

Value Analysis Study  
for  
San Francisco Maritime National Historical Park

Treatment and Preservation Options  
for  
the Historic Vessel *Wapama*

**SAFR PMIS No. 55738**

**Final Report  
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**Value Analysis Study  
November 29 & 30, 2006**

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# **1. FOREWORD**

This Value Analysis Report presents the recommendations of the Value Analysis Study for the Treatment and Preservation Options for the Historic Vessel Wapama, San Francisco Maritime National Historical Park.

This is to certify that the Value Analysis Study was led by the undersigned National Park Service Value Analysis Technical Expert and was conducted in accordance with National Park Service value analysis principles and guidelines.

Mark Tabor  
Landscape Architect / National Park Service  
Technical Expert – Value Analysis

## 2. EXECUTIVE SUMMARY

The National Park Service is preparing to determine a course of action that would determine the disposition of the historic vessel *Wapama*. A value study was conducted on November 29<sup>th</sup> and 30<sup>th</sup>, 2006 in San Francisco, CA.

### Summary Description of Project

Architectural Resources Group (ARG) has been retained by the National Park Service (NPS) to provide a two-phase Condition Survey of the National Historic Landmark Steam Schooner *Wapama* and recommend a range of alternatives to preserve/rehabilitate this vessel. The *Wapama*, built in 1915, is the last survivor of over 200 built and is currently resting on a barge at the Richmond Reserve Shipyard in Richmond, CA. *Wapama* was transferred from the water to the barge about 25 years ago because of her deteriorated condition and fears that she might sink at the San Francisco Maritime National Historical Park pier. Since then she has received sporadic maintenance, and the ravages of time and exposure to weather and fresh water have taken a heavy toll.

### Range of Alternatives

The Draft Report submitted on November 6, 2006 used in planning for Value Analysis (VA) listed four alternatives. An initial VA was done and through that session, additional alternatives were identified and included in the evaluation.

Alternative 1 – Full Rehabilitation / Restoration to Floating Exhibit

Alternative 2 – Preservation (Stabilization) of Vessel on Barge

Alternative 3 – Preservation (bow) / Rehabilitation (stern) in Building

Alternative 4 – Preserve Structure / Rehabilitate Exterior for Outdoor Exhibit

Alternative 5 – Rehabilitate stern in Building / Dismantle and Salvage Remainder

Alternative 6 – Partial Salvage / Disposal

Alternative 1 (Full Rehabilitation/Restoration as a Floating Exhibit) and Alternative 6 (Partial Salvage / Disposal) represent both ends of the scale in term of cost and level of preservation. Alternative 1 would restore the *Wapama* as an intact vessel in the water and carry the highest cost while Alternative 6 would dismantle the vessel, salvage major components and have the least cost.

Other four alternatives (2 to 5) would have varying degrees of preservation and rehabilitation at different display locations. The cost of these alternatives is varied in the mid-range based on the level construction activities associated with each alternative.

## Value Study Objectives

The objective of the study is to determine the best option for preserving the historic steamer *Wapama* based on considerations of its current state of repair, the interpretive goals of the Park Service and cost are focused on the following factors:

1. Prevent Loss of Original Materials
2. Maintain and Improve Condition of Structural Materials
3. Improve Visitor Access and Convenience
4. Providing for Visitor Experience Opportunities
5. Protect Safety and Environmental Health
6. Improve Operational Efficiency and Sustainability

## Summary of Recommendations

Unlike most Value Analysis (VA) studies which evaluate the various functional aspects and details of a new design to determine the most cost effective, for value, alternatives, this VA is intended to determine the most cost effective, for value, approach to the preservation of an existing deteriorated historic vessel. Therefore its scope is broader than usual and addresses far less detail.

Although Alternative 1 (Full Rehabilitation/Restoration as a Floating Exhibit) resulted in the highest raw score of advantages, it also carries the highest cost and one that may be unreasonable to expect to be funded. As an intact vessel in the water, it scores highest in terms of design integrity, structural strength, visitor access and visitor experience and it retains its NHL designation but it scores low on efficiency due to the high cost of maintaining it afloat.

At the other end of the scale, Alternative 6 (Partial Salvage / Disposal) has the lowest score of advantages as well as the lowest cost because most of deteriorated components of the vessel would be dismantled and disposed of and there would be fewer components to maintain.

Of the other four alternatives with varying degrees of preservation and rehabilitation in the mid-range of advantages and cost, Alternative 5 (Rehabilitation of the Stern of the Vessel in a Building / Dismantle and Salvage Remainder) stands out as only marginally more expensive than Alternative 6 but has almost twice the advantage score because it retains greater portion of historic fabric and has higher level of visitor experience and interpretation.

At the VA session, using the rough cost estimates provided by the A/E's consultants, Alternative 5 resulted in the highest importance factor and cost ratio. Due to the Rough Order of Magnitude (ROM) cost at this stage, the Value Study Group felt that additional time would be needed to refine the cost components of each alternative to confirm the final selection of the preferred alternative.

The following table provides a summary on cost, Importance of Advantage point, the cost ratio after the detail cost of each alternative was updated based on the level of preservation/rehabilitation and construction activities that were discussed and identified during the VA session.

Alternatives		Cost (\$)	I *	I/\$
Alternate 1	Full Rehabilitation / Restoration to Floating Exhibit	\$38,215,000	410	10.7
Alternate 2	Preservation (Stabilization) of Vessel on Barge	\$13,230,000	275	20.8
Alternate 3	Preservation (bow) / Rehabilitation (stern) in Building	\$19,525,000	340	17.4
Alternate 4	Preserve Structure / Rehabilitate Exterior for Outdoor Exhibit	\$19,005,000	285	15.0
Alternate 5	Rehabilitate stern in Building / Dismantle and Salvage Remainder	\$15,925,000	325	20.4
Alternate 6	Partial Salvage / Disposal	\$8,500,00	175	20.6

\* Importance of Advantage (I)

The revised Choosing by Advantage Graph (on page 33) of Importance/Cost ratio indicates both Alternative 1 (Full Rehabilitation/Restoration as a Floating Exhibit) and Alternative 6 (Partial Salvage / Disposal) still represent both ends of the scale regarding cost and importance of advantage. Due to the lower cost in Alternatives 6 (Partial Salvage / Disposal) and 2 (Preservation on a Barge), the Importance/Cost ratio of these Alternatives has increased respectively to 20.6 and 20.8 higher than 20.4 of Alternative 5 (Rehabilitate stern in Building / Dismantle and Salvage Remainder).

Among the three Alternatives, 2, 5, and 6 which are in the range of similar importance factor and cost ratio as indicated by the CBA graph, Alternative 6 is graphically the preferred alternative and has the most advantage in efficiency and sustainability at a lowest cost of \$8.5 million. Both Alternates 2 and 5 provide higher advantage points 275 and 325 but at a much higher costs \$13.2 and \$15.9 million respectively. There is also added long term cost in operation as the full/partial vessel is continuing to be maintained by the park in Alternates 2 and 5.

The preferred Alternative 6 (Partial Salvage / Disposal) entails partial salvage of major components for museum display and interpretation and dismantling of the vessel. This alternative is in accordance with the park's 1997 General Management Plan / Environment Impact Statement (GMP/EIS) document.

### 3. VALUE STUDY

#### Introductions

Team Leader, Mark Tabor from the Denver Service Center, opened the session with a round of introductions of all the participants and proceeded to review the purpose of the Value Study and the Agenda for the next two days.

#### Project Background

The *Wapama* was built in 1915 and was one of about 200 built to haul lumber along the Pacific north coast. She is the last of her kind and as such was acquired by NPS in 1977 and exhibited at San Francisco Maritime National Historical Park until 1980. She was designated a National Historic Landmark in 1984.

San Francisco Maritime NHP's 1997 General Management Plan and Programmatic Agreement (PA) between the park, SHPO, and Advisory Council identified the following treatment decision: "Dismantling the *Wapama* will be undertaken only as a last resort. Prior to implementation, the Park Service, in full consultation with the SHPO, will explore the widest possible range of alternative measures for preserving the vessel. Such alternatives will include, in priority order, leasing of the vessel, working with local/state/federal government or private agencies to relocate the vessel to a site conducive to preservation and interpretation, or transfer to a federal or state or private entity with the proven capability of funding and carrying out preservation of the vessel."

In addition, the PA details a series of actions which must be taken before demolition, including: developing a marketing plan for leasing/transfer of the vessel in consultation with the SHPO, documentation/survey, collection of material for interpretive purposes, and interpretation of *Wapama*'s story.

San Francisco Maritime NHP worked with the non-profit Pacific Steam Schooner Foundation to seek preservation alternatives for *Wapama*. The foundation received some small support but was unable to find either another home for *Wapama* or enough funding to preserve the vessel. The organization was disbanded several years ago.

In 2005, a contract was issued to an Indefinite Delivery/Indefinite Quantity (ID/IQ) Consultant, Architectural Resources Group (ARG) to provide a condition survey of the *Wapama* and propose treatment and preservation recommendations. To assist in the evaluation of the vessel, ARG, as Team Leader, has retained the services of BMT Designers & Planners (D&P) of Arlington, VA for naval architecture evaluation with assistance from Allen C. Rawl Inc. (ACR), experts in wooden ship preservation and construction, and Winzler & Kelly, Consulting Engineers (W&K) of San Leandro, CA for evaluation of the presence of and nature of hazardous materials. In addition, at NPS request, we contracted with the University of Minnesota through the USDA Forest Products Laboratory to perform a physical condition assessment of the main structural members to aid BMT D&P in their analysis.

The analysis was conducted in two phases:

- Phase I: an updated safety and stability determination of the barge and vessel, both separately and in combination, in her present location.
- Phase II: an updated structural analysis of the vessel's main features and support structure; and, a range of reasonable stabilization and preservation recommendations, which retain the greatest amount of historical integrity based on the current state of decay and deterioration.

In Phase I, several meetings and on-board surveys have been conducted beginning in mid June 2005 with the goal of providing updated information as to the safety and stability of the vessel and the barge, updated structural analysis of the vessel, and recommendations for near and longer term actions to preserve/rehabilitate and possibly dismantle parts of the vessel. This report reviews the first phase of the work and generally covers the condition of the vessel and identifies a range of action alternatives for consideration by the NPS. The results of this Report provided the basis for the Value Analysis which identifies and evaluates the preservation alternatives and which will provide the basis for selecting one of the suggested alternatives, or variation thereof, to study in further detail and prepare documents for implementation.

Aside from addressing the visible deterioration, the report has identified serious structural defects which pose safety hazards and the report recommends that mitigation of these hazards be addressed as soon as possible.

### **A. Significance of Vessel**

The significance of the *Wapama* is that she is the last survivor of her breed and she represents an important link in the transition from the wooden sailing schooners of the 19<sup>th</sup> Century to the steel cargo ships that would be developed shortly after in the late teens and twenties. She and others like her plied the waters of the Pacific Coast for many years furnishing the lumber from Northern California and the Northwest to develop the cities and towns to the south.

### **B. Condition of Vessel**

*Wapama* was in a deteriorated condition when she was removed from the water. After more than 25 years out of the water she is in much worse condition, such that there is little of her original hull materials that can be economically saved. The rot and loss of structural integrity are too great. The rebuilding of the *C. A. Thayer* in a former aircraft hangar in Alameda is testimony to the level of work required on a wooden vessel that had been maintained on a regular basis and kept floating until rehabilitation started. Approximately 85 % of the *C.A. Thayer* hull material has been replaced. The after cabin superstructure on the other hand, is in much better shape due to more concerted efforts to protect and maintain those areas of the ship that were least deteriorated to begin with

and easiest to protect. *Wapama* is in a precarious structural state and requires immediate steps to alleviate safety and liability risks as outlined in the Condition Survey. In addition we recommend an aggressive schedule for determining disposition and for funding other required short-term stabilization measures. We emphasize that this vessel presents a large “sail area” to the wind, and is in potential danger of movement within its lateral supports, which could result in a threat to life safety as well as possible collapse resulting in material coated with lead paint falling into the water.

### **C. Abatement Measures Taken**

The *Wapama* was pulled from the water and her berth at the Hyde Street Pier (San Francisco Maritime NHP) in 1980 due to concerns that she might sink. She was placed on the barge that she is currently on with the intent of restoring her to a level where she could provide a meaningful interpretive visitor experience. Over the years, protective canopies were installed to limit fresh water intrusion and borate treatments were applied in selective locations to help stave off further deterioration. The barge and vessel have been in several locations over the years and are currently in a flooded graving dock at the World War II, Richmond, CA shipyard.

The masts, propeller and various other artifacts have already been removed and are in storage. The protective canopies have been deteriorating and the funding for the borate treatments was not renewed. Consequently, as the study report shows, the vessel is in a substantially more deteriorated state than when she was initially pulled from the water.

### **Secretary of the Interior’s Standards Overview**

The following definitions taken from the Secretary of the Interior’s Standards for treatments that are appropriate in historic vessel preservation projects were discussed and provided to the Value Study Group to further clarify different course of actions of each proposed alternative.

**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 relevant to the discussion of alternatives are:

**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.]

Additional information on General and Specific Standards for Treatment of Historic Vessels are included in the Appendices

## Objectives for the Study

The value study had four basic objectives:

### A. Protect and Improve Cultural Resource:

#### Prevent Loss of Original Materials

- By maximizing the degree to which historic fabric, including design, setting, materials, workmanship and feeling, is retained
- By maximizing the degree of protection from the elements

#### Maintain and Improve Condition of Structural Materials

- By maximizing the degree to which structural strength for the retained portion of the ship is improved
- By maximizing the degree to which structure is returned to design stability

#### B. Provide for Visitors' Enjoyment:

##### Improve Visitor Access and Convenience

- By maximizing the degree of accessibility and visitor interaction with the vessel

##### Providing for Visitor Experience Opportunities

- By maximizing the degree of experience authenticity relative to the ship in its original condition

#### C. Provide for Safety:

##### Protect Safety and Environmental Health

- By maximizing the degree to which structural safety hazards are reduced.
- By maximizing the degree to which hazardous material and environmental hazards are reduced.

#### D. Improve Efficiency of Park Operations:

##### Improve Operational Efficiency and Sustainability

- By reducing required staffing and maintenance and maximizing ease of operations.

The study team was composed of a mix of professional disciplines ranging from maritime design professionals to maritime museum professionals as well as varied National Park Service design, operations and maintenance personnel experience. Members of the park staff grounded the team with knowledge of the history of the vessel and its maintenance as well as the limitations of the Park site and of other potentially suitable sites.

## Special Criteria

### Applicable Codes:

As a vessel, the usual building codes do not apply except that their provisions for life safety and access might be applied relative to visitor and staff access around her or on board. At this time the ultimate location and therefore potential AHJ (Authority Having Jurisdiction) is unknown. The following codes may apply to this project.

