protective coating systems to metals or alloys that require them after cleaning, so that accelerated corrosion occurs.
Retaining, protecting, and preserving original or historic finishes whenever possible.	Removing coatings that are sound and intact, unless removal is required for good adhesion of new coatings.
	Failing to collect, document, and preserve samples when removal of the original finish is necessary.

GUIDELINES FOR STABILIZATION

General Guidelines (continued)

- APPLICABLE TO ALL VESSELS –

Recommended	*Not Recommended*
Discovering original paint colors and finishes; repainting or refinishing with colors based on the original.	Refinishing with colors that cannot be documented through research and investigation to be appropriate to the vessel and period.
Using "traditional" paints and protective coatings that match the original as closely as possible in composition, appearance, and other properties.	Painting historically unpainted or varnished wooden surfaces; varnishing or leaving unfinished surfaces that were historically painted.
Using modern, long-lasting, low maintenance protective coatings where substantially improved protection and reduced maintenance will add to the life of the vessel, so long as the new finish is reversible and matches the original in color, texture, and appearance.	Applying a high-gloss, yacht-like finish to work boats, etc., unless specifically appropriate.
	Applying "new technology" products or methods on the recommendation of salesmen, shipyard personnel, etc., without first investigating the long term effects.
	Sealing, or applying impermeable coatings to, wood structural members that have high moisture content, thus promoting rot and preventing drying.

GUIDELINES FOR STABILIZATION

Hull, Decks, Structural Members, Deck Houses and Superstructure, Hull and Deck Openings

- APPLICABLE TO ALL VESSELS –

Recommended	*Not Recommended*
Ensuring that a vessel out of water, whether permanently or temporarily, is adequately supported, including overhanging sections at bow and stern. Ensuring that the weight of masts, machinery, heavy deck equipment, etc., is transmitted to support blocks and/or shores, especially if deck beams, frames, keel, or other major structural members are weak.	Failing to thoroughly document the position, method of attachment or fastening, etc., of any elements or material displaced in reestablishing structural stability.
Removing to protected storage masts, armament, winches, windlasses, capstans, etc., if necessary to effect structural repairs or if their condition constitutes a hazard to the vessel's structure or to personnel.	Leaving untreated known structural problems that will cause continuing deterioration and shorten the life of the vessel.
Reinforcing decayed and weakened structural members, especially where there are visible signs of deflection or failure.	Installing new openings, closures, or associated hardware that are incompatible with the vessel's historic appearance or that obscure, damage, or destroy character-defining features.
Retaining existing hull, deck and deckhouse openings, such as doors, hatches, scuttles, windows, ports, port lights, etc.	

GUIDELINES FOR STABILIZATION

Hull, Decks, Structural Members, Deck Houses and Superstructure, Hull and Deck Openings (continued)

- APPLICABLE TO VESSELS AFLOAT AND VESSELS EXPOSED TO WEATHER –

Recommended	*Not Recommended*
Performing a survey to determine whether a vessel afloat is in immediate danger of hull failure or collapse due to wastage, rot, worm damage, structural deterioration, etc. Arranging for drydocking or haul-out and performing emergency repairs, if required.	Failing to ensure that the vessel will not be damaged by hauling out or drydocking.
Repairing or, if necessary, replacing severely weakened, deteriorated, or missing structural members or hull material (planking, caulking, sheathing, hull plates, etc.) with new material of the same composition, size, scale, and methods of fastening and construction as the original (e.g., riveted iron plates should, if at all possible, be replaced with iron plates of the same size and shape, riveted in place; white oak planking should be replaced by white oak planks of the same dimensions, fastened in the same manner as the originals, with seams appropriately caulked, etc.).	Coating underwater portions of hull with gunnite, fiberglass, or other non-historic products that are non-reversible, that would interfere with historic methods of maintenance, or that could accelerate deterioration of bottom material.
Using state-of-the-art, long-lasting, low maintenance coatings on underwater portions of a vessel's hull, provided that application of such coatings does not involve destruction of historic fabric and does not require a departure from historic methods of bottom construction.	Installing too many or too few zincs.
Renewing or installing hull zincs.	Failure to monitor an impressed current cathotic protection system, or allowing untrained staff to monitor or adjust system.
Determining the electrolytic potential of a floating vessel's hull; testing for stray electrical current in surrounding water. Designing an active or passive cathodic system to compensate.	

GUIDELINES FOR STABILIZATION

Hull, Decks, Structural Members, Deck Houses and Superstructure, Hull and Deck Openings (continued)

- APPLICABLE TO VESSELS AFLOAT AND VESSELS EXPOSED TO WEATHER –

Recommended	*Not Recommended*
Ensuring that decks, hull topsides, deckhouses, etc., are weathertight. Rigging temporary canopies, covers, etc., over vessel to prevent incursion of rainwater, if repairs cannot be effected immediately.	Damaging or altering distinctive features or historic fabric in installation of temporary protective measures.
Repairing or, if necessary, replacing deteriorated or missing deckhouse tops and sides, deck planks, deck plates, etc., with new material of the same composition, size, scale, and method of fastening as the original.	Replacing or covering over (except as a temporary protective measure) planked decks with plywood sheeting. Fiberglassing over a deck that was not originally so covered.
Recaulking and/or paying seams in wooden decks as required, using historically appropriate materials and methods.	Caulking or paying seams with historically inappropriate materials that do not have the same appearance as the original, or that are irreversible or non-removable.
Replacing deteriorated historically appropriate coverings on decks and deckhouse tops (painted canvas, concrete, linoleum, tar, etc.) with new material that matches the old in composition, size, shape, color, and texture after reestablishing the structural stability of the deck or deckhouse top.	
Relieving hogging, sagging, and shear forces caused by improper distribution of ballast, fuel, water, etc., after consultation with a naval architect.	
Eliminating the causes of standing water on decks, deckhouse tops, etc. Cleaning, repairing, or replacing, if required, deck drains, scuppers, etc.	
Adjusting the trim of a floating vessel by repositioning, removal, or addition of ballast, water, fuel, anchor chain, etc., in order to render existing deck drains and scuppers effective. Ensuring that the stability of the vessel is maintained in the operation, and that undue hull stresses that might cause hogging, sagging, etc. are not introduced.	

GUIDELINES FOR STABILIZATION

Hull, Decks, Structural Members, Deck Houses and Superstructure, Hull and Deck Openings (continued)

- APPLICABLE TO VESSELS AFLOAT AND VESSELS EXPOSED TO WEATHER –

Recommended	*Not Recommended*
Installing new drains or scuppers in topside areas that hold standing water, if decay or damage would result from lack of drainage. Designing new drains that are historically appropriate in appearance and construction, and that require minimal displacement of historic fabric.	Failing to thoroughly document addition of non-historic features, with justification for the addition, details of construction, etc.
Cleaning, repairing or replacing, if necessary, mouldings, waterways, margins, covering boards, rail caps, etc.; filling cracks, checks, open joints or seams with appropriate fillers; painting or finishing, if appropriate, with coatings of the same color, texture, and appearance as the original.	Deferring, or discounting as "minor," repairs that could prevent fresh water intrusion into structural members.
Reestablishing the soundness and weathertight integrity of hull and deck openings such as hatches, doors, port lights, etc., through repair or replacement. Installing temporary covers if repair or replacement cannot be immediately accomplished. Retaining all hardware affected; duplicating the material, design, and hardware of the original openings and closures where replacement is necessary. Ensuring that loose, corroded, damaged or missing through-deck fittings or fastenings are not allowing water to seep below decks or into the vessel structure; sealing such openings, and/or repairing or replacing fittings or fastenings with historically appropriate material.	
Replacing loose or missing deck plugs in wooden decks. Properly bedding new plugs in appropriate waterproof compounds.	

GUIDELINES FOR STABILIZATION

Interior Spaces, Including Cabins, Holds, Compartments, Trunks, Passageways, etc., with Appurtenant Joinery, Trim, Furnishings, and Fittings

- APPLICABLE TO ALL VESSELS –

Recommended	*Not Recommended*
Retaining the basic plan of a vessel's interior, including the relationship and size of spaces.	Breaching or removing sections of deck, hull, ceiling, or interior arcelin in order to create circulation between frame bays, etc., without first determining, in consultation with a naval architect experienced in such matters, that the effect of such an action on the vessel's hull girder strength will be acceptable.
Removing debris and dirt from all interior spaces, including bilges, frame bays, lockers, etc.	Allowing dehumidifiers to drain into areas where fresh water accumulation could promote rot or decay.
Providing ventilation to interior spaces through active or passive means, paying particular attention to forepeak, afterpeak, lockers, under-counter areas, and other spaces normally closed off from air circulation.	Permitting air to become excessively dry, thus promoting over-drying of wood structure.
Installing dehumidifiers in closed spaces where excessive relative humidity promotes decay or corrosion.	Failing to monitor operation of heating, ventilating, and dehumidifying equipment for detection of fire hazards or malfunctions, etc.
Providing low heat in interior spaces to accelerate drying and to prevent freezing, condensation, etc.	Failing to take paint samples of original or historic finishes removed in the stabilization process.
Removing loose paint, scale, and corrosion from wood and metal surfaces, using the least abrasive method effective for the task.	

GUIDELINES FOR STABILIZATION

Interior Spaces, Including Cabins, Holds, Compartments, Trunks, Passageways, etc., with Appurtenant Joinery, Trim, Furnishings, and Fittings (continued)

- APPLICABLE TO VESSELS AFLOAT AND VESSELS EXPOSED TO WEATHER –

Recommended	*Not Recommended*
Removing standing water from all interior spaces as it accumulates.	Permitting water to accumulate in any interior space; failing to track down and repair leaks.
Ensuring that limber holes, scuppers, drains, etc., are free of debris.	
Ensuring that ballast material is dry, appropriately coated (if metallic), and installed in such a manner that air circulation and/or access to the inside of the hull is possible.	
Repairing or replacing missing or severely deteriorated elements, when required for structural stability, with new material that matches the original in composition, size, appearance, and method of fastening.	
Exercising special care to avoid breaching hull material below the waterline of a floating vessel while scraping, chipping, or grit blasting.	

GUIDELINES FOR STABILIZATION

Equipment, Including Masts and Spars, Rigging, Boats, Deck Equipment, Armament, etc.

- APPLICABLE TO ALL VESSELS –

Recommended	*Not Recommended*
Thoroughly examining masts, spars, and rigging to determine their structural soundness.	Failing to restrict access to areas where insecure or unsound rigging poses a safety hazard.
Thoroughly documenting the position, method of attachment, rigging detail, etc. of all elements displaced during the stabilization process. Providing secure, protected storage for such material.	Failing to recoat ferrous metal surfaces with protective finishes after cleaning.
Relieving strain on severely weakened or deteriorated masts or standing rigging by arceling them, and/or by sending down yards, upper masts, etc., pending repair or replacement of unsound elements.	
Eliminating hazards by sending down gear aloft such as blocks, lights, antennas, etc. if their attachments or supporting structures are insecure.	
Reinforcing decayed or weakened masts, spars, and related structures or fittings, especially when there are visible signs of deflection or failure.	
Supplementing existing standing rigging, if severely deteriorated, with temporary stays rigged to secure points.	
Ensuring that boats are adequately supported to prevent damage or change in shape.	
Applying temporary measures to preserve the shape of boats, such as securing sprung planks, reinforcing broken frames, etc.	
Treating the causes of rot and corrosion to arrest deterioration of boats.	
Cleaning and removing loose paint, corrosion, etc., from masts, spars, decks, equipment, machinery, etc. Sealing or coating with appropriate protective	

finishes.

Lubricating moving parts and metal bearing surfaces.

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GUIDELINES FOR STABILIZATION

Equipment, Including Masts and Spars, Rigging, Boats, Deck Equipment, Armament, etc. (continued)

- APPLICABLE TO VESSELS AFLOAT AND VESSELS EXPOSED TO WEATHER –

Recommended	*Not Recommended*
Ensuring that water is not permitted to enter masts, spars, or the vessel structure through cracks, checks, open joints, wasted iron or steel, inadequately bedded or loose fittings, etc.	Replacing hemp rigging with wire or vice versa when there is no historical basis for the change.
Filling open joints and end-grain checks, especially at mastheads; filling horizontal checks on upper surfaces of wooden spars with appropriate fillers.	Replacing lanyards and deadeyes with turnbuckles, or vice versa, when there is no historical basis for the change.
Installing stopwaters in vertical checks on wooden masts, etc., above the point of deck penetration.	Permanently substituting wire clamps or swage fittings for seizings or splices, etc.
Applying new paint or other protective coatings to masts, spars, machinery, armament, and gear aloft after thorough cleaning and removal of scale, corrosion, loose paint, etc. Matching the historic coatings as closely as possible in color, texture, and appearance.	Failing to thoroughly inspect and repair or replace as required running rigging and associated blocks, sheaves, etc., that are required for management or operation of the vessel.
Applying penetrating wire preservative to sound standing wire rigging. Replacing worming, arceling, and service as necessary. Protecting with historically appropriate coatings. Cleaning and lubricating rigging screws, turnbuckles, etc.; applying appropriate protective coatings.	
Renewing seizings, service, etc., as required on sound organic (i.e., hemp, etc.) standing rigging. Tarring, or coating with appropriate protective coatings. Replacing unsound rigging with new material that matches the old as closely as possible in composition, size, color, texture, etc.	
Overhauling running rigging. Replacing deteriorated rope, wire, etc., with new material that matches the old as closely as possible in composition, size, color, texture, and appearance. Cleaning and lubricating blocks, sheaves, etc. Repairing or replacing, if necessary, with materials that are historically appropriate.	

GUIDELINES FOR STABILIZATION

Equipment, Including Masts and Spars, Rigging, Boats, Deck Equipment, Armament, etc. (continued)

- APPLICABLE TO VESSELS AFLOAT AND VESSELS EXPOSED TO WEATHER –

Recommended	*Not Recommended*
Removing severely deteriorated boats to covered protected storage if possible.	Failing to provide adequate support and/or stiffening for boats that are to be moved.
Providing exposed boats with weatherproof covers that permit air circulation.	
Ensuring that decks, cabin tops, etc., of enclosed boats are weathertight, if uncovered.	
Making provisions for drainage and ventilation of boat interiors.	
Ensuring that water is not permitted to enter gun tubes or sensitive mechanisms. Providing covers for elements such as breech mechanisms, gun muzzles, etc.	
Ensuring that gaskets and seals on control boxes, mechanism covers, etc., are in good condition; replacing, if necessary.	
Providing weatherproof covers, if appropriate, for protection of deck equipment, armament, or exposed machinery such as capstans, windlasses, binnacles, etc.	

GUIDELINES FOR STABILIZATION

Machinery, Tankage and Piping, Electrical Equipment, Mechanical Systems

- APPLICABLE TO ALL VESSELS –

Recommended	*Not Recommended*
Cleaning and removing loose paint, corrosion, etc., from engines, auxiliaries, compressors, pumps, etc. Priming and/or painting with appropriate paints.	Allowing salt water or corrosive coolants to remain in the cooling systems of machinery that is not operated. Failing to drain pipes and cooling systems, or to add anti-freeze, when equipment is subject to freezing temperatures.
Coating historically unpainted machinery surfaces with gun grease, oil or other appropriate products to prevent corrosion.	Rotating machinery without ensuring that moving parts are lubricated.
Lubricating moving parts and bearing surfaces of operable machinery.	Permitting asbestos dust to dissipate through cracks or breaks in covering.
Flushing liquid cooling systems; recharging with coolant or draining, as applicable.	Failing to take appropriate safety precautions while working around asbestos.
Rotating machinery, if possible; making provision for lubrication and rotation on a regular basis, by hand or mechanical means.	
Covering machinery to protect it from dirt, dust, water, etc., after cleaning and recoating.	
Flushing boilers with fresh water; draining thoroughly if not used.	
Cleaning and scaling boilers, uptakes, exhaust stacks, and related surfaces with rust-inhibitant; coating, if appropriate, to prevent corrosion.	
Ensuring that asbestos insulation on boilers, piping, etc., is contained.	
Isolating, if possible, all plumbing, piping, and valves that will remain in use for management or operation of the vessel. Ensuring that valves are operable and properly packed, and that pressurized pipes and related joints and fittings are sound and free of leaks.	

GUIDELINES FOR STABILIZATION

Machinery, Tankage and Piping, Electrical Equipment, Mechanical Systems (continued)

- APPLICABLE TO ALL VESSELS –

Recommended	*Not Recommended*
Flushing and draining all piping and related fixtures not required for management or operation of the vessel.	Failing to ensure that tanks are gas-free and oxygen-safe before they are entered by personnel and/or before heat producing work such as welding, cutting, etc., is performed in their vicinity.
Stripping water from fuel and oil tanks.	Failing to thoroughly document electrical systems before any changes are made; failing to clearly document changes.
Flushing and draining water and fuel tanks if not required for use. Cleaning, scaling, and coating inside and out if possible.	
Ensuring that all tanks are adequately vented.	
Isolating electrical circuits not required for management or use of the vessel. Eliminating ground losses, shorts, etc., from active circuits.	
Drying out, if required, and cleaning corrosion from electric motors, electrical panels, switch boards, etc. Applying appropriate moisture- and corrosion-inhibiting products to motor and generator commutators, armatures, electrical contacts, etc.	
Lubricating bearings, etc., of motors and generators. Rotating, if possible.	

GUIDELINES FOR STABILIZATION

Machinery, Tankage and Piping, Electrical Equipment, Mechanical Systems (continued)

- APPLICABLE TO VESSELS AFLOAT AND VESSELS EXPOSED TO WEATHER –

Recommended	*Not Recommended*
Installing permanent or temporary covers over stacks, escape pipes, etc., to prevent water entry into machinery or boilers.	Failing to recognize the danger of freezing (and consequent failure) of below-waterline fittings as a result of sub-freezing temperatures within the vessel, even though exterior water temperature might be above the freezing point.
Recognizing the hazard of siphoning action present in piping that connects directly or indirectly to through-hull fittings below the waterline.	
Ensuring that through-hull fittings and fastenings are sound and operable if required for use.	
Blanking off through-hull fittings not required for operation or maintenance of the vessel.	
Packing or heating sea chests and below-waterline through-hull fittings in sub-freezing weather, especially on vessels in fresh water.	
Installing an isolating transformer between shore power line and a floating vessel's electrical system.	
Installing ground fault interrupters on circuits likely to be used for pumps, power tools, hand-held lighting, or machinery in damp or wet areas of the vessel.	

GUIDELINES FOR STABILIZATION

Health, Safety and Code Requirements; Access; Lighting; Mechanical and Alarm Systems

- APPLICABLE TO ALL VESSELS –

Recommended	*Not Recommended*
Complying with health and safety codes in such a manner that character-defining spaces, features, and finishes are preserved.	
Working with local code officials to investigate alternative life safety measures or variances available under some codes so that alterations or non-historic additions to the vessel can be avoided.	
Designing and constructing boarding ramps, ladders, stairs, gangplanks, etc., that do not require alteration, displacement, or removal of historic fabric or character-defining features of the vessel. Access over rails or bulwarks, or through existing gangways or ports, etc., is recommended.	
Utilizing, wherever feasible, existing stairs, companion ladders, etc., for access within the vessel.	
Constructing or adding railings, barriers, etc., when required for safety or security, that do not detract from or diminish the historic character of the vessel.	
Utilizing, when possible, existing mechanical system elements such as wiring, electrical fixtures, plumbing and ducting in providing light, heat, ventilation, etc.	
Installing on floating vessels operable pumps of sufficient capacity and accessibility to deal with substantial flooding on short notice. Providing generators to ensure backup power for pumps and emergency lighting in case of power outages.	
Installing bilge alarms, security alarms, and fire detection equipment; ensuring that alarms are monitored at all times, and that emergency backup power is provided.	

GUIDELINES FOR STABILIZATION

Health, Safety and Code Requirements; Access; Lighting; Mechanical and Alarm Systems (continued)

- APPLICABLE TO ALL VESSELS –

Recommended	*Not Recommended*
Installing or activating a fire suppression system (a charged dry-chemical or inert gas system may be preferable to sprinklers).	
Designing and installing new lighting, electrical, mechanical, security, and fire suppression systems and devices in such a manner that character-defining spaces and features are preserved, and historic fabric and finishes are not damaged, displaced, or unnecessarily obscured.	
Developing comprehensive emergency plans that address in detail actions to be taken in case of fire, flooding, storms, etc. Conducting regular emergency drills for the purpose of training and testing the effectiveness of such plans. Coordinating plans with local fire, police, and rescue agencies; Coast Guard; etc.	
Removing from the vessel all flammables not required for operation or maintenance of the vessel; storing flammables that must remain on board in appropriate fireproof containers.	

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GUIDELINES FOR PRESERVATION

General Guidelines

- APPLICABLE TO ALL VESSELS –

Recommended	*Not Recommended*
Identifying, retaining, and preserving to the greatest extent possible original or historic fabric, as well as material, elements, features, and form that are important in defining the historic character of the vessel.	Failing to document affected areas or elements before performing preservation work or emergency repairs, so that knowledge of conditions existing before commencement of work is lost.
Thoroughly documenting the existing conditions of any affected part of the vessel, including location, size, composition, method and pattern of fastenings, etc., of the affected elements, before performing work of any kind, **including emergency repairs**.	Failing to provide proper protection for historic features and finishes during work so that they are gouged, scratched, dented, or otherwise damaged.
Retaining and protecting, whenever possible, original or historic material that may be affected when reestablishing structural stability or arresting deterioration.	Departing from original methods of construction or configuration of material in making repairs or replacements, especially where changes will be visible.
Whenever possible, repairing rather than replacing historic elements, using materials and methods historically appropriate to the vessel. When deteriorated elements **must** be replaced, ensuring that the replacement matches the original as closely as possible in composition, size, form, and method of fastening.	Failing to document or preserve material samples for possible future use in manufacturing replacements.
Carefully documenting material or features displaced, removed, or otherwise affected during treatment, even if the material is not of historic significance.	Failing to thoroughly document repairs or replacement of material, with reasons for the action taken.
Clearly and unobtrusively marking, by branding, stamping, affixing welded tabs, or other permanent means, the date of installation on any new or replacement material that is incorporated into the vessel.	Failing to exercise care when cleaning, so that delicate historic elements or features are damaged.
Using the least abrasive and caustic cleaning agents possible when cleaning historic elements or finishes.	Leaving corrosion on metal surfaces untreated, especially between or behind structural members.
Stabilizing or removing corrosion on metal surfaces, using the least abrasive effective method.	

GUIDELINES FOR PRESERVATION

General Guidelines (continued)

- APPLICABLE TO ALL VESSELS –

Recommended	*Not Recommended*
Treating severely corroded metals with chemical metal stabilization or consolidation products.	Treating one material with chemical products that could have an adverse reaction with other materials in proximity.
Applying appropriate paint or other coating systems to metals or alloys after stabilization or cleaning.	Failing to reapply protective coating systems to metals or alloys that require them after stabilization or cleaning, so that accelerated corrosion occurs.
Treating areas or pockets of active rot or pest infestation in wood with appropriate chemical fungicides, insecticides, preservatives, etc.	Failing to ensure that all surfaces, whether wood or metal, receive proper preparation before application of coatings. This may include scaling, grit blasting, dereasin, deacidifying, etching, drying, priming, etc.
Removing rot- or pest-infected wood when adjacent areas are threatened with contamination, if stabilization measures such as chemical treatment, ventilation and drying, etc., cannot be effected within a reasonable time, or if structural stability is threatened.	Failing to assign a high priority to treatment of rot or pest infestation, thus ensuring further contamination.
Treating new wood with chemical preservatives (after shaping, drilling, and fitting) before incorporation into the vessel. Using fungicidal bedding compounds where appropriate.	Applying fungicides or other chemical treatments that are hazardous to humans or the natural environment after application.
Preserving existing finishes whenever possible. When refinishing is required, using new coatings that match the old as closely as possible in color, texture, and appearance.	Failing to remove wood beyond the area of infestation when removal is required, thus permitting spread of contamination.
	Failing to thoroughly document removal of any material or features, including the reason for removal, and the composition, size, finish, method of fastening, and location of the material removed.
	Treating one material with chemical treatments that could have an adverse reaction with other materials in proximity.
	Failing to collect, document, and preserve samples when removal of the original finish is necessary.

GUIDELINES FOR PRESERVATION

General Guidelines (continued)

- APPLICABLE TO ALL VESSELS –

Recommended	*Not Recommended*
Discovering original paint colors and finishes; repainting or refinishing with colors based on the original.	Refinishing with colors that cannot be documented through research and investigation to be appropriate to the vessel and period.
Using "traditional" paints and protective coatings that match the original as closely as possible in composition, appearance, and other properties.	Painting historically unpainted or varnished surfaces; varnishing or leaving unfinished surfaces that were historically painted.
Using modern, long-lasting, low maintenance protective coatings where substantially improved protection and reduced maintenance will add to the life of the vessel, so long as the new finish is reversible and matches the original in color, texture, and appearance.	Applying a high-gloss, yacht-like finish to work boats, etc., unless specifically appropriate.
Lubricating moving parts and bearing surfaces of machinery, equipment, armament, rigging gear, etc.	Sealing, or applying impermeable coatings to, wood structural members that have high moisture content, thus promoting rot and preventing drying.
Developing, and adhering to, schedules for regular and cyclic maintenance, including drydocking or haul-out of vessels afloat.	Applying "new technology" products or methods on the recommendation of salesmen, shipyard personnel, etc., without first investigating the long-term effects.
Establishing a schedule of regular inspections of all parts of the vessel in order to monitor condition, identify problems, etc.	
Establishing a schedule for regular cleaning.	

GUIDELINES FOR PRESERVATION

Hull, Decks, Structural Members, Deck Houses and Superstructure, Hull and Deck Openings

- APPLICABLE TO ALL VESSELS –

Recommended	*Not Recommended*
Ensuring that a vessel out of the water, whether permanently or temporarily, is adequately supported, including overhanging sections at bow and stern. Ensuring that the weight of masts, machinery, heavy deck equipment, etc., is transmitted to support blocks and/or shores, especially if deck beams, frames, keel, or other major structural members are weak.	Leaving untreated known structural problems that will cause continuing deterioration and shorten the life of the vessel.
Reinforcing decayed and weakened structural members, especially where there are visible signs of deflection or failure.	Installing new openings, closures, or hardware that are incompatible with the vessel's historic appearance or that obscure, damage, or destroy character-defining features.
Retaining existing hull, deck and deckhouse openings, such as doors, hatches, scuttles, windows, ports, port lights, etc.	
Keeping all topside areas free of dirt and grime, especially in areas where accumulated dirt will hold moisture, thus contributing to decay.	

GUIDELINES FOR PRESERVATION

Hull, Decks, Structural Members, Deck Houses and Superstructure, Hull and Deck Openings (continued)

- APPLICABLE TO VESSELS AFLOAT AND VESSELS EXPOSED TO WEATHER –

Recommended	*Not Recommended*
Arranging for thorough examination of the vessel by a qualified marine surveyor on a periodic basis, in order to determine the condition of the vessel and to plan for major maintenance and repairs.	Coating underwater portions of hull with gunnite, fiberglass, or other non-historic products that are non-reversible, that would interfere with historic methods of maintenance, or that could accelerate deterioration of bottom material.
Repairing or, if necessary, replacing severely weakened, deteriorated, or missing structural members or hull material (planking, caulking, sheathing, hull plates, etc.) with new material of the same composition, size, scale, and methods of fastening and construction as the original (e.g., riveted iron plates should, if at all possible, be replaced with iron plates of the same size and shape, riveted in place; white oak planking should be replaced by white oak planks of the same dimensions, fastened in the same manner as the originals, with seams appropriately caulked, etc.).	Installing too many or too few zincs.
	Failing to monitor an impressed current cathodic protection system, or allowing untrained staff to monitor or adjust system.
	Failing to recognize the possible negative effects of brine washdowns, especially in iron or steel vessels.
Using state-of-the-art, long-lasting, low maintenance coatings on underwater portions of a vessel's hull, provided that such coatings are reversible, and that their application does not require destruction of historic fabric or departure from historic methods of bottom construction.	Painting or otherwise covering decks that were historically unfinished.
Renewing or installing hull zincs.	
Determining the electrolytic potential of a floating vessel's hull; testing for stray electrical current in surrounding water. Designing an active or passive cathodic system to compensate.	
Ensuring that decks, hull topsides, deckhouses, etc., are weathertight.	
Employing traditional methods of keeping unpainted wooden decks tight, such as regular brine washdowns, applications of oil, etc.	

GUIDELINES FOR PRESERVATION

Hull, Decks, Structural Members, Deck Houses and Superstructure, Hull and Deck Openings (continued)

- APPLICABLE TO VESSELS AFLOAT AND VESSELS EXPOSED TO WEATHER –

Recommended	*Not Recommended*
Repairing or, if necessary, replacing deteriorated or missing deckhouse tops and sides, deck planks, deck plates, etc., with new material of the same composition, size, scale, and method of fastening as the original.	Replacing or covering over (except as a temporary protective measure) planked decks with plywood sheeting. Fiberglassing over a deck that was not originally so covered.
Recaulking and/or paying seams in wooden decks as required, using historically appropriate materials and methods.	Caulking or paying seams with historically inappropriate materials that do not have the same appearance as the original, or that are irreversible or non-removable.
Replacing deteriorated historically appropriate coverings on decks and deckhouse tops (painted canvas, concrete, linoleum, tar, etc.) with new material that matches the old in composition, size, shape, color, and texture after reestablishing the structural stability of the deck or deckhouse top.	Damaging or altering distinctive features or historic fabric in installation of temporary protective measures.
Rigging temporary or seasonal canopies, covers, etc., over vessel to prevent incursion of rainwater, if decks cannot be made watertight.	Installing ballast that cannot be removed, or that renders the inside of the hull inaccessible (e.g., concrete poured between floors).
Relieving hogging, sagging, and shear forces caused by improper distribution of ballast, fuel, water, etc., after consultation with a naval architect.	
Eliminating the causes of standing water on decks, deckhouse tops, etc. Cleaning, repairing, or replacing, if required, deck drains, scuppers, etc.	
Adjusting the trim of a floating vessel by re-positioning, removal, or addition of ballast, water, fuel, anchor chain, etc., in order to render existing deck drains and scuppers effective. Ensuring that the stability of the vessel is maintained in the operation, and that undue hull stresses that might cause hogging, sagging, etc., are not introduced.	

GUIDELINES FOR PRESERVATION

Hull, Decks, Structural Members, Deck Houses and Superstructure, Hull and Deck Openings (continued)

- APPLICABLE TO VESSELS AFLOAT AND VESSELS EXPOSED TO WEATHER –

Recommended	*Not Recommended*
Installing new drains or scuppers in topside areas that hold standing water, if decay or damage would result from lack of drainage. Designing new drains that are historically appropriate in appearance and construction, and that require minimal displacement of historic fabric.	Failing to thoroughly document addition of non-historic features, with justification for the addition, details of construction, etc.
Regularly inspecting, and repairing or replacing when necessary, mouldings, waterways, margins, covering boards, rail caps, etc.; filling cracks, checks, open joints or seams with appropriate fillers; painting or finishing, if appropriate, with coatings of the same color, texture, and appearance as the original.	Deferring, or discounting as "minor," repairs that could prevent fresh water intrusion into structural members.
Maintaining the soundness and weathertight integrity of hull and deck openings. Duplicating the material, design, and hardware of the original openings and closures where replacement is necessary.	

