

**OFFICE OF HISTORIC PRESERVATION
DEPARTMENT OF PARKS AND RECREATION**

P.O. BOX 942896
SACRAMENTO, CA 94296-0001
(916) 653-6624 Fax: (916) 653-9824
calshpo@ohp.parks.ca.gov



August 8, 2006

Ms. Diane Oshima, Assistant Deputy Director
Waterfront Planning
Port of San Francisco
Pier 1
San Francisco, California 94111

RE: Port of San Francisco Embarcadero Historic District Listing on the
National Register of Historic Places

Dear Ms. Oshima:

I am pleased to notify you that on May 12, 2006, the above-named property was placed on the National Register of Historic Places (National Register). As a result of being placed on the National Register, this property has also been listed in the California Register of Historical Resources, pursuant to Section 4851(a)(2) of the Public Resources Code.

Placement on the National Register affords a property the honor of inclusion in the nation's official list of cultural resources worthy of preservation and provides a degree of protection from adverse affects resulting from federally funded or licensed projects. Registration provides a number of incentives for preservation of historic properties, including special building codes to facilitate the restoration of historic structures, and certain tax advantages.

There are no restrictions placed upon a private property owner with regard to normal use, maintenance, or sale of a property listed in the National Register. However, a project that may cause substantial adverse changes in the significance of a registered property may require compliance with local ordinances or the California Environmental Quality Act. In addition, registered properties damaged due to a natural disaster may be subject to the provisions of Section 5028 of the Public Resources Code regarding demolition or significant alterations, if imminent threat to life safety does not exist.

If you have any questions or require further information, please contact Cynthia Howse of the National Register Unit at (916) 653-6624.

Sincerely,

A handwritten signature in black ink, appearing to read "Milford Wayne Donaldson".

Milford Wayne Donaldson, FAIA
State Historic Preservation Officer

Enclosure

Piggott, 06000440,
LISTED, 5/31/06

ARKANSAS, DESHA COUNTY,
McGehee National Guard Armory,
1610 S. First St.,
McGehee, 06000441,
LISTED, 5/31/06

ARKANSAS, VAN BUREN COUNTY,
Clinton Commercial Historic District,
Roughly bounded by Town Branch Creek and by AR 65B,
Clinton, 06000410,
LISTED, 5/15/06

CALIFORNIA, SAN FRANCISCO COUNTY,
Port of San Francisco Embarcadero Historic District,
From Pier 45 to Pier 48, The Embarcadero,
San Francisco, 06000372,
LISTED, 5/12/06

FLORIDA, HILLSBOROUGH COUNTY,
Roosevelt Elementary School,
3205 S. Ferdinand Ave.,
Tampa, 06000443,
LISTED, 5/31/06

FLORIDA, MARTIN COUNTY,
Seminole Inn,
15885 SE Warfield Blvd.,
Indiantown, 06000442,
LISTED, 5/31/06

GEORGIA, COBB COUNTY,
Moore, Tarleton, House,
4784 Northside Dr.,
Acworth, 06000453,
LISTED, 5/31/06

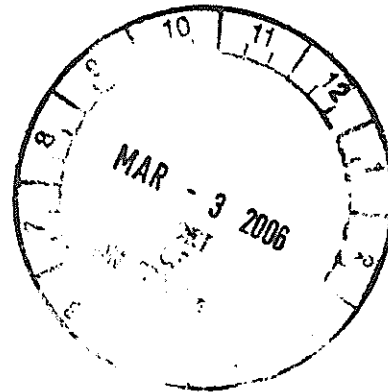
ILLINOIS, COOK COUNTY,
Krause Music Store,
4611 N. Lincoln Ave.,
Chicago, 06000452,
LISTED, 5/31/06

ILLINOIS, DU PAGE COUNTY,
Downtown Hinsdale Historic District,
Roughly bounded by Maple St., Lincoln St., Garfield St. and Second St.,
Hinsdale, 06000011,
LISTED, 5/30/06