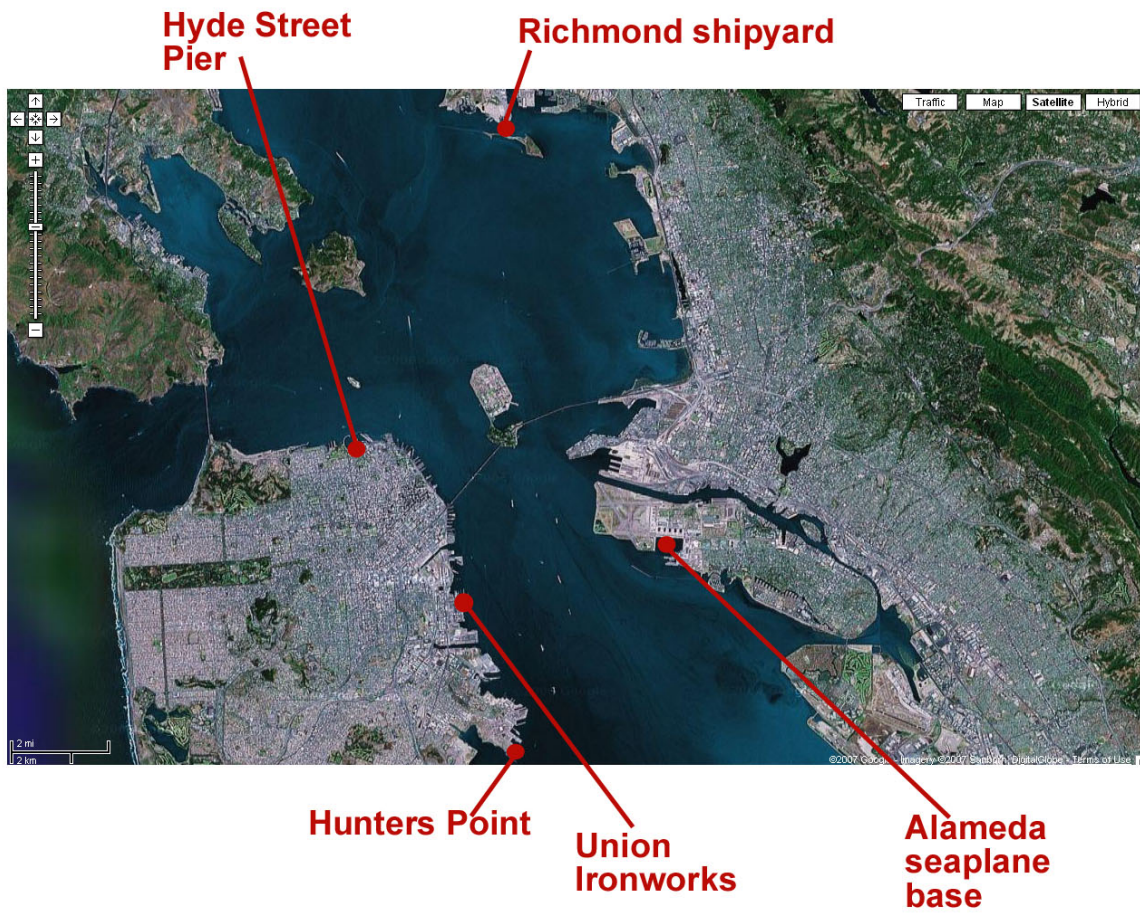
- California Environmental Quality Act
- State of California Building Code and/or codes administered by local AHJ
- Uniform Federal Accessibility Standards

- Americans with Disabilities Act
- National Fire Protection Association Codes

#### Planning Criteria and Constraints:

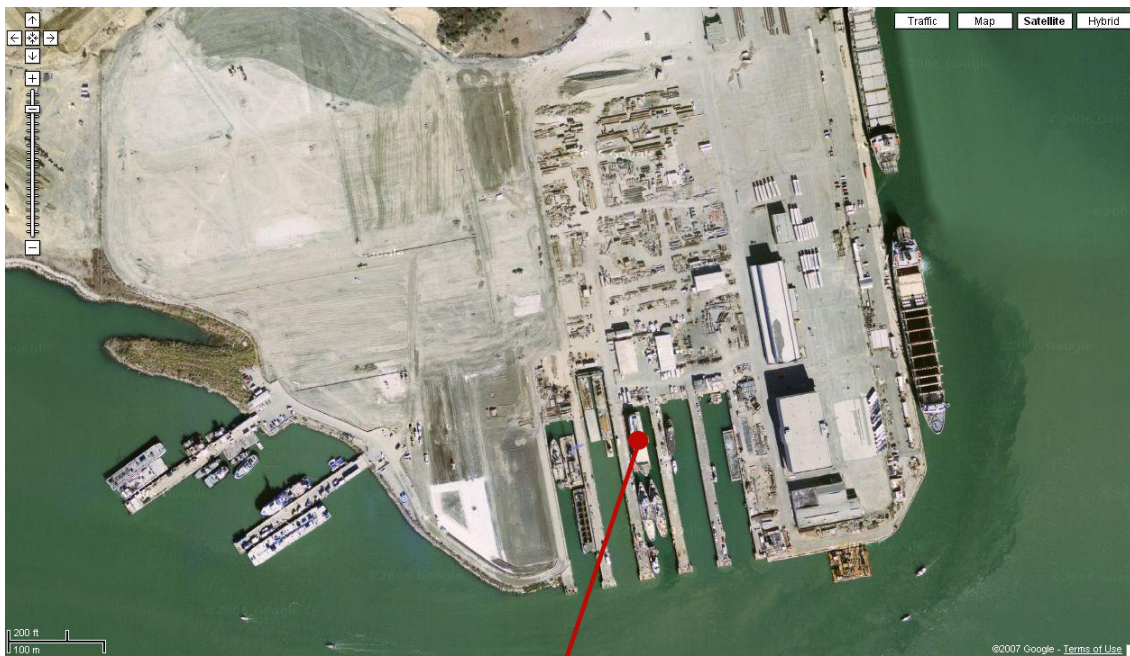
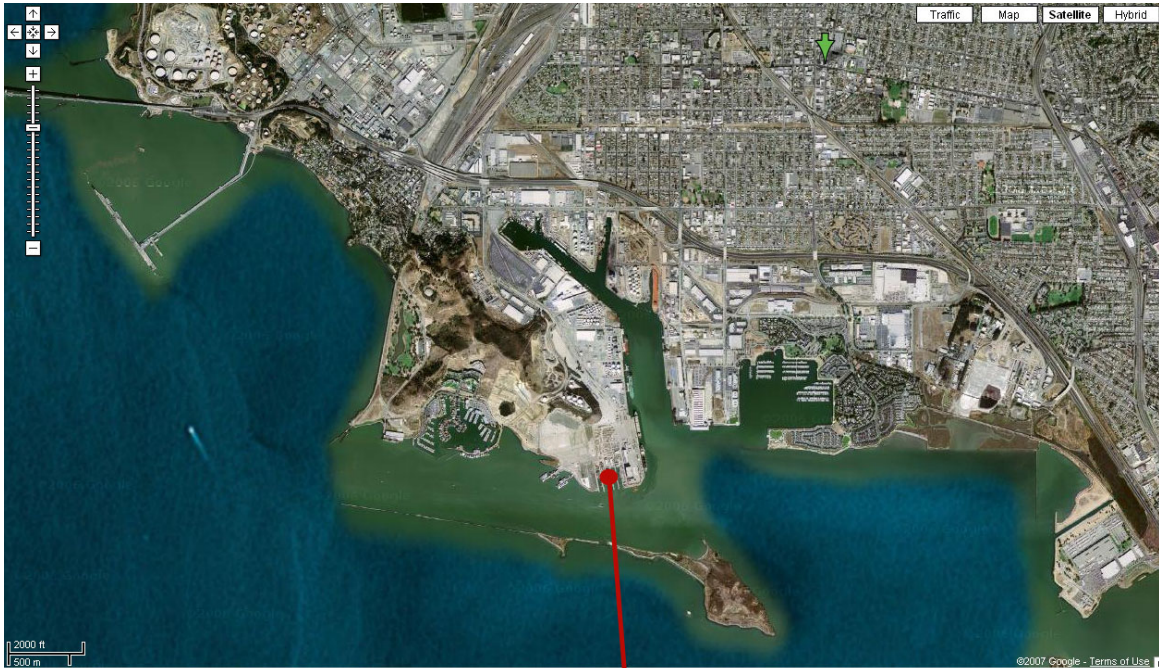
- Relocation of the 200 foot long, 945 gross ton vessel from her existing berth on a barge in Richmond, California would be a challenge given the potential instability of the barge and vessel in open water and the deteriorated state of the vessel. Substantial lateral shoring would be required.
- Maintaining the vessel on the barge at the Richmond shipyard will also require substantial shoring to prevent eventual collapse.
- Finding and negotiating a new home for the vessel other than at the Richmond shipyard would be a challenge both in practical terms and in terms of developing a visitor market. Sites that have so far been considered are: SAFR at Hyde St. Pier; Hunters Point Shipyard which will be undergoing redevelopment and is home to the San Francisco Railroad Museum; Union Ironworks which will be undergoing redevelopment; and the Alameda Seaplane Base which is adjacent to the USS Hornet museum aircraft carrier.

## Referenced Locations



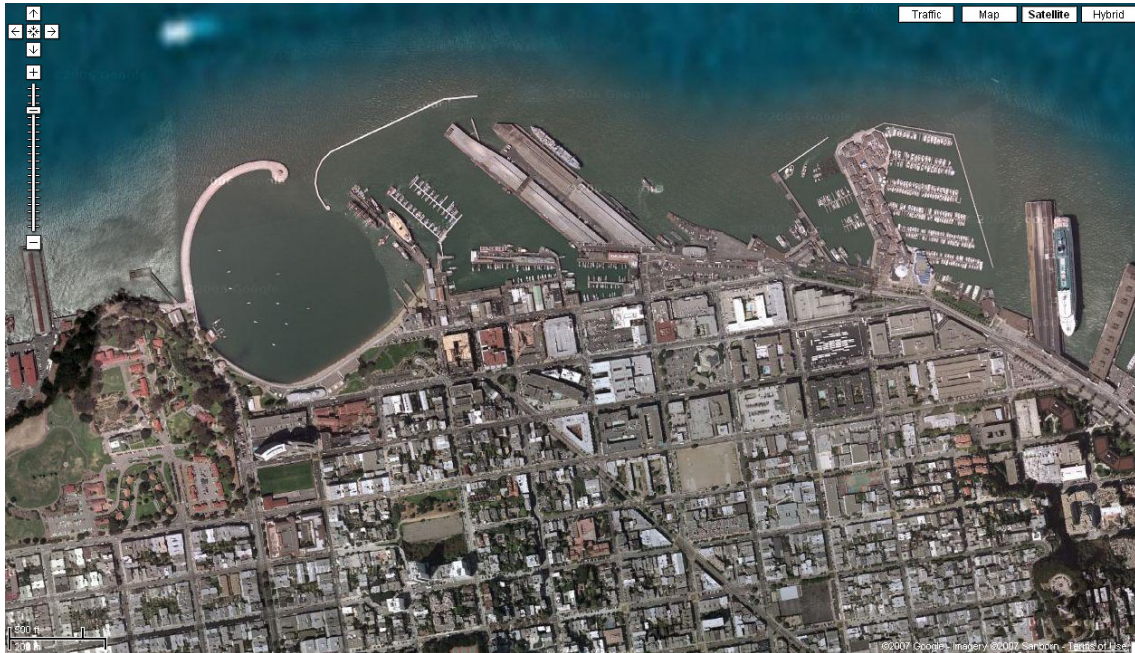
San Francisco Bay Area (Overall Area of Study)

## Existing Wapama Location

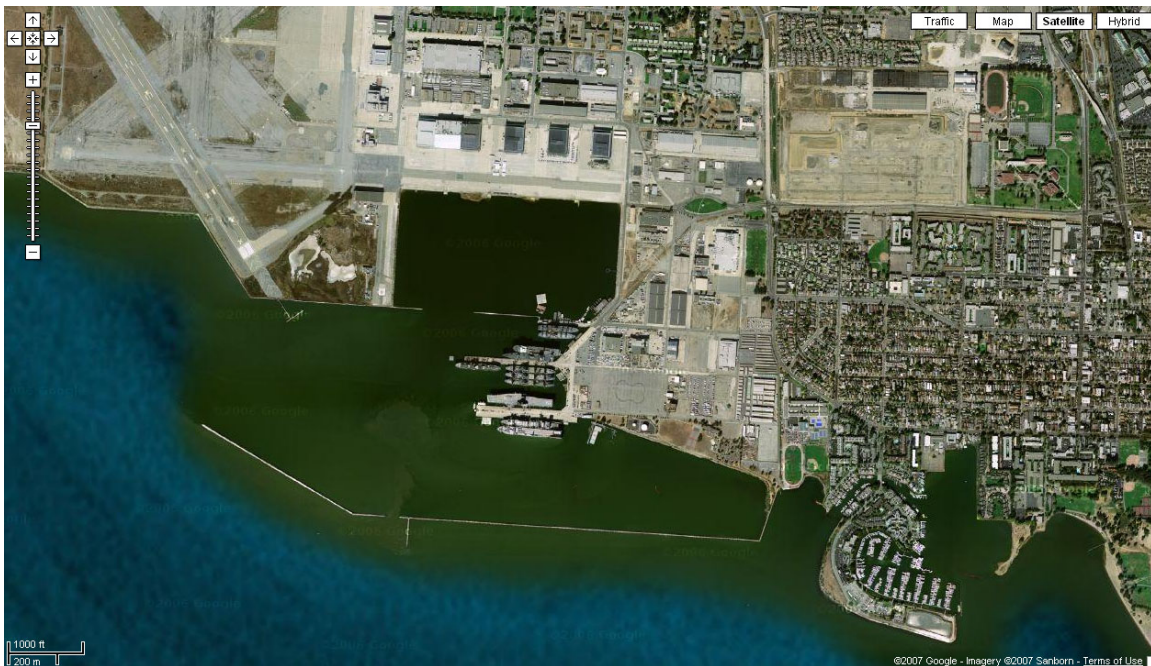


**Wapama**  
**Richmond Shipyard**

## Potential Future Wapama Locations



**Hyde Street Pier (San Francisco Maritime NHP)**



**Alameda seaplane base (location of CA Thayer Restoration)**

## Potential Future Wapama Locations



**Hunters Point Naval Shipyard**



**Union Iron Works**

## PHASE I - INFORMATION

A range of material was available to the value study team including:

- The Draft Report prepared by ARG, BMT and Allen Rawl dated October 2006

In an effort to understand the context for this project, the study team developed a list of “stakeholders”, persons and organizations with an active interest in the making of project decisions or the outcome of such decisions.