GUIDELINES FOR PRESERVATION

Interior Spaces, Including Cabins, Holds, Compartments, Trunks, Passageways, etc., with Appurtenant Joinery, Trim, Furnishings, and Fittings

- APPLICABLE TO ALL VESSELS –

Recommended	*Not Recommended*
Retaining the basic plan of a vessel's interior, including the relationship and size of spaces.	Failing to maintain interior surface coatings on a cyclical basis so that loss or deterioration of interior features and hardware results.
Maintaining all interior spaces, including bilges, frame bays, lockers, etc., free of dirt and debris. Using the least abrasive and caustic cleaning agents possible when cleaning historic elements or finishes.	Radically changing the type of surface finishes or their color, such as painting a previously varnished wood feature.
Protecting and maintaining interior surfaces and finishes through appropriate treatments such as cleaning, rust removal, and reapplication of protective coating systems.	Permitting unauthorized entry into historic slips so that interior features and finishes are damaged by exposure to weather or through vandalism.
Protecting interior features and finishes against arson and vandalism before project work begins by erecting protective fencing and other barriers, installing fire alarm systems that are keyed to local protection agencies, etc.	Stripping interiors of features such as woodwork, doors, hardware, light fixtures, mechanical equipment, or of decorative materials.
Providing ventilation to interior spaces through active or passive means, paying particular attention to forepeak, afterpeak, lockers, under counter areas, frame bays, and other spaces normally closed off from air circulation.	Breaching or removing sections of deck, hull, ceiling, or interior arcelin in order to create circulation between frame bays, etc., without first determining, in consultation with a naval architect experienced in such matters, that the effect of such an action on the vessel's hull strength will be acceptable.

GUIDELINES FOR PRESERVATION

Interior Spaces, Including Cabins, Holds, Compartments, Trunks, Passageways, etc., with Appurtenant Joinery, Trim, Furnishings, and Fittings (continued)

- APPLICABLE TO VESSELS AFLOAT AND VESSELS EXPOSED TO WEATHER –

Recommended	*Not Recommended*
Installing dehumidifiers in spaces where excessive relative humidity promotes decay or corrosion.	Allowing dehumidifiers to drain into areas where fresh water accumulation could promote rot or decay.
Providing low heat in interior spaces to retard moisture and to prevent freezing, condensation, etc.	Permitting air to become excessively dry, thus promoting over-drying of wood structure.
Coating hard-to-reach areas of the inside of iron and steel hulls with penetrating coatings, such as "Eureka Fluid," that work their way under frames, etc., to prevent rust.	Failing to monitor operation of heating or ventilating equipment for detection of malfunctions, fire hazard, etc.
Retaining existing material, hardware, and architectural features such as joinery, paneling, cornices, mouldings, insulation, doors and doorways, stairs and ladders, deck coverings, furniture, upholstery, and lighting and plumbing fixtures.	Removing existing material, hardware, or architectural features except where essential for safety or efficiency.
Treating, as they appear, the causes of leaks that permit water to enter the vessel interior or structure. Ensuring that water is not permitted to stand in interior spaces.	Permitting water to accumulate in any interior space; failing to track down and repair leaks.
Ensuring that limber holes, scuppers, drains, sumps, etc., are free of debris.	
Ensuring that ballast material is dry, appropriately coated (if metallic), and installed in such a manner that air circulation and/or access to the inside of the hull is possible.	
Exercising special care to avoid breaching hull material below the waterline of a floating vessel while scraping, chipping, or grit blasting.	

GUIDELINES FOR PRESERVATION

Equipment, Including Masts and Spars, Rigging, Boats, Deck Equipment, Armament, etc.

- APPLICABLE TO ALL VESSELS –

Recommended	*Not Recommended*
Retaining and preserving existing masts, spars, rigging, equipment, armament, etc., to the greatest extent possible.	Failing to thoroughly document repairs or replacement of material, with the reasons for action taken.
Retaining the existing form and configuration of a vessel's rig, arrangement of deck equipment and machinery, armament, etc.	
Removing rotten, decayed, or wasted portions of masts, spars, or other elements when structural stability is affected or when adjacent areas are threatened with contamination. Effecting repairs in such a manner that existing material is preserved to the greatest extent possible, and that the completed repair resembles the surrounding area in texture, finish, etc.	
Ensuring that boats are adequately supported to prevent drainage or change in shape.	

GUIDELINES FOR PRESERVATION

Equipment, Including Masts and Spars, Rigging, Boats, Deck Equipment, Armament, etc. (continued)

- APPLICABLE TO VESSELS AFLOAT AND VESSELS EXPOSED TO WEATHER –

Recommended	*Not Recommended*
Ensuring that water is not permitted to enter masts, spars, or the vessel structure through checks, open joints, wasted iron or steel, inadequately bedded fittings, etc.	Painting spars that were historically varnished or slushed, or vice versa.
Filling open joints and end-grain checks, especially at mastheads, and filling horizontal checks on upper surfaces of wooden spars, with appropriate fillers.	Replacing hemp rigging with wire (or vice versa) when there is no historical basis for the change; replacing lanyards and deadeyes with turnbuckles (or vice versa) without historical justification.
Installing stopwaters in vertical checks on wood masts, etc., above the point of deck penetration.	
Maintaining sound coatings on masts, spars, deck equipment, machinery, armament, and gear aloft. When refinishing, matching the historic coatings as closely as possible in color, texture, and appearance.	
Regularly and thoroughly inspecting all elements of a vessel's tophamper to ensure against safety hazards and undetected deterioration. Paying special attention to ladders, footropes, tops and platforms, etc., and to slings, yokes, rings and eyes, and other load-bearing elements, with their associated fittings. Repairing or replacing when necessary with materials that match the original as closely as possible in composition, size, appearance, method of fastening, etc.	
Replacing unsound standing rigging with new material that matches the old as closely as possible in composition, size, color, texture, etc.	
Cleaning, and applying penetrating wire preservative to, sound standing wire rigging.	
Cleaning and lubricating rigging screws, turnbuckles, etc.; applying historically appropriate protective coatings.	

GUIDELINES FOR PRESERVATION

Equipment, Including Masts and Spars, Rigging, Boats, Deck Equipment, Armament, etc. (continued)

- APPLICABLE TO VESSELS AFLOAT AND VESSELS EXPOSED TO WEATHER –

Recommended	*Not Recommended*
Replacing worming, arceling, service, siezings, etc., when required, employing historically appropriate methods and materials.	
Applying and maintaining historically appropriate protective coatings on standing rigging.	
Overhauling running rigging regularly. Replacing deteriorated rope, wire, etc., with new material that matches the old as closely as possible in composition, size, color, texture, and appearance. Cleaning and lubricating blocks, sheaves, etc. Repairing or replacing, if necessary, with new materials that match the old as closely as possible.	
Maintaining sound coatings on boats that are exposed to the weather. Providing ventilated, weatherproof covers for open boats stored right-side-up. Filling cracks, checks, open seams, etc., on exposed boats, thus preventing incursion of water into the boat's structure.	
Ensuring that boat interiors are adequately ventilated and kept dry. Opening hatches and doors, and removing boat covers in fair weather, whenever possible. Installing drains at the lowest point of boats stored upright. Keeping drains clear.	
Ensuring that water is not permitted to enter gun tubes or sensitive mechanisms of armament or machinery. Providing weatherproof covers for elements such as breech mechanisms, gun muzzles, control boxes, etc.	
Ensuring that deck equipment, armament, deck-mounted machinery, and associated mounts or bases are bedded or secured in such a manner as to prevent incursion of moisture between mount and deck, or into the vessel structure.	

GUIDELINES FOR PRESERVATION

Equipment, Including Masts and Spars, Rigging, Boats, Deck Equipment, Armament, etc. (continued)

- APPLICABLE TO VESSELS AFLOAT AND VESSELS EXPOSED TO WEATHER –

Recommended	*Not Recommended*
Ensuring that mast coats, collars, electrical cable packing, and similar covers or seals on through-deck openings are intact. Replacing, when necessary, with new material that matches the old as closely as possible.	
Providing weatherproof covers, if appropriate, for protection of deck equipment, armament, or exposed machinery.	

GUIDELINES FOR PRESERVATION

Machinery, Tankage and Piping, Electrical Equipment, Mechanical Systems

- APPLICABLE TO ALL VESSELS –

Recommended	*Not Recommended*
Retaining and preserving existing machinery, tankage, electrical equipment, mechanical systems, etc., to the greatest extent possible.	Failing to thoroughly document repairs or replacement of material, with the reasons for actions taken.
Repairing, rather than replacing, deteriorated material or elements whenever possible. When replacement is necessary, using new material that matches the old as closely possible in composition, texture, appearance, and method of construction or fastening.	Failing to recoat historically painted ferrous elements after removal of paint or treatment of corrosion.
Cleaning dirt, loose paint, corrosion, etc., from machinery, tankage, piping, electrical equipment, etc., using the least caustic/abrasive effective means.	Painting historically unpainted surfaces, or leaving bright surfaces that were historically painted.
Coating historically unpainted machinery surfaces with gun grease, oil, or other appropriate products to prevent corrosion.	Failing to establish a schedule for renewal of internal preservative coatings on static machinery.
Disassembling and thoroughly cleaning interiors and moving parts of machinery. Coating with appropriate preservatives before reassembly if machinery is to remain static; otherwise, lubricating parts with clean lubricant.	Rotating machinery without ensuring that moving parts are lubricated.
Ensuring that operable (not necessarily "operating") machinery is not permitted to deteriorate through lack of maintenance or protection from moisture, dirt, etc.	Allowing salt water or corrosive coolants to remain in the cooling systems of machinery that is not operated. Failing to drain pipes and cooling systems, or to add an when equipment is subject to freezing temperatures.
Establishing and adhering to a regular schedule of inspection, lubrication, and rotation of operable machinery, unless the machinery is internally preserved and statically maintained.	
Flushing liquid cooling systems. Thoroughly draining if machinery is not to be operated; otherwise, recharging with appropriate coolant.	

GUIDELINES FOR PRESERVATION

Machinery, Tankage and Piping, Electrical Equipment, Mechanical Systems (continued)

- APPLICABLE TO ALL VESSELS.

Recommended	*Not Recommended*
Flushing boilers with fresh water. Draining thoroughly if not used.	Permitting asbestos dust to dissipate through cracks or breaks in covering, etc.
Cleaning and scaling boilers, uptakes, exhaust stacks, and related surfaces. Coating with rust inhibitant. Painting, if appropriate, to prevent corrosion.	Failing to take appropriate safety precautions while working with asbestos.
Ensuring that asbestos insulation on boilers, piping, bulkheads, etc., is contained.	Failing to document modifications to the plumbing system, or to retain and safely store fittings removed.
Isolating, if possible, any plumbing, piping, and valves that are to remain in use for management or operation of the vessel. Ensuring that valves are operable and properly packed, and that pressurized pipes and related joints and fittings are sound and free of leaks.	Failing to ensure that tanks are gas-free and oxygen-safe before they are entered by personnel and/or before heat generating work such as welding, cutting, etc., is performed in their vicinity.
Flushing and draining all piping, pumps, and related fixtures not required for management or operation of the vessel. Opening unused piping to the air to prevent condensation and associated deterioration.	
Flushing and draining water, fuel, and oil tanks if not required for use. Cleaning, scaling, and coating inside and out if possible.	
Stripping water from fuel and oil tanks that remain in use.	
Completely filling tanks or boilers that are required for use, in order to prevent condensation and retard deterioration of interior surfaces.	
Ensuring that all tanks are adequately vented. Removing or opening inspection ports of unused tankage in order to promote air circulation.	

GUIDELINES FOR PRESERVATION

Machinery, Tankage and Piping, Electrical Equipment, Mechanical Systems (continued)

- APPLICABLE TO ALL VESSELS –

Recommended	*Not Recommended*
Isolating electrical circuits not required for maintenance or use of the vessel. Eliminating ground losses, shorts, etc., from active circuits.	Failing to thoroughly document electrical systems before any changes are made; failing to thoroughly document changes or additions.
Drying out, if required, and cleaning corrosion from electric motors, generators, electrical panels, switch boards, etc. Applying appropriate moisture- and corrosion-inhibiting products to motor and generator commutators, armatures, electrical contacts, etc.	
Lubricating bearings, etc., of motors and generators. Rotating on a regular basis, if possible.	

GUIDELINES FOR PRESERVATION

Machinery, Tankage and Piping, Electrical Equipment, Mechanical Systems (continued)

- APPLICABLE TO VESSELS AFLOAT AND VESSELS EXPOSED TO WEATHER –

Recommended	*Not Recommended*
Thoroughly cleaning ducts, air passages, blowers, fan housings, etc., to remove corrosion and/or accumulated dirt. Recoating, if required.	Failing to recognize the danger of freezing (and consequent failure) of below-waterline fittings as a result of sub-freezing temperatures within the vessel, even though exterior water temperature might be above the freezing point.
Installing permanent or temporary covers over stacks, escape pipes, etc., to prevent water entry into machinery or boilers.	
Ensuring that through-hull fittings and fastenings are sound and operable if required for use.	
Blanking off below-waterline through-hull fittings not required for operation or maintenance of the vessel.	
Packing or heating sea chests and below-waterline through-hull fittings in sub-freezing weather, especially on vessels in fresh water.	
Installing an isolating transformer between a floating vessel's shore power line and shipboard electrical system.	
Installing ground fault interrupters in circuits likely to be used for tools, handheld lighting, pumps, or machinery in damp or wet areas of the vessel.	
Ensuring that ventilators, air intake grilles, etc., are provided with adequate covers or hoods to prevent entry of rainwater, etc.	

GUIDELINES FOR PRESERVATION

Health, Safety and Code Requirements; Access; Lighting; Mechanical and Alarm Systems

- APPLICABLE TO ALL VESSELS –

Recommended	*Not Recommended*
Complying with health and safety codes in such a manner that character-defining spaces, features, and finishes are preserved.	
Working with local code officials to investigate alternative life safety measures or variances available under some codes so that alterations or non-historic additions to the vessel can be avoided.	
Designing and constructing boarding ramps, ladders, stairs, gangplanks, etc., that do not require alteration, displacement, or removal of historic fabric or character-defining features of the vessel. Access over rails or bulwarks, or through existing gangways or ports, etc., is recommended.	
Utilizing wherever feasible, existing stairs, companion ladders, etc., for access within the vessel.	
Constructing or adding railings, barriers, etc., when required for safety or security, that do not detract from or diminish the historic character of the vessel.	
Utilizing, when possible, existing mechanical system elements such as wiring, electrical fixtures, plumbing and ducting in providing light, heat, ventilation, etc.	
Installing on floating vessels operable pumps of sufficient capacity and accessibility to deal with substantial flooding on short notice. Providing generators to ensure backup power for pumps and emergency lighting in case of power outages.	
Installing bilge alarms, security alarms, and fire detection equipment; ensuring that alarms are monitored at all times, and that emergency backup power is provided.	

GUIDELINES FOR PRESERVATION

Health, Safety and Code Requirements; Access; Lighting; Mechanical and Alarm Systems (continued)

- APPLICABLE TO ALL VESSELS –

Recommended	*Not Recommended*
Installing or activating a fire suppression system (a charged dry-chemical or inert gas system may be preferable to sprinklers).	
Designing and installing new lighting, electrical, mechanical, security, and fire suppression systems and devices in such a manner that character-defining spaces and features are preserved, and historic fabric and finishes are not damaged, displaced, or unnecessarily obscured.	
Developing comprehensive emergency plans that address in detail actions to be taken in case of fire, flooding, storms, etc. Conducting regular emergency drills for the purpose of training and testing the effectiveness of such plans. Coordinating plans with local fire, police, and rescue agencies; Coast Guard; etc.	
Removing from the vessel all flammables not required for operation or maintenance of the vessel; storing flammables that must remain on board in appropriate fireproof containers.	

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GUIDELINES FOR REHABILITATION

General Guidelines

- APPLICABLE TO ALL VESSELS –

Recommended	*Not Recommended*
Identifying, retaining, and preserving to the greatest extent possible original or historic fabric, as well as material, elements, features, and form that are important in defining the historic character of the vessel.	Removing or radically changing features that are important in defining the overall historic character of the vessel, thus diminishing its historic identity.
Thoroughly documenting the existing conditions of the vessel or any affected part of the vessel, including location, size, composition, method and pattern of fastenings, etc., of the affected elements, before performing work of any kind, **Including emergency repairs**.	Replacing or rebuilding elements or features that can be repaired, thus diminishing historic integrity.
Thoroughly assessing the potential impact of rehabilitation work on materials and features that are essential in defining the historic character of the vessel. Proceeding with the work only if those materials and features can be preserved and protected in the process.	Failing to document affected areas or elements before performing preservation work or emergency repairs, so that knowledge of conditions existing before commencement of work is not lost.
When rehabilitation work involves restoration (recovering the form, substance, and details of the vessel or its parts as they appeared at a particular time), applying the Guidelines or Restoration.	Failing to thoroughly investigate possible alternatives to alteration that would permit retention and preservation of historic fabric.
Making alterations for which there is no historical basis only when the alterations are absolutely necessary in order to provide for an efficient contemporary use.	
Carefully documenting material or features displaced, removed, or otherwise affected during treatment, even if the material is not of historic significance.	
Clearly and unobtrusively marking, by branding, stamping, affixing welded tabs, or other permanent means, the date of installation on any new material that is incorporated into the vessel.	

GUIDELINES FOR REHABILITATION

General Guidelines (continued)

- APPLICABLE TO ALL VESSELS –

Recommended	*Not Recommended*
Whenever possible, repairing rather than replacing historic elements, using materials and methods historically appropriate to the vessel. When deteriorated elements **must** be replaced, ensuring that the replacement matches the original as closely as possible in composition, size, form, and method of fastening.	Departing from original methods of construction or configuration or composition of material in making repairs or replacements, except when absolutely necessary for reasons of safety, or when required by regulation.
Designing and constructing new replacements for essential elements that are missing. These should be (1) replicas based on historical, pictorial, and physical documentation; or (2) new designs that are compatible with the historic character of the vessel.	Creating a false historical appearance because the replacement is based on faulty or insufficient evidence or documentation.
When safety considerations; compliance with fire, building, or health codes; Coast Guard regulations, etc., require replacement of original or historic materials or finishes with new material not historically appropriate to the vessel, making the replacement in such a manner that the finished work resembles the original as closely as possible in form, finish, detail, and appearance.	Failing to thoroughly document replacements that are not made in-kind, with the reasons for the substitution, etc.
Retaining, preserving, and providing protected storage for historically significant elements that must be removed to effect the rehabilitation.	Failing to document the position on the vessel, method of attachment and assembly, etc., of elements removed.
Incorporating new construction or installing new elements necessary for effective contemporary use of the vessel in such a manner that original or historic material, elements, and features are obscured, displaced, or altered to the least possible degree.	Failing to exercise care when cleaning, so that delicate historic elements or features are damaged.
Using the least abrasive and caustic cleaning agents possible when cleaning historic elements or finishes.	

GUIDELINES FOR REHABILITATION

General Guidelines (continued)

- APPLICABLE TO ALL VESSELS –

Recommended	*Not Recommended*
Stabilizing or removing corrosion on metal surfaces; sealing and coating with appropriate protective coatings.	Leaving corrosion on metal surfaces untreated, especially between or behind structural members.
When removing loose paint, scale, or corrosion from wood or metal surfaces, using the least abrasive method effective for the task.	Failing to reapply protective coating systems to metals or alloys that require them after stabilization or cleaning, so that accelerated corrosion occurs; failing to properly prepare surfaces before recoating.
Treating areas or pockets of active rot or pest infestation in wood with appropriate chemical fungicides, insecticides, preservatives, etc.	Removing coatings that are sound and intact, unless removal is required for good adhesion of new coatings.
Removing rot- or pest-infected wood when adjacent areas are threatened with contamination if stabilization measures such as chemical treatment, ventilation, drying, etc., cannot be effected within a reasonable time, or if structural stability is threatened.	Failing to assign a high priority to treatment of rot or pest infestation, thus ensuring further contamination.
Treating new wood with chemical preservatives (after shaping, drilling, and fitting) before incorporation into the vessel. Using fungicidal bedding compounds where appropriate.	Applying fungicides or other chemical treatments that are hazardous to humans or the natural environment after application.
Retaining, protecting, and preserving original or historic finishes whenever possible.	Failing to remove wood beyond the area of infestation when removal is required, thus permitting spread of contamination. Failing to thoroughly document removal of any material or features.
	Treating one material with chemical treatments that could have an adverse reaction with other materials in proximity.
	Failing to collect, document, and preserve samples when removal of the original finish is necessary.

GUIDELINES FOR REHABILITATION

General Guidelines (continued)

- APPLICABLE TO ALL VESSELS –

Recommended	*Not Recommended*
Discovering original paint colors and finishes; repainting or refinishing with colors based on the original.	Refinishing with colors that cannot be documented through research and investigation to be appropriate to the vessel and period.
Using "traditional" paints and protective coatings that match the original as closely as possible in composition, appearance, and other properties.	Painting historically unpainted or varnished wooden surfaces; varnishing or leaving unfinished surfaces that were historically painted.
Using modern, long-lasting, low maintenance protective coatings or fire retardant paints where required by regulation or health and safety codes, or where substantially improved protection and reduced maintenance will add to the life of the vessel, so long as the new finish is reversible and matches the original in color, texture, and appearance.	Applying a high-gloss, yacht-like finish to work boats, etc., unless specifically appropriate. Applying "new technology" products or methods on the recommendation of salesmen, shipyard personnel, etc., without first investigating the long term effects.

GUIDELINES FOR REHABILITATION

Hull, Decks, Structural Members, Deckhouses and Superstructure, Hull and Deck Openings

- APPLICABLE TO ALL VESSELS –

Recommended	*Not Recommended*
Ensuring that a vessel out of the water, whether permanently or temporarily, is adequately supported, including overhanging sections at bow and stern. Ensuring that the weight of masts, machinery, heavy deck equipment, etc., is transmitted to support blocks and/or shores, especially if deck beams, frames, keel or other major structural members are weak.	Giving the vessel an appearance it never had.
Retaining and preserving the vessel's historic outline or profile, including hull shape, arrangement of deckhouses or superstructure, etc.	Leaving untreated known structural problems that will cause continued deterioration and shorten the life of the vessel.
Repairing or, if necessary, replacing severely weakened, deteriorated, or missing structural members or hull material (planking, caulking, sheathing, hull plates, etc.) with new material of the same composition, size, scale, and methods of fastening and construction as the original (e.g., riveted iron plates should, if possible, be replaced with iron plates of the same size and shape, riveted in place; white oak planking should be replaced by white oak planks of the same dimensions, fastened in the same manner as the originals, etc.).	Removing, covering, or radically changing features of structural systems that are important in defining the overall historic character of the vessel.
Repairing or, if necessary, replacing deteriorated or missing deckhouse tops and sides, deck planks, deck plates, etc., with new material of the same composition, size, scale, and method of fastening as the original.	Replacing or covering over (except as a temporary protective measure) planked decks with plywood sheeting. Fiberglassing over a deck that was not originally so covered.
Recaulking and/or paying seams in wooden decks as required, using historically appropriate materials and methods.	Caulking or paying seams with historically inappropriate materials that do not have the same appearance as the original, or that are irreversible or non-removable.
Replacing deteriorated historically appropriate coverings on decks and deckhouse tops (painted canvas, concrete, linoleum, tar, etc.) with new material that matches the old in composition, size, shape, color, and texture after reestablishing the structural stability of the deck or deckhouse top.	Painting or otherwise covering decks that were historically unfinished.
	Applying deck coverings such as fiberglass, rubber, or vinyl compounds, etc., unless specifically appropriate to the vessel.

GUIDELINES FOR REHABILITATION

Hull, Decks, Structural Members, Deckhouses and Superstructure, Hull and Deck Openings (continued)

- APPLICABLE TO ALL VESSELS –

Recommended	*Not Recommended*
Retaining existing hull, deck and deckhouse openings such as doors, hatches, scuttles, windows, ports, port lights, etc. When alteration is required for contemporary use, making the alterations in such a manner that the openings retain an appearance historically appropriate to the vessel.	Altering existing hull, deck, and deckhouse openings so that they are incompatible with the vessel's historic appearance.
Duplicating the material, design, and hardware of historically appropriate openings if new openings or closures are used.	Installing picture windows, etc., in the hull; replacing port lights or traditional marine windows with aluminum sliding windows, etc.
Using original doors, windows, port lights, and other closures, with their associated hardware, when they can be repaired and used in place.	Installing new openings, closures, or hardware that are incompatible with the vessel's historic appearance or that obscure, damage, or destroy character-defining features.
Wherever possible, using existing hull and deck openings for access to and egress from the vessel.	Discarding original closures or hardware when they can be repaired and used.
Avoiding, if possible, breaching of the hull to provide access and egress. When safety, handicapped access, or regulations governing the contemporary use require cutting entryways through the hull, planning the work in such a way that there is the least possible loss of historic or character-defining material and that the vessel's structural integrity is preserved.	Discarding or destroying elements or portions of the vessel that could be reincorporated in a future restoration. Such elements (e.g., hull plating and frames cut away for access ports) should be documented, stored, and preserved.
Designing new deckhouses or structures, when required for contemporary use, that are compatible with the size, scale, material, and color of the vessel.	Adding new elements that overwhelm the existing historic deck structures, or that substantially change the outline of the vessel, or that are inappropriate to the vessel in design, material, etc.

GUIDELINES FOR REHABILITATION

Hull, Decks, Structural Members, Deckhouses and Superstructure, Hull and Deck Openings (continued)

- APPLICABLE TO VESSELS AFLOAT AND VESSELS EXPOSED TO WEATHER –

Recommended	*Not Recommended*
Using state-of-the-art, long-lasting, low maintenance coatings on underwater portions of the vessel's hull, provided that such coatings are reversible and that their application does not require destruction of historic fabric or departure from historic methods of bottom construction.	Coating underwater portions of the hull with gunnite, fiberglass, or other non-historic products that are non-reversible, that would interfere with historic methods of maintenance, or that could accelerate deterioration of bottom material.
Renewing or installing hull zincs.	Installing too many or too few zincs.
Determining the electrolytic potential of a floating vessel's hull; testing for stray electrical current in surrounding water. Designing an active or passive cathodic system to compensate.	Failing to monitor an active cathodic protection system, or allowing untrained staff to monitor or adjust system.
Ensuring that decks, hull topsides, deckhouses, etc., are weathertight.	Damaging or altering distinctive features or historic fabric in installation of temporary protective measures.
Rigging temporary or seasonal canopies, covers, etc., over vessel to prevent incursion of rainwater, if decks cannot be made watertight.	Deferring, or discounting as "minor," repairs that could prevent fresh water intrusion into structural members.
Renewing or repairing caulking, welds, riveted joints, seals, gaskets, collars, mast coats, etc., that allow rainwater to enter the vessel's interior or structural members.	Failing to consider the effect on the hull of weight newly added or redistributed as a result of the rehabilitation.
Ensuring that cracks, checks, open joints and seams in mouldings, waterways, margins, covering boards, rail caps, etc., are filled with appropriate fillers and properly coated to prevent water entry.	
Eliminating the causes of standing water on decks, deckhouse tops, etc. Cleaning, repairing, or replacing, if required, deck drains, scuppers, etc.	
Minimizing hogging, sagging, and shear forces by careful distribution of ballast, fuel, water, machinery and equipment, etc., under consultation with a naval architect.	

GUIDELINES FOR REHABILITATION

Interior Spaces, Including Cabins, Holds, Compartments, Trunks, Passageways, etc., with Appurtenant Joinery, Trim, Furnishings, and Fittings

- APPLICABLE TO ALL VESSELS –

Recommended	*Not Recommended*
Retaining the basic plan of a vessel's interior, including the relationship and size of spaces. Identifying and preserving interior spaces that are important in defining the overall historic character of the vessel.	Failing to thoroughly document the interior arrangements of the vessel before restoration or alteration, including finishes, joinery, fittings, hardware, etc.
Retaining and protecting, whenever possible, original or historic features such as furniture, fixtures, arcelin, mouldings, hardware, etc., that may be affected in the rehabilitation process.	Removing principal bulkheads and partitions to create a new appearance.
Protecting and maintaining interior surfaces and finishes through appropriate treatments such as cleaning, rust removal, and reapplication of protective coating systems.	Failing to maintain interior surface coatings on a cyclical basis so that loss or deterioration of interior features and hardware results.
Protecting interior features and finishes against arson and vandalism before work begins by erecting protective fencing and other barriers, installing fire alarm systems that are keyed to local protection agencies, etc.	Radically changing the type of surface finishes or their color, such as painting a previously varnished wood feature.
Installing new partitions, etc., when required for contemporary use, in such a manner that the new construction is removable, and that it causes the least possible damage or obstruction of character-defining features.	Permitting unauthorized entry into historic ships so that woodwork, doors, hardware, light fixtures, mechanical equipment, or decorative materials can be damaged or stolen.
Wherever possible, locating service functions such as mechanical equipment, offices, bathrooms, etc., in spaces originally used for those purposes; otherwise, placing these in non-character-defining spaces of the vessel.	Stripping interiors of features such as woodwork, doors, hardware, light fixtures, mechanical equipment, or of decorative materials.
Retaining existing historically appropriate doors and doorways, stairs, ladders, etc., for access within the vessel.	Removing historically appropriate material, hardware, or architectural features except where essential for safety or efficiency.

GUIDELINES FOR REHABILITATION

Interior Spaces, Including Cabins, Holds, Compartments, Trunks, Passageways, etc., with Appurtenant Joinery, Trim, Furnishings, and Fittings (continued)

- APPLICABLE TO ALL VESSELS –

Recommended	*Not Recommended*
Enclosing character-defining interior stairways, when required by code, in such a manner that their historic character is retained.	Failing to take new use patterns into consideration so that interior features are damaged.
Locating new stairways or elevators required by code in areas where they will least damage or obscure character-defining spaces, features, or finishes.	Using a substitute material for the replacement part that does not convey the visual appearance of the surviving parts or portions of the interior feature or finish, or that is physically or chemically incompatible.
Installing protective coverings in area of heavy pedestrian traffic to protect historic features such as arcelin, historic finishes, and the character-defining details.	Removing a character-defining feature or finish that is unrepairable and not replacing it; or replacing it with a new feature or finish that does not convey the same visual appearance.
Replacing missing or unrepairable features such as hardware, lamps or light fixtures, furnishings, fabrics, mouldings, arcelin, etc., only after thorough research. Basing designs for new material on actual knowledge obtained from the remaining physical evidence of the feature, or on photographs, drawings, measurements, reliable accounts, etc., specific to the vessel under rehabilitation or similar vessels of the same period.	Breaching, or removing sections of, deck, hull, ceiling, or interior arcelin in order to create circulation between frame bays, etc., without first determining that the effect on the vessel's hull strength will be acceptable.
Removing debris and dirt from all interior spaces, including bilges, frame bays, etc.	
Retaining and documenting miscellaneous objects discovered on board during rehabilitation treatment, especially items such as moulding fragments, turnings, hardware, fasteners, etc., that may be useful in replicating features that are missing.	
Making provision for adequate ventilation of interior spaces in the restored vessel in such a manner that historic fabric and the historic character of spaces are preserved to the greatest extent possible and structural integrity is not compromised.	

GUIDELINES FOR REHABILITATION

Interior Spaces, Including Cabins, Holds, Compartments, Trunks, Passageways, etc., with Appurtenant Joinery, Trim, Furnishings, and Fittings (continued)

- APPLICABLE TO VESSELS AFLOAT AND VESSELS EXPOSED TO WEATHER –

Recommended	*Not Recommended*
Installing watertight bulkheads, machinery enclosures, etc., in such a manner that historic fabric and features are affected to the least possible degree.	Failing to thoroughly document addition of non-historic features, including justification for the addition, details of construction, etc.
Ensuring that limber holes, scuppers, drains, sumps, pump wells and screens, etc., are free of debris.	Failing to distribute ballast, fuel, water, anchor chain, etc., in such a manner that hogging and sagging forces are minimized.
Installing new drains, scuppers, limber holes, etc., if necessary to provide drainage and prevent standing water in below-deck areas. Designing drains that are historically appropriate in appearance and construction, and that require minimal displacement of historic fabric.	
Ensuring that dry ballast is clean, appropriately coated, and installed in such a manner that air circulation and physical access to the inside of the hull are provided.	