ILLINOIS, HENRY COUNTY,
Kewanee Public Library,
102 S Tremont,
Kewanee, 06000447,
LISTED, 5/31/06

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March 2, 2006

Ms. Monique Moyer
Executive Director
Port of San Francisco
Pier One, The Embarcadero
San Francisco, CA 94111

Attention: Mark Paez

Subject: **Port of San Francisco Embarcadero Historic District
National Register of Historic Places**

Dear Ms. Moyer:

This letter is to notify you that the Port of San Francisco Embarcadero Historic District was unanimously found eligible for the National Register of Historic Places by the State Historical Resources Commission on February 3, 2006. The Commission recommended the nomination be forwarded to the National Park Service for formal listing in the Register.

If you have any questions, please call Cynthia Howse of my staff at 916-653-9054.

Sincerely,

A handwritten signature in black ink, appearing to read "Milford Wayne Donaldson".

Milford Wayne Donaldson, FAIA
State Historic Preservation Officer

**PORT COMMISSION
CITY & COUNTY OF SAN FRANCISCO**

RESOLUTION NO. 04-89

- WHEREAS, In 2000, the Port and San Francisco Bay Conservation and Development Commission (BCDC) approved amendments to their respective plans that established a comprehensive set of policies to guide waterfront development, including seismic retrofit and rebuilding of piers for major redevelopment projects on piers, integrated with removal of specified piers and the creation of new major open space parks and public access along The Embarcadero waterfront, north of China Basin; and
- WHEREAS, As part of this package of plan amendments, the Port committed to prepare a nomination for an Embarcadero National Register Historic District for listing on the National Register of Historic Places; and
- WHEREAS, In December 2001, the Port hired URS Corporation to prepare the historic district nomination report; and
- WHEREAS, The draft nomination report, completed in April 2004, is comprehensive in scope, addressing the physical waterfront historic resources from Pier 45 to Pier 48; the development and governance of the Port by the State Board of Harbor Commissioners; engineering and technological changes that shaped the waterfront's development; and labor history during the period of historic significance from 1878 to the end of World War II in 1946; and
- WHEREAS, The Port and URS sought and received substantial advice and consultation on the extensive research generated in this report with staff of BCDC, the State Office of Historic Preservation, National Park Service, and consultation with San Francisco Architectural Heritage and representatives of the local preservation community; and
- WHEREAS, The boundaries of the Embarcadero National Register Historic District include Contributing and Non-contributing resources, including the Seawall, bulkhead wharf segments, and piers, pier sheds, bulkhead buildings, and other waterfront structures as further detailed in the Historic District nomination report; and
- WHEREAS, The nomination report identifies Pier 36, Pier 40, 22 sections of the bulkhead wharf and four waterfront café structures as contributing resources in the historic district, although they had not been identified in previous historic resource surveys; and
- WHEREAS, Port and BCDC approved plans call for the removal of Pier 36 and the adjacent bulkhead wharf for the development of the Brannan Street Wharf public park in South Beach which, because these facilities have been defined as contributing resources in the Historic District nomination, are subject to further environmental review to comply with the California Environmental Quality Act (CEQA); and