### Stakeholders

#	Stakeholders	Primary Interest
1	<ul style="list-style-type: none"> <li>• Visitors 4.8 Million to SFMNP               <ul style="list-style-type: none"> <li>• Visitors to Hyde Street Pier</li> <li>• Educational Groups</li> <li>• Student overnight experience</li> <li>• Repeat visitors</li> <li>• Fisherman (on the Municipal Pier)</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Visitor Experience and Quality</li> <li>• Protection of Resources</li> <li>• Local Economy</li> </ul>
2	<ul style="list-style-type: none"> <li>• Related Organizations / Agencies               <ul style="list-style-type: none"> <li>• Council of American Maritime Museums.</li> <li>• National Maritime Historical Society</li> <li>• National Trust for Historic Preservation</li> <li>• World Ship Trust</li> <li>• San Francisco Maritime Historical Association</li> <li>• California Historical Society</li> <li>• California Preservation Foundation</li> <li>• National Liberty Ship Memorial – S.S. Jeremiah O'Brien</li> <li>• Association for Preservation Technology</li> <li>• Society for Industrial Archeology</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Advocacy</li> <li>• Preservation</li> <li>• History</li> </ul>
3	<ul style="list-style-type: none"> <li>• Federal Government               <ul style="list-style-type: none"> <li>• Secretary of the Interior</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Protection of Historic Resources</li> </ul>
4	<ul style="list-style-type: none"> <li>• Congressional Delegations               <ul style="list-style-type: none"> <li>• Sen. Diane Feinstein (CA)</li> <li>• Sen. Barbara Boxer (CA)</li> <li>• Rep. Nancy Pelosi (CA) – Speaker of the House of Representatives</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Local Economy</li> <li>• Project Cost</li> <li>• Tourism</li> </ul>
5	<ul style="list-style-type: none"> <li>• Chamber of Commerce</li> <li>• San Francisco Visitors and Convention Bureau</li> </ul>	<ul style="list-style-type: none"> <li>• Visitor Experience/tourism</li> <li>• Local Economy</li> <li>• Public Relations</li> </ul>
6	<ul style="list-style-type: none"> <li>• U. S. Borax</li> </ul>	<ul style="list-style-type: none"> <li>• Demonstration Project</li> </ul>
7	<ul style="list-style-type: none"> <li>• Seaman's Union</li> </ul>	<ul style="list-style-type: none"> <li>• Maritime Labor Heritage</li> </ul>
8	<ul style="list-style-type: none"> <li>• Fish Club – Norwegian Ship Owners</li> </ul>	<ul style="list-style-type: none"> <li>• Maritime Heritage</li> </ul>
9	<ul style="list-style-type: none"> <li>• West Coast Lumber Industry</li> </ul>	<ul style="list-style-type: none"> <li>• Demonstration Project - Historical</li> </ul>

10	<ul style="list-style-type: none"> <li>Local Environmental Groups</li> <li>.</li> </ul>	<ul style="list-style-type: none"> <li>Protection of Resources - Water Quality</li> </ul>
11	<ul style="list-style-type: none"> <li>Local Governments               <ul style="list-style-type: none"> <li>City &amp; County of San Francisco</li> <li>Port of San Francisco</li> <li>Bay Conservation &amp; Development Commission</li> <li>San Francisco Redevelopment Agency</li> <li>Port of Richmond</li> <li>City of Sausalito</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Protection of Resources</li> <li>Local Economy</li> <li>Traffic</li> <li>Shoreline Impacts</li> <li>Water Quality</li> <li>Current Vessel Location</li> <li>Former / Potential Vessel Location</li> </ul>
12	<ul style="list-style-type: none"> <li>Miscellaneous Interested Groups               <ul style="list-style-type: none"> <li>Rosie the Riveter/WW II Home Front NHP (RORI)</li> <li>Society of Naval Architects and Marine Engineers</li> <li>Local School Groups</li> <li>Maritime Contractors</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Maritime Experience and Education</li> <li>Local workforce</li> </ul>
13	<ul style="list-style-type: none"> <li>State Government               <ul style="list-style-type: none"> <li>Department of Natural Resources (Water Quality Division)</li> <li>State Historic Preservation Office</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Protection of Resources</li> <li>Regional Economy</li> <li>Local Economy</li> </ul>
14	<ul style="list-style-type: none"> <li>National Park Service               <ul style="list-style-type: none"> <li>Servicewide</li> <li>Park - SAFR                   <ul style="list-style-type: none"> <li>Superintendent</li> <li>Cultural Resources Staff</li> <li>Interpretation Staff</li> <li>Park Maintenance Staff</li> <li>Operations Staff</li> </ul> </li> <li>Western Region</li> <li>Denver Service Center</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Owner</li> <li>Protection of Resources</li> <li>Visitor Experience</li> <li>Park Operations</li> <li>Local Economy</li> <li>Educational Quality</li> <li>Project Cost</li> </ul>

## Broad Considerations

The *Wapama* is the last of the Pacific Coast steam lumber schooners and has been designated a National Historic Landmark. The prime goal of this analysis is to determine how best to preserve and display this historic vessel taking into account the realistically limited funding opportunities and the limited areas to locate her both physically and for an audience. It's paramount that preservation is given the highest consideration among all other factors to ensure each alternative receiving a fair and appropriate evaluation.

## Areas of Focus

**Preservation / Rehabilitation Strategy:** The alternatives for preservation and rehabilitation cover a wide range. Preservation implies stabilization of as much original material as possible while addressing structural deficiencies to make for a stable and safe environment. Rehabilitation implies a more radical approach in terms of

replacement of historic fabric to address structural deficiencies. Both of these strategies will likely be incorporated in varying degrees depending on interpretive goals, vessel location and cost.

**Site Improvement / Location Strategy:** The size of the vessel will be a prime consideration in dictating its eventual location. At 200 feet long and 60 feet high to the stack (110 feet high to the masts) it will command a substantially sized site and building to house her if she is not to be rebuilt and refloated. The SAFR pier where she was previously berthed is leased from the Port of San Francisco and the adjacent grounds are probably not of sufficient size to accommodate the vessel out of the water in a meaningful interpretive way or within the scale of the Park and its surroundings. Alternative locations mentioned include the Hunter's Point Shipyard which has large unoccupied buildings, the old Union Iron Works, and the Richmond Shipyard where she is now. Maintaining her on the barge is an option which could allow flexibility in location. Almost any alternative will involve leased real estate but it is desirable that the site be relevant to the vessel and its maritime history.

**Interpretive / Access Strategy:** Given the deteriorated state of the vessel, it is understood that substantial historic fabric may have to be sacrificed under several of the options (*C.A. Thayer* was in better condition but required about 85% new material to allow her to be rebuilt to floating condition). The degree of work will be dictated by the planned interpretive option and consequent safety and maintenance considerations. The scale of interpretation could vary from that of the entire vessel and its overall scale down to representative materials and artifacts.

## **Cost Modeling**

This project is inevitably compared to the major restoration work that is in process on the *C.A. Thayer*, a west coast sailing lumber schooner, in Alameda, CA. That vessel has been rebuilt from the keel up and has served as the model for cost-comparison.

A cost matrix summarizing the costs associated with various vessel improvement alternatives was prepared to help focus on the major alternatives. The various cost elements were plotted relative to their applicability for each alternative.

## **Analysis**

Using the treatment and preservation alternatives with attendant cost estimates, the study team focused on the following goals of the project, as stated by the participants:

- To prevent further damage to the resource
- To preserve as much historic fabric as possible
- To maintain the National Register and National Historic Landmark status
- To preserve the resource for informational and research value
- To identify achievable goals
- To afford increased opportunity for interpretation

- To establish safe means of access to the vessel
- To account for maintenance considerations
- To identify possible ways that it could be self-supporting
- To identify potential long-term locations for the vessel and the possibility of its being incorporated into the Maritime National Historic Park

## PHASE II – CREATIVITY

### Brainstorming

The draft report of November 2006 addressed the following alternatives (options) with full documentation of the vessel as being common to all:

1. Full Rehabilitation and Restoration

This was intended to provide a restored floating, but not operational, exhibit similar to the *C.A. Thayer* located at the Hyde St. Pier.

2. Full Stabilization of the Vessel

This assumed minimum costs to protect the vessel from the elements in its current location at the Richmond Shipyard and to shore it structurally and treat the wood to minimize further decay. There was concern as to the viability of this option given the extent of decay. An alternate to leaving her in Richmond was to transport her to Hunters Point to be housed in an existing structure.

3. Partial Salvage, Restoration & Display of a Major Portion of the Vessel and major components of the deck gear at a Land Based Facility

This assumed that the forward hull, which is twisting to starboard, is in such deteriorated condition that it should be dismantled and the after section be relocated to a land based facility for minimal restoration and exhibit.

4. Dismantling and Selective Salvage, Restoration & Display of Elements of the Vessel and major components of the deck gear at a Land Based Facility

This assumed that the entire hull is deteriorated beyond reasonable salvage but that significant elements could be salvaged, restored and exhibited in a land based facility.

The *Wapama*, as a National Historic Landmark; therefore, one of the goals is to determine how best to prevent the loss of an NHL. The brainstorming discussion also identified other goals which are nonetheless important to the treatment of *Wapama*.

- Prevent resource damage to both ship and environment
- Preserve historic fabric and information value
- Develop achievable/sustainable project – Life cycle cost and environmental concerns need to be analyzed in phases.
- Increase and establish interpretive opportunities

- Establish both physical and virtual access
- Reduce maintenance (O&M)
- *WAPAMA* would be accessible, visible, and situated near the park in appropriate context
- *WAPAMA* and the environment is safe and stable
- *WAPAMA* would generate support and excitement

Based on the above goals, the following treatment options were discussed:

- Rehabilitate - Partial rehab for effective interpretation (Out of water)
- No Action/Disposal – must be thoroughly documented
- Stabilize - Preserve as is with interpretive value (Out of the water)
- Roof - Providing cover is an issue. Will it be in a building? Under a roof?
- Partial Rehab – Exterior skin/deck (results in loss of historical fabric); No access to the interior (Out of the water)

During the brainstorming session the definition of some of the alternatives identified in the Study Report in advance of the VA session was modified and others were added for consideration. The Value Analysis team chose to evaluate the following six conceptual alternatives for preserving, rehabilitating, salvaging or disposing of the vessel. All alternatives include the full documentation of the original vessel prior to any subsequent management action. These alternatives include:

#### **Alternative 1 – Full Rehabilitation / Restoration to Floating Exhibit**

The ship would be largely rebuilt to a rehabilitated and restored condition for use as a floating exhibit at the Hyde St Pier in San Francisco similar to the *C.A. Thayer*. This would include only limited machinery work such as refurbishing the main engine and shaft line bearings to allow it to be “jacked over”. Any attempt to make the plant fully operational, would require major work and replacement of the boilers and some auxiliary machinery. As with other ships at the Pier, visitors would have access to the restored *Wapama* and improvements would necessarily be made for disabled access. Staff programs would be conducted in conjunction with the other vessels in the Park.

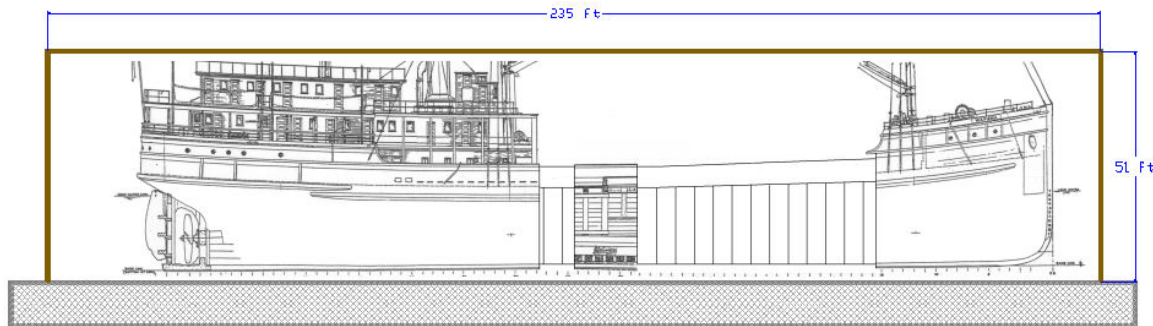
#### **Alternative 2 – Preservation (Stabilization) of Vessel on Barge**

Measures would be taken to arrest further deterioration of the vessel while remaining on the floating barge most likely at its current location. A structural membrane weather cover for the vessel would be included spanning the slip. Preservation measures would include extensive shoring, decayed wood removal, chemical preservative treatment, preparing and painting exterior surfaces. Under this

alternative, funding would be focused on preservation measures and would not emphasize visitor facilities or accessibility improvements. Rather the vessel would be stabilized either permanently as an artifact or for future restoration measures.

### **Alternative 3 – Preservation (bow) / Rehabilitation (stern) in Building**

Vessel would be transferred to a building and measures taken to arrest any further deterioration (see alternative 2). The after portion of the vessel containing the machinery, wheelhouse, and passenger areas would be preserved and rehabilitated to accommodate some amount of visitor access and interpretation. Depending on the size of the building the exhaust stack and masts might be partially displayed. Conversely the bow would only be stabilized, shored and preserved showing the deterioration. The mid section would be opened to show the structure of the vessel. Some facilities could support disabled access on a limited basis. Figure 1 shows the minimum size of the building structure not accommodating the stack or masts



**Figure 1 – Display of Fwd & Aft Section of the Vessel & Three Open Frames Amidships in a Covered Facility**

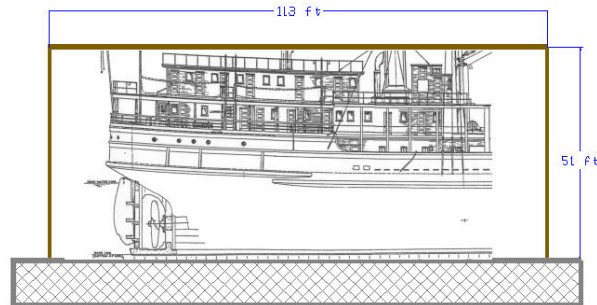
### **Alternative 4 – Preserve Structure / Rehabilitate Exterior for Outdoor Exhibit**

Vessel would be fully stabilized and preserved (with strengthened internal structure) and external surfaces rehabilitated to a “tight” condition so as to successfully withstand exposure to the weather. Vessel would be transferred to a suitable location as a permanent exterior visitor exhibit. Visitor access to view the vessel exhibit would be improved with appropriate support facilities provided. Visitor access on the vessel itself would be limited and interpretation of the interior portions of the vessel and components would be accomplished through interpretive media.

### **Alternative 5 – Rehabilitate Stern of Vessel in Building / Dismantle and Salvage Remainder**

The after portion of the vessel (behind the deck loading hatch) would be preserved, rehabilitated and restored as a visitor exhibit in an enclosed museum building space. Major components of the rear of the vessel including wheelhouse, passenger cabins, engines, and deck gear would become part of this static exhibit that would include cross sections of the hull, view openings to internal components with full disabled access and appropriate support facilities provided. Visitor access support facilities

would be constructed to provide display of internal, external and hull cross section areas of the vessel. The forward hull and components would be dismantled, salvaged, and decayed portions disposed of. Figure 2 shows the minimum size of the building structure.



**Figure 2 – Display of Nearly Complete Aft Section of the Vessel in a Covered Facility**

### **Alternative 6 - Partial Salvage / Disposal**

Given its deteriorated state, vessel and major components would be dismantled with some components such as engine, winches, hardware, nameplate, etc. being salvaged and restored or refurbished for museum display. Most of the wood components of the vessel would be dismantled and disposed of. Visitor displays with salvaged ship components would be integrated with the wider park museum displays within the park.

In addition, many ideas were suggested during the VA indicating that beyond the basic alternatives included in the CBA, there are preservation variables within each alternative as well as for how the vessel is exhibited leading to improvements in the nature of the interpretive experience.