GUIDELINES FOR REHABILITATION

Equipment, Including Masts and Spars, Rigging, Boats, Deck Equipment, Armament, etc.

- APPLICABLE TO ALL VESSELS –

Recommended	*Not Recommended*
Retaining and preserving existing masts, spars, rigging, equipment, armament, etc., to the greatest extent possible.	Failing to thoroughly document repairs or replacement of material, with the reasons for action taken.
Retaining the existing form and configuration of a vessel's rig, arrangement of deck equipment and machinery, armament, etc.	Creating a false historic appearance by changing or adding to the rig, equipment, armament, etc. Replacing historic elements with, or introducing, elements that are historically inappropriate to the vessel.
Removing rotten, decayed, or wasted portions of masts, spars, or other elements when structural stability is affected or when adjacent areas are threatened with contamination. Effecting repairs in such a manner that existing material is preserved to the greatest extent possible, and that the completed repair matches the surrounding area in texture, finish, etc.	Except when specifically appropriate to the vessel, replacing wooden masts or spars with steel, or vice versa.
Replacing missing, inappropriate, or unsound masts, spars, and associated elements with new material that is historically appropriate in composition, size, shape, method of fastening, and finish, to the vessel.	Painting spars that were historically left bright or slushed, or vice versa.
Thoroughly inspecting all elements of a vessel's tophamper to identify safety hazards and undetected deterioration. Paying special attention to ladders, footropes, tops and platforms, etc., and to slings, yokes, rings and eyes, and other load-bearing elements, with their associated fittings. Repairing or replacing when necessary with materials that match the original as closely as possible in composition, size, appearance, method of fastening, etc.	Failing to ensure that ironwork, blocks, etc., are properly sealed and coated.
Applying sound historically appropriate coatings to masts, spars, blocks, and associated structures and fittings after proper cleaning and preparation. When refinishing, matching the historic coatings as closely as possible in color, texture, and appearance.	

GUIDELINES FOR REHABILITATION

Equipment, Including Masts and Spars, Rigging, Boats, Deck Equipment, Armament, etc. (continued)

- APPLICABLE TO ALL VESSELS –

Recommended	*Not Recommended*
Replacing unsound or missing standing and running rigging with new material that matches the original in composition, size, color, texture, etc.	Replacing hemp rigging with wire (or vice versa) when there is no historical basis for the change; replacing lanyards and deadeyes with turnbuckles, or vice versa, without historical justification.
Applying penetrating wire rope preservative to wire rigging.	Fitting a vessel with boats that are not historically appropriate in type, size, material, finish, or method of construction.
Renewing worming, arceling, service, seizings, etc., where required, using historically appropriate materials and methods.	Retaining deck equipment that is not appropriate to the vessel.
Applying historically appropriate protective coatings to standing rigging.	
Retaining, and restoring if required, boats that are historically appropriate to the vessel.	
When missing boats are essential to establishing the historic character or use of vessel, replacing with (1) boats of the same type, style, size, age, and appearance as the original; (2) accurate copies, based on the originals; or (3) copies that have the general form and appearance of the original.	
Repairing or replacing davits, chocks, skids, and other shipboard elements associated with support and handling of boats. Ensuring that replacement elements are historically appropriate to the vessel in material, method of construction, scale, finish and placement.	
Retaining existing deck equipment (capstans, windlasses, winches, deck pumps, etc.)that are historically appropriate to the vessel. Repairing, if necessary.	
When missing deck equipment or armament is essential to establishing the historic character or use of vessel, replacing with (1) elements of the same type, style, size, age, and appearance as the original; (2) accurate copies, based on the originals; or (3) copies that have the general form	

and appearance of the original.

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GUIDELINES FOR REHABILITATION

Equipment, Including Masts and Spars, Rigging, Boats, Deck Equipment, Armament, etc. (continued)

- APPLICABLE T0 VESSELS AFLOAT AND VESSELS EXPOSED TO WEATHER –

Recommended	*Not Recommended*
Ensuring that water is not permitted to enter masts, spars, or the vessel structure through cracks, checks, open joints, wasted iron or steel, inadequately bedded or loose fittings, etc.	
Filling open joints and end-grain checks, especially at mastheads, and filling horizontal checks on upper surfaces of wooden spars, with appropriate fillers.	
Installing stopwaters in vertical checks on wooden masts, etc., above the point of deck penetration.	
Providing ventilated covers, historically appropriate in design and material, for open boats.	
Filling cracks, checks, open joints and seams, etc., on exposed boats. Applying sound protective coatings.	
Ensuring that water is not permitted to enter gun tubes or sensitive mechanisms of armament or machinery. Providing weatherproof covers for elements such as breech mechanisms, gun muzzles, control boxes, etc.	
Ensuring that deck equipment, armament, deck-mounted machinery, and associated mounts or bases are bedded or secured in such a manner as to prevent incursion of moisture between mount and deck, or into the vessel structure.	
Ensuring that mast coats, collars, electrical cable packing, caulking or seals around through-deck elements are intact and weather-tight. Replacing, when necessary, with new material that is historically appropriate.	

GUIDELINES FOR REHABILITATION

Equipment, Including Masts and Spars, Rigging, Boats, Deck Equipment, Armament, etc. (continued)

- APPLICABLE TO VESSELS AFLOAT AND VESSELS EXPOSED TO WEATHER –

Recommended	*Not Recommended*
Installing life rafts, safety equipment, and other new elements required by Coast Guard regulations in such a manner that historic fabric and the overall historic appearance of the vessel are destroyed or diminished to the least possible extent, while at the same time ensuring maximum accessibility and utility of safety equipment.	

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GUIDELINES FOR REHABILITATION

Machinery, Tankage and Piping, Electrical Equipment, Mechanical Systems (continued)

- APPLICABLE TO ALL VESSELS –

Recommended	*Not Recommended*
Retaining and preserving to the greatest extent possible existing machinery, tankage, electrical equipment, mechanical systems, etc., that are important in determining the overall historic character of the vessel.	Replacing missing machinery with elements that are inappropriate, in vintage, type, size, or appearance, to the vessel as it existed at the time represented by the restoration.
Removing, when not essential for safety or maintenance of the restored vessel, machinery, electrical equipment, piping, wiring, etc., that are non-historic or inappropriate to the vessel.	Failing to recoat historically painted ferrous elements after removal of paint or treatment of corrosion.
When removal or replacement of character-defining engines, machinery, electrical or mechanical equipment, etc., is necessitated by the new use, the elements removed should be carefully documented and preserved in another location, especially if they could be reinstalled in the vessel in a future restoration.	Painting historically unpainted surfaces, or leaving bright surfaces that were historically painted.
Thoroughly documenting the characteristics, placement, method of attachment, fastening, etc., of elements temporarily or permanently displaced or removed in the process of restoration.	
Replacing, if possible, missing engines, boilers, motors, etc., that are essential in defining the historic character of the vessel with (1) elements of the same vintage, type, size, and appearance as those replaced; (2) accurate copies of the originals; or (3) copies that have the general form and appearance as the originals.	
Cleaning dirt, loose paint, corrosion, etc., from machinery, tankage, piping, electrical equipment, etc., using the least caustic or abrasive effective means.	
Coating historically unpainted machinery surfaces with gun grease, oil, or other appropriate products to prevent corrosion.	

GUIDELINES FOR REHABILITATION

Machinery, Tankage and Piping, Electrical Equipment, Mechanical Systems (continued)

- APPLICABLE TO ALL VESSELS –

Recommended	*Not Recommended*
Removing lagging or insulation that did not exist in the vessel at the time represented by the restoration. Retaining asbestos insulation only if it is safely contained.	Failing to take appropriate safety precautions when working with or near asbestos.
Cleaning and scaling boilers, uptakes, exhaust stacks, and related surfaces. Coating with rust inhibitant. Painting, if appropriate, to prevent corrosion.	Permitting asbestos dust to dissipate through cracks or breaks in covering, etc.
Maintaining and using, wherever possible, existing plumbing, piping, ducting, and related fixtures for the new use.	Installing “dropped” or false overheads to conceal mechanical systems, thus destroying the proportions of character-defining spaces.
Installing new machinery, tanks, plumbing, wiring, and associated equipment required for contemporary use in such a manner that historic fabric is obscured or destroyed to the least possible degree, and that character-defining features and spaces are preserved.	Failing to document modifications to the plumbing system, or to retain and safely store any historic fittings removed.
Wherever possible, locating new machinery, electrical panels, mechanical equipment, etc., in secondary (non-character-defining) spaces.	Failing to ensure that tanks, voids, etc., are gas-free and oxygen-safe before entry and/or before hot work such as welding, cutting, etc., is performed nearby.
Isolating, if possible, any plumbing, piping, and valves that are to remain in use for management or operation of the vessel. Ensuring that valves are operable and properly packed, and that	
Pressurized pipes and related joints and fittings are sound and leak-free.	
Flushing and draining all piping, pumps, and related fixtures not required for management or operation of the vessel. Opening unused piping to the air to prevent condensation and associated deterioration.	
Flushing and draining water, fuel, and oil tanks if not required for use. Cleaning, scaling, and coating inside and out if possible.	

GUIDELINES FOR REHABILITATION

Machinery, Tankage and Piping, Electrical Equipment, Mechanical Systems (continued)

- APPLICABLE TO ALL VESSELS –

Recommended	*Not Recommended*
Stripping water from fuel and oil tanks that remain in use.	Failing to thoroughly document electrical systems before any changes are made; failing to thoroughly document changes or additions.
Completely filling tanks or boilers that are required for use, in order to prevent condensation and retard deterioration of interior surfaces.	
Ensuring that all tanks are adequately vented. Removing or opening inspection ports of unused tankage in order to promote air circulation.	
Isolating electrical circuits not required for maintenance or use of the vessel. Eliminating ground losses, shorts, etc., from active circuits.	

GUIDELINES FOR REHABILITATION

Machinery, Tankage and Piping, Electrical Equipment, Mechanical Systems (continued)

- APPLICABLE TO VESSELS AFLOAT AND VESSELS EXPOSED TO WEATHER –

Recommended	*Not Recommended*
When contemporary use calls for repowering of an auxiliary or power vessel, installing the new engine(s), shafts, and auxiliaries, if possible, in the same space occupied by the original engines, shafts, etc.	Failing to carefully engineer installation of propulsion machinery, taking into consideration added weight, vibration, destruction or displacement of historic fabric, etc.
Installing engines, auxiliaries, propeller shafts, etc., when required for contemporary use of a previously unpowered vessel, in such a manner that interior character-defining features and spaces are obscured or displaced to the least possible degree, and that the hull form is altered as little as possible.	Failing to recognize the danger of freezing (and consequent failure) of below-waterline fittings as a result of sub-freezing temperatures within the vessel, even though exterior water temperature might be above the freezing point.
Installing permanent or temporary covers over stacks, escape pipes, etc., to prevent water entry into machinery or boilers.	
Ensuring that through-hull fittings and fastenings are sound and operable if required for use.	
Blanking off below-waterline through-hull fittings not required for operation or maintenance of the vessel.	
Packing or heating sea chests and below-waterline through-hull fittings in freezing weather, especially on vessels in fresh water.	
Installing an isolating transformer between a floating vessel's shore power line and shipboard electrical system.	
Installing ground fault interrupters in circuits likely to be used for pumps or machinery in damp or wet areas of the vessel.	
Ensuring that ventilators, air intake grilles, etc., are provided with adequate covers or hoods to prevent entry of rainwater, etc.	

GUIDELINES FOR REHABILITATION

Health, Safety and Code Requirements; Access; Lighting; Mechanical and Alarm Systems

- APPLICABLE TO ALL VESSELS –

Recommended	*Not Recommended*
Complying with health and safety codes in such a manner that character-defining spaces, features, and finishes are preserved.	
Working with local code officials to investigate alternative life safety measures or variances available under some codes so that alterations or non-historic additions to the vessel can be avoided.	
Designing and constructing boarding ramps, ladders, stairs, gangplanks, etc., that do not require alteration, displacement, or removal of historic fabric or character-defining features of the vessel. Access over rails or bulwarks, or through existing gangways or ports, etc., is recommended.	
Utilizing, wherever feasible, existing stairs, companion ladders, etc., for access within the vessel.	
Constructing or adding railings, barriers, etc., when required for safety or security, that do not detract from or diminish the historic character of the vessel.	
Utilizing, when possible, existing mechanical system elements such as wiring, electrical fixtures, plumbing and ducting in providing light, heat, ventilation, etc.	
Installing on floating vessels operable pumps of sufficient capacity and accessibility to deal with substantial flooding on short notice. Providing generators to ensure backup power for pumps and emergency lighting in case of power outages.	
Installing bilge alarms, security alarms, and fire detection equipment; ensuring that alarms are monitored at all times, and that emergency backup power is provided.	

GUIDELINES FOR REHABILITATION

Health, Safety and Code Requirements; Access; Lighting; Mechanical and Alarm Systems (continued)

- APPLICABLE TO ALL VESSELS –

Recommended	*Not Recommended*
Installing or activating a fire suppression system (a charged dry-chemical or inert gas system may be preferable to sprinklers).	
Designing and installing new lighting, electrical, mechanical, security, and fire suppression systems and devices in such a manner that character-defining spaces and features are preserved, and historic fabric and finishes are not damaged, displaced, or unnecessarily obscured.	

GUIDELINES FOR RESTORATION

General Guidelines

- APPLICABLE TO ALL VESSELS –

Recommended	*Not Recommended*
Identifying, retaining, and preserving to the greatest extent possible original or historic fabric, as well as material, elements, features, and form that are important in defining the historic character of the vessel.	Sacrificing historic significance to romanticism or popular appeal in making restoration decisions.
Choosing a specific time or period in a vessel's history to be represented by the restoration. In making this decision, carefully assessing: - the availability of information about the appearance of the vessel at the time or period selected; - the historic, cultural, and technological significance of the vessel in the period selected; - the degree to which the vessel's historic fabric will be affected by restoration to a particular period.	Giving the vessel an appearance it never had.
Basing decisions for restoration work on actual knowledge of the past appearance of the vessel, obtained from photographs, drawings, measurements, reliable descriptions, etc.	Failing to document thoroughly any features removed prior to their removal.
Removing features that are known to have been added to the vessel after the period represented by the restoration.	Applying new material that is inappropriate or that was not available in the period represented by the restoration.
Replacing by new construction missing elements or features that are known to have existed in the period represented by the restoration. Wherever possible, ensuring that replacement material is the same in composition, size, detail, and method of fastening or incorporation as the original.	

GUIDELINES FOR RESTORATION

General Guidelines (continued)

- APPLICABLE TO ALL VESSELS –

Recommended	*Not Recommended*
Whenever possible, repairing rather than replacing historic elements, using materials and methods historically appropriate to the vessel. When deteriorated elements must be replaced, ensuring that the replacement matches the original as closely as possible in composition, size, form, and method of fastening.	Departing from original methods of construction or configuration of material in making repairs or replacements, especially where changes will be visible.
Carefully documenting material or features displaced, removed, or otherwise affected during treatment, even if the material is not of historic significance.	Failing to document or preserve material samples for possible future use in manufacturing replacements.
Clearly and unobtrusively marking, by branding, stamping, affixing welded tabs, or other permanent means, the date of installation on any new or replacement material that is incorporated into the vessel.	Failing to thoroughly document repairs or replacement of material, with reasons for the action taken.
Using the gentlest means possible when cleaning historic elements or finishes.	Failing to exercise care when cleaning, so that delicate historic elements or features are damaged.
Stabilizing or removing corrosion on metal surfaces; sealing and coating with appropriate protective coatings.	Leaving corrosion on metal surfaces untreated, especially between or behind structural members.
When removing loose paint, scale, or corrosion from wood or metal surfaces, using the least abrasive method effective for the task.	Failing to reapply protective coating systems to metals or alloys that require them after stabilization or cleaning, so that accelerated corrosion occurs.
Treating areas or pockets of active rot or pest infestation in wood with appropriate chemical fungicides, insecticides, preservatives, etc.	Removing coatings that are sound and intact, unless removal is required for good adhesion of new coatings.
	Failing to assign a high priority to treatment of rot or pest infestation, thus ensuring further contamination.
	Applying fungicides or other chemical treatments that are hazardous to humans or the natural environment after application.

GUIDELINES FOR RESTORATION

- General Guidelines (continued) APPLICABLE TO ALL VESSELS –

Recommended	*Not Recommended*
Removing rot- or pest-infected wood when adjacent areas are threatened with contamination, if stabilization measures such as chemical treatment, ventilation and drying, etc., cannot be effected within a reasonable time, or if structural stability is threatened.	Failing to remove wood beyond the area of infestation when removal is required, thus permitting spread of contamination. Failing to thoroughly document removal of any material or features.
Treating new wood with chemical preservatives (after shaping, drilling, and fitting) before incorporation into the vessel. Using fungicidal bedding compounds where appropriate.	Treating one material with chemical treatments that could have an adverse reaction with other materials in proximity.
Retaining, protecting, and preserving original or historic finishes whenever possible.	Failing to collect, document, and preserve samples when removal of the original finish is necessary.
Discovering original paint colors and finishes; repainting or refinishing with colors based on the original.	Refinishing with colors that cannot be documented through research and investigation to be appropriate to the vessel and period.
Using “traditional” paints and protective coatings that match the original as closely as possible in composition, appearance, and other properties.	Painting historically unpainted or varnished surfaces; varnishing or leaving unfinished surfaces that were historically painted.
	Applying a high-gloss, yacht-like finish to work boats, etc., unless specifically appropriate.
	Sealing, or applying impermeable coatings to, wood structural members that have high moisture content, thus promoting rot and preventing drying.

GUIDELINES FOR RESTORATION

General Guidelines (continued)

- APPLICABLE TO ALL VESSELS –

Recommended	*Not Recommended*
Using modern, long-lasting, low maintenance protective coatings where substantially improved protection and reduced maintenance will add to the life of the vessel, so long as the new finish is reversible, and matches the original in color, texture, and appearance.	Applying "new technology" products or methods on the recommendation of salesmen, shipyard personnel, etc., without first investigating the long term effects.
Following Guidelines for Preservation after restoration work is complete.	Failing to ensure that all surfaces, whether wood or metal, receive proper preparation before application of coatings. This may include scaling, grit blasting, dereasin, deacidifying, etching, drying, priming, etc.

GUIDELINES FOR RESTORATION

Hull, Decks, Structural Members, Deckhouses and Superstructure, Hull and Deck Openings

- APPLICABLE TO ALL VESSELS. –

Recommended	*Not Recommended*
Ensuring that a vessel out of water, whether permanently or temporarily, is adequately supported, including overhanging sections at bow and stern. Ensuring that the weight of masts, machinery, heavy deck equipment, etc., is transmitted to support blocks and/or shores, especially if deck beams, frames, keel or other major structural members are weak.	Leaving untreated known structural problems that will cause continued deterioration and shorten the life of the vessel.
Removing deckhouses, bulwarks, extensions of the hull or superstructure, structural members, etc., that were added to the vessel after the period represented by the restoration.	Replacing or covering over (except as a temporary protective measure) planked decks with plywood sheeting. Fiberglassing over a deck that was not originally so covered.
Recovering the hull form that existed in the period represented by the restoration, using materials and methods of construction that are historically appropriate, and making every effort to retain and minimize displacement of historic fabric.	
Repairing or, if necessary, replacing severely weakened, deteriorated, or missing structural members or hull material (planking, caulking, sheathing, hull plates, etc.) with new material of the same composition, size, scale, and methods of fastening and construction as the original (e.g., riveted iron plates should, if at all possible, be replaced with iron plates of the same size and shape, riveted in place; white oak planking should be replaced by white oak planks of the same dimensions, fastened in the same manner as the originals, etc.).	
Repairing or, if necessary, replacing deteriorated or missing deckhouse tops and sides, deck planks, deck plates, etc., with new material of the same composition, size, scale, and method of fastening as the original.	

GUIDELINES FOR RESTORATION

Hull, Decks, Structural Members, Deckhouses and Superstructure, Hull and Deck Openings (continued)

- APPLICABLE TO ALL VESSELS –

Recommended	*Not Recommended*
Recaulking and/or paying seams in wooden decks as required, using historically appropriate materials and methods.	Caulking or paying seams with historically inappropriate materials that do not have the same appearance as the original, or that are irreversible or non-removable.
Replacing deteriorated historically appropriate coverings on decks and deckhouse tops (painted canvas, concrete, linoleum, tar, etc.) with new material that matches the old in composition, size, shape, color, and texture after reestablishing the structural stability of the deck or deckhouse top.	Painting or otherwise covering decks that were historically unfinished.
	Applying deck coverings such as fiberglass, rubber, or vinyl compounds, etc., unless specifically appropriate to the vessel.
Retaining existing hull, deck, and deckhouse openings, such as doors, hatches, scuttles, windows, ports, port lights, etc., when they are appropriate to the period represented by the restoration.	Installing new openings, closures, or hardware that are incompatible with the vessel's historic appearance or that obscure, damage, or destroy character-defining features.
Duplicating the material, design, and hardware of historically appropriate openings or closures if new openings or closures are used.	Discarding original closures or hardware when they can be repaired and used.
Using original doors, windows, port lights, and other closures, with their associated hardware, when they can be repaired and used in place.	

GUIDELINES FOR RESTORATION

Hull, Decks, Structural Members, Deckhouses and Superstructure, Hull and Deck Openings (continued)

- APPLICABLE TO VESSELS AFLOAT AND VESSELS EXPOSED TO WEATHER –

Recommended	*Not Recommended*
Using state-of-the-art, long-lasting, low maintenance coatings on underwater portions of the vessel's hull, provided that such coatings are reversible and that their application does not require destruction of historic fabric or departure from historic methods of bottom construction.	Coating underwater portions of the hull with gunnite, fiberglass, or other non-historic products that are non-reversible, that would interfere with historic methods of maintenance, or that could accelerate deterioration of bottom material.
Renewing or installing hull zincs.	Installing too many or too few zincs.
Determining the electrolytic potential of a floating vessel's hull; testing for stray electrical current in surrounding water. Designing an active or passive cathodic system to compensate.	Failing to monitor an active cathodic protection system, or allowing untrained staff to monitor or adjust system.
Rigging temporary or seasonal canopies, covers, etc., over vessel to prevent incursion of rainwater, if decks cannot be made watertight.	Damaging or altering distinctive features or historic fabric in installation of temporary protective measures.
Relieving hogging, sagging, and shear forces caused by improper distribution of ballast, fuel, water, etc., after consultation with a naval architect.	Deferring, or discounting as "minor," repairs that could prevent fresh water intrusion into structural members.
Ensuring that decks, hull topsides, deckhouses, etc., are weathertight.	
Renewing or repairing caulking, welds, riveted joints, seals, gaskets, collars, mast coats, etc., that allow rainwater to enter the vessel's interior or structural members.	
Ensuring that cracks, checks, open joints and seams in mouldings, waterways, margins, covering boards, rail caps, etc., are filled with appropriate fillers and properly coated to prevent water entry.	
Eliminating the causes of standing water on decks, deckhouse tops, etc. Cleaning, repairing, or replacing, if required, deck drains, scuppers, etc.	

GUIDELINES FOR RESTORATION

Hull, Decks, Structural Members, Deckhouses and Superstructure, Hull and Deck Openings (continued)

- APPLICABLE TO VESSELS AFLOAT AND VESSELS EXPOSED TO WEATHER –

Recommended	*Not Recommended*
Adjusting the trim of a floating vessel by repositioning, removal, or addition of ballast, water, fuel, anchor chain, etc., in order to render existing deck drains and scuppers effective. Ensuring that the stability of the vessel is maintained in the operation, and that undue hull stresses that might cause hogging, sagging, etc., are not introduced.	Installing ballast that cannot be removed, or that renders the inside of the hull inaccessible (e.g., concrete poured between floors).
Installing new drains or scuppers in topside areas that hold standing water, if decay or damage would result from lack of drainage. Designing new drains that are historically appropriate in appearance and construction, and that require minimal displacement of historic fabric.	Failing to thoroughly document addition of non-historic features, with justification for the addition, details of construction, etc.
Ensuring that hull, deck, and superstructure openings and their closures are sound and weathertight. Repairing, if required, with historically appropriate materials. Where replacement is necessary, duplicating the material, design, and hardware of the original.	

GUIDELINES FOR RESTORATION

Interior Spaces, Including Cabins, Holds, Compartments, Trunks, Passageways, etc., with Appurtenant Joinery, Trim, Furnishings, and Fittings

- APPLICABLE TO ALL VESSELS –

Recommended	*Not Recommended*
Retaining or recreating the basic plan of a vessel's interior as it existed at the time represented by the restoration, including the relationship and size of spaces.	Failing to thoroughly document the interior arrangements of the vessel before restoration. Failing to preserve removed elements of particular historic or architectural significance.
Removing bulkheads, decks, platforms, doors, hatches, fixtures, furniture, etc., that were added to the vessel after the period represented by the restoration.	Failing to provide proper protection of interior features and finishes during work, so that they are gouged, scratched, dented, or otherwise damaged.
Retaining and protecting, whenever possible, original or historic features such as furniture, fixtures, arcelin, mouldings, hardware, etc., that may be affected in the restoration process.	Removing historically appropriate material, hardware, or architectural features except where essential for safety or efficiency.
Retaining existing historically appropriate doors and doorways, stairs, ladders, etc., for access within the vessel.	Installing new material that is inappropriate or was unavailable at the time represented by the restoration, such as plastic, vinyl, imitation wood, etc.
Replacing missing features such as hardware, lamps or light fixtures, furnishings, fabrics, mouldings, arcelin, etc., only after thorough research. Basing designs for new material on actual knowledge obtained from photographs, drawings, measurements, reliable accounts, etc., specific to the vessel under restoration or similar vessels of the same period.	Installing features, fixtures, or furnishings for which there is no historical evidence.
Removing debris and dirt from all interior spaces, including bilges, frame bays, etc.	

GUIDELINES FOR RESTORATION

Interior Spaces, Including Cabins, Holds, Compartments, Trunks, Passageways, etc., with Appurtenant Joinery, Trim, Furnishings, and Fittings (continued)

- APPLICABLE TO ALL VESSELS –

Recommended	*Not Recommended*
Protecting and maintaining interior surfaces and finishes through appropriate treatments such as cleaning, rust removal, and reapplication of protective coating systems.	Failing to maintain interior surface coatings on a cyclical basis so that loss or deterioration of interior features and hardware results.
Protecting interior features and finishes against arson and vandalism before project work begins by erecting protective fencing and other barriers, installing fire alarm systems that are keyed to local protection agencies, etc.	Radically changing the type of surface finishes or their color, such as painting a previously varnished wood feature.
Retaining and documenting miscellaneous objects discovered on board during restoration treatment, especially items such as moulding fragments, turnings, hardware, fasteners, etc., that may be useful in replicating features that are missing.	Permitting unauthorized entry into historic ships so that interior features and finishes are exposed to vandalism and theft.
Making provision for adequate ventilation of interior spaces in the restored vessel in such a manner that historic fabric and the historic character of spaces are preserved to the greatest extent possible and structural integrity is not compromised.	Stripping interiors of features such as woodwork, doors, hardware, light fixtures, mechanical equipment, or of decorative materials.
	Breaching, or removing sections of, deck, hull, ceiling, or interior arcelin in order to create circulation between frame bays, etc., without first determining that the effect of such an action on the vessel's hull's strength will be acceptable.

GUIDELINES FOR RESTORATION

Interior Spaces, Including Cabins, Holds, Compartments, Trunks, Passageways, etc., with Appurtenant Joinery, Trim, Furnishings, and Fittings (continued)

- APPLICABLE TO VESSELS AFLOAT AND EXPOSED TO WEATHER –

Recommended	*Not Recommended*
Ensuring that dry ballast is clean, appropriately coated, and installed in such a manner that air circulation and physical access to the inside of the hull are provided.	Failing to distribute ballast, fuel, water, anchor chain, etc., in such a manner that hogging and sagging forces are minimized.
Ensuring that limber holes, scuppers, drains, sumps, pump wells, etc., are free of debris.	Failing to thoroughly document addition of non-historic features, including justification for the addition, details of construction, etc.
Installing new drains, scuppers, limber holes, etc., if necessary to provide drainage and prevent standing water in below-deck areas. Designing drains that are historically appropriate in appearance and construction, and that require minimal displacement of historic fabric.	
Coating hard-to-reach areas of the inside of iron and steel hulls with penetrating coatings, such as "Eureka Fluid," that work their way under frames, etc., to prevent rust.	

GUIDELINES FOR RESTORATION

Equipment, Including Masts and Spars, Rigging, Boats, Deck Equipment, Armament, etc.

- APPLICABLE TO ALL VESSELS –

Recommended	*Not Recommended*
Retaining and preserving existing masts, spars, rigging, equipment, armament, etc., that are appropriate to the vessel and its use in the period represented by the restoration.	Failing to thoroughly document repairs or replacement of material.
Recreating the form and configuration of a vessel's rig, arrangement of deck equipment, armament, etc., as they existed at the time represented by the restoration, incorporating to the greatest degree possible existing original or historic elements and material.	Except when specifically appropriate to the vessel, replacing wooden masts or spars with steel, or vice versa.
Removing rotten, decayed, or wasted portions of masts, spars, or other elements when structural stability is affected or when adjacent areas are threatened with contamination. Effecting repairs in such a manner that existing material is preserved to the greatest extent possible, and that the completed repair matches the surrounding area in texture, finish, etc.	Painting spars that were bright or slushed at the time represented by the restoration, or vice versa.
Replacing missing, inappropriate, or unsound masts, spars, and associated elements with new material that is historically appropriate, in composition, size, shape, method of fastening, and finish, to the vessel as it appeared in the period represented by the restoration.	Failing to ensure that ironwork, blocks, etc., are properly sealed and coated.
Applying sound, historically appropriate coatings to masts, spars, blocks, and associated structures and fittings after proper cleaning and preparation. When refinishing, matching the historic coatings as closely as possible in color, texture, and appearance.	Replacing hemp rigging with wire (or vice versa) when there is no historical basis for the change; replacing lanyards and deadeyes with turnbuckles, or vice versa, without historical justification.
Replacing unsound or missing rigging with new material that matches in composition, size, color, texture, etc., the rigging that was in place at the time represented by the restoration.	
Applying wire rope preservative to wire rigging.	

GUIDELINES FOR RESTORATION

Equipment, Including Masts and Spars, Rigging, Boats, Deck Equipment, Armament, etc. (continued)

- APPLICABLE TO ALL VESSELS –

Recommended	*Not Recommended*
Renewing worming, arceling, service, seizings, etc., where appropriate, using historically appropriate materials and methods.	Fitting a vessel with boats that are not historically appropriate in type, size, material, finish, or method of construction.
Applying historically appropriate protective coatings to standing rigging.	Retaining deck equipment that is not appropriate to the vessel as it existed in the period represented by the restoration.
Retaining, and restoring if required, boats that are historically appropriate to the vessel as it existed in the period represented by the restoration.	Installing elements inappropriate to the vessel in type, style, size, or appearance.
When missing boats are essential to establishing the historic character or use of a vessel, replacing with (1) boats of the same type, style, size, age, and appearance as the original; (2) accurate copies, based on the originals; or (3) copies that have the general form and appearance of the original.	
Repairing or replacing davits, chocks, skids, and other shipboard elements associated with support and handling of boats. Ensuring that replacement elements are historically appropriate to the vessel in material, method of construction, scale, finish, and placement.	
Retaining existing deck equipment (capstans, windlasses, winches, deck pumps, etc.) that are historically appropriate to the vessel. Repairing, if necessary. Recreating as closely as possible the appearance it had at the time represented by the restoration. Restoring to operable condition, if possible.	
When missing deck equipment or armament is essential to establishing the historic character or use of vessel, replacing with (1) elements of the same type, style, size, age, and appearance as the original; (2) accurate copies, based on the originals; or (3) copies that have the general form and appearance of the original	

GUIDELINES FOR RESTORATION

Equipment, Including Masts and Spars, Rigging, Boats, Deck Equipment, Armament, etc. (continued)

- APPLICABLE TO VESSELS AFLOAT AND VESSELS EXPOSED TO WEATHER –

Recommended	*Not Recommended*
Ensuring that water is not permitted to enter masts, spars, or the vessel structure through cracks, checks, open joints, wasted iron or steel, inadequately bedded or loose fittings, etc.	
Filling open joints and end-grain checks, especially at mastheads, and filling horizontal checks on upper surfaces of wooden spars, with appropriate fillers.	
Installing stopwaters in vertical checks on wooden masts, etc., above the point of deck penetration.	
Providing ventilated covers, historically appropriate in design and material, for open boats.	
Filling cracks, checks, open joints and seams, etc., on exposed boats. Applying sound protective coatings.	
Ensuring that water is not permitted to enter gun tubes or sensitive mechanisms of armament or machinery. Providing weatherproof covers for elements such as breech mechanisms, gun muzzles, control boxes, etc.	
Ensuring that deck equipment, armament, deck-mounted machinery, and associated mounts or bases are bedded or secured in such a manner as to prevent incursion of moisture between mount and deck, or into the vessel structure.	
Ensuring that mast coats, collars, electrical cable packing, caulking or seals around through-deck elements are intact and weathertight. Replacing, when necessary, with new material that is historically appropriate.	

GUIDELINES FOR RESTORATION

Machinery, Tankage and Piping, Electrical Equipment, Mechanical Systems

- APPLICABLE TO ALL VESSELS –

Recommended	*Not Recommended*
Retaining and preserving to the greatest extent possible existing machinery, tankage, electrical equipment, mechanical systems, etc., that were a part of the vessel at the time represented by the restoration.	Replacing missing machinery with elements inappropriate in vintage, type, size, or appearance to the vessel as it existed at the time represented by the restoration.
Removing, when not essential for safety or maintenance of the restored vessel, machinery, electrical equipment, piping, wiring, etc., that is non-historic or inappropriate to the vessel as it existed at the time represented by the restoration.	Replacing missing machinery with elements that are inappropriate, in vintage, type, size, or appearance, to the vessel as it existed at the time represented by the restoration.
Thoroughly documenting the characteristics, placement, method of attachment, fastening, etc., of elements temporarily or permanently displaced or removed in the process of restoration.	Failing to recoat historically painted ferrous elements after removal of paint or treatment of corrosion.
Replacing missing engines, boilers, motors, etc., that were extant in the vessel at the time represented by the restoration with (1) elements of the same vintage, type, size, and appearance as those replaced; (2) accurate copies of the originals; or (3) copies that have the general form and appearance as the originals.	Painting historically unpainted surfaces, or leaving bright surfaces that were historically painted.
Cleaning dirt, loose paint, corrosion, etc., from machinery, tankage, piping, electrical equipment, etc., using the least caustic/abrasive effective means.	
Coating historically unpainted machinery surfaces with gun grease, oil, or other appropriate products to prevent corrosion.	
Disassembling and thoroughly cleaning interiors and moving parts of machinery. Coating with appropriate preservatives before reassembly if machinery is to remain static; otherwise, lubricating parts with clean lubricant.	

GUIDELINES FOR RESTORATION

Machinery, Tankage and Piping, Electrical Equipment, Mechanical Systems (continued)

- APPLICABLE TO ALL VESSELS –

Recommended	*Not Recommended*
Removing lagging or insulation that did not exist in the vessel at the time represented by the restoration. Retaining asbestos insulation only if it is safely contained.	Failing to take appropriate safety precautions when working with or near asbestos.
Cleaning and scaling boilers, uptakes, exhaust stacks, and related surfaces. Coating with rust inhibitant. Painting, if appropriate, to prevent corrosion.	Permitting asbestos dust to dissipate through cracks or breaks in covering, etc.
Isolating, if possible, any plumbing, piping, and valves that are to remain in use for management or operation of the vessel. Ensuring that valves are operable and properly packed, and that pressurized pipes and related joints and fittings are sound and leak-free.	Failing to document modifications to the plumbing system, or to retain and safely store any historic fittings removed.
Flushing and draining all piping, pumps, and related fixtures not required for management or operation of the vessel. Opening unused piping to the air to prevent condensation and associated deterioration.	Failing to ensure that tanks are gas-free and oxygen-safe before they are entered by personnel and/or before heat generating work such as welding, cutting, etc., is performed in their vicinity.
Flushing and draining water, fuel, and oil tanks if not required for use. Cleaning, scaling, and coating inside and out if possible.	Failing to thoroughly document electrical systems before any changes are made; failing to thoroughly document changes or additions.
Stripping water from fuel and oil tanks that remain in use.	
Completely filling tanks or boilers that are required for use, in order to prevent condensation and retard deterioration of interior surfaces.	
Ensuring that all tanks are adequately vented. Removing or opening inspection ports of unused tankage in order to promote air circulation.	
Isolating electrical circuits not required for maintenance or use of the vessel. Eliminating ground losses, shorts, etc., from active circuits.	

GUIDELINES FOR RESTORATION

Machinery, Tankage and Piping, Electrical Equipment, Mechanical Systems (continued)

- APPLICABLE TO ALL VESSELS –

Recommended	*Not Recommended*
Drying out, if required, and cleaning corrosion from, electric motors, generators, electrical panels, switch boards, etc. Applying appropriate moisture- and corrosion-inhibiting products to motor and generator commutators, armatures, electrical contacts, etc.	
Lubricating bearings, etc., of motors and generators. Rotating on a regular basis, if possible.	
Removing radio and other electronic gear (including antennas, etc.) not appropriate to the vessel as it existed at the time represented by the restoration. Replacing, if possible, with (1) equipment of the same type, style, size, age, and appearance of the originals; (2) accurate copies of the originals; or (3) copies that have the general form and appearance of the originals.	

GUIDELINES FOR RESTORATION

Machinery, Tankage and Piping, Electrical Equipment, Mechanical Systems (continued)

- APPLICABLE TO VESSELS AFLOAT AND VESSELS EXPOSED TO WEATHER –

Recommended	*Not Recommended*
Thoroughly cleaning ducts, air passages, blowers, fan housings, etc., to remove corrosion and/or accumulated dirt. Recoating, if required.	Failing to recognize the danger of freezing (and consequent failure) of below-waterline fittings as a result of sub-freezing temperatures within the vessel, even though exterior water temperature might be above the freezing point.
Installing permanent or temporary covers over stacks, escape pipes, etc., to prevent water entry into machinery or boilers.	
Ensuring that through-hull fittings and fastenings are sound and operable if required for use.	
Blanking off below-waterline through-hull fittings not required for operation or maintenance of the vessel.	
Packing or heating sea chests and below-waterline through-hull fittings in freezing weather, especially on vessels in fresh water.	
Installing an isolating transformer between a floating vessel's shore power line and shipboard electrical system.	
Installing ground fault interrupters in circuits likely to be used for tools, hand-held lighting, pumps, or machinery in damp or wet areas of the vessel.	
Ensuring that ventilators, air intake grilles, etc., are provided with adequate covers or hoods to prevent entry of rainwater, etc.	

GUIDELINES FOR RESTORATION

Health, Safety and Code Requirements; Access; Lighting; Mechanical and Alarm Systems

- APPLICABLE TO ALL VESSELS –

Recommended	*Not Recommended*
Complying with health and safety codes in such a manner that character-defining spaces, features, and finishes are preserved.	
Working with local code officials to investigate alternative life safety measures or variances available under some codes so that alterations or non-historic additions to the vessel can be avoided.	
Designing and constructing boarding ramps, ladders, stairs, gangplanks, etc., that do not require alteration, displacement, or removal of historic fabric or character-defining features of the vessel. Access over rails or bulwarks, or through existing gangways or ports, etc., is recommended.	
Utilizing wherever feasible, existing stairs, companion ladders, etc., for access within the vessel.	
Constructing or adding railings, barriers, etc., when required for safety or security, that do not detract from or diminish the historic character of the vessel.	
Utilizing, when possible, existing mechanical system elements such as wiring, electrical fixtures, plumbing and ducting in providing light, heat, ventilation, etc.	
Installing on floating vessels operable pumps of sufficient capacity and accessibility to deal with substantial flooding on short notice. Providing generators to ensure backup power for pumps and emergency lighting in case of power outages.	
Installing bilge alarms, security alarms, and fire detection equipment; ensuring that alarms are monitored at all times, and that emergency backup power is provided.	

Recommended	*Not Recommended*
Installing or activating a fire suppression system (a charged dry-chemical or inert gas system may be preferable to sprinklers).	
Designing and installing new lighting, electrical, mechanical, security, and fire suppression systems and devices in such a manner that character-defining spaces and features are preserved, and historic fabric and finishes are not damaged, displaced, or unnecessarily obscured.	

GUIDELINES FOR INTERPRETATION

General Guidelines

- APPLICABLE TO ALL VESSELS –

Recommended	*Not Recommended*
Identifying and presenting the vessel accurately. Avoiding hyperbole or falsehood in characterizations (e.g., describing a vessel as the "last commercial sailing vessel under the American flag" when that fact cannot be firmly established and documented).	Presenting a vessel as having had a role or use that it never had in order to create a more compelling image (e.g., using terms such as "death ship" or "convict ship" unless such characterizations can be established by factual evidence).
Interpreting the vessel under a name that corresponds to its appearance or configuration. (e.g.: If a sailing vessel, originally named *Jekyll* was later converted as a steamship and renamed *Hyde* then it should be interpreted under the name *Hyde* if so preserved. If the vessel is restored to its original sailing configuration, it should be interpreted under the name *Jekyll*.	Presenting as fact only that information about the vessel, its history, use, etc., that has been confirmed by careful research. Surmise and conjecture should be presented as such.
Ensuring that the paint color scheme and the configuration of the vessel are historically appropriate to the time period and historic use that are being interpreted.	Renaming a vessel with a name it never had, or a name that is historically inappropriate to its appearance or configuration as preserved.
Identifying and explaining the preservation treatment that the vessel has undergone; indicating major changes, renewals, etc., including their extent and the degree to which they are either conjectural or based on factual evidence.	Falsely identifying material or features as original or historic; or omitting mention of replacement material when it is present, thus leaving the impression that all material is original or historic.
Clearly indicating which materials and features are original or historic, and which are replacements. Indicating whether replacements or restorations are based on conjecture or factual evidence. (This may be done in statements about the vessel in general, or about specific features. While it is obviously impractical to specifically interpret every non-historic element or feature, it is important to convey the general extent of replacements, and the degree of their authenticity.)	

GUIDELINES FOR INTERPRETATION

General Guidelines (continued)

- APPLICABLE TO ALL VESSELS –

Recommended	*Not Recommended*
Furnishing and equipping spaces or areas of the vessel with material that is historically appropriate to the period and use represented, in order to create an understanding of the function or historic use of the vessel or of specific spaces.	Furnishing or equipping the vessel or any of its interpreted spaces with material that is historically inappropriate, or that was not available at the time represented in the vessel's interpretation.
Indicating whether furnishings, equipment, or accessories are original to the vessel; contemporary to the vessel but from another source; accurate copies, based on the originals or historical evidence; etc.	Failing to identify non-original furnishings, equipment, etc.
Designing and constructing ramps, stairs, railings, barriers, ballast containment, and other such non-historic structures required for safety, access, vessel stability, etc., in such a manner that they are clearly differentiated from other structures or features that are original or historically appropriate to the vessel.	Designing or employing such features so that they appear to be historic or original, thus creating a false historic impression
Employing exhibit furniture, display panels, and interpretative signs and labels that are clearly differentiated by design, construction, and/or finish from the vessel or its historically appropriate equipment.	'Building in," or otherwise installing exhibits or interpretative furniture that might be confused with features or structure of the vessel itself.
Designing and installing structures for access, safety, exhibits, interpretation, etc., in such a manner that significant or character-defining features are obscured, displaced, or damaged to the least possible degree.	
Avoiding installation of exhibits, interpretative panels, etc., to such an extent that the size and scale of spaces is lost, or that features indicative of the vessel's historic use are obscured or overwhelmed.	

GUIDELINES FOR INTERPRETATION

General Guidelines (continued)

APPLICABLE TO ALL VESSELS

Recommended	*Not Recommended*
Providing live interpretation by interpreters, guides, or docents who have a sound knowledge of the history of the vessel, its use, the principal features of its construction, its preservation treatment, etc., emphasizing to all interpreters the absolute necessity for presenting accurate information to visitors.	Employing interpreters who are (a) not knowledgeable about the vessel and related matters; or (b) not capable of, or willing to, impart information to visitors.
Producing, publishing, or otherwise making available brochures, monographs, videotapes, recordings, or other interpretative materials that include more detailed information about the vessel than can be provided by interpretation on board.	

Content is First Edition, May 1990
Online Formatted Version 1.04, 25 Mar 05
Word Formatted Version 1.00, 25 Mar 05

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Report on
Failure Analysis & Repair Procedure
For the USS IOWA Battleship

Prepared for

Pacific Battleship Center
Los Angeles, CA

Prepared by:
Shelley R. Joaquin
Certified NACE Coatings Inspector

Date of Inspection: October 12, 2010

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Report for Pacific Battleship Center

Examination of coating failure on the USS IOWA Battleship
Inspection Date October 12, 2010

Purpose

Pursuant to a request from Pacific Battleship Center an inspection was performed onboard the USS IOWA battleship on October 12, 2010. The purpose of this inspection was to evaluate the condition of the coating on the interior and the exterior of the ship, as well as to recommend a repair procedure for any damaged coating.

Limitations

The opinions contained herein are based on the information known and available as of the date written**.** This report is based on the assumption that the coating currently on the interior and exterior of the ship does not contain any lead based paints. Further tests will need to be performed by Pacific Battleship Center to ensure that there is no existence of lead based paints. Coating removal and repairs should not be performed until this has been confirmed.

Inspection

Inspection was performed on October 12, 2010. Upon my inspection numerous areas of coating failure were noted, both in the interior and exterior portions of the ship. Due to government regulations pictures could not be taken, so there will not be any pictures documented in this report. The areas of inspection have been broken up into two categories. They are Interior, which includes all enclosed areas of the ship and Exterior-Topside which includes the exposed areas of the top deck.

Interior (Enclosed areas)

The coating on the interior of the ship appeared to be a latex based paint. Further testing will be required to confirm this, and to eliminate any possibility of the existence of lead based paints.

The condition of the coating varied in the different locations onboard the ship. The most common failure noted was cracked and peeling coating. Some areas had numerous coats that were peeling off to reveal the substrate below, while areas of less damage were peeling off to reveal previous coats sufficiently attached.

While some areas appeared to have suffered heat and water damage which lead to the coating failure, most of the failures are a result of improper surface preparation prior to the paint application.

Given the fact that the USS IOWA Battleship will be docked and used for a museum, it is my recommendation that the coating only be repaired in areas which will be available to the public.

The damaged or failing coating should be removed to a tight edge to expose the substrate or previous coating which is tightly adhered to the substrate. The newly exposed area should be lightly abraded to roughen the surface. The new coating can then be applied. I would suggest a latex based coating be used for these repairs.

The areas where the coating is applied to light gauge galvanized metal and is peeling off in large flakes over a majority of the surface, such as the dividers between the stalls in the bathrooms, does not need to be recoated. The coating should be removed completely in these areas, exposing the galvanized metal.

Exterior (Topside-Exposed areas)

The exterior topside of the ship showed numerous areas of coating failure and exposed steel. The areas of exposed steel exhibited rusting and some pitting was evident. These areas are of utmost concern, as the longer they bare steel is exposed to the environment, the worse the rusting and pitting will become.

There are two different ways to repair this situation. The best way is complete removal of the existing coating by abrasive blasting and recoating of the entire exterior topside of the ship. This however will be a costly repair.

The other form of repair is spot repair. Spot repair repairs only the areas which are currently exhibiting paint failure and/or have exposed steel. For spot repairs, the coating should be removed, and the area cleaned by abrasive blasting. Abrasive blasting will remove all rust and leave a clean & abraded surface for the coating application.

Report Prepared By Shelley R. Joaquin
NACE Certified Coatings Inspector
NACE #6731
Date Prepared: October 26, 2010

Appendix B-4-3
Paint Costs, Type, and Application

USS Iowa Take-Off

Concise Coatings, Inc.

	Quantities					10 Year Warranty Costing		
	Units	Unit Type	Factor	sq.'	Unit Price	Total Price	Gallons	Hours
Non-Slip on Wood Deck	54000	sq.'	1	54000	$0.52	$28,147.99	317.65	270.00
Sandblast Metal Deck	37249	sq.'	1	37249	$2.25	$83,810.25		372.49
Paint Metal Deck	37249	sq.'	1	37249	$2.26	$84,182.74	595.98	372.31
Water Blast Soffit	9390	sq.'	2	18780	$0.20	$3,756.00		187.80
Paint Soffit	9390	sq'	2	18780	$2.26	$42,442.80	300.48	187.71
Boom for Hull	4	months			$2,000.00	$8,000.00		320.00
Barge for Hull						$25,000.00		400.00
Water Blast Hull	12217	sq.'	1	12217	$0.20	$2,443.40		122.17
Paint Hull Below Waterline	83250	sq.'	1	83250	$1.12	$93,625.36	578.13	416.25
Paint Hull Above Waterline	41625	sq.'	1	41625	$2.26	$94,072.50	666.00	416.05
Scaffold Above Level 1 Deck						$44,000.00		640.00
Shrink Wrap Scaffold						$34,600.00		
Small Items (approx. 15 sq')	167	each	15	2505	$2.26	$5,661.30	40.08	25.04
Medium Items (approx. 102 sq')	108	each	102	11016	$2.26	$24,896.16	176.26	110.11
Large Items (approx. 292 sq')	21	each	292	6132	$2.26	$13,858.32	98.11	61.29
Water Blast Exterior Walls	55027	sq.'	1.2	66032.4	$0.20	$13,206.48		660.32
Sandblast Exterior Walls	5502.7	sq.'	1.2	6603.24	$2.25	$14,857.29		66.03
Paint Exterior Walls	55027	sq.'	1.2	66032.4	$2.26	$149,233.22	1056.52	660.00
Cable Rail Posts	200	each	16	3200	$2.26	$7,232.00	51.20	31.98
Guardrail	2979	lin.'	8	23832	$2.26	$53,860.32	381.31	238.20
Large Gun Barrels	9	each	320	2880	$2.26	$6,508.80	46.08	28.79
Small Gun Barrels	16	each	20	320	$2.26	$723.20	5.12	3.20

Turret Exterior	15955	sq.'	1	15955	$2.26	$36,058.30	255.28	159.47
Tomohawk Launcher	8418	sq.'	1.2	10101.6	$2.26	$22,829.62	161.63	100.97
Ladder	81	each	30	2430	$250.00	$20,250.00	29.16	32.40
Crane Arms & Racks	5248	sq.'	1	5248	$2.26	$11,860.48	83.97	52.45
Exterior Doors	105	each	15	1575	$100.00	$10,500.00	18.90	21.00
Tower Pipe Steel	795	lin.'	4	3180	$2.26	$7,186.80	50.88	31.78
Pipe Steel at Bow	254	lin.'	4	1016	$2.26	$2,296.16	16.26	10.16
Anchor Chain	463	lin.'	6	2778	$2.26	$6,278.28	44.45	27.77
Tie Offs	1670	each	1	1670.26	$50.00	$83,512.92	5.57	835.13
Joint Sealer					2.00%	$20,697.81	99.58	137.22
General Contingency					5.00%	$52,779.42	253.93	6998.08
Additional Scope Contingency					10.00%	$110,836.79	533.25	1399.62
Totals				535,657		**$1,219,205**	5,866	15,396

Level	Wall sq'	Metal Deck sq'	Wood Deck Sq'	Guardrail Lin'	Soffit sq'	Tie Offs ea.
1	8397	11173	46093	287	112	1670
o1 Aft	5832	760	500			
o1 Fwd	2786		500	169		
o2 Aft	1760	739	500	66	739	
o2 Fwd	1792	2070	500	205		
o3 Aft	10445	7225	500	619	1645	
o3 Fwd	4102	4150	500	400	728	
o4	1964	1544	1000	171	1544	
o5	3416	5314	1000	516	2311	
o4, o5, o6 Aft	9346	1200	2907	204		
o6 - o12	5187	2343		342	1580	
Tower		731			731	
Totals	**55027**	**37249**	**54000**	**2979**	**9390**	**1670**

Project:	USS Iowa			
Material Description:	Porch and Floor			
Total Square '	54000			
Material Cost per gallon	Spread Rate	Coats	Total Gallons	Total Material Cost
$24.99	170	1	317.65	**$7,938.00**
Labor Cost per Hour	Application Rate	Coats	Total Hours	Total Labor Cost
$40.00	400	2	270.00	**$10,800.00**
Misc. Material (5% of Material)				
$396.90				
Tax on Material (8.25%)				
$687.63				
Profit & Overhead (42% of Total)				
$8,325.46				
Grand Total				
$28,147.99	$0.52			

Material Description:	Carbomastic 15		Below Water Line	
Total Square '	83250			
Material Cost per gallon	Spread Rate	Coats	Total Gallons	Total Material Cost
$75.00	288	2	578.13	**$43,359.38**
Labor Cost per Hour	Application Rate	Coats	Total Hours	Total Labor Cost
$40.00	400	2	416.25	**$16,650.00**
Misc. Material (5% of Material)				
$2,167.97				

Tax on Material (8.25%)
$3,756.01
Profit & Overhead (42% of Total)
$27,692.01
Grand Total
$93,625.36

$1.12

Material Description:	Carboguard 890			
Total Square '	257525.26			
Material Cost per gallon	Spread Rate	Coats	Total Gallons	Total Material Cost
$57.30	185	2	2,784.06	**$159,526.46**
Labor Cost per Hour	Application Rate	Coats	Total Hours	Total Labor Cost
$40.00	400	2	1,287.63	**$51,505.05**

Misc. Material (5% of Material)
$7,976.32
Tax on Material (8.25%)
$13,818.98
Profit & Overhead (42% of Total)
$97,787.26
Grand Total
$330,614.07

$1.28

Material Description:	Carbothane 133 VOC			
Total Square '	257525.26			
Material Cost per gallon	Spread Rate	Coats	Total Gallons	Total Material Cost
$83.40	385	2	1,337.79	**$111,571.98**
Labor Cost per Hour	Application	Coats	Total Hours	Total Labor Cost

	Rate			
$40.00	400	2	1,287.63	**$51,505.05**
Misc. Material (5% of Material)				
$5,578.60				
Tax on Material (8.25%)				
$9,664.92				
Profit & Overhead (42% of Total)				
$74,894.63				
Grand Total				
$253,215.19	$0.98			

Material Description:	Carboxane 945
Total Square '	257525.26

Material Cost per gallon	Spread Rate	Coats	Total Gallons	Total Material Cost
$270.00	245	2	2,102.25	**$567,606.69**
Labor Cost per Hour	Application Rate	Coats	Total Hours	Total Labor Cost
$40.00	400	2	1,287.63	**$51,505.05**
Misc. Material (5% of Material)				
$28,380.33				
Tax on Material (8.25%)				
$49,168.93				
Profit & Overhead (42% of Total)				
$292,597.62				
Grand Total				
$989,258.63	$3.84			

Appendix B-4-4 Condition Review by Dreadnaught Consulting Dick Landgraff – Board Member PBC

MATERIEL CONDITION INSPECTION

There were a number of rumors or myths that required checking out in addition to a normal materiel inspection of the ship's condition. All were investigated during the inspection and in some cases further investigated in the following weeks through historical research, interviews with Battleship historians and communications with government agencies and other Battleship restoration/recall groups.

1: EXTENT OF INTERIOR RUST: The condition of the ship, in general, had been rumored to be rusting out completely from the lack of Dehumidified (D/H) air after decommissioning.

INSPECTION: Though there are several areas of ugly rust stains with minor rust damage, all are repairable. Several deck areas of the ship show evidence of rusting and interior paint on the overheads are hanging in blisters. This is evident of lack of D/H air as compared to other mothballed ships that have been inspected. Some of the rusting is from overhead deck drains that run through the compartments and are rusted out allowing rainwater to come in. This was noted on a preliminary inspection in May of 2006 and MARAD has made some repairs to those drains.

Follow up checking on D/H: After decommissioning on 26 October 1990 in Norfolk, Virginia, the ship was towed to the Naval Education and Training Center in Newport, Rhode Island on 24 September 1998 and remained there until 8 March 2001. Though nine D/H machines had been installed for her inactivation, no power was ever run out to the ship to turn them on throughout the nearly three years she was in Rhode Island. This was also confirmed by the Tow Master who is now retired in California and other sources on the East coast who visited the ship while at Rhode Island.

When the ship was towed from the east coast to San Francisco Bay in 2001, it was eventually added to the reserve fleet in Benicia, California on 21 April. A number of concerned persons of vested Battleship interest asked Dreadnaught Consulting and the ICPA if D/H air as well as Impressed Current Cathodic Protection had finally been restored. Contacting INACTSHIPFAC in Bremerton, Washington in about September of that year confirmed that extra power lines had finally been run out to the ship and both D/H and Cathodic Protection were in operation in the latter quarter of 2001. But that still left the ship without D/H for at least another half year since leaving Rhode Island.

Additional rust damage was caused by broken deck drains that run through the compartments to the outer shell. Though some were identified during a preliminary inspection in May and subsequently fixed by MARAD, many others have been found since. On main deck, the worst found was in the Personnel Office 1-119-4-L where a

waste drain had broken off from the overboard discharge and at least one-third of the deck is covered with black mold.

On the second deck, the worst found was in Crew's Berthing 2-68-1-L where a deck drain apparently ruptured under its insulation and seeped water over a number of years. The insulation of an adjoining pipe is also swollen from water inclusion. The deck is very rusty indicating a water depth of about 6-inches. An additional eye-sore to the space is that the final coat of paint applied was apparently not Mil-Spec paint and is peeling off the overhead in rag-sized pieces. Samples of this paint have been sent out for analysis. The coat underneath is in excellent shape. There was some opinion that this damage was caused by the Turret II deflagration and fire fighting efforts. However, all damage was contained inside the turret and the turret foundation. The Turret incident occurred on 19 April 1989 and *Iowa* was put back into service less than two months later on 7 June for a European tour until decommissioning in 1990. In the Navy, there is a general rule that "If it moves, grease it. If it doesn't move, paint it". Therefore the compartment would have been cleaned up, if needed, and was inhabited as evident by the cleaning crew roster still on the bulkhead and dated well after the incident.

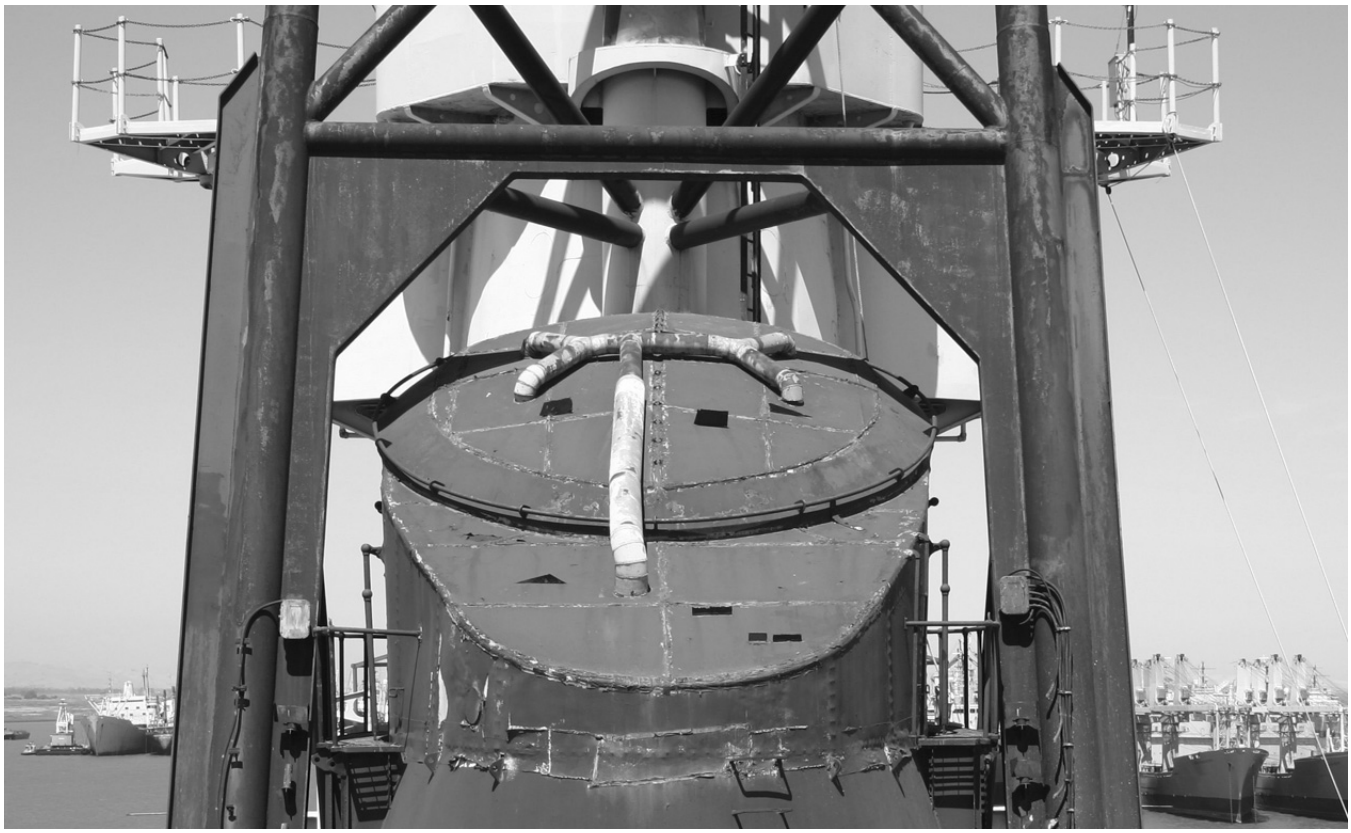
Streaks of rust are very evident around the barbette of Turret II, but again this was not caused by the incident. Instead, the seal between the deck edge of 01 level and the face hardened Class A armor of the barbette panels eventually deteriorated and has recently been sealed with silicone caulk.

Additionally, even the D/H piping has suffered from corrosion and the D/H pipe to the top of the forward stack is rotted through. On top of that, the cap on top of the forward stack is damaged as if something dropped on it during the mast removal.

CONCLUSION: Being without dehumidified air for at least three years would cause humidity within the ship to condense and form beads of moisture throughout the compartments. Moisture dripping off the overheads or running down the bulkheads added to water on the decks themselves. Additionally broken deck drains and deteriorated seals have added to rust damage. However the damage is minor though it looks ugly. Therefore, in most cases, just cleaning, painting and/or retiling will repair and preserve the ship.

Painting of the ship will be an expensive item at $120.00 per 5-gallon bucket unless a major paint company offers to donate their paint and services. An estimate done for exterior paint alone above the boot top is about 1 acre (about 44,000 sq. ft.) of deck gray and 3 acres (about 130,000 sq. ft.) of haze gray. Several gallons of white paint will also be required to paint the helicopter deck markings, white stars on the mooring bitts, etc. Interior painting is estimated to be at least 100,000 square feet.

EXAMPLE OF DECK RUST AROUND MANHOLE



ROTTED D/H PIPING ON FWD STACK CAP.