Variables suggested relative to the NPS Objectives:

#### **Protection of Cultural and Natural Resources**

- Protection and maintenance of the after passenger accommodation which is in the best condition of any part of the vessel
- Prevention of materials and lead paint from falling into the Bay

#### **Provision for Visitor Enjoyment**

- Options for visitor vista and access such as cut-away views, walkways thru openings in hull and elevated walkways alongside hull
- Options for various combinations of preservation and rehabilitation that would show the full scale of the vessel but with only portions rehabilitated

#### **Improved Efficiency of Park Operations**

- Review of options for alternative sites for displaying the vessel

**Provision of Cost Effective and Environmentally Responsible Development**

- Options for outside funding
- Understanding that in general the greater the investment the greater the maintenance and life cycle costs

## PHASE III - EVALUATION (Part 1 - Evaluation Factors)

As the first task of the evaluation phase, the team developed and discussed the factors which would be used to evaluate the alternatives.

The NPS Objectives and Factors 1-7 shown below were established for the NPS service wide priority setting process and grow out of National Leadership Council guidance and formed a framework for evaluation.

The study team then defined variables and sub factors to tailor the evaluation factors to the needs of this project. No significant advantage was identified among the six alternatives in the last factor.

### EVALUATION FACTORS AND DEFINITIONS

<b>NPS OBJECTIVE: Protect Cultural and Natural Resources</b>	
<b>Factor 1: Prevent loss of Cultural Resources</b>	
Evaluation Sub-factors	Definitions/Variables
1.a. Protect Original Structure and Finish Materials	<ul style="list-style-type: none"> <li>Degree to which historic fabric retained</li> <li>Degree to which integrity retained</li> </ul>
1.b. Protect the Natural Environment in the Bay	<ul style="list-style-type: none"> <li></li> </ul>
1.c. Protect Historic Artifacts	<ul style="list-style-type: none"> <li>Degree of (weather) protection from elements</li> </ul>
	<ul style="list-style-type: none"> <li></li> </ul>
<b>Factor 2: Maintain and Improve the Condition of Resources</b>	
Evaluation Sub-factors	Definitions/Variables
2.a. Improve Structural Integrity	<ul style="list-style-type: none"> <li>Degree of stability</li> <li>Degree to which structure improved</li> <li>Degree to which structure improved to original strength</li> </ul>
2.b. Improve Original Finish Materials	<ul style="list-style-type: none"> <li>Degree to which materials replaced or rehabilitated</li> </ul>
2.c. Improve Historic Artifacts	<ul style="list-style-type: none"> <li>Degree to which artifacts stabilized</li> </ul>
	<ul style="list-style-type: none"> <li></li> </ul>
<b>NPS OBJECTIVE: Provide for Visitor Enjoyment</b>	
<b>Factor 3: Provide visitor services and educational and recreational opportunities</b>	
Evaluation Sub-factors	Definitions/Variables
3.a. Improve Visitor Services (Access, Convenience)	<ul style="list-style-type: none"> <li></li> </ul>
3.b. Improve Educational Opportunities (Media, Programs, Waysides, Outreach, Discovery)	<ul style="list-style-type: none"> <li></li> </ul>
3.c. Provide Active Recreational Opportunities (Direct Interaction)	<ul style="list-style-type: none"> <li></li> </ul>
	<ul style="list-style-type: none"> <li></li> </ul>
<b>Factor 4: Protect public health, safety and welfare.</b>	
Evaluation Sub-factors	Definitions/Variables

4.a. Protect Public Health (Adequate Facilities)	<ul style="list-style-type: none"> <li>Degree to which environmental hazards mitigated</li> </ul>
4.b. Protect Public and Employee Safety (Ease of Accessibility, Hazard reductions, Fire Protection)	<ul style="list-style-type: none"> <li>Degree to which physical hazards mitigated</li> </ul>
	<ul style="list-style-type: none"> <li></li> </ul>
<b>NPS OBJECTIVE: Improve efficiency of park operations</b>	
<b>Factor 5: Improve operational efficiency and sustainability.</b>	
Evaluation Sub-factors	Definitions/Variables
5.a. Maintainability (Durability of Improvements, Experience Levels, Repair Costs)	<ul style="list-style-type: none"> <li>Degree of long-term ease and cost of maintenance</li> </ul>
5.b. Operations Systems (Staffing Requirements, Energy Input, Regulatory Needs)	<ul style="list-style-type: none"> <li>Degree of long-term ease and cost of operations</li> </ul>
	<ul style="list-style-type: none"> <li></li> </ul>
<b>Factor 6: Protect employee health, safety, and welfare</b>	
Evaluation Sub-factors	Definitions/Variables
6.a. Protect Employee Safety (Secure Work Areas, Stable and Reliable Infrastructure)	<ul style="list-style-type: none"> <li></li> </ul>
6.b. Protect Employee Welfare (No Hazards, Emergency Communications, Rescues Avoided)	<ul style="list-style-type: none"> <li></li> </ul>
	<ul style="list-style-type: none"> <li></li> </ul>
<b>NPS OBJECTIVE: Provide cost-effective, environmentally responsible, and otherwise beneficial development for the National Park System.</b>	
<b>Factor 7: Provide other advantages to the National Park System.</b>	
Evaluation Sub-factors	Definitions/Variables
7.a. Partnership Fundraising Opportunities / Economic Development (Employment, Commercial Sector)	<ul style="list-style-type: none"> <li>Other sources of funding</li> </ul>
7.b. Potential for Good Public Relations	<ul style="list-style-type: none"> <li>Demonstrate commitment to preservation of NHLs</li> </ul>
	<ul style="list-style-type: none"> <li></li> </ul>
<b>SPECIAL FACTOR: COST</b>	
Evaluation Sub-factors	Definition/Variables
INITIAL COST (Short-term)	<ul style="list-style-type: none"> <li>Capital Costs</li> </ul>
LIFE CYCLE COST (Long-term)	<ul style="list-style-type: none"> <li>Maintenance Costs</li> <li>Operating Costs</li> <li>Staffing Costs</li> </ul>

### **PHASE III - EVALUATION (Part 2 - Choosing by Advantages)**

The six alternatives were evaluated using a process called Choosing by Advantages, where decisions are based on the importance of advantages between alternatives. The evaluation involves the identification of the attributes or characteristics of each alternative relative to the evaluation criteria, a determination of the advantages for each alternative within each evaluation factor, and then the weighing of importance of each advantage.

The highest importance advantage is identified in each factor. The paramount advantage, across factors, was determined and assigned a weight of 100. Remaining advantages were rated on the same scale. Construction costs were developed for each alternative. Recommendations are based on a balance of cost and importance.

The evaluation sheets form the basis for presenting the developed alternatives and design sketches and cost estimates are attached. The evaluation tables present many types of information. Attributes of an alternative are shown above the dotted line in the tables. Advantages between alternatives are shown below the dotted line. An anchor statement summarizes those advantages. The advantage with the highest importance within a factor is indicated by a highlight around the advantage cell. The advantages are all rated on a common scale.

# San Francisco Maritime NHP/ Steam Schooner Wapama

## Treatment, Preservation, and Management Options

### Choosing by Advantages

Component;				Function:									
Factor	Alternatives												
	Alternative 1 Full Rehab		Alternative 2 Preservation		Alternative 3 Partial Rehab		Alternative 4 Rehab Envelope		Alternative 5 Rehab Section		Alternative 6 Dispose		
Protect Cultural and Natural Resources													
Factor 1 - Prevent Loss of Integrity													
Attributes <i>Degree to which integrity is retained</i> <b>1 Design</b> <b>2 Setting</b> <b>3 Materials</b> <b>4 Workmanship</b> <b>5 Feeling</b>	80%+ HF lost  100% retained 100% retained 90% retained 100% retained 100% retained		10% + fabric lost  80% retained 50% retained 75% retained 75% retained 50% retained		40% + fabric lost  90% retained 40% retained 80% retained 80% retained 40% retained		70% + fabric lost  80% retained 60% retained 85% retained 80% retained 75% retained		90% + fabric lost  20% retained 40% retained 40% retained 40% retained 10% retained		95% + fabric lost  0% retained 0% retained 5% retained 0% retained 0% retained	0	
Advantages	20% HF	20	90% HF	90	60% HF	55	30% HF	30	10% HF	10	0% HF	0	
	Retains NHL		Retains NHL		May retain NHL		Retains NHL		No NHL		No NHL	0	
Average of 5	98	95	66	60	66	55	76	75	30	30	1		

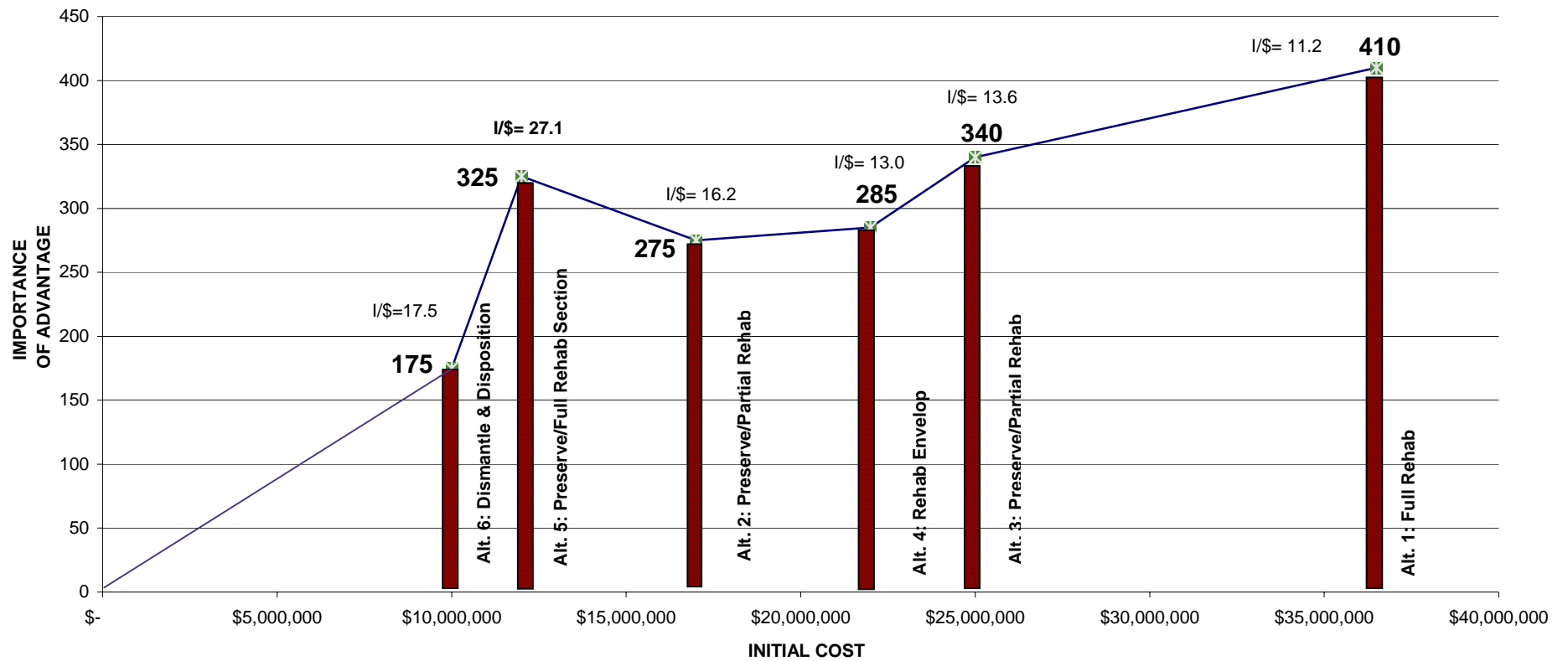
COMPONENT;				FUNCTION:								
FACTOR	ALTERNATIVES											
	Alternative 1		Alternative 2		Alternative 3						Alternative 6	
<b>FACTOR 2 - Maintain and Improve Condition of Structural Materials</b>												
Attributes <i>Degree to which structural strength for retained portion of ship is improved</i> <i>Scale 1 to 10</i>	10		3		5		7		9		0	
Advantages	<i>Highest strength</i>	60	Minimal strength	25	Moderate strength	35	High strength	45	Next highest strength	55	<i>Least Preferred Set of Attributes</i>	0
PROVIDE FOR VISITOR ENJOYMENT												
<b>FACTOR 3 - Improve Visitor Access and Convenience</b>												
Attributes <i>Degree of Access and Interaction</i>	Full physical access to most visitors, some ADA access, integrated with park		Minimum physical access for all visitors, off site interpretation, remote site, limited support		Moderate physical access to whole ship including ADA access, remote site, adequate support facilities		Limited physical access to exterior, deck, after house, remote site, potential for adequate support facilities		Full physical access to section, moderate ADA access, may be integrated with park		Access to pieces, adequate facilities possible	
Advantages	<i>Most improved visitor access and convenience</i>	85	<u>Minimum level of improved visitor access and convenience</u>	0	Moderate access, some support	65	Limited access, some support	45	High access, good support	75	High potential for public access to limited pieces, some support	25

<b>FACTOR 4 - Providing for Visitor Experience Opportunities</b>	Alternative 1		Alternative 2		Alternative 3		Alternative 4		Alternative 5		Alternative 6	
Attributes Degree of Experience Authenticity	Full historic ship experience, wide range of program opportunities		Opportunity to study original ship is preserved as a ruin for study		Opportunity to study more of original ship inside/out		Improved visuals, more interior access		Partial historic ship experience, some program opportunities		Select experience of limited artifacts	
Advantages	<i>Comprehensive experience, enhances park</i>	100	Limited experience, high authenticity	50	More interaction with authentic vessel	80	Most authentic setting for hauled out vessel, public sculpture	70	Limited authentic experiences	30	<u>Limited experience with isolated artifacts</u>	0
PROVIDE FOR SAFETY												
<b>FACTOR 5 - Protect Safety and Environmental Health</b>												
Attributes Degree to which safety hazards are reduced.	Hazards are minimized, enviro issues are almost eliminated, located in secure area		Enviro issues are reduced, safety improved with many issues remaining, questionable site security		Enviro and safety issues are moderately improved, good security		Enviro and safety issues are largely reduced, some employee issues remain, questionable site security		Hazards are minimized, enviro and safety issues are almost eliminated, most secure site		All hazards eliminated	
Advantages	Moderate/acceptable degree of safety and EH	<b>50</b>	<u>Lowest degree of safety and EH</u>	0	Moderately low degree of safety and EH	20	Low degree of safety and EH	10	High degree of safety and EH	60	<i>Highest degree of safety and EH</i>	70
IMPROVE EFFICIENCY OF PARK OPERATIONS												

<b>FACTOR 6 - Improve Operational Efficiency and Sustainability</b>	Alternative 1		Alternative 2		Alternative 3		Alternative 4		Alternative 5		Alternative 6	
Attributes Maintainability and ease of operations and maintenance	O&M program, no DM on high priority asset, periodic dry dock		O&M on a ruin, long term O&M & dry docking on barge, cover maintenance, all at remote site		O&M of building and preserved ship		O&M of a hull on land, no dry dock events	•	O&M of smaller building and preserved section of ship	•	Maintenance of stored artifacts	
Advantages	<u>Lowest efficiency and sustainability</u>	0	Moderately high E & S	50	Moderately low E & S	30	Low E & S	10	High efficiency and sustainability	65	<i>Highest efficiency and sustainability</i>	80
TOTAL IMPORTANCES OF ADVANTAGES		410		275		340		285		325		175
Initial Cost (Net) M		36		17		25		22		12		10
Re-design Cost												
Compliance												
Life Cycle Cost (Net)												
TOTAL												
Version 12/11/98												

Note: Costs from Phase 1b report updated during CBA to those above

**San Francisco Maritime National Historical Park  
Steam Schooner Wapama - Treatment, Preservation, and Management Options  
CBA Graph**



## **ROM Cost Estimates for the Different Restoration or Stabilization Alternatives (Phase 1B Draft Report referenced where applicable)**

### **Alternate 1 (Draft Report Option 1) - Full Rehabilitation / Restoration to Floating Exhibit**

This alternate provides a full hull floating display at Hyde Street Pier as described in the Draft Report. As noted in the report, the machinery and equipment are not restored to be operable.