2: MAIN MACHINERY SPACES: It had been rumored that the main machinery spaces were stripped to provide spare parts for the AOE class ships that used the main machinery from the unfinished Battleship *Kentucky*.

INSPECTION: All four fire rooms, all four engine rooms and both Emergency Diesel Generator rooms were inspected for missing parts. This was a very time consuming part of the inspection though the method seemed simple by using a copy of the Propulsion Operating Guide (POG) to look for any machinery foundations with nothing on them and note on the POG guide what they were. However, the pure numbers of machinery components is almost staggering and it took all three days for Mr. Covarubbias to inspect all the spaces at all levels even with some help by Mr. Upshaw and Mr. Mousaw during the August inspection. Additionally, a Battleship *New Jersey* POG was used as an *Iowa* POG was not available, but it was generally the same. Motors and pumps were found "stowed" in some of the Main Propulsion spaces but there was no evidence of where they came from and there were no bare foundations to match them. It was found that only one item of main machinery had been removed from the ship and that was Main Lube Oil Pump No.3 in Engine Room No. 2. The Pump's motor and motor foundation were still there but sitting on the deck plates.

Notes from Mr. Covarubbias' inspection:

Ex-Iowa's (BB-61) six main machinery spaces were inspected for missing or cannibalized parts. The order in that they are presented here is in accordance with the Propulsion Operating Guide (POG) S9BB0-B5-POG-010/BB-62. The BB-61 and BB-62 machinery arrangements are very similar with minor exceptions which will not be addressed here.

I. Engine Room #2:

A. Upper Level: All accounted for.

B. Lower Level: This unit was Cannibalized: Main Lube Oil Pump #3 (Electric) (Stand-by). The pump was removed from the electric motor which was secured to the ladder leading up to the intermediate level near bulkhead 119. The foundation was lying nearby. .

Additional notes from Mr. Covarubbias are:

II. Fire Room #4

A. Upper Level: Starboard side aft, laid a Turbine pump with foundation which was not bolted to the deck nor did it look like it belonged there. It

had been partially covered up and no other piping was attached to it. There were no telltale signs of where this foundation may have been or come from.

B. Lower Level: The Bilge area, portside, displayed considerable corrosion. It was also evident on several deck plates. My opinion is that it was due to electrolytic imbalance.

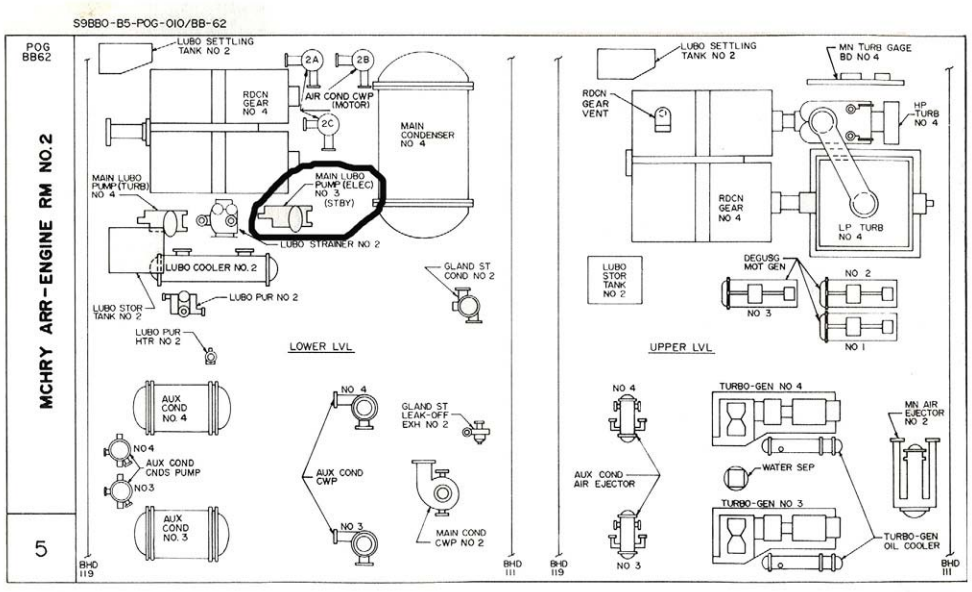
III. Uptake Air Intake Trunk Compartment (2-103-0-E): Inspection doors of both uptakes had no hinges. Also, there was a crack in the stainless steel trunk of the starboard uptake.

IV. Engine Room #2

V. Upper Level: Portside, two "CO SEW MOTR XFR PMP NO 3 DISCH" 4-114-2, the corrosion build up on the piping was causing it to bond to the motor casing.

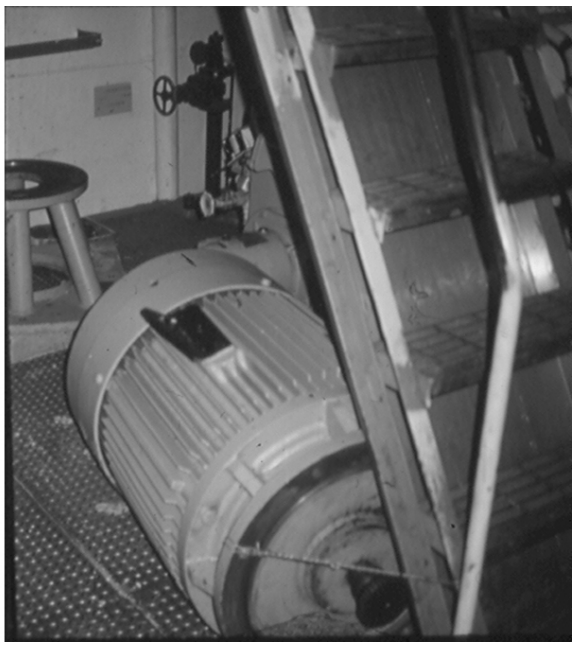
The machinery space inspection was reviewed and walked through again by Mr. Choate during the October inspection and was found to be correct.

CONCLUSION: The solitary Lube Oil Pump was apparently removed by the Navy. It may have been removed to provide a replacement pump for one of the AOE's, but that is not known at this time. However, the myth of the Main Machinery Spaces being heavily stripped out is busted. See attached copy of page 5 of the POG for location of the missing pump.



ENGINE ROOM No. 2 SHOWING LOCATION OF

MISSING LUBE OIL PUMP ON LOWER LEVEL



LUBE OIL PUMP FOUNDATION

MOTOR & MOTOR FDN

FOR LUBE OIL PUMP

3: TURRET II REPAIR PARTS: In 1989 it was reported to LBNSY by one of the coordinators for the turret repair that all the spare parts for the *Iowa's* turret II were sitting on the pier ready for installation before the ship deployed overseas. Since the ship's decommissioning, it has been taken as fact by many people that the repaired and replacement parts had been stored aboard the ship. Where this originated from is not known.

INSPECTION: All teams involved in the inspection including NAVSEA and MARAD escorts searched the entire ship for the turret parts which would have included the range finder and several motors. NAVSEA personnel even used fire axes to open some wood crates identifying 16-inch gun parts only to reveal rubber disk pads for stowing the shells within the turret foundation as of the August inspection.

However, during the October inspection some parts were found at the bottom powder magazine 5-68-1-M. There is one pile of damaged parts and one pile of replacement parts. Unfortunately, the replacement parts are mostly minor hardware items such as nuts and bolts with no motors or pumps.

The list of damaged or destroyed parts as provided to LBNSY in April of 1989 is as follows:

DESTROYED:

Gun Bucklers (rubber boots over barrels). However, these were replaced for the deployment later that year. Unfortunately they are missing again.

Turret Officer's booth doors.

Electrical wiring & remote operating stations to electrical sprinkler valves serving powder passing scuttles and projectile decks.

Powder hoist cabling.

Center gun rammer.

Range finder (reportedly repaired but not installed and not stowed on board).

Mk 3 Computer.

Multiple Turret Train Indicator.

Turret Officer's Indicator Panel.

Turret Captain's Indicator Panel.

Turret Officer's Transfer Switchboard.

Velocimeter.

All wiring in turret and booths.

Sprinkling System.

Gun Port Covers (?)

Cover Plate, center gun counter recoil plunger.

Periscopes.

Sound Powered Phone Circuits.

Tail Hatch platform.

Center gun room bulkhead to upper Hoist Station.

Trunnion cover plates on all guns.

Center Rammer Expansion Tanks.

DAMAGED:

Powder Hoist Motors.

Powder Door Pistons.

Vent Ducting.

Center Gun Cradle.

Turret Officer's booth deck.

Gun Room deck plates.

Elevation Motor B-end hydraulic lines of all guns.

Center Powder Hoist bulkhead on Powder Flats buckled and bulged.

Center Powder Hoist trunk on Powder Flats bulged (marked up for remove and repair).

Left Powder Hoist bulkhead on Powder Flats warped.

Center Powder Car wedged near the top of the hoist.

Center Gun Room left bulkhead split at roof.

CONCLUSION: The assumption is only partially correct except that the major repaired parts or replacement parts for Turret II are not on board the ship. In retrospect, this makes sense as the ship was deployed less than two months after the incident, there

would have been no room to stow the parts without taking up other valuable stowage spaces needed for her European tour. Nor is it likely that Norfolk would have kept the parts (some quite large such as the range finder) for almost a year and a half before the ship was decommissioned. It is possible, however, that the parts were sent to Watervliet Arsenal in Watervliet, New York for storage in NAVSEA's "Battleship Surplus Store" where even equipment removed from the museum ships *Massachusetts* and *North Carolina* were stored for possible use aboard the *Iowa's*. It has also been reported by the United States Naval Fire Support Association (USNFSA) that the parts may have been sent to Crane, Indiana and they are double checking that possibility.

As an additional note, it was found on Turret top armored panel T-9 that 47 bolts have been removed and replaced with a welded cap. This panel is the one that would have to be removed to complete the repairs and it was reported that all bolts had been loosened with a penetrating liquid. The number 47 is significant as that is the number of crewmen killed in the Turret incident and it is assumed the bolts have been used in some sort of memorial to them. Replacement of the bolts would only be necessary if the Turret is to be fully repaired and the ship reactivated with plans to fire the guns.

4: SHIP'S MAST: The top of the ship's mast was reported to have been cut off so it could clear the Union Pacific Railroad Bridge on the east side of the Highway 680 Bridge to reach its berth in Benicia, California.

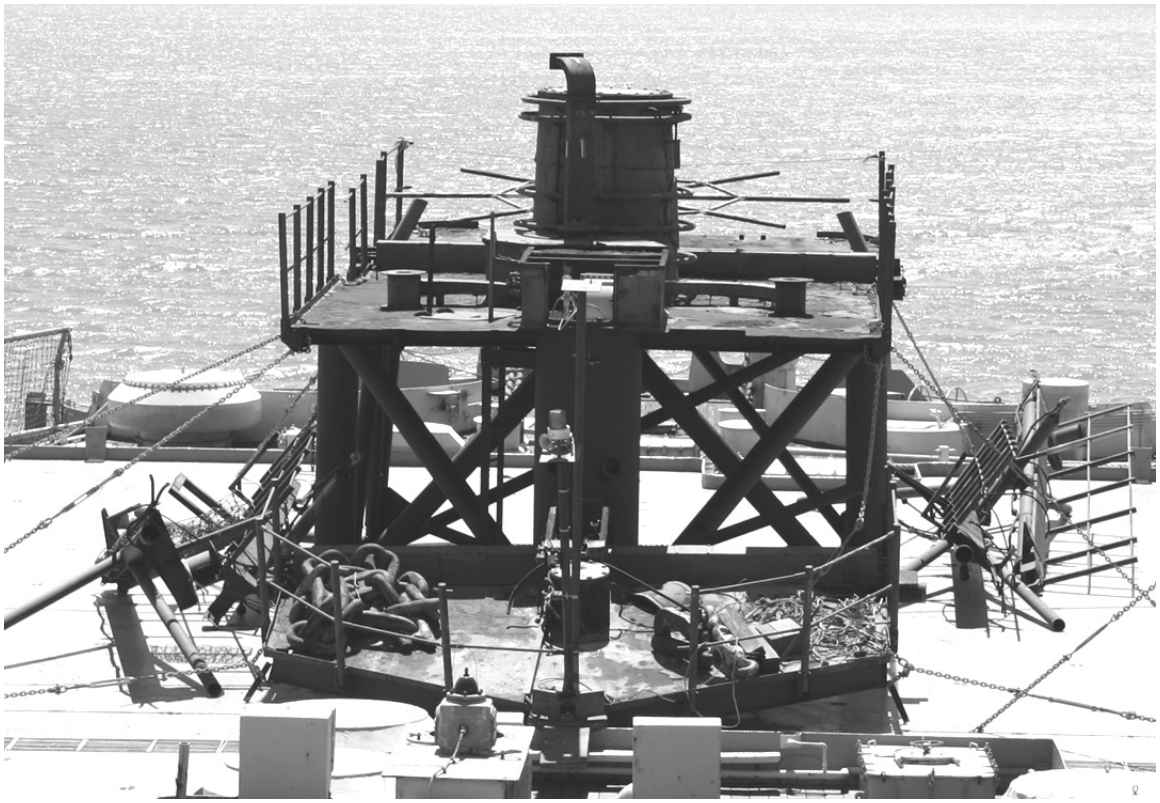
INSPECTION: The mast was found to have had the entire main platform and above cut off the three mast legs and "stowed" on the helicopter deck aft. But it was not cut off in one piece. Rather it was cut up into several sections for ease of removal without an appropriately sized crane to handle anything larger.

However, the cuts were made by an experienced Oxy-Acetylene burner and they are quite even and not "chopped up" as they would be from a carbon arc cutting method.

CONCLUSION: Because the cuts are neat, restoration of the mast is technically possible. But it would be a very complex reconstruction project that must be done with proper staging around the mast and forward stack area and with the proper size cranes. This is also a hazardous method of piecing the mast back together and very time consuming to do one piece at a time. Therefore it is recommended that the remainder of the mast be removed from the ship and set on a jig on an assembly pier. The other pieces can also be set in jigs and the mast sections brought together with chain falls, come-a-longs and hydraulic jacks. Detailed restoration instructions would have to be made in accordance with Navy specifications to meet the Navy's own requirements for possible reactivation. Re-connection of the pipe sections would require both an internal welding sleeve and an external two-piece sleeve outside for reinforcement of the main leg. The aft legs can be welded at the cuts but also reinforced with external sleeves. This is a much safer method and the mast can be reinstalled in one piece by a properly sized crane. Also a highly experienced person familiar with mast design, structural integrity and

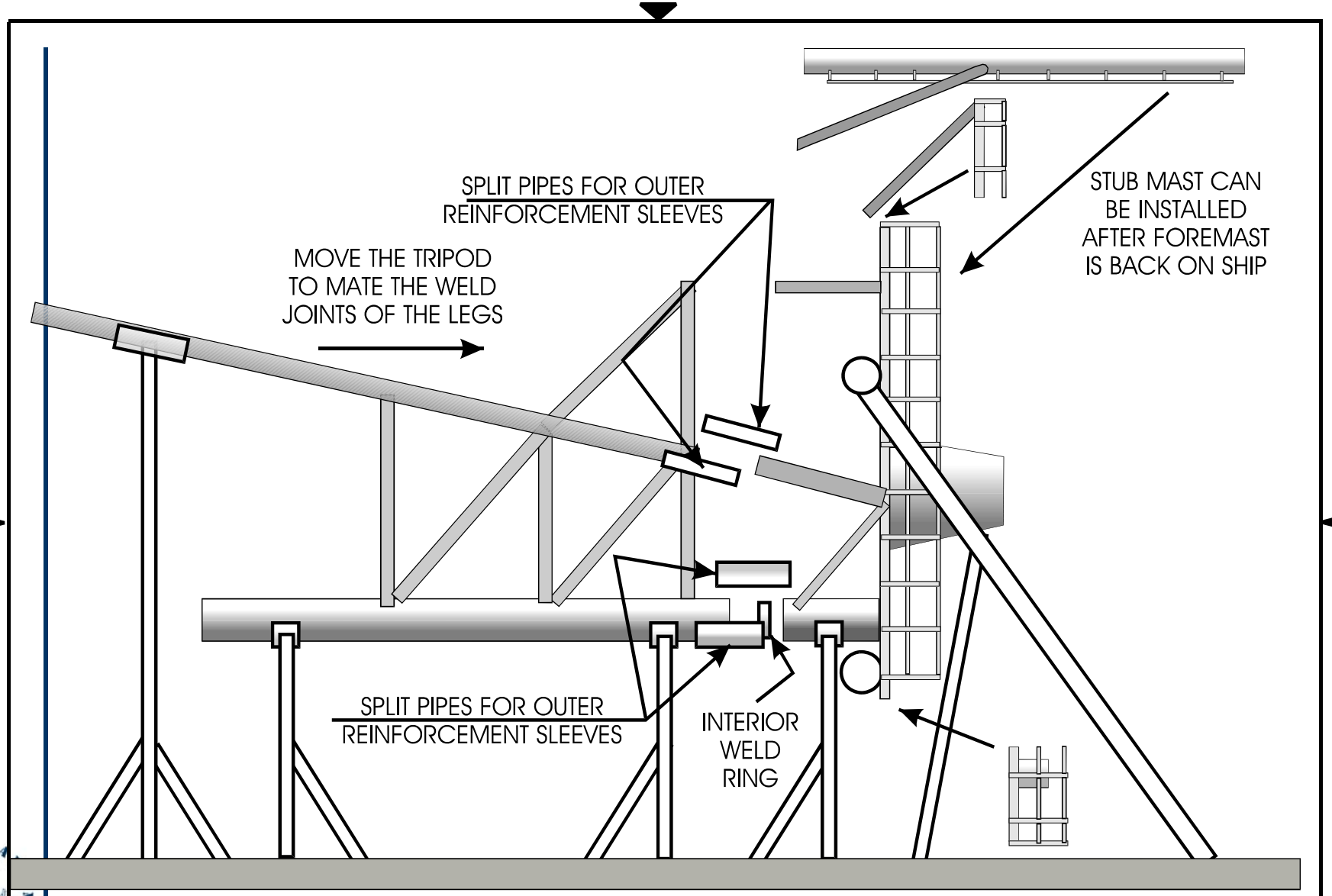
structural techniques would be required to act as progressman and inspector of the mast restoration.

IOWA WITH CUT OFF MAST APPROACHING LOW BRIDGE TO BENICIA – 2001



MAST PLATFORMS STOWED ON HANGAR DECK AFT.

REMAINDER OF MAST AFTER PLATFORMS REMOVED



SIMPLIFIED JIG ARRANGEMENT FOR REASSEMBLING MAST AND MAST PLATFORMS

THIS IS THE WAY THE MAST WAS ORIGINALLY BUILT AND IS THE SAFEST AND MOST ACCURATE WAY OF REBUILDING IT.

5: DECK PLANKING: It was reported that the ship's Teak decking is in bad shape.

INSPECTION: The ship does not have some Teakwood decking but Douglas Fir has replaced most of the original Teak. This has been a thorn in the side of many people since the first of the *Iowa's* was brought back into service in 1982. Fir is a soft wood and soaks up water quickly. When soaked it swells and pushes all of the caulking out from between the seams. Then when it dries out and shrinks back down it leaves gaps in the seams to allow water to seep under the decking and start rusting the deck underneath if a preservative is not present.

Besides a few small areas repaired or replaced by MARAD, the decking at the present time is in totally unsatisfactory condition. Some planks are so badly warped they are bowed above the surface of adjoining planks. The margin plates abutting bulkheads are not sloped as required by the original BUSHIPS drawings and water has seeped down under them causing total separation of the seams. The decking as is would be totally unsafe for visitors to walk on. Total removal, without total replacement, is out of the question as the decking provides insulation to the compartments below as well as providing a smooth deck surface over the riveted butt straps of the deck.

Pacific Battleship Center was given copies of a drawing that DREADNAUGHT CONSULTING made for museum ship associations. The drawing is precisely exact copies of two official BUSHIPS/NAVSEA drawings that have become almost unreadable through age and multiple reproductions. Even the original list of material is copied though followed by an updated list with the modern Mil-Specs and EPA approved materials (Hemp grommets no longer allowed). The drawing also identifies an import company in Lake Oswego, Oregon that provided the Teakwood in the 1980's.

CONCLUSION: All of the wood decking should be replaced with Teakwood in accordance with the provided drawing. It will be an expensive undertaking but in the long run the most effective as it will remain in place much longer if it is installed properly and maintained properly. For example, only during initial installation should powered sanders be used to smooth out the final surface. Afterwards, only holey-stoning should be done to bring out the color but reduce the amount of wood lost. Drawing number TYPE 2001-1 is attached for reference.

EXAMPLES OF WARPED AND ROTTED DOUGLAS FIR DECKING

6: BARREL BUCKLERS: It was reported that the rubber “boots” for the 16-inch guns could not be found.

INSPECTION: The ship was thoroughly searched for the 16-inch Bucklers and all that was found were the steel hoop rings that go around them to shape them for a fold upon gun elevation.

CONCLUSION: An effort should be made to contact the company (it may have been Goodyear but no one on any team knew for sure) that made the original Bucklers and order new ones. They were still being manufactured as new items for replacements for the *Iowa’s* in the 1980’s.

PRESENT TYPICAL TURRET CONFIGURATION WITHOUT BUCKLERS

ARCHIVE PHOTO OF IOWA WITH BUCKLERS IN PLACE

7: DIRECTOR BLOOMERS: The Bloomers for the range finders of the secondary battery directors are missing.

INSPECTION: It is true that the rubberized canvas covers, officially called Bloomers in the original plans, and at the sides of the secondary battery directors that cover the vertical oblong opening for the range finder are missing. When Iowa was

decommissioned in 1990 there was an attempt to follow NAVSEA's "wish" that the ships be done in such a way that they could be reactivated again in 45 days. Therefore, rather than removing the RADAR antennas on top of the directors, sheet metal covers were placed over them and sheet metal covers were installed over the range finders in place of the Bloomers. Since then, while the ship was still under Navy jurisdiction, the antennas have been removed and stowed in a shipping container on the helicopter deck and the range finders are bare. This has left the directors open to the elements but amazingly the interior of the directors is not in bad shape.

CONCLUSION: The Bloomers should be replaced on all four secondary battery directors.

8: COMPARTMENT FLOODING: Minor flooding of various compartments was reported.

INSPECTION: It was found that most flooding was liquids other than salt water with most of it being fresh water and in some cases petroleum based liquids. The Pitometer Sword trunk was of major concern but inspection showed no flooding within it.

CONCLUSION: Most, if not all, fresh water "flooding" is actually drainage of condensation caused by no D/H systems running on the ship and by the leaking deck drains that were rusted out within the compartments they passed through. Only recent D/H in Benicia has prevented further rusting and apparent flooding but even that was interrupted by a major power outage in July of this year. As of this inspection, there does not appear to be any sea water leakage with the possible exception of the Forepeak tank addressed later.

9: ANALOG COMPUTER: The Mk-48 Analog Computer in the aft Main Battery Fire Control plot is missing.

INSPECTION: One of the places visitors would like to see is the Fire Control Room on the third deck so they can see the triggers that fired the guns and the Electro-Mechanical computer that even compensated for the Correalus Effect (rotation of Earth under projectile in flight). However, the Mk-48 computer has been totally removed apparently by the Washington Navy Yard for their museum. Even the trigger console is tagged for commandeering by the Washington Navy Yard.

This is distressing because most people do not know there is a Washington Navy Yard and that it is primarily a museum. However NAVSEA has moved into one of its old shop buildings and the impression of "No Trespassing" is higher and many tourists by-pass the Washington Navy Yard altogether concentrating their historical interests on the Smithsonian Institute. However, the October inspection found that a Mk-48 computer is still in place in the forward Main Battery Plot.

CONCLUSION: Unfortunately, there appears to be nothing we can do about the missing computer but the forward computer can be removed and shipped down "Broadway" to the aft Main Battery Plot. As for the trigger consoles, if the Washington Navy Yard still wants them, it is suggested strongly that they acquire those from the forward Main Battery Plot where visitors are less likely to see them missing.

ONLY SHOCK MOUNTS LEFT OF MK-48
COMPUTER IN AFT MAIN BATTERY PLOT

Mk-48 COMPUTER IN FWD MAIN BATTERY PLOT THAT CAN BE RELOCATED

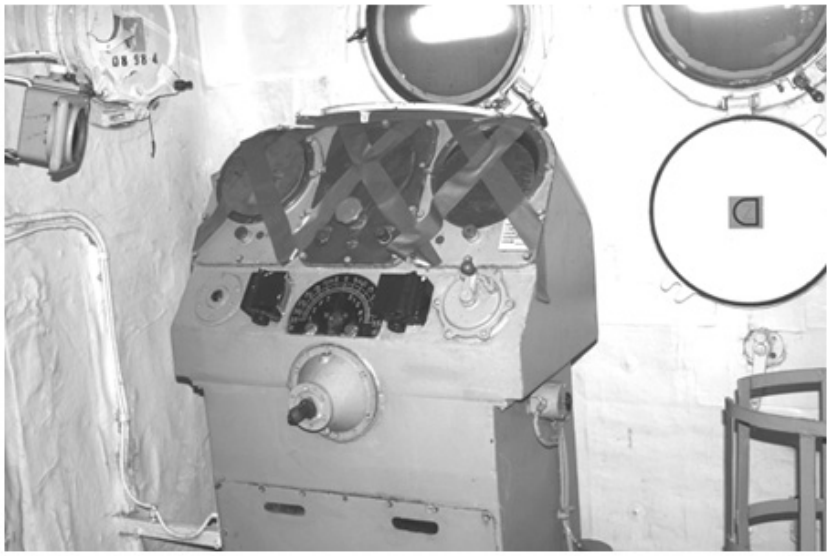
TO AFT MAIN BATTERY PLOT FOR VISITOR DISPLAY

10: HELMSMAN'S WHEELS ARE MISSING:

INSPECTION: It was found that the helmsman's wheels in both primary and secondary conning stations are missing. This is another item visitors would want to see even though their design and size is not extraordinary. This is true of many other small items such as sound powered telephones, etc. that are missing.

CONCLUSION: Hopefully the wheels are stowed someplace on the ship and have not been taken for souvenirs by anyone. Even if totally gone, replacement wheels must be provided somehow for visitor appeal.

MISSING HELMSMAN'S WHEEL IN 05 LVL CONN



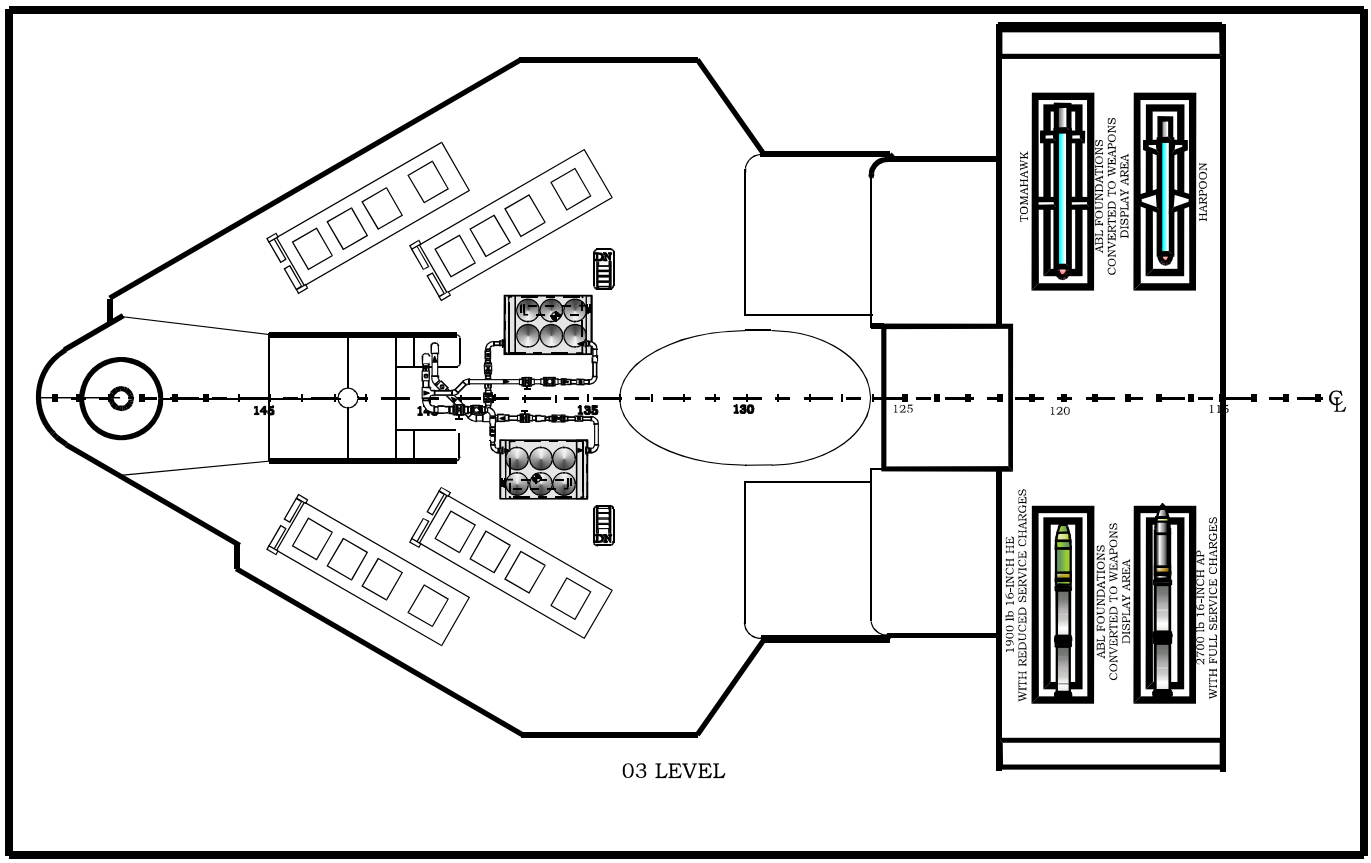
MISSING HELMSMAN'S WHEEL IN 08 LVL CONN

11: FOUR ARMORED BOX LAUNCHERS ARE MISSING:

INSPECTION: All four ABLs are no longer mounted at the amidships launch deck on the 03 ½ level. The four ABLs aft are still in place and would hide air conditioning machinery. An inquiry with Decom Assets at Port Hueneme after the ship check received this answer;

We no longer hold any rack level TWCS retrograde material such as OIDTs, they have all been sent to DRMO and sold as scrap. The ABLs from IOWA as best anyone call recall were sent to Louisville for storage and have since been destroyed. We know of no other ABLs that are left. Sorry but this request comes a little too late to be able to provide any of the material.
v/r, Dennis U.

CONCLUSION: It is unlikely any ABLs can be found anymore though two have supposedly been spotted somewhere as having come off of a *Spruance* class Destroyer.. However, the deck area could be turned into a show stage with full scale models of Tomahawk and Harpoon missiles.



EMPTY ABL FDNS CAN BE USED AS BASES FOR MISSILE AND SHELL DISPLAYS

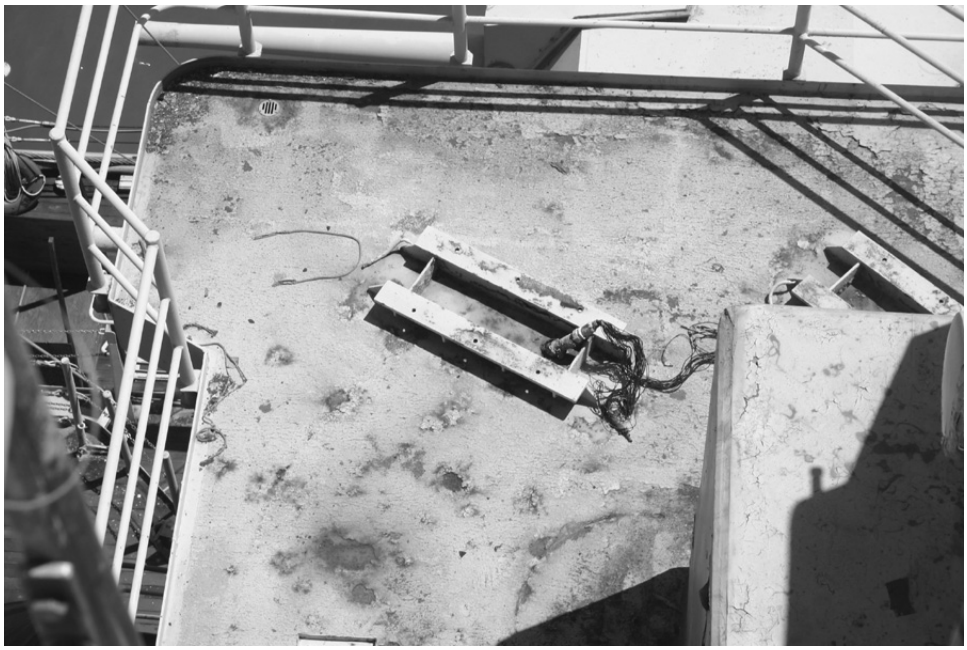
12: HARPOON TUBES AND YOKES ARE MISSING:

INSPECTION: The Harpoon launcher cradles are in place with their exhaust deflectors. There are no tubes installed which is normal. However, the middle and upper securing cradle yokes for the missile tubes were not found.

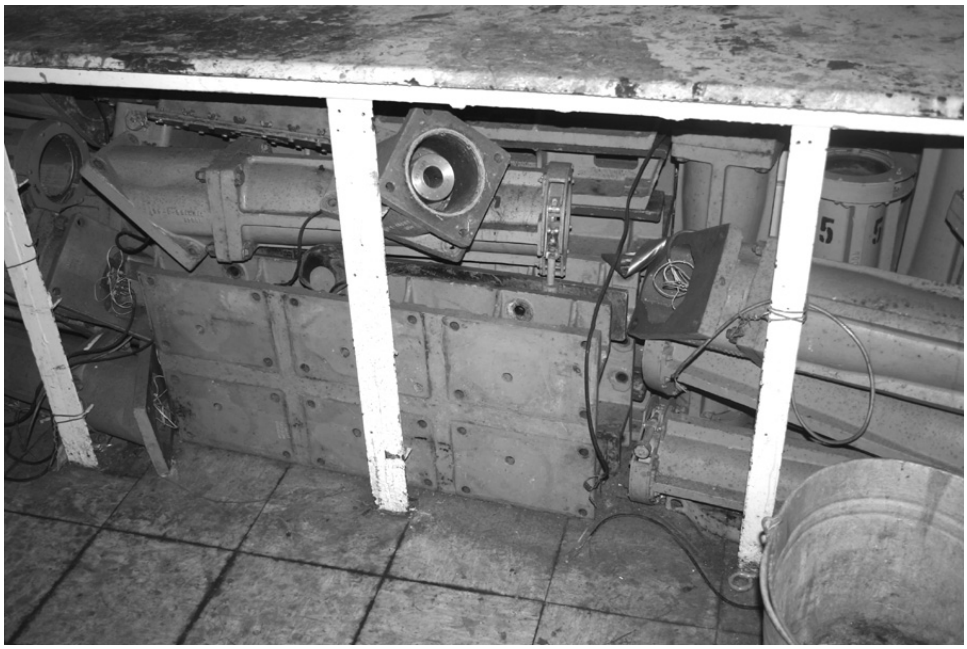
CONCLUSION: A hunt must be conducted for the missing cradle yokes and 16 empty Harpoon launching tubes. Additionally, the tubes should be the armored tubes of 1 ¾-inch thick aluminum.

13: SRBOC launchers.

INSPECTION: The eight foundations for the Super Rapid Blooming Overside Chaff (SRBOC) launchers are in place on the deck but with no launchers. However, the launcher bases were found stowed aboard ship and can be reinstalled.



SRBOC LAUNCHER FOUNDATIONS STILL IN PLACE



14: FOREPEAK TANK: The Forepeak tank was reported to be flooded.

INSPECTION: Flooding of the Forepeak tank was no surprise as the *New Jersey* also had the same problem because of erosion/corrosion in the Paravane Eye of the Forefoot Skeg that breached the 7-inch IPS chain pipe (a pipe size no longer in production). On *New Jersey*, the first "repair" in 1981 was merely to add a welded plate to the bottom of the eye. But that soon eroded out as well and at the 1987 dry dock availability the entire forefoot skeg and Paravane Eye were totally removed, with the 7-inch piping and plated over as a smooth bulbous bow. See the following photos of the *New Jersey's* Paravane Eye.

However, in the case of the Iowa, the water in the tank appears to be fresh water and not the brackish water of Suisun Bay. It is assumed that the forepeak tank was deliberately flooded with fresh water for ballast. Therefore only a diver's inspection will show if the Paravane Eye and bellmouth are the cause of flooding.

CONCLUSION: As the *Iowa* will never see erosion type of wear while in museum status tied to a pier, and diver's inspection finds penetration of corrosion through the bellmouth, welding of a steel plate across the bellmouth opening to the chain pipe should solve the flooding problem and can be accomplished by a diver rather than requiring dry docking the ship.

Close up of Forefoot Skeg/Paravane Eye
that corroded inside the bellmouth and flooded
the Forepeak tank.

FINAL CONCLUSION:

Materiel conditions must be started prior to any conversion and modifications to a museum ship. Some museum modifications could be done in conjunction with materiel repair. That would require an on-site Progressman experienced in ship repair keeping safety in mind at all times above schedules and budgets. One critical repair work that requires immediate attention is the replacement of all wood decking with Teakwood, though even this can be done in stages depending upon what spaces would be first open to visitors.

The mast repairs will require extensive staging around the three mast legs as well as on top of the forward stack to gain safe access to all sections that need to be re-welded together. The museum association's Progessman for this project must be experienced in heavy metal fabrications, mast design and Navy welding specifications. He would not take the place of the contractor's job-site supervisor(s) but monitor, recommend, approve or disapprove any detail changes and safety risks.

Painting of the ship's hull and superstructure can be done, for the most part, concurrently with most museum modifications. In areas where doorways or arches are going to be cut out for handicap access painting would be postponed until the flat-bar protective frame is welded in place. There will be times where painting would interfere with some modifications that should be completed first. Again, an experienced Progressman in ship repair and conversions would be needed to settle the job scheduling.

Appendix B-4-5 Wallace Marine Letter on Decking

Wallace Marine
P.O Box 41283, Long Beach, CA 90853
(310) 617-9385
wallacemarine@aol.com

Muldoon Marine Services, Inc.
716 W. 14th St.
Long Beach, CA 90813

August 21, 2010

from: Jim Wallace

Richard:

The laminated deck sample I lent you is from the COLUMBIA at Disneyland. It was cut forward of the foremast where a ventilator penetrates the deck.

The COLUMBIA deck is clear vertical grain fir though any lumber can be used. There is a cost savings over making the finished material full dimension as the 1x is the least expensive way to buy lumber. If a hardwood such as teak or oak is used, or an oily wood like long leaf yellow pine, the underside of the planks must be washed in acetone before gluing.

The exposed surface lamination can be laid down in traditional patterns to show proper nibbing of plank ends, margin planks, and waterways. This is done quickly and easily because we are only dealing with 1x material. Different thicknesses can also be used to give the effect of heavy beds under deck furniture such as winches and bollards.

The biggest advantage of the system is that there are no exposed fasteners. No plugs over fasteners to rot or chip away which can allow nuts or screw heads to corrode. Also, plugs over fasteners that leak or go missing, may allow moisture to percolate down around the fastener and cause deterioration of the subdeck. With this system, there is no way for moisture to penetrate the epoxy membrane under the surface lamination. Gaps in caulking may allow moisture to rot out a surface plank, but it can be replaced without affecting the subdeck.

The caulking is full depth and is "bridged" to give maximum expansion/contraction without breaking loose. The polysulfide compound has been proven effective for over 20 years.

Maintenance involves oiling/sealing for a water barrier. Something as simple as Thompson's Water Seal should be applied quarterly. The deck may be stained under the sealer.

We have used this system on the COLUMBIA in Disneyland as well as the MARK TWAIN in Tokyo Disneyland and for seven replica ships in Tokyo Disney Sea. The decks on the COLUMBIA have been down for 10 years and show no appreciable wear. They get an average of 5,000 passengers over them per day in street shoes (open about half year equals 10 million passengers to date!). The decks are not well maintained so there has been some problem with water intrusion and rot to the surface planking. No moisture or rot has penetrated to the plywood because of the epoxy barrier. The MARK TWAIN in Tokyo gets up to 10,000 passengers a day, every day and is 8 years old (30 million passengers to date). The boarding area shows some wear but is weather tight. It is over steel plate and well maintained as per our specifications.

I regard any engineering calculations and exact laminating procedures and materials as proprietary. I would be most willing to bid on laying this system anywhere, anytime. I believe that it is the very best and most cost effective way to lay a traditional looking wooden deck.

Thank you for your interest!

Jim Wallace

Appendix B-4-6 Decking Schedules

REVISIONS

SHT	REV						REVISION NOTES
1	A						
2	A						
3	A						
4	A						

ISSUE STATUS

ISSUE STATUS:						ISSUE NOTES
REVISION	A					
DRDNTCON	CAD ORIG					
PACBBCTR	2					
SCALE SHIPYARD	1					

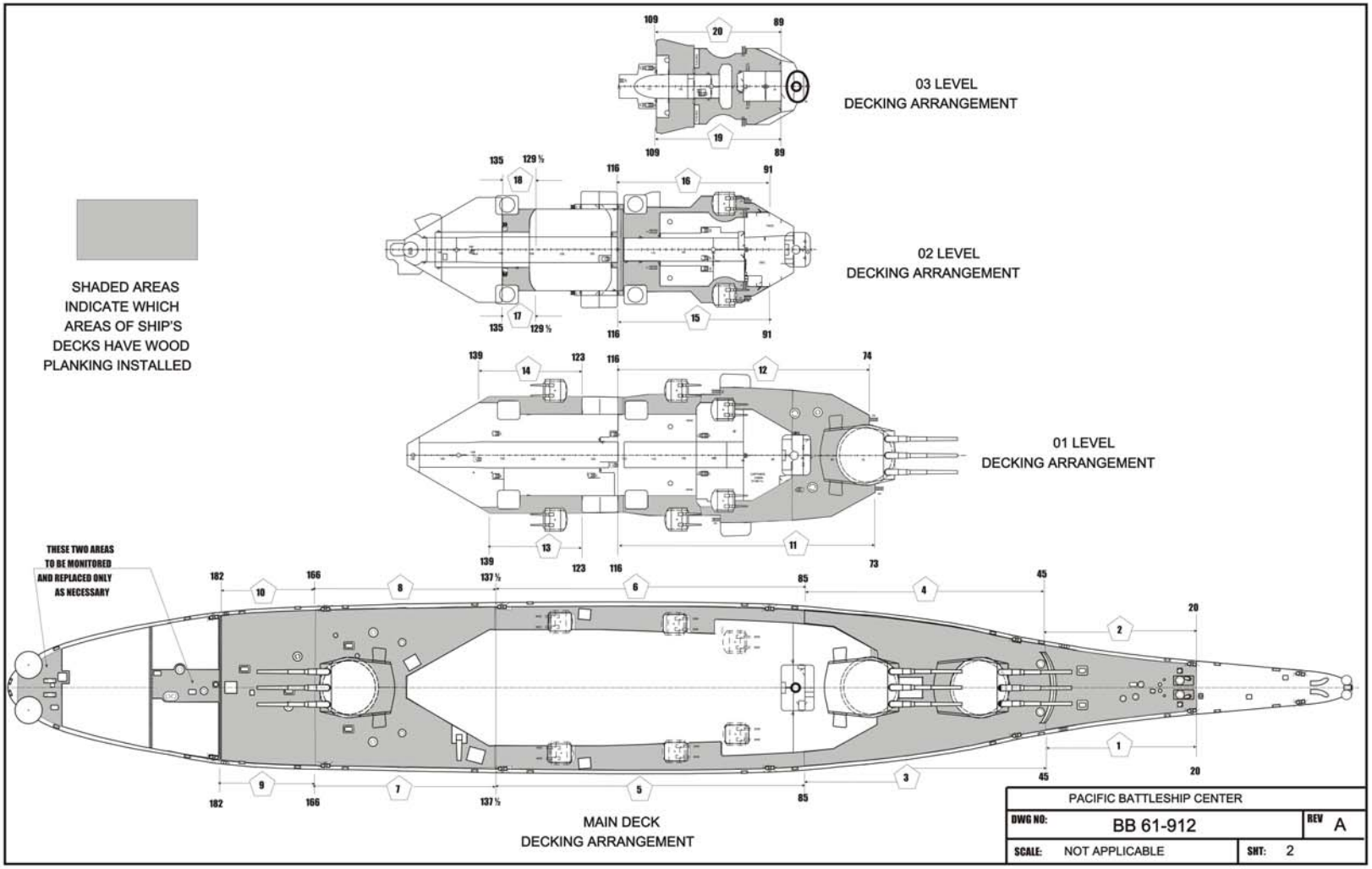
GENERAL NOTES:

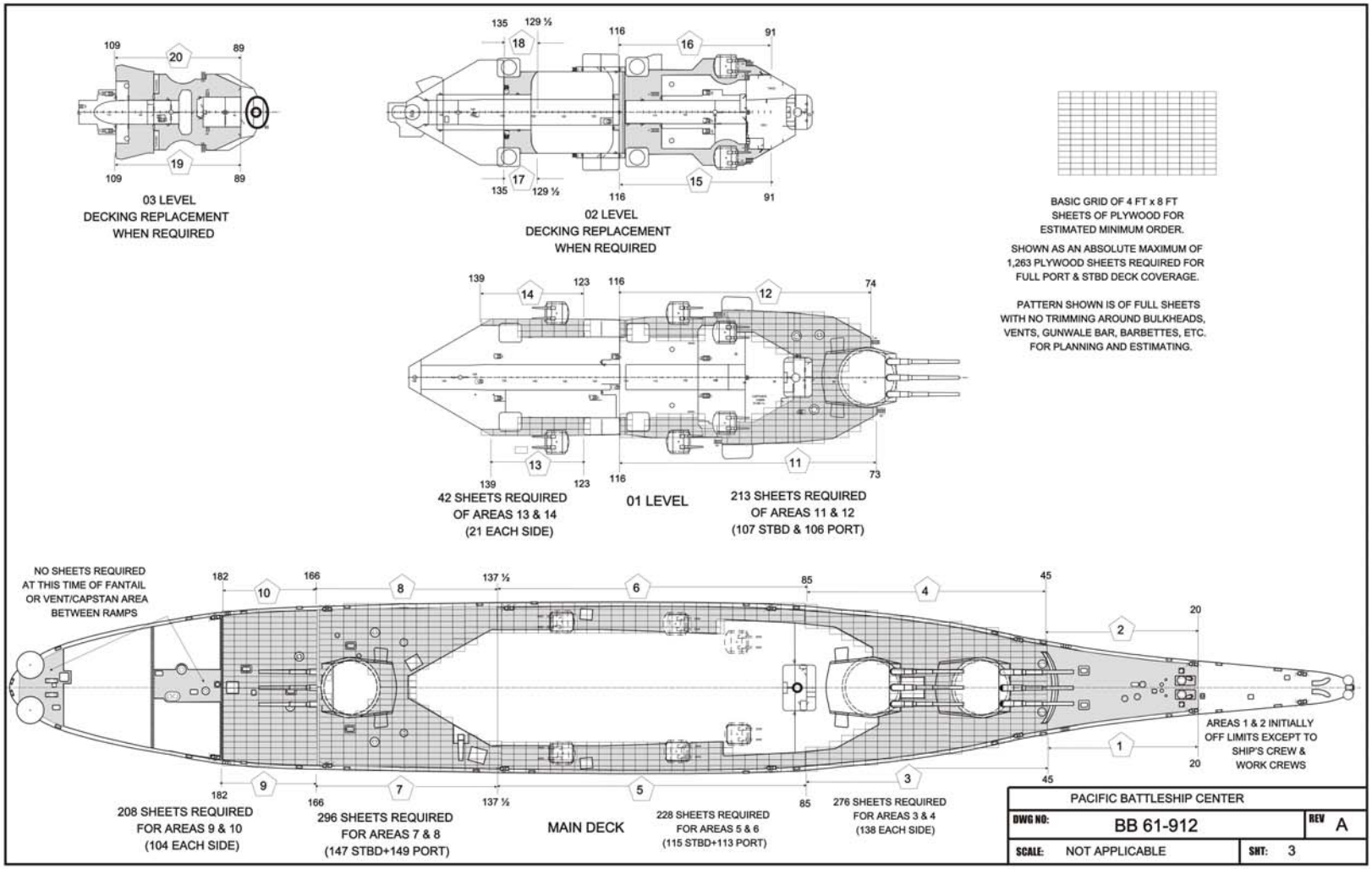
1. THIS DRAWING WAS DEVELOPED TO PROVIDE A PATTERN OF DECKING SAFETY AND PRESERVATION WITH PLYWOOD WHILE EXISTING PERMANENT DECKING IS REPLACED OR REPAIRED ON THE (EX) USS (BBV/A1)..
2. DECKING INSTALLATION SHALL BE DONE IN ACCORDANCE WITH REFERENCE 6.
3. PLYWOOD SHEETS SHALL BE EQUAL OR SIMILAR TO 48" WIDE BY 96" LONG (4 ft X 8 ft) HAVING A THICKNESS OF NO LESS THAN 9/16" THICK AND A MAXIMUM THICKNESS OF 3/4" THICK. INSTALLATION IN ANY CONTINUOUS AREA SHALL BE ALL OF THE SAME THICKNESS TO PREVENT TRIPPING HAZARDS AND ALLOW A SMOOTH SURFACE FOR MOVEMENT OF EQUIPMENT.
4. THE PLYWOOD SHALL BE SIMILAR OR EQUAL TO MARINE PLYWOOD TO PROVIDE WEATHER RESISTANCE IF NEEDED TO BE KEPT IN PLACE UP TO 10 YEARS.
5. THE PLYWOOD SHALL BE ATTACHED TO THE EXISTING WOOD DECKING WITH COUNTERSUNK FLAT HEAD SCREWS FOR SECURE LONG TERM PLACEMENT BUT WITH FAST REMOVAL LATER SHOULD THE PANELS BE USED ON ANOTHER PORTION OF THE DECK WHILE THE DECKING UNDERNEATH IS BEING REPLACED OR RESTORED.
6. WHERE PLYWOOD PANELS BUTT UP TO VERTICAL STRUCTURES (BULKHEADS, 5"/38 UPPER HANDLING ROOMS, MAIN BATTERY TURRET BARBETTES, GUNWALE BARS, BITTS, CHOCKS, HATCH COAMINGS, WINCH FOUNDATIONS, DAVIT SOCKETS, BULLWARKS, ETC.) THE BUTT SHALL BE SEALED WITH A CAULKING COMPOUND TO PREVENT WATER FROM RUNNING DOWN THE VERTICAL SURFACES AND UNDERNEATH BOTH THE PLYWOOD SHEATHING AND EXISTING DECKING. ALSO, A CAULKING COMPOUND SHALL BE USED TO SEAL ALL SEAMS AND BUTTS OF THE PLYWOOD SHE ATHING FOR THE SAME PURPOSE AS A WATER SEAL.
7. PLYWOOD PANELS SHALL FIRST BE TREATED ON BOTH SIDES AND ON EXPOSED EDGES WITH A DEEP PENETRATING SEALANT/ THE TOP SURFACE SHALL THEN RECEIVE A COAT OF PRIMER PAINT AND FINALLY A TOP COAT OF APPROPRIATE COLOR TO MATCH OR COMPLIMENT THE ADJACENT AREAS.
8. REFERENCE 6 SHOWS THE DECKING REPLACEMENT DIVIDED UP INTO TWENTY SECTIONS FROM MAIN DECK TO 03 LEVEL. HOWEVER, SECTIONS 1 & 2 WILL BE THE FIRST CLOSED OFF TO THE PUBLIC FOR DECKING REPLACEMENT AND RESTORING THE ANCHOR WINDLASSES AND MOORING CAPSTANS. THE SMALL SECTION AFT OF THE HELICOPTER DECK WILL ALS BE OFF LIMITS TO THE GENERAL PUBLIC AS WELL AS THE SPACE BETWEEN THE TWO HELICOPTER RAMPS. 02 AND 03 LEVELS HAVE HAD SOME DECKING RESTORED BY MARAD AND IS PRESENTLY SAFE TO WALK ON UNTIL IT IS PLANED, SANDED, OR HOLEY-STONED TOO THIN (TOO CLOSE TO THE HOLDING DOWN STUDS & NUTS) AND WILL BE REPLACED IN THE FUTURE WHEN THAT NECESSITY ARISES.

REFERENCES:

1. TYPE DWG 909-T DECK PLANKING, INSTALLATION AND DETAILS.
2. BUSHIPS TYPE-805-921806 INSTALLATION OF PLANKING ON DECK PLATING.
3. BUSHIPS C&R BB 616-1401AD/BASIC NO. 351771 DECK PLANKING DETAILS.
4. BUSHIPS C&R BB 616-1401AC DECK PLANKING MAIN DECK.
5. BUSHIPS C&R BB 616-1401AF DECK PLANKING FOR SUPER DECKS AND ABOVE.
6. PACBBCTR DWG BB 61-220 DK PLANKING INSTLN DETS & PROCEDURES.

CONTRACTOR:	DRAWN BY: R. A. LANDGRAFF DATE: 09/18/2010 CHECKED BY: DATE:	PACIFIC BATTLESHIP CENTER DWG TITLE: DECK PLANKING PLYWOOD DECK COVERING FOR SAFETY & PRESERVATION
CONTRACT:	APPROVED BY: DATE:	DWG NO: BB 61- 912 REV A SHT: 1


03 LEVEL
DECKING ARRANGEMENT
02 LEVEL
DECKING ARRANGEMENT
01 LEVEL
DECKING ARRANGEMENT
SHADED AREAS
INDICATE WHICH
AREAS OF SHIP'S
DECKS HAVE WOOD
PLANKING INSTALLED
THESE TWO AREAS
TO BE MONITORED
AND REPLACED ONLY
AS NECESSARY
MAIN DECK
DECKING ARRANGEMENT
PACIFIC BATTLESHIP CENTER
DWG NO: BB 61-912
REV A
SCALE: NOT APPLICABLE
SHT: 2



Appendix B-4-7 Mast Reattachment

GENERAL NOTES:

1. THIS DRAWING WAS DEVELOPED FOR (EX) USS IOWA (BB 61) FOR THE PURPOSE OF RESTORING AND/OR REPAIRING THE FOREMAST THAT WAS CUT DOWN TO CLEAR A LOW BRIDGE WHEN TOWED TO BENICIA, CALIFORNIA.
2. TO MEET THE INTENT OF REF. 2, ALL SHIP STRUCTURES & EQUIPMENT RELOCATED, MODIFIED OR REMOVED BY THIS DRAWING SHALL BE DONE IN SUCH A WAY THAT THEY CAN BE READILY REPLACED SHOULD THE SHIP BE RECALLED TO ACTIVE DUTY.
3. REASSEMBLY OF THE MAST SHALL MAINTAIN STRUCTURAL INTEGRITY AS IF THE SHIP WERE ON ACTIVE DUTY. WHAT MAY APPEAR TO BE SHORTCUTS FOR REASSEMBLY ARE IN ACCORDANCE WITH STANDARD NAVY DESIGN PROCEDURES OF A NEW MAST THAT WOULD WITHSTAND A 100 KNOT WIND, A 30 DEGREE ROLL AND A 10 DEGREE PITCH.
4. A THOROUGH SHIP INSPECTION WILL BE NECESSARY TO IDENTIFY EACH PIECE OF THE MAST, NOW STOWED ON THE HELICOPTER DECK, AND THEIR CONDITION. THERE IS CONCERN THAT PHOTOGRAPHS OF THE MAST PARTS INDICATE THAT THE MAIN LEG OF THE MAST WAS MADE OF ORDINARY STRENGTH STEEL AND ONLY 1/2" THICK. THOUGH THIS IS STEEL OF SUFFICIENT STRENGTH AND THICKNESS FOR A STANDARD MAST, IT WAS SUPPOSED TO BE MADE OF 3/4" THICK HY-80 STEEL FOR LEVEL I FRAGMENTATION PROTECTION AND WELDED WITH 610 STAINLESS STEEL. HOWEVER, AS FRAG ARMOR IS NOT REQUIRED IN A MUSEUM STATUS, IT WILL NOT BE NECESSARY TO REPLACE OF ANY OF THE STEEL. SHOULD THE SHIP BE CALLED BACK INTO SERVICE, THE MAST LEG CAN HAVE "WRAP" PLATES OF 1/2" THICK HY-80 OR HSLA AS THE MAST ON THE USS NEW JERSEY WAS DONE.
5. IT MUST BE KEPT IN MIND THAT THE CUTTING OF THE MAST PARTS WAS DONE WITH AN OXY-ACETYLENE TORCH, 1/8" OF THE LENGTH OF EACH LEG WAS LOST. ADDITIONALLY, GRINDING OF THE BEVELS AND SMOOTHING OFF THE EDGES FOR RUST REMOVAL WILL TAKE AWAY ANOTHER 1/8" FOR A FULL 1/4" LOSS. THEREFORE THESE PROCEDURES WILL NOT ONLY RETURN THE MAST HEIGHT NEAR ITS ORIGINAL SIZE, IT WILL ASSURE BETTER ALIGNMENT OF THE ANGLED REAR LEGS.
6. ALL FABRICATION AND WELDING SHALL BE DONE IN ACCORDANCE WITH MIL-STD-1689 "FABRICATION, WELDING AND INSPECTION OF SHIPS STRUCTURE".
7. PAINT AFFECTED AREAS IN ACCORDANCE WITH NAVSEA S9AA0-AB-GOS-010.
8. ALL ROUGH OR SHARP EDGES WHICH CAN INJURE PERSONNEL OR DAMAGE EQUIPMENT SHALL BE MADE SMOOTH.

REFERENCES:

1. S9086-BS-STM-008 NAVAL SHIPS' TECH MANUAL, CHAPTER 050, "READINESS AND CARE OF INACTIVE SHIPS".
2. DEPT OF NAVY LTR OF JANUARY 1994: "NAVY DEPARTMENTAL INSTRUCTIONS FOR PREPARATION OF APPLICATION FOR DONATION OF OBSOLETE OR CONDEMNED NAVY SHIPS, BOATS AND SMALL LANDING CRAFT".

CONTRACTOR:	DRAWN BY: R. A. LANDGRAFF DATE: 07/04/09	PACIFIC BATTLESHIP CENTER	
	CHECKED BY: DATE:	DWG TITLE: MAST REPAIR PROCEDURES	
CONTRACT:	APPROVED BY: DATE:	DWG NO: BB 61-225	REV A
			SHT: 1

LIST OF MATERIAL

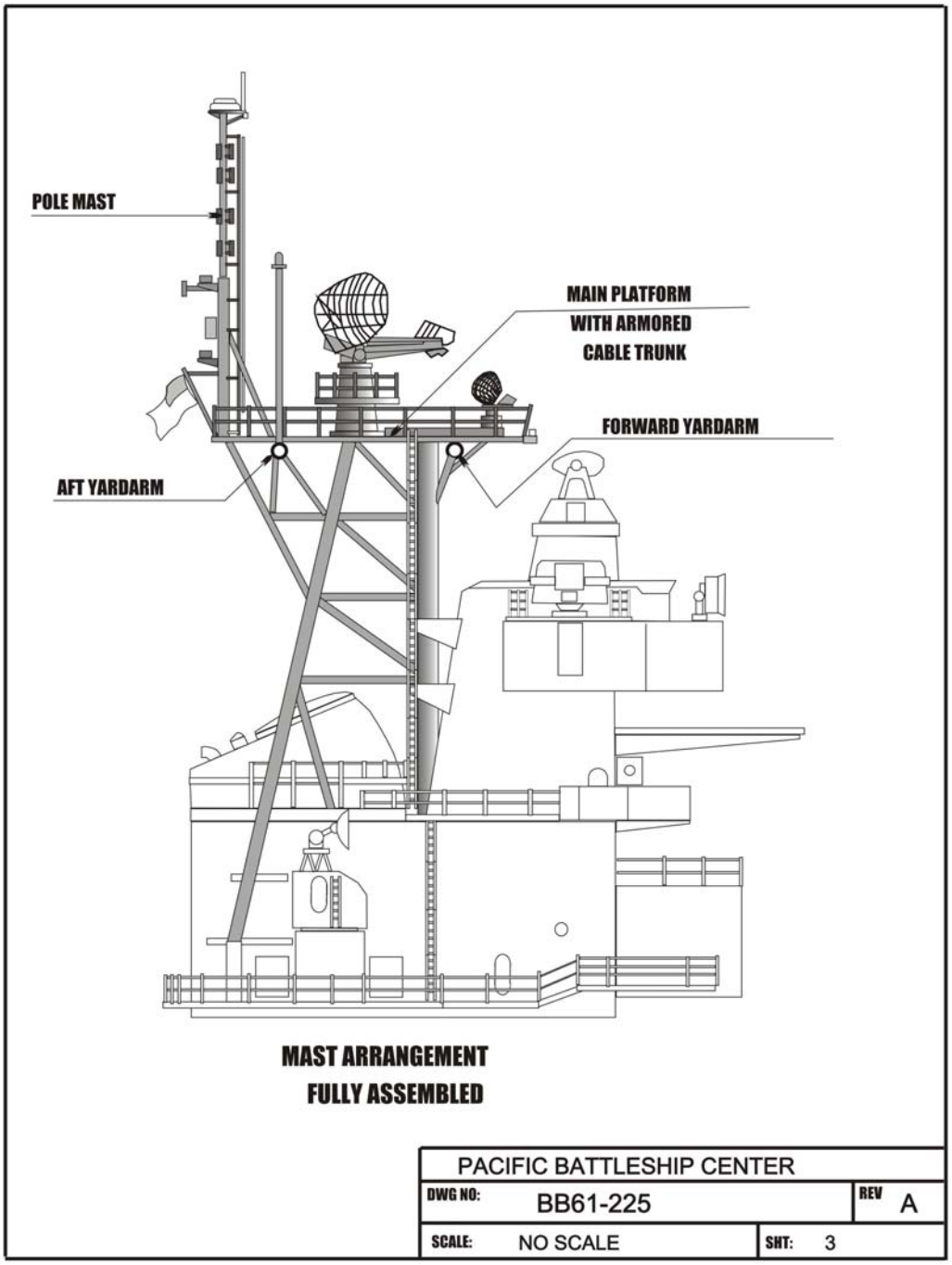
PC NO.	AMT	DESCRIPTION	MATERIAL	STK NO. OR SOURCE	REMARKS
1	AS REQD	2" X 12" SCAFFOLD PLANKING DOUGLAS FIR	MIL-L-2594D	SEE NOTE 1 BELOW	
2		1" X 4" SCAFFOLD CLEAT PLANKING DOUGLAS FIR	MIL-L-2594D		
3		SCAFFOLD FRAMING TUBING STEEL			
4		SCAFFOLD CLAMPS STEEL			
5		15.3 LB PLATE WELDING COLLAR O.S. STL MIL-S-22698			
6	▼	10.2 LB SPACER PLATES O.S. STL MIL-S-22698			