Estimated cost - \$36,000,000

### **Alternate 2 (Draft Report Option 2b) – Preservation (Stabilization) of Vessel on Barge**

This alternate is similar to that in the Draft Report but with the following additions based on the Team discussion:

- More extensive shoring and chemical treatment
- A more extensive temporary structure with utility services
- The addition of removal of decayed material
- The addition of preparation and painting of the exterior surfaces

Estimated cost - \$17,000,000

### **Alternate 3 – Preservation (bow) / Rehabilitation (stern) in Building**

The Team added this alternate for consideration. It generally includes relocating the vessel in a building, preservation of the bow by means of temporary shoring and chemical treatment and the rehabilitation of the stern enough to allow limited visitor access.

Estimated cost - \$25,000,000

### **Alternate 4 – Preserve Structure / Rehabilitate Exterior for Outdoor Exhibit**

The Team added this alternate for consideration. It generally includes stabilizing, strengthening and preserving the vessel in a weather-tight condition as an exterior land display with limited visitor access.

Estimated cost - \$22,000,000

### **Alternate 5 (Draft Report Option 3) – Rehabilitate Stern of Vessel in Building / Dismantle and Salvage Remainder**

This alternate is very similar to that in the Draft Report and salvages only the stern for exhibit in a building.

Estimated cost - \$12,000,000

### **Alternate 6 (Draft Report Option 4) – Partial Salvage and Disposal**

This alternate is similar to that in the Draft Report but adds for restoration of the salvaged artifacts and provides a building for their display.

Estimated cost - \$10,000,000

## **PHASE IV – DEVELOPMENT**

### **Benefit Cost Analysis**

Although Alternative 1 (Full Rehabilitation/Restoration as a Floating Exhibit) resulted in the highest raw score of advantages, it also carries the highest cost and one that may be unreasonable to expect to be funded. As an intact vessel in the water, it scores highest in terms of design integrity, structural strength, visitor access and visitor experience and it retains its NHL designation but it scores low on efficiency due to the high cost of maintaining it afloat.

At the other end of the scale, Alternative 6 (Partial Salvage / Disposal) has the lowest overall score of advantages. The integrity of the historic vessel would be lost and it would provide very limited visitor experience through viewing of isolated artifacts. However, the greatest advantages resulted with this alternative are safety by removing all hazards and maintenance/operational efficiency because of minimum amount of components would be maintained. This alternative has the lowest cost since most of deteriorated components of the vessel would be dismantled and disposed of.

Of the other four alternatives with varying degrees of preservation and rehabilitation in the mid-range of advantages and cost, Alternate 5 (Rehabilitation of the Stern of the Vessel in a Building / Dismantle and Salvage Remainder) stands out as only marginally more expensive than Alternate 6 but has almost twice the advantage score. The specific advantages are improving high structural strength of the stern section, high degree of public access and interpretation with the possibility of being located at the Park, high degree of safety and high operational efficiency and sustainability. The disadvantages are the potential loss of NHL designation due to loss of half of the vessel and therefore a limited authentic experience.

Lifecycle cost analyses were not performed at this time, given the very schematic nature of the project and the number of variables to be determined. It will be appropriate when there is more concrete information to evaluate.

## PHASE V - RECOMMENDATIONS/ WRAP-UP

The value analysis team reviewed the study alternatives and the CBA conclusions at the close of the study. The highest score for Alternative 1 – Complete Rehabilitation of the Vessel – also carries by far the highest initial cost and a high long term and maintenance cost. As desirable as this might be, and in light of the experience with *C.A. Thayer*, the initial and long term costs would seem to preclude it unless major outside sources of funding were identified.

Alternative 5 – Preservation of the Stern and Salvage of the Bow – saves the historic fabric that is in the best condition and gives the best interpretive experience and value for the cost. Its proposed location in a government owned building at Hunter's Point or other location, would afford a reasonable-to-maintain program with good visitor accommodation. The ultimate decision as to the location of the vessel must include the ability of the location to have visitor draw to more than one venue.

Given all the factors evaluated, Alternative 5 has the highest important factor and cost ratio of 27.1. Due to the Rough Order of Magnitude (ROM) cost at this stage, the Value Study Group felt that additional time would be needed to refine the cost components of each alternative to confirm the final scoring and selection of the preferred alternative.

### Recommendations

As recommended by the Value Study Group, a comparative chart on component costs for all alternatives (appendix 5) was developed after the VA meeting. As summarized below, the costs of the six alternates vary from approximately \$38M for a complete rebuilding to floating condition at the Park (Alternative 1) to approximately \$9M to document, dismantle and display only artifacts in a new building (Alternative 6). Thus there is a substantial financial investment no matter how the treatment of vessel is approached. The four other preservation only and partial rehabilitation Alternatives, 2, 3, 4 and 5, range in cost from approximately \$13M to \$20M.

Alternative 1 – Full Rehabilitation / Restoration to Floating Exhibit  
\$38,215,000

Alternative 2 – Preservation (Stabilization) of Vessel on Barge  
\$13,230,000

Alternative 3 – Preservation (bow) / Rehabilitation (stern) in Building  
\$19,525,000

Alternative 4 – Preserve Structure / Rehabilitate Exterior for Outdoor Exhibit  
\$19,005,000

Alternative 5 – Rehabilitate Rear of Vessel in Building / Dismantle and Salvage  
Remainder  
\$15,925,000

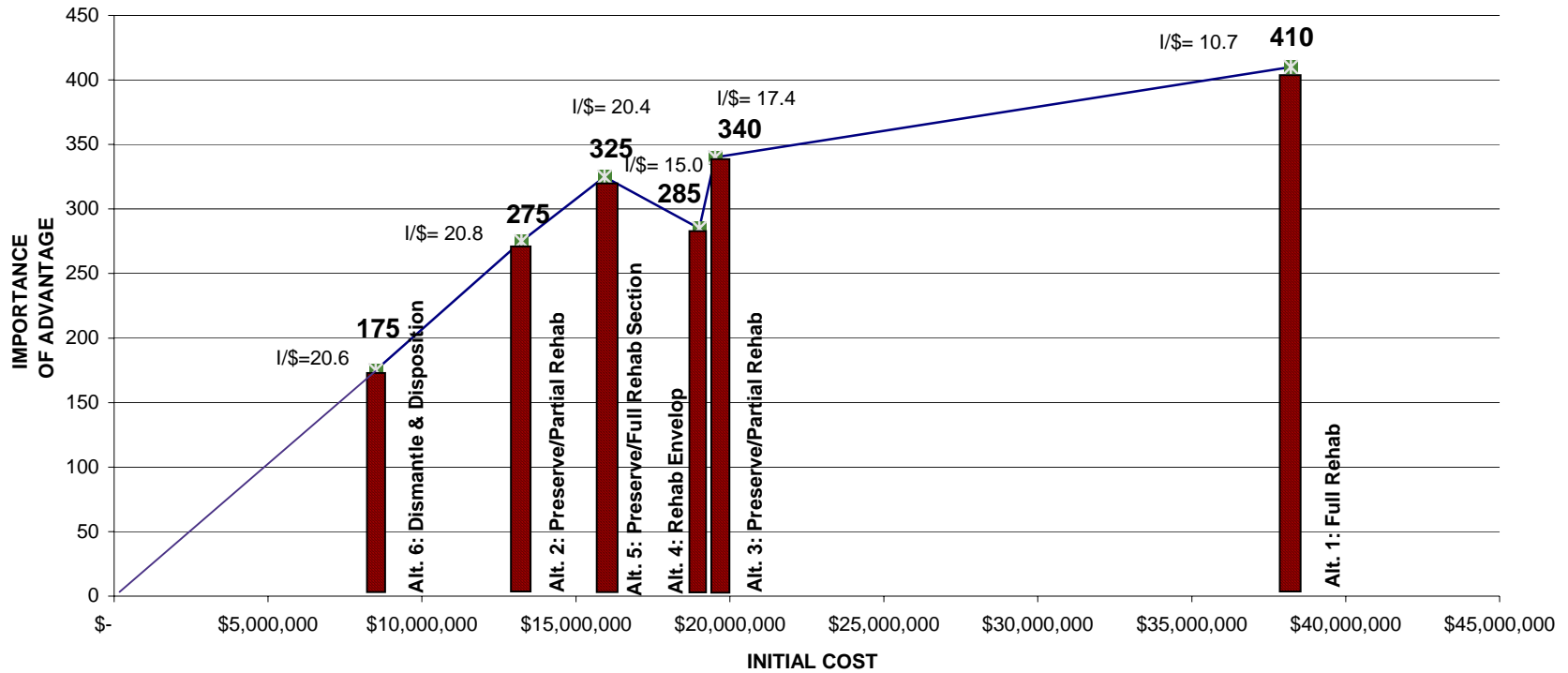
Alternative 6 - Partial Salvage / Disposal  
\$8,500,000

The revised Choosing by Advantage Graph of Importance/Cost ratio indicates both Alternative 1 (Full Rehabilitation/Restoration as a Floating Exhibit) and Alternative 6 (Partial Salvage / Disposal) still represent both ends of the scale regarding cost and importance of advantage. Due to the lower cost in Alternatives 6 (Partial Salvage / Disposal) and 2 (Preservation on a Barge), the Importance/Cost ratio of these Alternatives has increased respectively to 20.6 and 20.8 and is higher than 20.4 of Alternative 5 (Rehabilitation of the Stern of the Vessel in a Building / Dismantle and Salvage Remainder) importance factor and cost ratio score.

Among the three Alternatives, 2, 5, and 6 which are in the range of similar importance factor and cost ratio as indicated by the CBA graph, Alternative 6 is graphically the preferred alternative and has the most advantage in efficiency and sustainability at a lowest cost of \$8.5 million. Both Alternates 2 and 5 provide higher advantage points 275 and 325 but at a much higher costs \$13.2 and \$15.9 million respectively. There is also added long term cost in operation as the full/partial vessel is continuing be maintained by the park in Alternates 2 and 5.

The preferred Alternative 6 (Partial Salvage / Disposal) entails partial salvage of major components for museum display and interpretation and dismantling of the vessel. This alternative is in accordance with the park's 1997 General Management Plan / Environment Impact Statement (GMP/EIS) document.

**San Francisco Maritime National Historical Park  
Steam Schooner Wapama - Treatment, Preservation, and Management Options  
CBA Graph with Updated Costs**



## Updated Costs following the VA Session

### Updated Costs

#### Alternative 1

#### Full rehab to floating

Initial documentation	\$	165,000
Remove exist. temp cover	\$	30,000
Added shoring	\$	450,000
Vessel transportation	\$	760,000
Building use	\$	2,500,000
Haz Mat removal	\$	1,400,000
Borate / wood treatment	\$	-
Machinery restoration	\$	3,200,000
Disassembly options	\$	3,700,000
Disposal options	\$	510,000
Preservation / rehab / reconst	\$	23,000,000
Final display location	\$	2,000,000
Improvements at final disp. loc.	\$	500,000
Other	\$	-

<b>Total</b>	<b>\$</b>	<b>38,215,000</b>
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#### Alternative 2

#### Preserve on barge

Initial documentation	\$	165,000
Remove exist. temp cover	\$	30,000
Added shoring	\$	2,400,000
Vessel transportation	\$	-
Building use	\$	-
Haz Mat removal	\$	1,100,000
Borate / wood treatment	\$	2,800,000
Machinery restoration	\$	350,000
Disassembly options	\$	-
Disposal options	\$	-
Preservation / rehab / reconst	\$	200,000
Final display location	\$	850,000
Improvements at final disp. loc.	\$	4,950,000
Other	\$	385,000

<b>Total</b>	<b>\$</b>	<b>13,230,000</b>
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## Updated Costs following the VA Session

### Updated Costs

#### Alternative 3

##### Preserve bow / Rehab stern

Initial documentation	\$	165,000
Remove exist. temp cover	\$	30,000
Added shoring	\$	450,000
Vessel transportation	\$	330,000
Building use	\$	3,500,000
Haz Mat removal	\$	700,000
Borate / wood treatment	\$	700,000
Machinery restoration	\$	350,000
Disassembly options	\$	-
Disposal options	\$	-
Preservation / rehab / reconst	\$	11,500,000
Final display location	\$	1,600,000
Improvements at final disp. loc.	\$	200,000
Other	\$	-

<b>Total</b>	<b>\$</b>	<b>19,525,000</b>
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#### Alternative 4

##### Preserve structure / rehab ext.

Initial documentation	\$	165,000
Remove exist. temp cover	\$	30,000
Added shoring	\$	450,000
Vessel transportation	\$	330,000
Building use	\$	3,500,000
Haz Mat removal	\$	700,000
Borate / wood treatment	\$	700,000
Machinery restoration	\$	350,000
Disassembly options	\$	1,480,000
Disposal options	\$	300,000
Preservation / rehab / reconst	\$	9,200,000
Final display location	\$	1,600,000
Improvements at final disp. loc.	\$	200,000
Other	\$	-

<b>Total</b>	<b>\$</b>	<b>19,005,000</b>
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## Updated Costs following the VA Session

### Updated Costs

#### Alternative 5

##### Rehab aft section only

Initial documentation	\$	165,000
Remove exist. temp cover	\$	30,000
Added shoring	\$	650,000
Vessel transportation	\$	330,000
Building use	\$	3,500,000
Haz Mat removal	\$	700,000
Borate / wood treatment	\$	700,000
Machinery restoration	\$	-
Disassembly options	\$	1,600,000
Disposal options	\$	600,000
Preservation / rehab / reconst	\$	800,000
Final display location	\$	1,400,000
Improvements at final disp. loc.	\$	1,900,000
Other	\$	3,550,000

<b>Total</b>	<b>\$</b>	<b>15,925,000</b>
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#### Alternative 6

##### Preserve structure / rehab ext.

Initial documentation	\$	165,000
Remove exist. temp cover	\$	30,000
Added shoring	\$	-
Vessel transportation	\$	550,000
Building use	\$	-
Haz Mat removal	\$	580,000
Borate / wood treatment	\$	-
Machinery restoration	\$	-
Disassembly options	\$	450,000
Disposal options	\$	600,000
Preservation / rehab / reconst	\$	-
Final display location	\$	-
Improvements at final disp. loc.	\$	3,300,000
Other	\$	2,825,000

<b>Total</b>	<b>\$</b>	<b>8,500,000</b>
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## **PHASE VI - IMPLEMENTATION**

Implementation of the value study recommendations will rest with the NPS in accordance with the park's 1997 General Management Plan and Programmatic Agreement treatment decision to, ultimately, dismantle the vessel. Any action equivalent to "dismantling" the vessel would be deemed an adverse effect and require specific steps prior to undertaking that action. Consultations with the Advisory Council on Historic Preservation (ACHP) and the State Historic Preservation Officer (SHPO), and possibly the Secretary will be required to find ways to minimize or mitigate adverse effects.

Further value analysis will likely be needed throughout any future phases. It is recognized that the deteriorated condition of the vessel requires decisions and funding sooner rather than later.

## VALUE STUDY TEAM

NAME	TITLE	PHONE	ADDRESS
<b>TEAM MEMBERS</b>			
Mark Tabor	DSC – Project Manager and Team Leader	303-969-2493	Denver, CO
Kate Richardson	SAFR - Superintendent	415-561-7000	San Francisco, CA
Trung Nguyen	Western Region – Project Manager	510-817-1381	Oakland, CA
Shelly Niedernhofer	Western Region – Line Item Construction	510-817-1377	Oakland, CA
Robbyn Jackson	SAFR – Chief of Cultural Resources & Museum Management	415-561-7019	San Francisco, CA
John Shuster	SAFR – Manager Marine Operations	415-561-7191	San Francisco, CA
Steve Canright	SAFR – Museum Curator	415-561-7008	San Francisco, CA
Steve Hyman	SAFR – Restoration	415-561-7020	San Francisco, CA
Steve Rodgers	SAFR – Chief of Facilities Maintenance	415-561-7046	San Francisco, CA
Mike Bell	SAFR – Project Manager	415-561-7003	San Francisco, CA
Stephanie Toothman	SAFR – Chief Cultural Resources Programs	206-220-4139	San Francisco, CA

<b>CONSULTANTS</b>			
Dick Wagner	Center for Wooden Boats - Director	206-382-2628	Seattle, WA
Dana Hewson	Mystic Seaport Museum	860-572-5302 ext. 5061	Mystic, CT
Ray Ashley	San Diego Maritime Museum	619-234-9153 ext. 104	San Diego, CA
Patrick Naughton	BMT Designers & Planners – Naval Architect	703-920-7070 ext. 231	Arlington, VA
Allen Rawl	Allen Rawl, Inc – Ships of Wood	443-413-7321	Bradshaw, MD
Gee Heckscher	Architectural Resources Group - Architect	415-421-1680	San Francisco, CA

# **APPENDICES**

- 1. General Value Analysis Methodology**
- 2. Value Study Agenda**
- 3. The U.S. Secretary of the Interior's Standards for Historic Vessels Preservation Projects**  
**Definitions for Treatments of Historic Vessels**
- 4. Seven Aspects of Property's Integrity**
- 5. Cost Spreadsheets - – Updated for Phase V / Recommendations and Wrap-up**
- 6. Phase 1b Report For Reference – ROM Cost Estimates for the Different Restoration or Stabilization Alternatives**
- 7. List of Attendees**

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# **Appendix 1**

## **GENERAL VALUE ANALYSIS METHODOLOGY**

Value analysis is not a critical review, constructability review, or cost cutting exercise. It is a problem solving and decision making technique that bypasses learned responses to produce alternative solutions achieving all required functions of the original design at the least cost over the life of the facility. It is a team effort which follows an established, organized, job plan, and problem identification format that promotes objectivity and stimulates creativity. When the value analysis methodology is followed precisely, beneficial results are ensured.

A value analysis team must be willing to challenge criteria and opinions, many of which may have been maintained by historical continuity or outdated policy. Value analysis follows a methodology of distinct phases, relies upon teamwork, and the increase in creativity resulting from the synergism of a multi-disciplined group. It searches for and uses current technology to achieve the value analysis goal: To creatively furnish technically sound alternatives to satisfy the user's needs at the lowest life cycle cost.

Value analysis examines systems of design and breaks them into components which are then described in terms of intended use. The intended use (the purpose for the component's existence) called a function, is described in just two words, an active verb, and measurable noun.

These two-word functions are separated into categories by type:

1. Higher order functions define the user's needs.
2. Basic functions present the performance feature which must be achieved to satisfy this need. Without this quality the item ceases to be useful for whatever purpose it is required.

Secondary functions result from the method chosen to accomplish the basic function or functions. These can be further categorized into essential, desired, or non-essential. Unless they are essential, they have zero value and can be eliminated without affecting the required performance of the system or design.

Functions are arranged into two word pictures describing the project under study. The result is a FAST Diagram, an acronym for Function Analysis System Technique. It verifies the correctness of the function definitions and shows their interrelationships. It identifies and separates them into higher order, basic, and required secondary functions.

A Cost Model of a design's components, including the identification of the component's function, prioritize opportunities for value improvement. A function analysis, including

cost/worth ratios, further pinpoints poor value in greater detail. When cost exceeds worth (when the cost worth ratios exceeds unity), it indicates critical areas for the Value Engineering team to concentrate on during their alternative development efforts.

Focused by the cost model and the functional analysis, alternatives are generated through brainstorming. Generally, ideas are put through two sieves: (a) an initial judgmental level screening against evaluation factors followed by and a final more rigorous evaluation using Choosing by Advantages or other decision making method. The top three alternatives surviving these procedures are identified. The top-ranked of these is developed as the recommended solution, and estimates are prepared. Redesign costs and hours are estimated to reflect implementation impacts to assist management in their decision-making process. Estimated savings resulting from the use of the recommended alternatives are calculated, using life cycle costs, recognizing the time value of money where applicable and redesign costs are subtracted to show net savings.

The Value Analysis process, described above, has been structured into a job plan that deals with seven phases.

## **VALUE ANALYSIS JOB PLAN**

### **Phase I - Information Phase**

This phase ensures that all team members completely understand the objectives of the project and purpose of the project by gathering relevant information. Data is used to focus the study team on areas of highest potential for improved project value. Correct information is essential to making a sound decision. **Keywords:** Cost Model, Quality Model, Design Presentation

### **Phase II - Functional Analysis Phase**

This phase ensures that all team members completely understand the functions required. The team paints a functional portrait of the project and evaluates program needs versus wants. **Keywords:** Functional Analysis, FAST Diagram, 75% of Net Available Alternative.

### **Phase III - Creativity Phase**

This is the creative phase where the team "brain-storms" alternative methods of achieving the required functions of a project. At this point ideas are not evaluated, since criticism of an idea could discourage participation, decrease the flow of alternatives, and inhibit the creative endeavor. **Keywords:** Brainstorming, Deferred Judgment, Options, Alternatives, 90% of Net Available Alternative.

#### **Phase IV - Evaluation Phase**

This phase may occur in two steps. 1) An initial phase, where the study team eliminates alternatives that are not feasible or are otherwise unsuitable, and documents the rationale. 2) A final stage, after development, where advantages are weighed using specific evaluation factors. Cost is evaluated on an initial and life-cycle basis. **Keywords:** Evaluation Factors, Importance, Choosing by Advantages, Importance to Cost Ratio

#### **Phase V - Development Phase**

This is the designated study phase, where the best alternatives are developed into proposals for final evaluation and presentation. Alternatives are developed sufficiently to (1) demonstrate technical viability, (2) permit accurate estimates of their costs, (3) determine advantage, and (4) facilitate design documentation and construction. **Keywords:** Cost Estimates, Life-cycle Cost, Design Development

#### **Phase VI - Recommendation/Presentation Phase**

This phase consists of presenting the recommended proposals to decision makers at the end of a value study workshop. The presentation must be clear and concise, present factual data, and clearly demonstrate reasons for the recommendations to the decision makers. Opportunities and impediments to implementation are identified. **Keywords:** Sound Decisions, Recommendations, Commitment.

#### **Phase VII - Implementation Phase**

This phase occurs outside the workshop and provides for follow-up and implementation of accepted VA proposals. Actions by the planning/design team and managers are typically required. **Keywords:** Follow-through, Monitoring, Documentation

## **Appendix 2**

### **Value Study Agenda**

**Park: San Francisco Maritime National Historical Park**  
**PMIS: SAFR 55738**  
**Project: Stabilization and Protection of the Steam Schooner Wapama**

### **Treatment and Preservation Options**

**DATE: November 29 & 30, 2006**

## **AGENDA**

Meeting Location: **Partnership Room  
Building E, Fort Mason  
San Francisco Maritime National Historical Park**

Study Team Leader/Facilitator: Mark Tabor, (303) 969-2493

The value study team members should bring any background material they might have that relates to the project. Team members should bring their own special materials or preferred tools e.g. resource material, codes, standards, tracing paper, notebook computers, pens etc. The report will be developed in MSWORD and EXCEL. Team members should plan on being present for the duration of the study, important information and understanding of issues are lost if team members miss portions of the study.

### **Wednesday, November 29, 8:30 AM - Phase I – Information**

This phase ensures that all team members completely understand the objectives and purpose of the project by presenting all relevant information gathered/developed to date. Data is used to focus the study team on areas of highest potential for improved project value.

Introductions .....	Supt/PM/Team Leader
Value Analysis Overview/Objectives for the Study/Schedule .....	Team Leader
Project Background and Presentation.....	SAFR/ARG/Consultants
Secretary of the Interior's Standards for Treatment of Historic Vessels Overview .....	PM/SAFR
Stakeholders Analysis.....	Team
Modeling (Cost, Square Foot, Quality, etc) .....	ARG/Consultants
Identification of Areas of Focus .....	Team

**Lunch, 12:00 – 1:00 PM**

### **Wednesday, November 29, 1:00 PM - Phase II – Creativity**

Building on alternatives developed by the consultants, the value study team will brainstorm options and alternative ways of achieving the functions identified for the project. The process involved the development of ideas without judgment at this point.

Brainstorming .....Team

### **Wednesday, November 29, 2:30 PM - Phase III - Evaluation**

This phase may occur in two steps: (1) An initial phase where the study team eliminates alternatives which are not feasible or are otherwise unsuitable, and documents the rationale; and (2) A final stage, evaluation of remaining alternatives will be based on stated evaluation factors using an evaluation process called Choosing by Advantages (CBA).

Identification of Evaluation Factors .....Team

Finalize Evaluation Factors .....Team

Screening of Alternatives .....Team

### **Close for Day: 4:30 PM**

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### **Thursday, November 30, 8:30 AM - Phase III – Evaluation (cont.)**

Final Evaluation using Choosing by Advantages .....Team

### **Lunch, 12:00 – 1:00 PM**

### **Thursday, November 30, 1:00 PM - Phase IV – Development**

For alternatives actively under consideration initial and life cycle cost estimates should be developed, at a level appropriate to the decision being made.

Development of Alternatives.....Team/Workgroups

Cost Estimates ..... Workgroups ARG/Consultants

Life-cycle Cost Estimate ..... Workgroups/ARG/Consultants

Benefit Cost Analysis .....Team

**Thursday, November 30, 2:00 PM - Phase V - Recommendation**

The team finalizes their recommendations, highlighting key reasons for adopting a specific course of action. Any potential impediments or questions about implementation should be documented here e.g. funding, compliance, etc.

Finalize Recommendations.....Team  
Review Recommendations .....Team

**Thursday, November 30, 3:30 PM - Wrap-up**

**Thursday, November 30, 4:00 PM - Study Closes**

**Park: San Francisco Maritime National Historical Park**  
**PMIS: SAFR 55738**  
**Project: Stabilization and Protection of the Steam Schooner Wapama**

## **Treatment and Preservation Options**

**DATE: November 29 & 30, 2006**

## **PARTICIPANTS LIST**

### **Study Team Members:**

Mark Tabor, Value Study Team Leader/Facilitator, DSC/NPS  
Trung-Son Nguyen, Project Manager, PWR/NPS  
Stephanie Toothman, Cultural Resources, PWR/NPS  
Shelley Mettlach-Neidernhofer - LICP Team Leader, PWR/NPS  
Kate Richardson, Superintendent, San Francisco Maritime NHP/NPS  
Robbyn Jackson, Chief of Cultural Resources, San Francisco Maritime NHP/NPS  
Steve Canright, Park Historic Preservation Officer, San Francisco Maritime NHP/NPS  
Steve Hyman, Historic Preservation Specialist, San Francisco Maritime NHP/NPS  
Mike Bell, Project Manager, San Francisco Maritime NHP/NPS  
John Schuster, Facility Specialist, Marine, San Francisco Maritime NHP/NPS  
Stephen Rodgers, Facility Manager, San Francisco Maritime NHP/NPS

### **California State - Historic Preservation Officer**

Amanda Blosser, State Historian II (not present)  
Susan Stratton, Project Review Supervisor (not present)

### **Subject Matter Experts**

Ray Ashley, San Diego Maritime Museum  
Dana Hewson, Mystic Seaport Museum  
Dick Wagner, Center for Wooden Boats

### **Consultants:**

Gee Heckscher, Project Manager, Architectural Resources Group  
Allen Rawl, Wooden Ship Expert, Allen C. Rawl Inc.  
Patrick Naughton, BMT Designers & Planners, Inc.

Resources available to the value study team if necessary

- Frank McGrath, BMT Designers & Planners, Inc.

## **Appendix 3**

### **The U.S. Secretary of the Interior's Standards for Historic Vessels Preservation Projects**

#### **Definitions for Treatments of Historic Vessels**

### **SECRETARY OF THE INTERIOR'S STANDARDS FOR TREATMENT OF HISTORIC VESSELS - OVERVIEW**

#### **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**

9. Protection shall safeguard the physical condition of a vessel from further deterioration or damage caused by weather or other natural, animal, or human intrusions.

10. 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**

9. 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.

## **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.

## **Appendix 4**

### **Seven Aspects of Property's Integrity**

The National Register traditionally recognizes a property's integrity through seven aspects, or qualities: location, design, setting, materials, workmanship, feeling, and association.

#### **Location**

The National Register consideration of "integrity of location" should be construed to mean that a vessel is located in a port or other location with which the vessel historically had some association, such as a port of construction, or a port of call. Location should not be confused with integrity of setting, which generally means that a vessel is maintained in the water. However, it is recognized that preservation of a vessel's original fabric may compel the removal of the vessel from the water. This issue will be examined in the discussion of integrity of setting.

#### **Design**

A vessel, like any other structure, changes with time. Vessels may be lengthened, deckhouses added or removed, and interior spaces modified for new uses. Changes which occur over time, particularly those associated with a shift to different owners or trades, if those owners or trades are historically significant, acquire significance in their own right. When changes to a vessel are in the form of renewal and replacement, either to continue operation historically or to perform a restoration, the structure will remain eligible if renewed features are replaced with materials which in their composition, design, color, texture, and workmanship retain the historic character of the vessel. These changes do not affect a vessel's integrity.

The noted maritime historian, Allan Villiers, once observed that historic vessels maintained and/or operated in the water ultimately become reconstructions or wrecks. While historic structures and buildings on land also deteriorate and require maintenance and replacement of original fabric, the corrosive nature of the marine environment greatly accelerates the process. Any historic vessel maintained in the water will ultimately lose all of her original fabric. *U.S.S. Constitution*, now berthed at Charlestown Navy Yard in Boston, retains as little as 10 to 23 percent of the wood that was in the frigate when launched in 1797 or when she earned her reputation as "Old Ironsides." Yet this is largely indistinguishable because of attention to maintaining historic materials and workmanship during her many restorations. These increasingly restored historic vessels retain their integrity in those cases when integrity as evidenced by hull form, rig, use of materials, or craftsmanship is maintained. It is important to retain original fabric though, for the greater the amount of historic fabric, the greater the quality of integrity for the vessel.