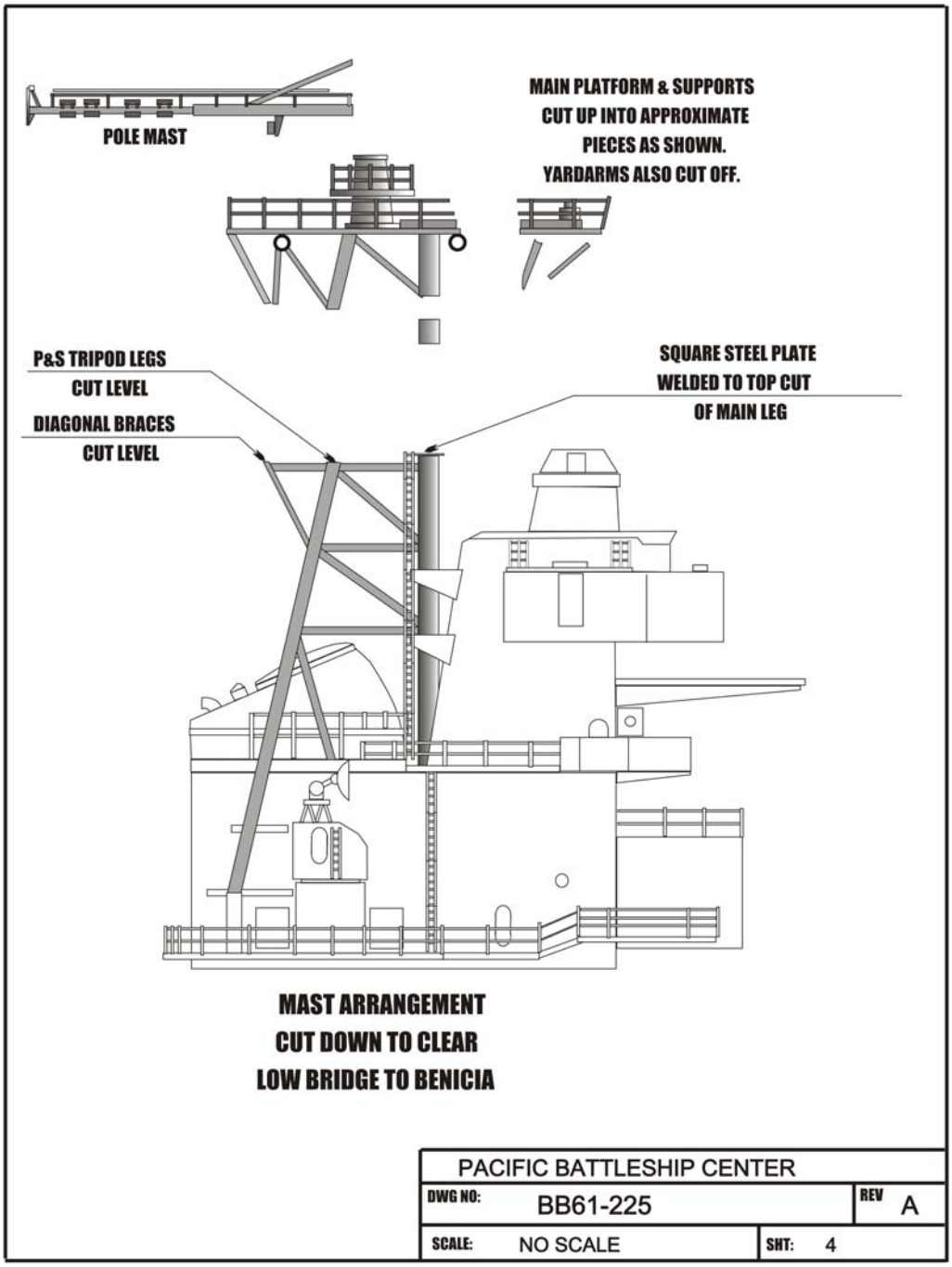
MATERIAL NOTES:

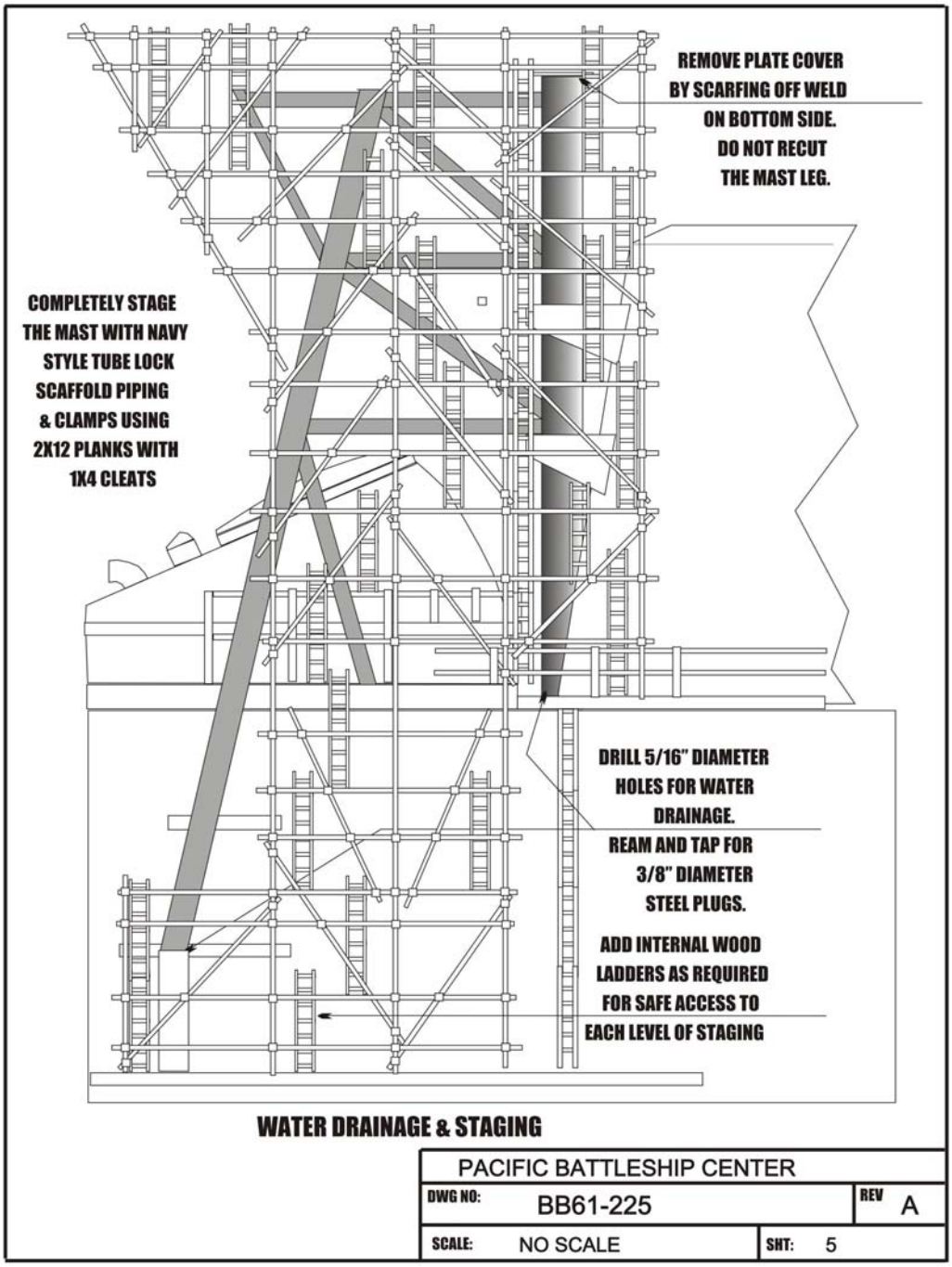
1. INSTALLERS OF MAST SCAFFOLDING SHALL USE NAVY STYLE TUBE LOCK SCAFFOLDING AND CLAMPS SIMILAR OR EQUAL TO T&C () BY THYSSENKRUPP SAFWAY INC CLAMP

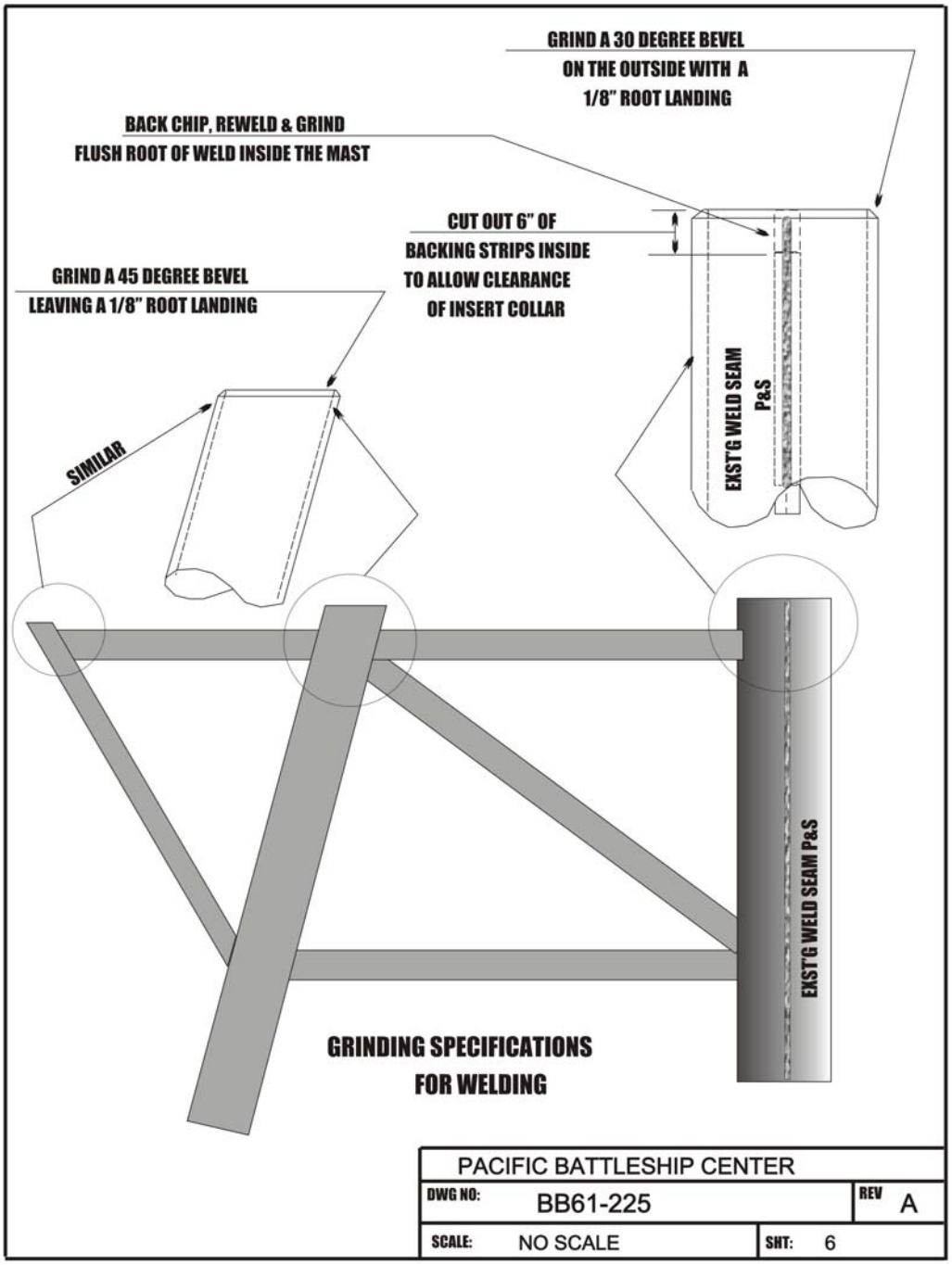
2. INNER WELDING ROOT COLLARS FOR THE MAIN LEG AND SPACER PLATES FOR FILLET WELDING OF OTHER LEGS AND/OR TUBULAR STRUCTURE SHALL BE TEMPLATED ON SITE AFTER A THOROUGH INVENTORY OF PARTS AND SUB-ASSEMBLIES HAS BEEN MADE. THERE MAY BE SOME CASES WHERE EITHER AN INSIDE ROOT COLLAR OR AN OUTSIDE SLEEVE MAY BE THE BEST WAY TO REJOIN TUBES AND PIPES.

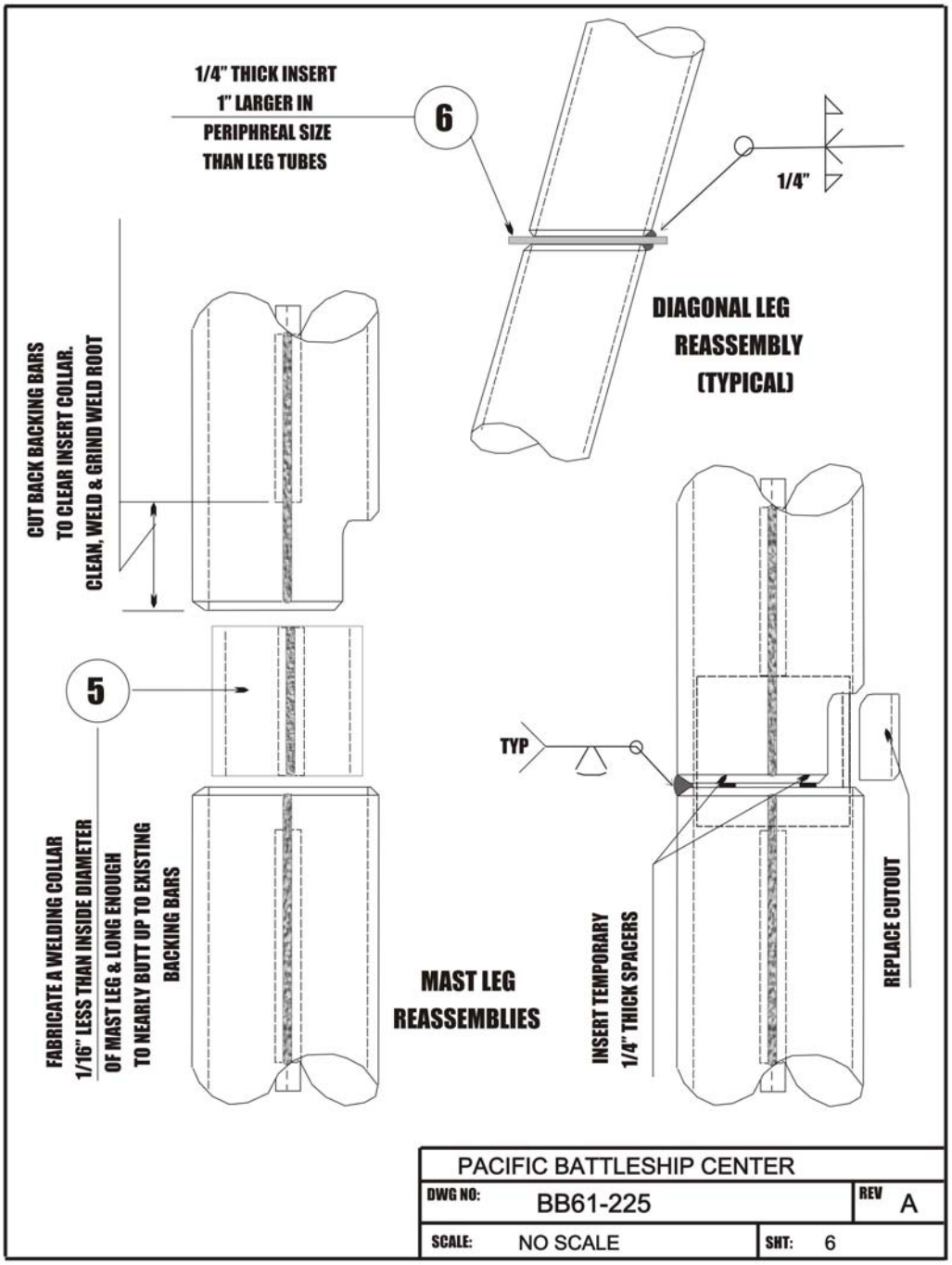
PACIFIC BATTLESHIP CENTER		
DWG NO: BB61-225		REV A
SCALE: NO SCALE	SHT: 2	

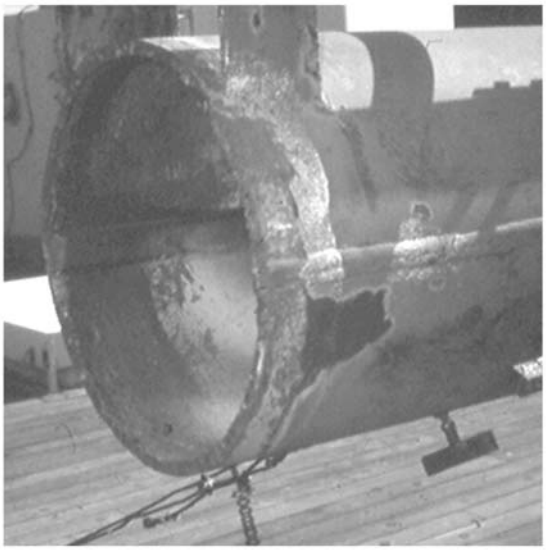

POLE MAST
MAIN PLATFORM
WITH ARMORED
CABLE TRUNK
FORWARD YARDARM
AFT YARDARM
MAST ARRANGEMENT
FULLY ASSEMBLED
PACIFIC BATTLESHIP CENTER
DWG NO: BB61-225
REV A
SCALE: NO SCALE
SHT: 3


POLE MAST
MAIN PLATFORM & SUPPORTS
CUT UP INTO APPROXIMATE
PIECES AS SHOWN.
YARDARMS ALSO CUT OFF.
P&S TRIPOD LEGS
CUT LEVEL
DIAGONAL BRACES
CUT LEVEL
SQUARE STEEL PLATE
WELDED TO TOP CUT
OF MAIN LEG
MAST ARRANGEMENT
CUT DOWN TO CLEAR
LOW BRIDGE TO BENICIA
PACIFIC BATTLESHIP CENTER
DWG NO: BB61-225
REV A
SCALE: NO SCALE
SHT: 4


REMOVE PLATE COVER
BY SCARFING OFF WELD
ON BOTTOM SIDE.
DO NOT RECUT
THE MAST LEG.
COMPLETELY STAGE
THE MAST WITH NAVY
STYLE TUBE LOCK
SCAFFOLD PIPING
& CLAMPS USING
2X12 PLANKS WITH
1X4 CLEATS
DRILL 5/16" DIAMETER
HOLES FOR WATER
DRAINAGE.
REAM AND TAP FOR
3/8" DIAMETER
STEEL PLUGS.
ADD INTERNAL WOOD
LADDERS AS REQUIRED
FOR SAFE ACCESS TO
EACH LEVEL OF STAGING
WATER DRAINAGE & STAGING
PACIFIC BATTLESHIP CENTER
DWG NO: BB61-225
REV A
SCALE: NO SCALE
SHT: 5

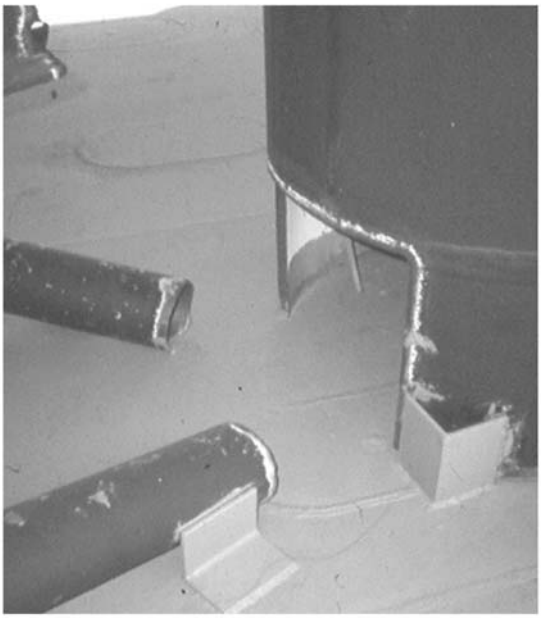

GRIND A 30 DEGREE BEVEL
ON THE OUTSIDE WITH A
1/8" ROOT LANDING
BACK CHIP, REWELD & GRIND
FLUSH ROOT OF WELD INSIDE THE MAST
CUT OUT 6" OF
BACKING STRIPS INSIDE
TO ALLOW CLEARANCE
OF INSERT COLLAR
GRIND A 45 DEGREE BEVEL
LEAVING A 1/8" ROOT LANDING
SIMILAR
EXST'G WELD SEAM
P&S
EXST'G WELD SEAM P&S
GRINDING SPECIFICATIONS
FOR WELDING
PACIFIC BATTLESHIP CENTER
DWG NO: BB61-225
REV A
SCALE: NO SCALE
SHT: 6


1/4" THICK INSERT
1" LARGER IN
PERIPHREAL SIZE
THAN LEG TUBES
6
1/4"
DIAGONAL LEG
REASSEMBLY
(TYPICAL)
CUT BACK BACKING BARS
TO CLEAR INSERT COLLAR.
CLEAN, WELD & GRIND WELD ROOT
5
FABRICATE A WELDING COLLAR
1/16" LESS THAN INSIDE DIAMETER
OF MAST LEG & LONG ENOUGH
TO NEARLY BUTT UP TO EXISTING
BACKING BARS
MAST LEG
REASSEMBLIES
TYP
INSERT TEMPORARY
1/4" THICK SPACERS
REPLACE CUTOUT
PACIFIC BATTLESHIP CENTER
DWG NO: BB61-225
REV A
SCALE: NO SCALE
SHT: 6



PHOTOGRAPHS TAKEN IN 2006 SHOWING CUT UP MAST MAIN LEG.

OXY-ACETYLENE CUTS THROUGH WELDS INDICATE THAT THE WELDING ROD WAS NOT STAINLESS STEEL



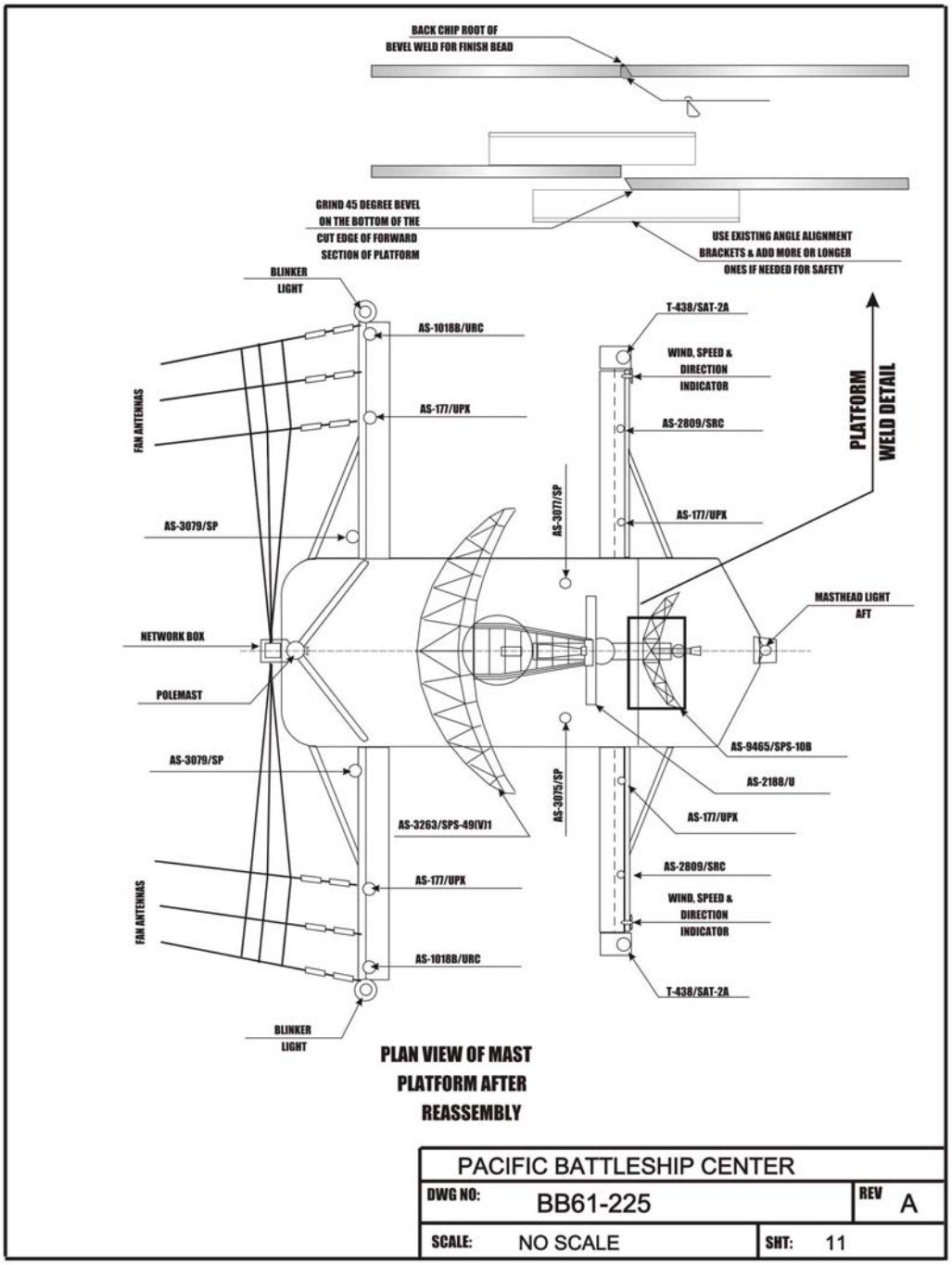
PACIFIC BATTLESHIP CENTER			
DWG NO:	BB61-225	REV	A
SCALE:	NO SCALE	SHT:	8

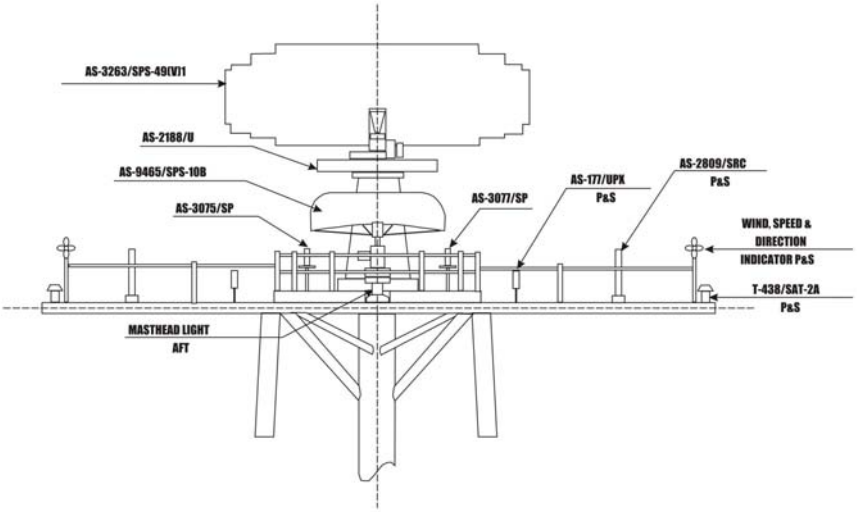
TOP OF MAST AS IT EXISTED IN 2006
NOTE THAT MAIN LEG AND BOTH TRIPOD LEGS
HAVE BEEN CUT APPROXIMATELY LEVEL
TO BASE LINE OF SHIP

PACIFIC BATTLESHIP CENTER			
DWG NO:	BB61-225	REV	A
SCALE:	NO SCALE	SHT:	9

2006 PHOTO SHOWS MAST AS IT WAS CUT TO CLEAR A LOW BRIDGE TO BENICIA

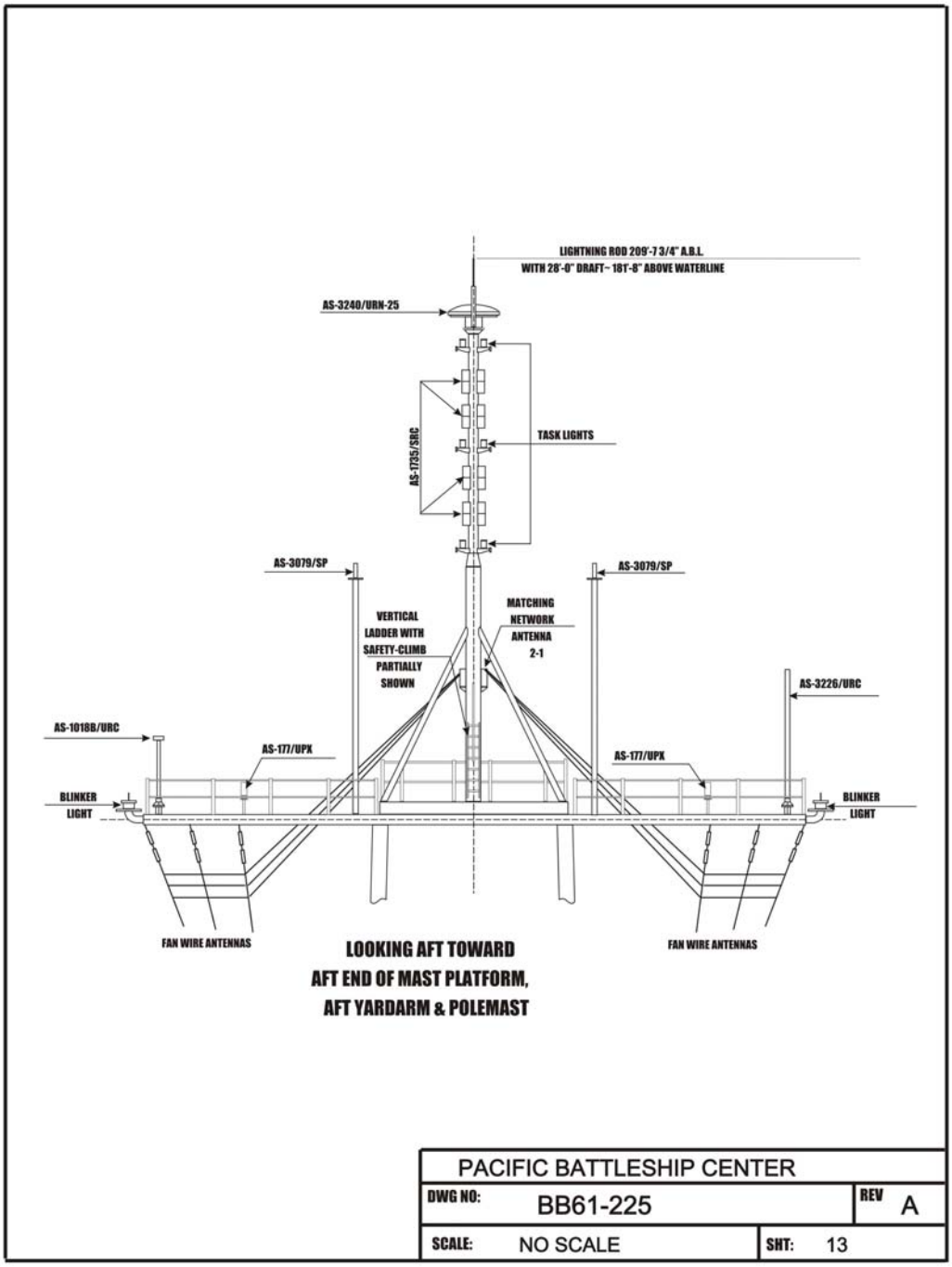
PACIFIC BATTLESHIP CENTER			
DWG NO:	BB61-225	REV	A
SCALE:	NO SCALE	SHT:	10

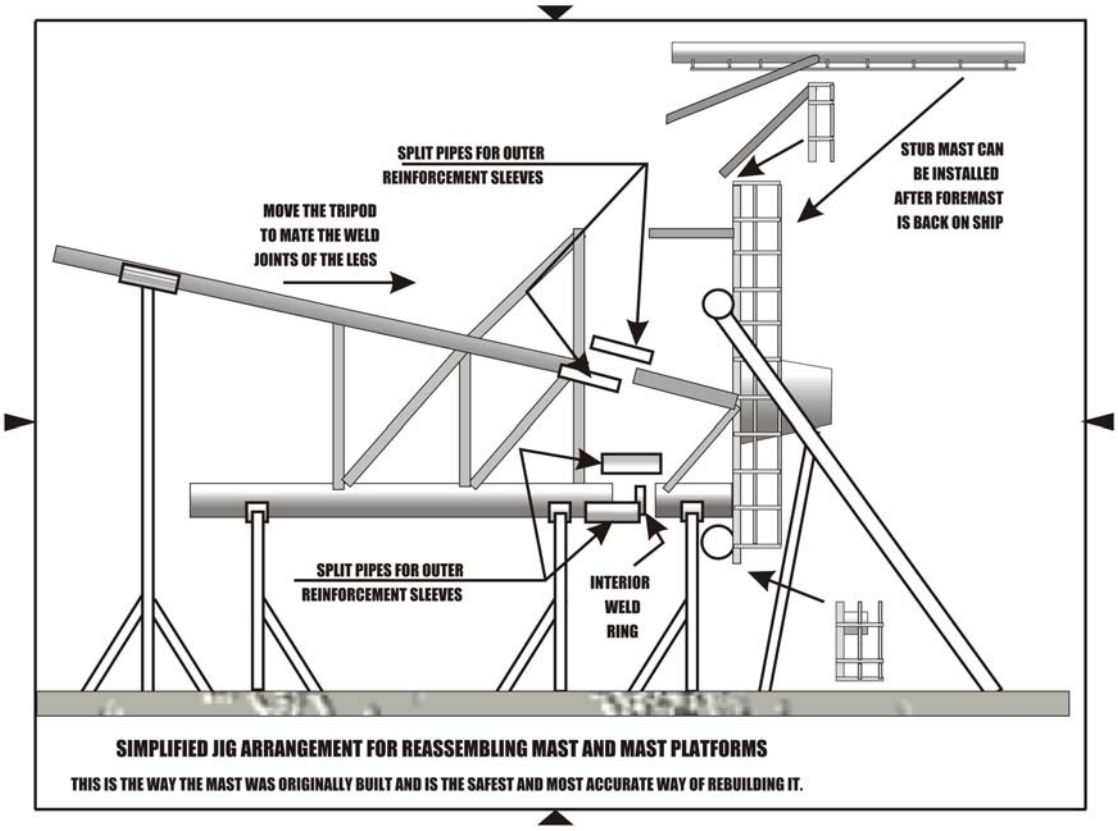

BACK CHIP ROOT OF
BEVEL WELD FOR FINISH BEAD
GRIND 45 DEGREE BEVEL
ON THE BOTTOM OF THE
CUT EDGE OF FORWARD
SECTION OF PLATFORM
USE EXISTING ANGLE ALIGNMENT
BRACKETS & ADD MORE OR LONGER
ONES IF NEEDED FOR SAFETY
BLINKER
LIGHT
AS-1018B/URC
AS-177/UPX
FAN ANTENNAS
AS-3079/SP
NETWORK BOX
POLEMAST
AS-3079/SP
AS-3263/SPS-49(V)1
AS-177/UPX
FAN ANTENNAS
AS-1018B/URC
BLINKER
LIGHT
T-438/SAT-2A
WIND, SPEED &
DIRECTION
INDICATOR
AS-2809/SRC
AS-3077/SP
AS-177/UPX
PLATFORM
WELD DETAIL
MASTHEAD LIGHT
AFT
AS-9465/SPS-10B
AS-2188/U
AS-3075/SP
AS-177/UPX
AS-2809/SRC
WIND, SPEED &
DIRECTION
INDICATOR
T-438/SAT-2A
PLAN VIEW OF MAST
PLATFORM AFTER
REASSEMBLY
PACIFIC BATTLESHIP CENTER
DWG NO: BB61-225
REV A
SCALE: NO SCALE
SHT: 11