## **Setting**

Integrity of setting usually means that a vessel is maintained in the water. National Register guidelines generally rule that vessels out of water, particularly if in an enclosed structure, were ineligible for National Register listing unless they were in a "natural" waterfront setting, such as in a drydock. Yet limiting the National Register only to vessels maintained afloat or in the open air ultimately dooms original fabric. In some cases, the preservation of that fabric may be essential. Craftsmanship cannot be replaced, nor archeologically recovered. Fragile intact vessels can only be preserved "under glass." To preserve historic fabric in rare vessels, integrity of setting will be maintained if the craft is associated with the water by means of a waterfront location. This setting must not detract from appreciating the vessel as a waterborne craft or present her as a museum object.

## **Materials**

Integrity of materials means that the physical elements that were combined in the vessel's historic design and construction have been maintained. For example, integrity of materials would be retained when a vessel's steel plates are replaced in-kind with steel plates, oak planks are replaced in-kind with oak planks, copper sheathing is replaced in-kind with copper sheathing, and tarred hemp standing rigging is replaced in-kind with tarred hemp standing rigging. This is not to suggest that failure to follow strict in-kind replacement could keep a vessel from being listed on the National Register. Modern materials for patching and repair, such as epoxies and fiberglass, may be necessary to preserve a vessel.

## **Workmanship**

Integrity of workmanship is maintained when materials are renewed in kind. When original but deteriorated riveted iron hull plates are replaced, integrity of workmanship is maintained when the new iron plates are also riveted. Double-sawn timber frames should be replaced with double-sawn timber frames to maintain integrity of workmanship.

## **Feeling**

Integrity of feeling means that the vessel evokes an aesthetic or historic sense of the past. Usually, this depends on the presence of the vessel's significant physical characteristics to convey her historic qualities. However, it must be recognized that extreme deterioration of a vessel, such as major rot and inherent structural collapse, would not interfere with the ability of the vessel to yield important information through analysis of her construction and career, and she would possess archeological integrity and be eligible under Criterion D.

## **Association**

A period or accurate waterfront setting for a historic vessel is desirable and adds to the integrity of setting for the vessel. A vessel loses her integrity of association if she is removed from the water and displayed out of sight of the water, such as a 19<sup>th</sup> century schooner placed on a lawn, surrounded by a chain-link fence, in front of a factory,

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NPS Costs Spreadsheet	Alternative 1		Alternative 2		Alternative 3		Alternative 4		Alternative 5		Alternative 6		
	Full Rehab to Floating Exhibit		Preservation on Barge		Preserve Bow/Rehab Stern		Preserve Struct/Rehab Exterior		Rehab Aft Section Only		Disposal/Salvage of Select Pieces		Other?
Initial Documentation	<input checked="" type="checkbox"/>	\$ 165,000	<input checked="" type="checkbox"/>	\$ 165,000	<input checked="" type="checkbox"/>	\$ 165,000	<input checked="" type="checkbox"/>	\$ 165,000	<input checked="" type="checkbox"/>	\$ 165,000	<input checked="" type="checkbox"/>	\$ 165,000	<input type="checkbox"/> \$ -
Removal of Existing Temporary Cover	<input checked="" type="checkbox"/>	\$ 30,000	<input checked="" type="checkbox"/>	\$ 30,000	<input checked="" type="checkbox"/>	\$ 30,000	<input checked="" type="checkbox"/>	\$ 30,000	<input checked="" type="checkbox"/>	\$ 30,000	<input checked="" type="checkbox"/>	\$ 30,000	<input type="checkbox"/> \$ -
Additional Shoring													
None Add Additional Shoring for move of entire vessel on barge from Pt Richmond to Hunter's Pt Add Additional Shoring & weights for move of partial vessel on barge from Pt Richmond to Hunter's Pt Add Additional Shoring for permanent display @ Pt Richmond	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input checked="" type="radio"/>	\$ -	<input checked="" type="radio"/> \$ -
	<input checked="" type="radio"/>	\$ 450,000	<input type="radio"/>	\$ -	<input checked="" type="radio"/>	\$ 450,000	<input checked="" type="radio"/>	\$ 450,000	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input type="radio"/> \$ -
	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input checked="" type="radio"/>	\$ 650,000	<input type="radio"/>	\$ -	<input type="radio"/> \$ -
	<input type="radio"/>	\$ -	<input checked="" type="radio"/>	\$ 2,400,000	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input type="radio"/> \$ -
Vessel Transportation													
Tow on Barge to Hunter's Pt (or similar location)  Transport of Rebuilt Vessel to Hyde St Pier  Transport of Selective Pieces to a Federal Facility (for Stand Alone Display)	<input checked="" type="checkbox"/>	\$ 330,000	<input type="checkbox"/>	\$ -	<input checked="" type="checkbox"/>	\$ 330,000	<input checked="" type="checkbox"/>	\$ 330,000	<input checked="" type="checkbox"/>	\$ 330,000	<input type="checkbox"/>	\$ -	<input type="checkbox"/> \$ -
	<input checked="" type="checkbox"/>	\$ 430,000	<input type="checkbox"/>	\$ -	<input type="checkbox"/>	\$ -	<input type="checkbox"/>	\$ -	<input type="checkbox"/>	\$ -	<input type="checkbox"/>	\$ -	<input type="checkbox"/> \$ -
	<input type="checkbox"/>	\$ -	<input type="checkbox"/>	\$ -	<input type="checkbox"/>	\$ -	<input type="checkbox"/>	\$ -	<input type="checkbox"/>	\$ -	<input checked="" type="checkbox"/>	\$ 550,000	<input type="checkbox"/> \$ -
Building Use													
None Permanent building use @ Hunter's Pt for entire vessel incl mods for visitor services (assume Federal Land/free use but include costs of mods for use) Permanent building use @ Hunter's Pt for partial vessel incl mods for visitor services (assume Federal Land/free use but include costs of mods for use) Temporary building use during rebuild @ Hunter's Pt (assume Federal Land/free use but include costs of mods for use)	<input type="radio"/>	\$ -	<input checked="" type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input checked="" type="radio"/>	\$ -	<input checked="" type="radio"/> \$ -
	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input checked="" type="radio"/>	\$ 3,500,000	<input checked="" type="radio"/>	\$ 3,500,000	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input type="radio"/> \$ -
	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input checked="" type="radio"/>	\$ 3,500,000	<input type="radio"/>	\$ -	<input type="radio"/> \$ -
	<input checked="" type="radio"/>	\$ 2,500,000	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input type="radio"/> \$ -
HAZMAT Removal													
None HAZMAT Removals during full rebuild (asbestos/lead paint) HAZMAT Removals as part of partial salvage (asbestos/lead paint) HAZMAT Removals as part of stabilization (asbestos/lead paint) HAZMAT removals for complete dismantling/retention of selective pieces	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input checked="" type="radio"/> \$ -
	<input checked="" type="radio"/>	\$ 1,400,000	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input type="radio"/> \$ -
	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input checked="" type="radio"/>	\$ 700,000	<input checked="" type="radio"/>	\$ 700,000	<input checked="" type="radio"/>	\$ 700,000	<input type="radio"/>	\$ -	<input type="radio"/> \$ -
	<input type="radio"/>	\$ -	<input checked="" type="radio"/>	\$ 1,100,000	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input type="radio"/> \$ -
	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input checked="" type="radio"/>	\$ 580,000	<input type="radio"/> \$ -
Borate/Wood Treatment													
None Undertake major Borate & other treatment to preserve remaining wood structure for entire vessel Undertake major Borate & other treatment to preserve remaining wood structure for partial vessel	<input checked="" type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input checked="" type="radio"/>	\$ -	<input checked="" type="radio"/> \$ -
	<input type="radio"/>	\$ -	<input checked="" type="radio"/>	\$ 2,800,000	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input type="radio"/> \$ -
	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input checked="" type="radio"/>	\$ 700,000	<input checked="" type="radio"/>	\$ 700,000	<input checked="" type="radio"/>	\$ 700,000	<input type="radio"/>	\$ -	<input type="radio"/> \$ -
Machinery Equipment Restoration													
None Restoration of machinery, galley equipment and deck gear, etc Restoration of steam plant Preservation/protection of iron machinery and gear with "Cosmoline"	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input checked="" type="radio"/>	\$ -	<input checked="" type="radio"/>	\$ -	<input checked="" type="radio"/> \$ -
	<input checked="" type="radio"/>	\$ 3,200,000	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input type="radio"/> \$ -
	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input type="radio"/> \$ -
	<input type="radio"/>	\$ -	<input checked="" type="radio"/>	\$ 350,000	<input checked="" type="radio"/>	\$ 350,000	<input checked="" type="radio"/>	\$ 350,000	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input type="radio"/> \$ -
Disassembly Options													
None Demolition of Entire Hull In Situ Deconstruction & Demolition of Hull Back to FR 45 Shell & Deck Planking & Some Supporting Structure Full Disassembly and Documentation	<input type="radio"/>	\$ -	<input checked="" type="radio"/>	\$ -	<input checked="" type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input checked="" type="radio"/> \$ -
	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input checked="" type="radio"/>	\$ 450,000	<input type="radio"/> \$ -
	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input checked="" type="radio"/>	\$ 1,600,000	<input type="radio"/>	\$ -	<input type="radio"/> \$ -
	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input checked="" type="radio"/>	\$ 1,480,000	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input type="radio"/> \$ -
	<input checked="" type="radio"/>	\$ 3,700,000	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input type="radio"/> \$ -
Disposal Options													
None Fwd Section of Hull Back to FR 45 Shell & Deck Planking & Some Supporting Structure Up to ~85% of Hull as part of Full Rebuild Most of Vessel (Except for Select Pieces of Equipment to be displayed separately)	<input type="radio"/>	\$ -	<input checked="" type="radio"/>	\$ -	<input checked="" type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input checked="" type="radio"/> \$ -
	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input checked="" type="radio"/>	\$ 600,000	<input type="radio"/>	\$ -	<input type="radio"/> \$ -
	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input checked="" type="radio"/>	\$ 300,000	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input type="radio"/> \$ -
	<input checked="" type="radio"/>	\$ 510,000	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input type="radio"/> \$ -
	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input checked="" type="radio"/>	\$ 600,000	<input type="radio"/> \$ -
Preservation/Rehab/Reconstruction Costs													
None Stabilization Only for Entire Vessel Stabilization & Restoration of Aft Section of Hull (Aft of FR 45) Stabilization Hull and Preservation of Partial Vessel Replacement of Hull & Deck Planking & Some Supporting Structure Full Rebuild	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input checked="" type="radio"/>	\$ -	<input checked="" type="radio"/> \$ -
	<input type="radio"/>	\$ -	<input checked="" type="radio"/>	\$ 200,000	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input type="radio"/> \$ -
	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input checked="" type="radio"/>	\$ 800,000	<input type="radio"/>	\$ -	<input type="radio"/> \$ -
	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input checked="" type="radio"/>	\$ 11,500,000	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input type="radio"/> \$ -
	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input checked="" type="radio"/>	\$ 9,200,000	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input type="radio"/> \$ -
	<input checked="" type="radio"/>	\$ 23,000,000	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input type="radio"/> \$ -
Final Display Location for Vessel													
None (Disposal of Vessel) @ Pt Richmond @ Hunter's Pt (or similar location) Partial Vessel @ Hunter's Pt (or similar location) Full Vessel @ Hyde St Pier	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input checked="" type="radio"/>	\$ -	<input checked="" type="radio"/> \$ -
	<input type="radio"/>	\$ -	<input checked="" type="radio"/>	\$ 850,000	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input type="radio"/> \$ -
	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input checked="" type="radio"/>	\$ 1,400,000	<input type="radio"/>	\$ -	<input type="radio"/> \$ -
	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input checked="" type="radio"/>	\$ 1,600,000	<input checked="" type="radio"/>	\$ 1,600,000	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input type="radio"/> \$ -
	<input checked="" type="radio"/>	\$ 2,000,000	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input type="radio"/>	\$ -	<input type="radio"/> \$ -
Improvements @ Final Display Location													
	<input type="checkbox"/>	\$ -	<input checked="" type="checkbox"/>	\$ 950,000	<input type="checkbox"/>	\$ -	<input type="checkbox"/>	\$ -	<input type="checkbox"/>	\$ -	<input type="checkbox"/>	\$ -	<input type="checkbox"/> \$ -
	<input type="checkbox"/>	\$ -	<input checked="" type="checkbox"/>	\$ 4,000,000	<input type="checkbox"/>	\$ -	<input type="checkbox"/>	\$ -	<input type="checkbox"/>	\$ -	<input type="checkbox"/>	\$ -	<input type="checkbox"/> \$ -
	<input type="checkbox"/>	\$ -	<input type="checkbox"/>	\$ -	<input checked="" type="checkbox"/>	\$ 200,000	<input checked="" type="checkbox"/>	\$ 200,000	<input checked="" type="checkbox"/>	\$ 200,000	<input type="checkbox"/>	\$ -	<input type="checkbox"/> \$ -
	<input type="checkbox"/>	\$ -	<input type="checkbox"/>	\$ -	<input type="checkbox"/>	\$ -	<input type="checkbox"/>	\$ -	<input checked="" type="checkbox"/>	\$ 900,000	<input type="checkbox"/>	\$ -	<input type="checkbox"/> \$ -
	<input type="checkbox"/>	\$ -	<input type="checkbox"/>	\$ -	<input type="checkbox"/>	\$ -	<input type="checkbox"/>	\$ -	<input checked="" type="checkbox"/>	\$ 800,000	<input type="checkbox"/>	\$ -	<input type="checkbox"/> \$ -
	<input checked="" type="checkbox"/>	\$ 500,000	<input type="checkbox"/>	\$ -	<input type="checkbox"/>	\$ -	<input type="checkbox"/>	\$ -	<input type="checkbox"/>	\$ -	<input type="checkbox"/>	\$ -	<input type="checkbox"/> \$ -
	<input type="checkbox"/>	\$ -	<input type="checkbox"/>	\$ -	<input type="checkbox"/>	\$ -	<input type="checkbox"/>	\$ -	<input type="checkbox"/>	\$ -	<input checked="" type="checkbox"/>	\$ 3,300,000	<input type="checkbox"/> \$ -
Other Items													
	<input type="checkbox"/>	\$ -	<input type="checkbox"/>	\$ -	<input type="checkbox"/>	\$ -	<input type="checkbox"/>	\$ -	<input checked="" type="checkbox"/>	\$ 2,800,000	<input type="checkbox"/>	\$ -	<input type="checkbox"/> \$ -
	<input type="checkbox"/>	\$ -	<input type="checkbox"/>	\$ -	<input type="checkbox"/>	\$ -	<input type="checkbox"/>	\$ -	<input checked="" type="checkbox"/>	\$ 750,000	<input type="checkbox"/>	\$ -	<input type="checkbox"/> \$ -
	<input type="checkbox"/>	\$ -	<input type="checkbox"/>	\$ -	<input type="checkbox"/>	\$ -	<input type="checkbox"/>	\$ -	<input type="checkbox"/>	\$ -	<input checked="" type="checkbox"/>	\$ 40,000	<input type="checkbox"/> \$ -
	<input type="checkbox"/>	\$ -	<input type="checkbox"/>	\$ -	<input type="checkbox"/>	\$ -	<input type="checkbox"/>	\$ -	<input type="checkbox"/>	\$ -	<input checked="" type="checkbox"/>	\$ 2,400,000	<input type="checkbox"/> \$ -
	<input type="checkbox"/>	\$ -	<input checked="" type="checkbox"/>	\$ 385,000	<input type="checkbox"/>	\$ -	<input type="checkbox"/>	\$ -	<input type="checkbox"/>	\$ -	<input checked="" type="checkbox"/>	\$ 385,000	<input type="checkbox"/> \$ -
Total Estimated Cost for Alternative	\$ 38,215,000		\$ 13,230,000		\$ 19,525,000		\$ 19,005,000		\$ 15,925,000		\$ 8,500,000		\$ -