LOOKING AFT TOWARD
FWD END OF MAST PLATFORM,
& FWD YARDARM

PACIFIC BATTLESHIP CENTER			
DWG NO:	BB61-225	REV	A
SCALE:	NO SCALE	SHT:	12


LIGHTNING ROD 209'-7 3/4" A.B.L.
WITH 28'-0" DRAFT~ 181'-8" ABOVE WATERLINE
AS-3240/URN-25
AS-1735/SRC
TASK LIGHTS
AS-3079/SP
AS-3079/SP
VERTICAL LADDER WITH SAFETY-CLIMB PARTIALLY SHOWN
MATCHING NETWORK ANTENNA 2-1
AS-3226/URC
AS-1018B/URC
AS-177/UPX
AS-177/UPX
BLINKER LIGHT
BLINKER LIGHT
FAN WIRE ANTENNAS
FAN WIRE ANTENNAS
LOOKING AFT TOWARD
AFT END OF MAST PLATFORM,
AFT YARDARM & POLEMAST
PACIFIC BATTLESHIP CENTER
DWG NO: BB61-225
REV A
SCALE: NO SCALE
SHT: 13


SPLIT PIPES FOR OUTER
REINFORCEMENT SLEEVES
MOVE THE TRIPOD
TO MATE THE WELD
JOINTS OF THE LEGS
STUB MAST CAN
BE INSTALLED
AFTER FOREMAST
IS BACK ON SHIP
SPLIT PIPES FOR OUTER
REINFORCEMENT SLEEVES
INTERIOR
WELD
RING
SIMPLIFIED JIG ARRANGEMENT FOR REASSEMBLING MAST AND MAST PLATFORMS
THIS IS THE WAY THE MAST WAS ORIGINALLY BUILT AND IS THE SAFEST AND MOST ACCURATE WAY OF REBUILDING IT.

Appendix B-4-8 Temporary Decking Protection Schedules

GENERAL NOTES:

1. THIS DRAWING WAS DEVELOPED TO PROVIDE A PATTERN OF DECKING SAFETY AND PRESERVATION WITH PLYWOOD WHILE EXISTING PERMANENT DECKING IS REPLACED OR REPAIRED ON THE (EX) USS IOWA.
2. DECKING INSTALLATION SHALL BE DONE IN ACCORDANCE WITH REFERENCE 6.
3. PLYWOOD SHEETS SHALL BE EQUAL OR SIMILAR TO 48" WIDE BY 96" LONG (4 ft X 8 ft) HAVING A THICKNESS OF NO LESS THAN 9/16 THICK AND A MAXIMUM THICKNESS OF 3/4" THICK. INSTALLATION IN ANY CONTINUOUS AREA SHALL BE ALL OF THE SAME THICKNESS TO PREVENT TRIPPING HAZARDS AND ALLOW A SMOOTH SURFACE FOR MOVEMENT OF EQUIPMENT.
4. THE PLYWOOD SHALL BE SIMILAR OR EQUAL TO MARINE PLYWOOD TO PROVIDE WEATHER RESISTANCE IF NEEDED TO BE KEPT IN PLACE UP TO 10 YEARS.
5. THE PLYWOOD SHALL BE ATTACHED TO THE EXISTING WOOD DECKING WITH COUNTERSUNK FLAT HEAD SCREWS FOR SECURE LONG TERM PLACEMENT BUT WITH FAST REMOVAL LATER SHOULD THE PANELS BE USED ON ANOTHER PORTION OF THE DECK WHILE THE DECKING UNDERNEATH IS BEING REPLACED OR RESTORED.
6. WHERE PLYWOOD PANELS BUTT UP TO VERTICAL STRUCTURES (BULKHEADS, 5"/38 UPPER HANDLING ROOMS, MAIN BATTERY TURRET BARBETTES, GUNWALE BARS, BITTS, CHOCKS, HATCH COAMINGS, WINCH FOUNDATIONS, DAVIT SOCKETS, BULLWARKS, ETC.) THE BUTT SHALL BE SEALED WITH A CAULKING COMPOUND TO PREVENT WATER FROM RUNNING DOWN THE VERTICAL SURFACES AND UNDERNEATH BOTH THE PLYWOOD SHEATHING AND EXISTING DECKING. ALSO, A CAULKING COMPOUND SHALL BE USED TO SEAL ALL SEAMS AND BUTTS OF THE PLYWOOD SHEATHING FOR THE SAME PURPOSE AS A WATER SEAL.
7. PLYWOOD PANELS SHALL FIRST BE TREATED ON BOTH SIDES AND ON EXPOSED EDGES WITH A DEEP PENETRATING SEALANT/ THE TOP SURFACE SHALL THEN RECEIVE A COAT OF PRIMER PAINT AND FINALLY A TOP COAT OF APPROPRIATE COLOR TO MATCH OR COMPLIMENT THE ADJACENT AREAS.
8. REFERENCE 6 SHOWS THE DECKING REPLACEMENT DIVIDED UP INTO TWENTY SECTIONS FROM MAIN DECK TO 03 LEVEL. HOWEVER, SECTIONS 1 & 2 WILL BE THE FIRST CLOSED OFF TO THE PUBLIC FOR DECKING REPLACEMENT AND RESTORING THE ANCHOR WINDLASSES AND MOORING CAPSTANS. THE SMALL SECTION AFT OF THE HELICOPTER DECK WILL ALSO BE OFF LIMITS TO THE GENERAL PUBLIC AS WELL AS THE SPACE BETWEEN THE TWO HELICOPTER RAMPS. 02 AND 03 LEVELS HAVE HAD SOME DECKING RESTORED BY MARAD AND IS PRESENTLY SAFE TO WALK ON UNTIL IT IS PLANED, SANDED, OR HOLEY-STONED TOO THIN (TOO CLOSE TO THE HOLDING DOWN STUDS & NUTS) AND WILL BE REPLACED IN THE FUTURE WHEN THAT NECESSITY ARISES.

REFERENCES:

1. TYPE DWG 909-T DECK PLANKING, INSTALLATION AND DETAILS.
2. BUSHIPS TYPE-805-921806 INSTALLATION OF PLANKING ON DECK PLATING.
3. BUSHIPS C&R BB 616-1401AD/BASIC NO. 351771 DECK PLANKING DETAILS.
4. BUSHIPS C&R BB 616-1401AC DECK PLANKING MAIN DECK.
5. BUSHIPS C&R BB 616-1401AF DECK PLANKING FOR SUPER DECKS AND ABOVE.
6. PACBBCTR DWG BB 61-120 DK PLANKING INSTLN DETS & PROCEDURES.

REVISIONS

SHT	REV	REVISION NOTES
1	A	
2	A	
3	A	
4	A	

ISSUE STATUS

ISSUE STATUS:		
REVISION	A	
BRUNTON	CAD ORIG	
PACBBCTR	2	
SCALE SHIPYARD	1	

ISSUE NOTES

CONTRACTOR:

DRAWN BY: R. A. LANDGRAFF
DATE: 09/18/2010
CHECKED BY:

CONTRACT:

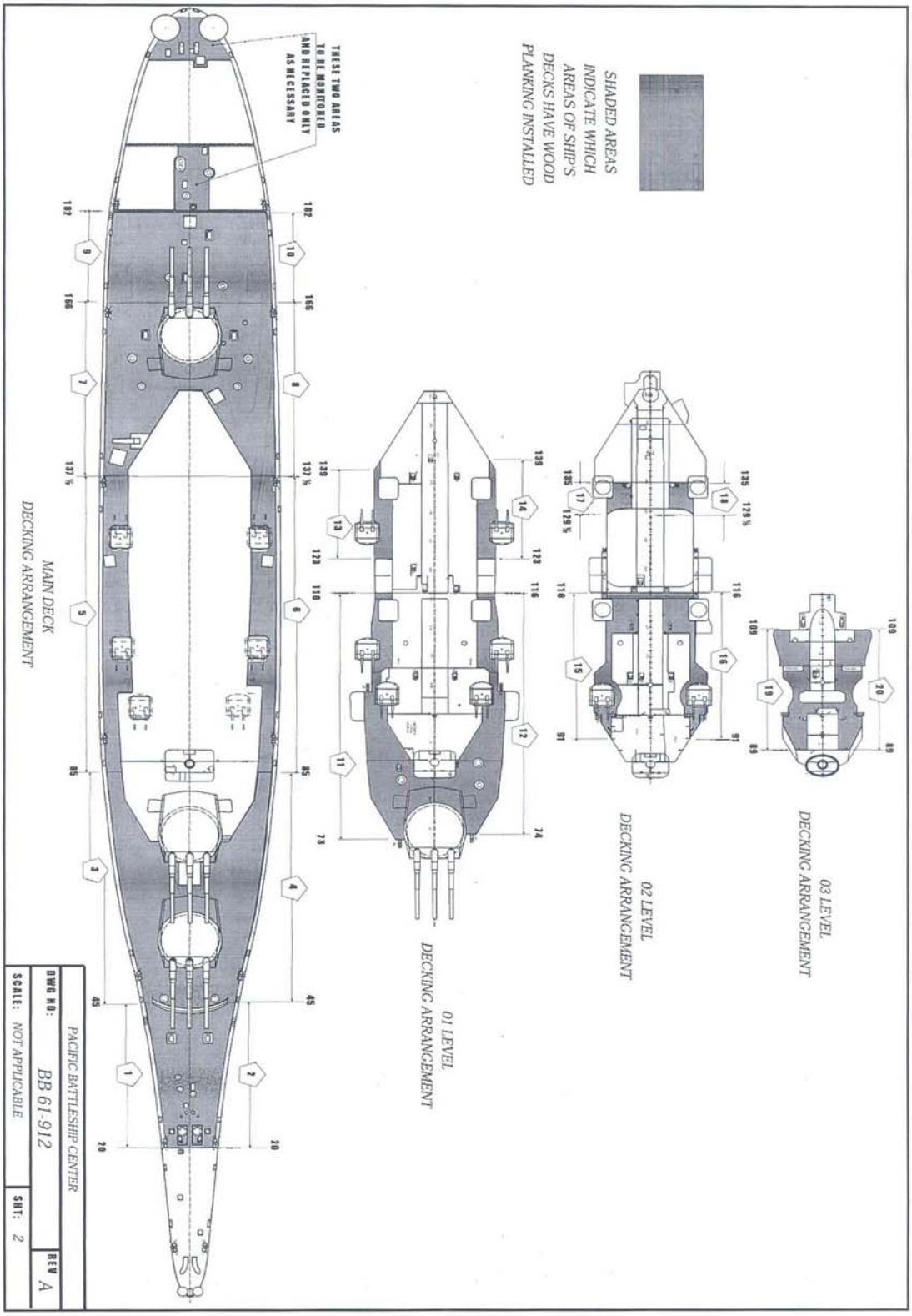
APPROVED BY:
DATE:

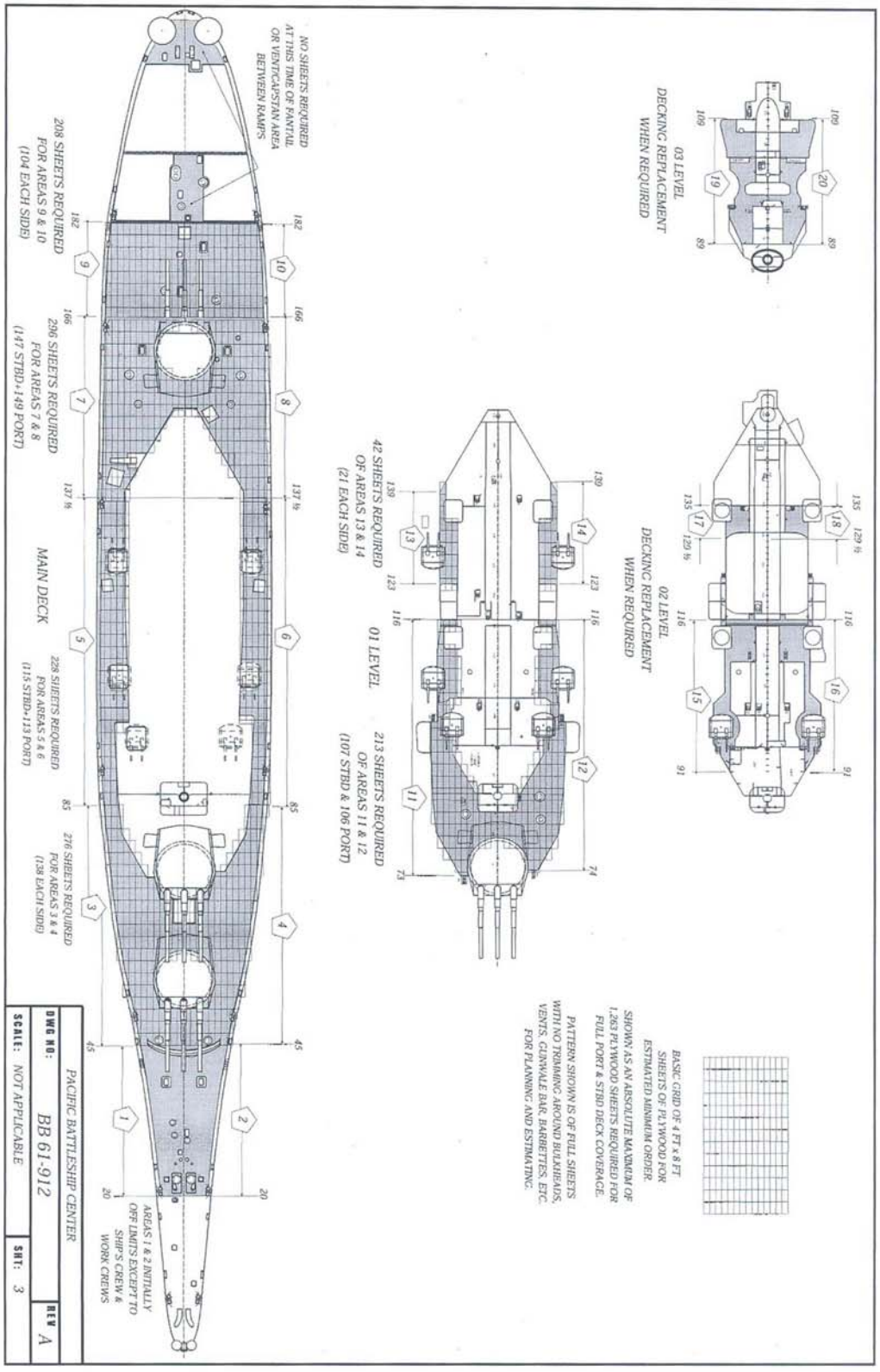
PACIFIC BATTLESHIP CENTER

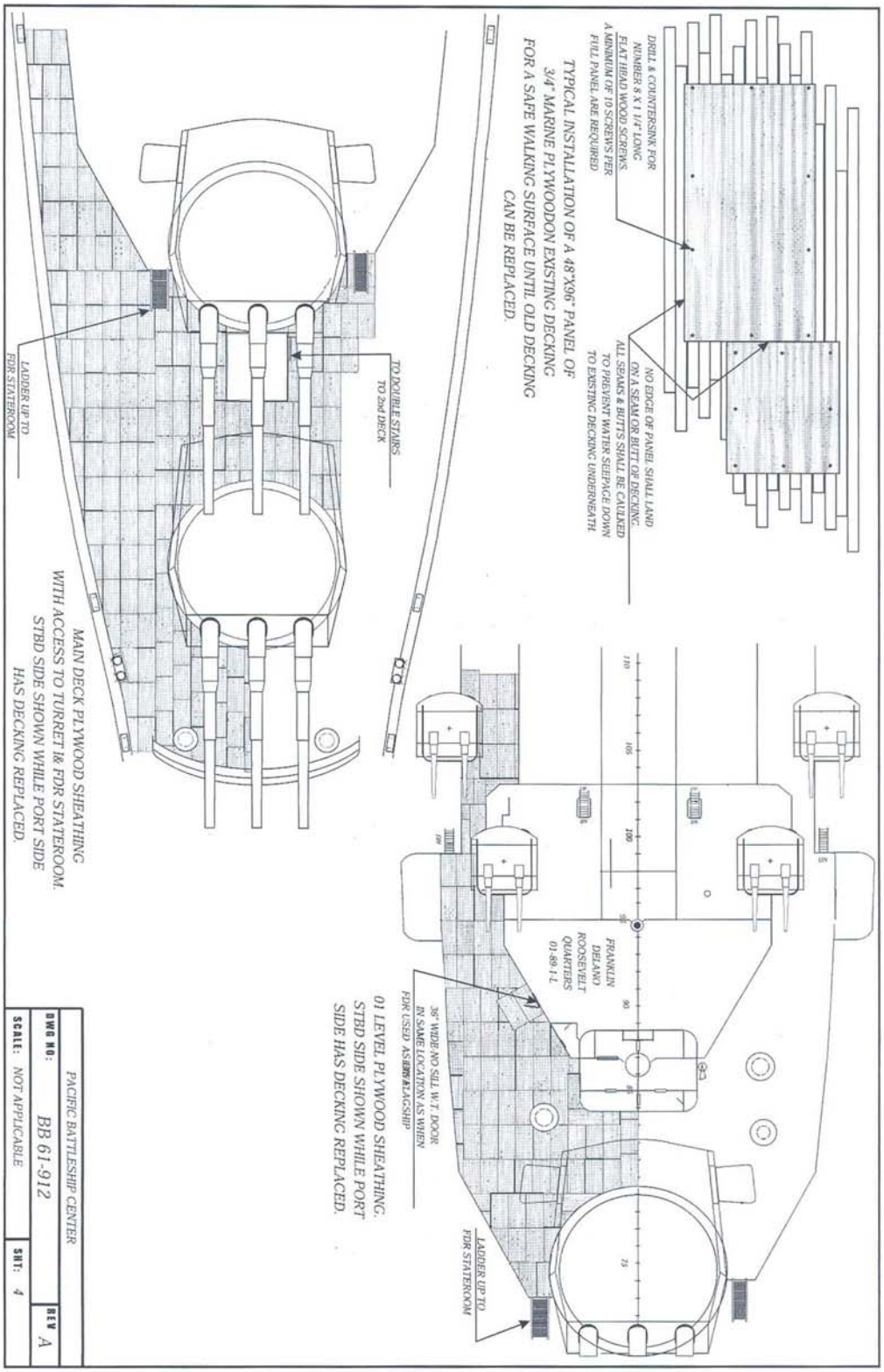
DWG TITLE: DECK PLANKING
PLYWOOD DECK COVERING
FOR SAFETY & PRESERVATION

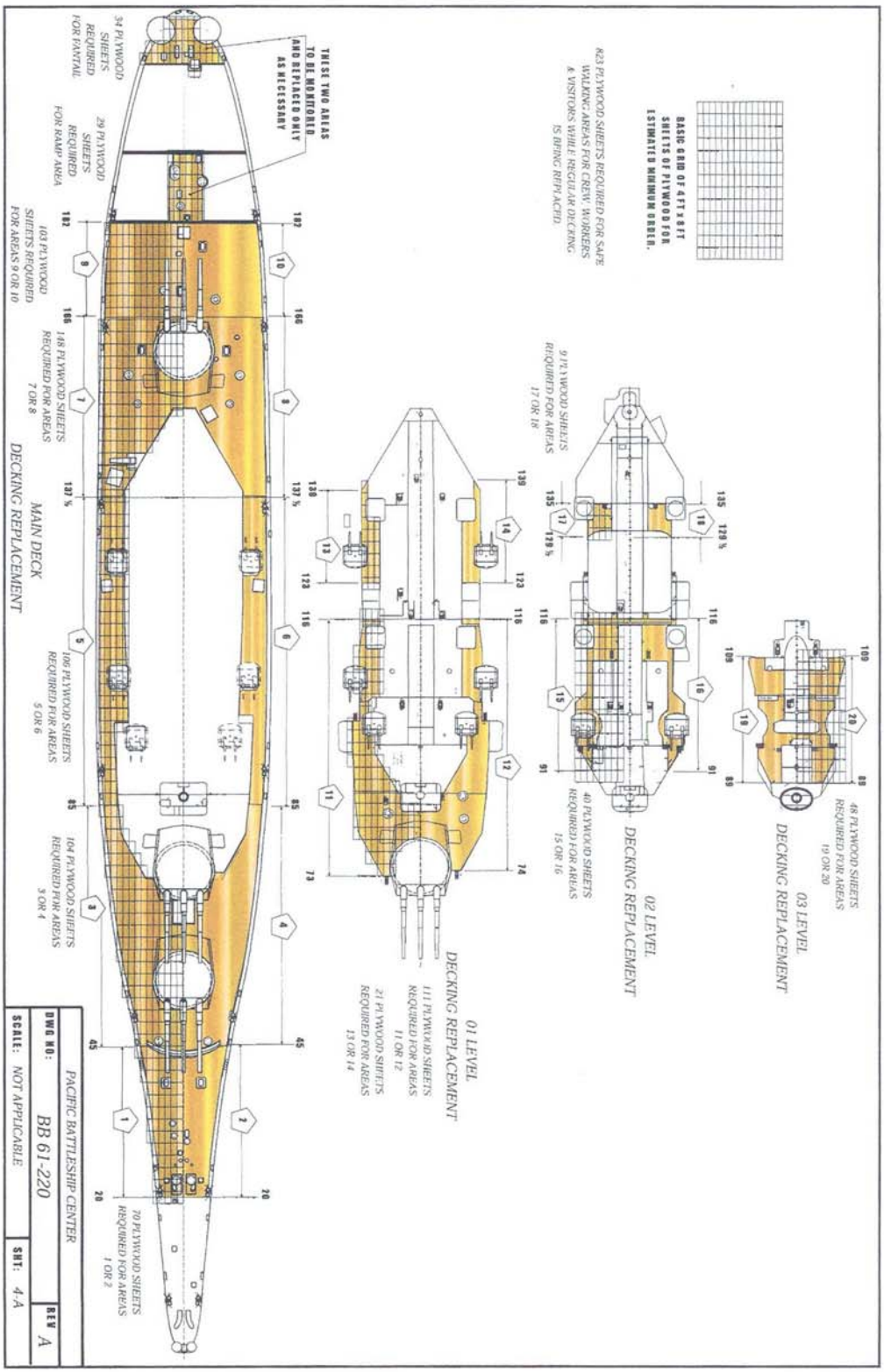
DWG NO: BB 61 - 912 REV A

SHT: 1


SHADED AREAS INDICATE WHICH AREAS OF SHIP'S DECKS HAVE WOOD PLANKING INSTALLED
THESE TWO AREAS TO BE MONITORED AND REPLACED ONLY AS NECESSARY
03 LEVEL DECKING ARRANGEMENT
02 LEVEL DECKING ARRANGEMENT
01 LEVEL DECKING ARRANGEMENT
MAIN DECK DECKING ARRANGEMENT
PACIFIC BATTLESHIP CENTER
DWG NO: BB 61-912
REV A
SCALE: NOT APPLICABLE
SHT: 2


NO SHEETS REQUIRED AT THIS TIME OF FANTAIL OR VENTCAPSTAN AREA BETWEEN RAMPS
208 SHEETS REQUIRED FOR AREAS 9 & 10 (104 EACH SIDE)
296 SHEETS REQUIRED FOR AREAS 7 & 8 (147 STBD+149 PORT)
MAIN DECK
228 SHEETS REQUIRED FOR AREAS 5 & 6 (115 STBD+113 PORT)
276 SHEETS REQUIRED FOR AREAS 3 & 4 (138 EACH SIDE)
AREAS 1 & 2 INITIALLY OFF LIMITS EXCEPT TO SHIP'S CREW & WORK CREWS
42 SHEETS REQUIRED OF AREAS 13 & 14 (21 EACH SIDE)
01 LEVEL
213 SHEETS REQUIRED OF AREAS 11 & 12 (107 STBD & 106 PORT)
03 LEVEL DECKING REPLACEMENT WHEN REQUIRED
02 LEVEL DECKING REPLACEMENT WHEN REQUIRED
BASIC GRID OF 4 FT x 8 FT. SHEETS OF PLYWOOD FOR ESTIMATED MINIMUM ORDER
SHOWN AS AN ABSOLUTE MAXIMUM OF 1,263 PLYWOOD SHEETS REQUIRED FOR FULL PORT & STBD DECK COVERAGE.
PATTERN SHOWN IS OF FULL SHEETS WITH NO TRIMMING AROUND BULKHEADS, VENTS, GUNWALE BAR, BARBETTES, ETC. FOR PLANNING AND ESTIMATING.
PACIFIC BATTLESHIP CENTER
DWG NO: BB 61-912
REV A
SCALE: NOT APPLICABLE
SHT: 3


DRILL & COUNTERSINK FOR NUMBER 8 X 1 1/4" LONG FLAT HEAD WOOD SCREWS. A MINIMUM OF 10 SCREWS PER FULL PANEL ARE REQUIRED
NO EDGE OF PANEL SHALL LAND ON A SEAM OR BUTT OR DECKING.
ALL SEAMS & BUTTS SHALL BE CAULKED TO PREVENT WATER SEEPAGE DOWN TO EXISTING DECKING UNDERNEATH.
TYPICAL INSTALLATION OF A 48"X96" PANEL OF 3/4" MARINE PLYWOODON EXISTING DECKING FOR A SAFE WALKING SURFACE UNTIL OLD DECKING CAN BE REPLACED.
TO DOUBLE STAIRS TO 2nd DECK
LADDER UP TO FDR STATEROOM
MAIN DECK PLYWOOD SHEATHING WITH ACCESS TO TURRET I& FDR STATEROOM. STBD SIDE SHOWN WHILE PORT SIDE HAS DECKING REPLACED.
FRANKLIN DELANO ROOSEVELT QUARTERS 01-89-1-L
36" WIDE NO SILL W.T. DOOR IN SAME LOCATION AS WHEN FDR USED AS
01 LEVEL PLYWOOD SHEATHING. STBD SIDE SHOWN WHILE PORT SIDE HAS DECKING REPLACED.
LADDER UP TO FDR STATEROOM
PACIFIC BATTLESHIP CENTER
DWG NO: BB 61-912
REV A
SCALE: NOT APPLICABLE
SHT: 4


BASIC GRID OF 4 FT x 8 FT SHEETS OF PLYWOOD FOR ESTIMATED MINIMUM ORDER.
823 PLYWOOD SHEETS REQUIRED FOR SAFE WALKING AREAS FOR CREW, WORKERS & VISITORS WHILE REGULAR DECKING IS BEING REPLACED.
THESE TWO AREAS TO BE MONITORED AND REPLACED ONLY AS NECESSARY
34 PLYWOOD SHEETS REQUIRED FOR FANTAIL
29 PLYWOOD SHEETS REQUIRED FOR RAMP AREA
163 PLYWOOD SHEETS REQUIRED FOR AREAS 9 OR 10
148 PLYWOOD SHEETS REQUIRED FOR AREAS 7 OR 8
106 PLYWOOD SHEETS REQUIRED FOR AREAS 5 OR 6
164 PLYWOOD SHEETS REQUIRED FOR AREAS 3 OR 4
70 PLYWOOD SHEETS REQUIRED FOR AREAS 1 OR 2
MAIN DECK DECKING REPLACEMENT
9 PLYWOOD SHEETS REQUIRED FOR AREAS 17 OR 18
40 PLYWOOD SHEETS REQUIRED FOR AREAS 15 OR 16
02 LEVEL DECKING REPLACEMENT
111 PLYWOOD SHEETS REQUIRED FOR AREAS 11 OR 12
21 PLYWOOD SHEETS REQUIRED FOR AREAS 13 OR 14
01 LEVEL DECKING REPLACEMENT
48 PLYWOOD SHEETS REQUIRED FOR AREAS 19 OR 20
03 LEVEL DECKING REPLACEMENT
PACIFIC BATTLESHIP CENTER
DWG NO: BB 61-220
REV A
SCALE: NOT APPLICABLE
SHT: 4-A