NPS Costs Spreadsheet				
Item	Description	Cost	Basis	Notes
1	a Initial Documentation	\$165,000	Based on data from Thayer	Includes digital survey of hull as-is
2	a Removal of existing temporary cover	\$30,000		Includes removal of some pieces of large deck equipment
3	a Add Additional Shoring for move of entire vessel on barge from Pt Richmond to Hunter's Pt	\$450,000		Includes both internal and external shoring as required for long term display
	b Add Additional Shoring & weights for move of partial vessel on barge from Pt Richmond to Hunter's Pt	\$650,000		
	c Add Additional Shoring for permanent display @ Pt Richmond	\$2,400,000		
4	a Tow by barge to Hunter's Pt	\$330,000		Includes costs of relocating two vessels currently moored aft of WAPAMA @ Pt Richmond
	b Transport of rebuilt vessel to Hyde St Pier	\$430,000		Includes cost of relaunching vessel
	c Transport of selective pieces to a Federal facility	\$550,000		
5	a Permanent building use @ Hunter's Pt for entire vessel incl mods for visitor services (assume Federal Land/free use but include costs of mods for use)	\$3,500,000		Includes envelope improvements to an existing 50,000 sf building
	b Permanent building use @ Hunter's Pt for partial vessel incl mods for visitor services (assume Federal Land/free use but include costs of mods for use)	\$3,500,000		Includes envelope improvements to an existing 50,000 sf building
	c Temporary building use during rebuild @ Hunter's Pt (assume Federal Land/free use but include costs of mods for use)	\$2,500,000		Includes temporary exterior and interior improvements to an existing 50,000 sf building
6	a HAZMAT Removals during full rebuild (asbestos/lead paint)	\$1,400,000		Includes degree of difficulty working through shoring in hazardous conditions
	b HAZMAT Removals as part of partial salvagen (asbestos/lead paint)	\$700,000		
	c HAZMAT Removals as part of stabilization (asbestos/lead paint)	\$1,100,000		
	d HAZMAT removals for complete dismantling/retention of selective pieces	\$580,000		
7	a Undertake major Borate & other treatment to preserve remaining wood structure for entire vessel	\$2,800,000		
	b Undertake major Borate & other treatment to preserve remaining wood structure for partial vessel	\$700,000		
8	a Restoration of machinery, galley equipment and deck gear, etc	\$3,200,000		Does not include full restoration of steam plant ROM estimate pending more detailed survey
	b Restoration of steam plant	\$800,000		
	c Preservation/protection of iron machinery and gear with "Cosmoline"	\$350,000		
9	a Demolition of Vessel	\$450,000	Assumed 40% of Full Rehab	Includes cost of moving vessel off barge & into building
	b In situ deconstruction of hull back to FR 45	\$900,000		
	& Demolition of remaining components of vessel	\$700,000		
	c Shell & Deck Planking & Some Supporting Structure	\$1,480,000		
	d Full disassembly and documentation	\$3,700,000		
10	a Fwd Section of Hull Back to FR 45	\$600,000		
	b Shell & Deck Planking & Some Supporting Structure	\$300,000		
	c Up to ~85% of Hull as part of Full Rebuild	\$510,000		
	d Most of Vessel (Except for Select Pieces of Equipment to be displayed separately)	\$600,000		
11	a Stabilization Only for Entire Vessel	\$200,000	Assumed 40% of Full Rehab Scaled from Thayer	
	b Stabilization & Restoration of Aft Section of Hull (Aft of FR 45) & Internal repairs to aft section of vessel for visitor vieweing for partial hull	\$800,000		
	c Stabilization Hull and Preservation of Partial Vessel	\$11,500,000		
	d Replacement of Hull & Deck Planking & Some Supporting Structure	\$9,200,000		
	e Full Rebuild	\$23,000,000		
12	a Lay up @ Pt Richmond	\$850,000		
	b Lay up @ Hunter's Pt (Partial Vessel)	\$1,400,000		Includes costs of additional permanent shoring, access, and utilities etc @ Hunter's Pt
	c Lay up @ Hunter's Pt (Full Vessel)	\$1,600,000		Includes costs of additional permanent shoring, access, and utilities etc @ Hunter's Pt
	d Lay Up @ Hyde St Pier	\$2,000,000		
13	a Improvements to access and utilities for a permanent display @ Pt Richmond	\$950,000		Includes 25,000 sf new structure plus Port of Richmond rent for 20 yrs at \$75,000 per year
	b Build structure over graving dock @ Pt Richmond to protect vessel	\$4,000,000		
	c Improvements to access and utilities for a permanent display @ Hunter's Pt	\$200,000		
	d Provide access for partial hull display	\$900,000		
	e Install lighting and develop interpretive exhibits for partial hull display	\$800,000		
	f Improvements to access and utilities for a permanent display @ Hyde St Pier	\$500,000		
	g New Museum building for display of selective components of vessel	\$3,300,000		Includes new 10,000 sf building, sitework and utilities at Hyde St. Pier
14	a Hull repairs for viewing partial vessel in cross section	\$2,800,000		
	b Mock Up skeleton of main hatch and bow for use with partial vessel display	\$750,000		
	c Determine what is reasonably salvageable for museum display (if vessel is to be totally dismantled)	\$40,000		
	d Salvage of selected pieces of equipment for display	\$2,400,000		
	e Storage and/or rehabilitation of salvaged pieces	\$385,000		

## **Appendix 6**

### **Phase 1 b Report For Reference – ROM Cost Estimates for the Different Restoration or Stabilization Alternatives**

<b>Alt. 1 - Full Rehabilitation and Return of Vessel to a Floating Display</b>		
1	Initial documentation	\$ 165,000
2	Add additional shoring for move from Pt Richmond to Hunter's Pt	\$ 450,000
3	Removal of large deck equipment prior to tow	\$ 280,000
4	Tow by barge to Hunter's Pt	\$ 330,000
5	Building use @ Hunter's Pt (assume Federal Land/free for rebuild but include any mods required to building for use)	\$ 2,700,000
6	Hazmat removals (asbestos/lead paint/oils)	\$ 1,400,000
7	Disassembly and documentation	\$ 3,700,000
8	Restoration of machinery, galley equipment and deck gear etc	\$ 3,200,000
9	Rebuild	\$ 23,000,000
10	Transport to Hyde St Pier	\$ 430,000
	<b>Total</b>	<b>\$ 35,655,000</b>

#### Notes:

- 1) Initial Documentation estimate includes digital survey of hull as-is
- 2) Addition of shoring estimate includes both internal and external shoring as required for transport of vessel by barge to the Hunter's Pt facility
- 3) Removal of large deck equipment estimate also includes removal of the existing temporary cover
- 4) Towing estimate includes cost of relocating the two existing vessels berthed aft of the WAPAMA at the Pt Richmond facility
- 5) The Building use estimate is a current ROM estimate, subject to revision upon a more comprehensive survey of the building
- 6) The Disassembly and documentation estimate includes the cost of moving the vessel off the barge to the storage building
- 7) The Rebuild estimate does not include full restoration of the steam plant. A ROM estimate to return the plant to service would be at least \$800,000, though due to the extremely deteriorated state of the boilers this could increase pending a more detailed survey of the systems
- 8) The transport to the Hyde St Pier estimate also includes the cost of relaunching the vessel
- 9) Estimated Costs are based on current cost of labor and material and work performed in the San Francisco Bay area.

<b>Alt. 2a - Full Stabilization to Maintain the Vessel for Future Restoration @ Hunter's Pt</b>		
1	Initial documentation	\$ 165,000
2	Add additional shoring for move from Pt Richmond to Hunter's Pt	\$ 450,000
3	Removal of large deck equipment prior to tow	\$ 280,000
4	Tow by barge to Hunter's Pt	\$ 330,000
5	Building Use @ Hunter's Pt (assume Federal Land/free for rebuild but include any mods required to building for use)	\$ 5,000,000
6	Undertake major Borate and other treatment to preserve remaining wood structure	\$ 2,800,000
7	Hazmat removals (asbestos/lead paint/oils)	\$ 800,000
8	Prepare iron machinery and gear with "Cosmoline" to help preserve	\$ 350,000
9	Lay Up @ Hunter's Pt	\$ 1,600,000
	Total	\$ 11,775,000

Notes:

- 1) Initial Documentation estimate includes digital survey of hull as-is
- 2) Addition of shoring estimate includes both internal and external shoring as required as required for transport of vessel by barge to the Hunter's Pt facility
- 3) Removal of large deck equipment estimate also includes removal of the existing temporary cover
- 4) Towing estimate includes cost of relocating the two existing vessels berthed aft of the WAPAMA at the Pt Richmond facility
- 5) The Building use estimate is a current ROM estimate, subject to revision upon a more comprehensive survey of the building. This estimate is higher than the estimated cost for the building for the Full Rehabilitation option, due to the longer time frame in question and to account for any potential added costs required for humidity control etc.
- 6) The Lay-Up estimate includes the costs for permanent shoring and providing access and utilities
- 7) Estimated Costs are based on current cost of labor and material and work performed in the San Francisco Bay area.

<b>Alt. 2b – Full Stabilization to Maintain the Vessel for Future Restoration @ Pt Richmond</b>		
1	Initial documentation	\$ 165,000
2	Add additional shoring as required	\$ 2,400,000
3	Removal of large deck equipment	\$ 330,000
4	Building Use @ Hunter's Pt	\$ 0
5	Undertake Major Borate and Other Treatment to Preserve Remaining Wood Structure	\$ 2,800,000
6	Hazmat removals (asbestos/lead paint/oils)	\$ 800,000
7	Prepare Iron Machinery and Gear with "Cosmoline" to Help Preserve	\$ 350,000
8	Build structure over graving dock to protect vessel	\$ 1,600,000
9	Lay Up @ Pt Richmond	\$ 650,000
10	Improvements to access and utilities	\$ 750,000
	<b>Total</b>	<b>\$ 9,845,000</b>

Notes:

- 1) Initial Documentation estimate includes digital survey of hull as-is
- 2) Addition of shoring estimate includes both internal and external shoring as required for long term stabilization and storage of vessel
- 3) Removal of large deck equipment estimate also includes removal of the existing temporary cover
- 4) Estimated Costs are based on current cost of labor and material and work performed in the San Francisco Bay area.

<b>Alt. 3 – Partial Salvage</b>		
1	Initial documentation	\$ 165,000
2	Assume in situ deconstruction of hull back to FR 45 (or as defined by NPS)	\$ 900,000
3	Demolition of remaining components of vessel	\$ 700,000
4	Disposal of remaining components of vessel	\$ 600,000
5	Add additional shoring and weights to balance load for move from Pt Richmond to Hunter's Pt	\$ 650,000
6	Tow by barge to Hunter's Pt	\$ 330,000
7	Building Use @ Hunter's Pt (assume Federal Land/free for rebuild but include any mods required to building for use)	\$ 4,000,000
8	Undertake major Borate and other treatment to preserve remaining wood structure	\$ 700,000
9	Hazmat removals (asbestos/lead paint/oils)	\$ 700,000
10	Hull Repairs for viewing (view in cross section)	\$ 2,800,000
11	Mock up skeleton of main hatch and bow section to impart overall vessel size	\$ 750,000
12	Internal repairs to aft section for visitor viewing	\$ 800,000
13	Install lighting and develop interpretive exhibits	\$ 800,000
14	Construct means of access for visitors to get onboard	\$ 900,000
	<b>Total</b>	<b>\$ 11,780,000</b>

Notes:

- 1) Initial Documentation estimate includes digital survey of hull as-is
- 2) Towing estimate includes cost of relocating the two existing vessels berthed aft of the WAPAMA at the Pt Richmond facility
- 3) The Building use estimate is a current ROM estimate, subject to revision upon a more comprehensive survey of the building and includes costs associated with converting the facility into a facility suitable for display of refurbished artifacts
- 4) The Lighting and Development of Interpretive Exhibits estimate is a rough estimate and may vary pending further development of plans for display and review of facilities.
- 5) Estimated Costs are based on current cost of labor and material and work performed in the San Francisco Bay area.

<b>Alt. 4 – Piecemeal Salvage</b>		
1	Initial documentation	\$ 165,000
2	Determine what is reasonably salvageable for museum display (such as engine, winches, main cabin etc)	\$ 40,000
3	Salvage of pieces identified above	\$ 2,400,000
4	Transport of pieces to Federal facility	\$ 550,000
5	Storage or rehabilitation of salvaged pieces	\$ 385,000
6	Hazmat removals (asbestos/lead paint/oils)	\$ 580,000
7	Demolition of remaining components of vessel	\$ 450,000
8	Disposal of remaining components of vessel	\$ 600,000
	Total	\$ 5,170,000

Notes:

- 1) Initial Documentation estimate includes digital survey of hull as-is
- 2) The estimate for Salvage of specific pieces is a ROM placeholder and may vary pending development of the Owner's final list of items to be salvaged for display.
- 3) Estimated Costs are based on current cost of labor and material and work performed in the San Francisco Bay area.

## **Appendix 7**

### **List of Attendees**

<b>NAME</b>	<b>TITLE</b>	<b>PHONE</b>	<b>ADDRESS</b>
<b>TEAM MEMBERS</b>			
Mark Tabor	DSC – Project Manager and Team Leader	303-969-2493	Denver, CO
Kate Richardson	SAFR - Superintendent	415-561-7000	San Francisco, CA
Trung Nguyen	Western Region – Project Manager	510-817-1381	Oakland, CA
Shelly Niedernhofer	Western Region – Line Item Construction	510-817-1377	Oakland, CA
Robbyn Jackson	SAFR – Chief of Cultural Resources & Museum Management	415-561-7019	San Francisco, CA
John Shuster	SAFR – Manager Marine Operations	415-561-7191	San Francisco, CA
Steve Canright	SAFR – Museum Curator	415-561-7008	San Francisco, CA
Steve Hyman	SAFR – Restoration	415-561-7020	San Francisco, CA
Steve Rodgers	SAFR – Chief of Facilities Maintenance	415-561-7046	San Francisco, CA
Mike Bell	SAFR – Project Manager	415-561-7003	San Francisco, CA
Stephanie Toothman	SAFR – Chief Cultural Resources Programs	206-220-4139	San Francisco, CA

<b>CONSULTANTS</b>			
Dick Wagner	Center for Wooden Boats - Director	206-382-2628	Seattle, WA
Dana Hewson	Mystic Seaport Museum	860-572-5302 ext. 5061	Mystic, CT
Ray Ashley	San Diego Maritime Museum	619-234-9153 ext. 104	San Diego, CA
Patrick Naughton	BMT Designers & Planners – Naval Architect	703-920-7070 ext. 231	Arlington, VA
Allen Rawl	Allen Rawl, Inc – Ships of Wood	443-413-7321	Bradshaw, MD
Gee Heckscher	Architectural Resources Group - Architect	415-421-1680	San Francisco, CA