- WHEREAS, The Port remains committed to development of the Brannan Street Wharf, and is coordinating with BCDC and San Francisco Cruise Terminal LLC to ensure that the additional CEQA environmental analysis is completed as part of BCDC's permit process required to be completed before construction of the Brannan Street Wharf park commences, which construction is scheduled for completion in late 2006; and
- WHEREAS, The Embarcadero National Register Historic District will greatly benefit Port historic rehabilitation projects by providing access to the Federal Rehabilitation Tax Credit program, which provides developers with a source of funds of up to 20% of the costs of historic rehabilitation, and thus benefit the Port through improved base and participation rent for historic rehabilitation projects, such as occurred for the Ferry Building and Pier 1 developments, and further benefits such projects by providing developers more flexibility than for non-historic buildings in complying with public trust requirements, as may be interpreted and applied by the State Lands Commission; and
- WHEREAS, As part of the pre-development phase of historic rehabilitation projects, developers hire historic consultants to conduct site-specific historic architectural research which scope, as part of future development projects, will be expanded to include qualified historic consultant-generated research that will provide information about the waterfront labor history of the project site and vicinity; and
- WHEREAS, The creation of the Embarcadero National Register Historic District will not result in a change in the status of any Port tenant leases and continues to allow tenants or the Port to propose alterations to historic resources, which alterations will continue to be subject to Port review through the Port building permit process and, as applicable, BCDC or other regulatory requirements, to ensure they comply with the Secretary of the Interior Standards for Rehabilitation ("Secretary Standards") and applicable environmental review requirements under CEQA and applicable federal review requirements when the project requires decisions by federal agencies; and
- WHEREAS, Ordinary maintenance and repair of the Port's historic resources as further described and defined in Exhibit A has been, and will continue to be, carried out and will be recognized as consistent with the Secretary of the Interior Standards; and
- WHEREAS, Bulkhead Wharf Section A, B and 1, located between Pier 35 and 45, have undergone significant alterations and new construction as part of the redevelopment in the area to create Pier 39 and marina, Aquarium of the Bay, the Red & White Ferry Terminal facility at Pier 41½, now under lease to Blue & Gold Fleet, and public access and landscaping improvements associated with those developments, which alterations warrant special consideration regarding the design standards that should be used to review future alteration and construction proposals in these bulkhead wharf sections; and
- WHEREAS, The unique opportunities and developer incentives that will be available under the Embarcadero National Register Historic District are critically important to attract the private investment required to preserve and rehabilitate as many of the District historic resources as possible; now, therefore, be it

- RESOLVED, The Embarcadero National Register Historic District provides formal, national recognition of one of the last and most intact collection of piers, bulkhead buildings and associated waterfront historic resources in the United States and a permanent account of not only the physical resources contained within, but also the birth, development and workings of the Port from 1878 to 1946; and be it further
- RESOLVED, As part of the pre-development phase of historic rehabilitation development projects, developers will be required to hire qualified historic consultants to conduct research to provide information about the waterfront labor history of the project site and vicinity, similar to efforts to carry out historic architectural research wherein both efforts, even if conducted by separate consultants, must be coordinated in terms of scope and schedule with the design and schedule needs of the development project; and be it further
- RESOLVED, The Commission hereby approves the Embarcadero National Register Historic District nomination report, substantially in the form on file with the Secretary of the Port Commission and as further refined and edited for clarity, internal consistency, and incorporation of additional facts to document Historic District resources; and be it further
- RESOLVED, The Commission directs the Executive Director to include the Historic Preservation Review Guidelines, presented in Exhibit A, as an appendix to be included in the Historic District nomination report, to provide more definition and explanation of how the Historic District will be interpreted and Secretary of Interior Standards applied for specified types of activities and proposals, including ordinary maintenance and repair, and changes to non-contributing resources or features within Bulkhead Wharf Section A, B and 1, between Pier 35 and 45; and be it further
- RESOLVED, The Commission hereby authorizes and directs the Executive Director, or her designee, to formally submit the Embarcadero National Historic District nomination report, as revised to incorporate corrections and additional information described in the October 20, 2004 Commission staff report, to the State Office of Historic Preservation for review and action by the State Historical Resources Commission, and the National Park Service for listing on the National Register of Historic Places; and be it further
- RESOLVED, The Commission hereby authorizes and directs the Executive Director, or her designee, to take all such further actions as are required for the listing of the Embarcadero National Register Historic District on the National Register of Historic Places to the extent that such actions do not materially alter the content or intent of the Historic District documentation, or Port's understanding of the interpretation of the Historic District as described in the Historic Preservation Review Guidelines in Exhibit A.

I hereby certify that the foregoing resolution was adopted by the San Francisco Port Commission at its meeting of October 26, 2004.


Secretary

S U M M A R Y

PORT OF SAN FRANCISCO EMBARCADERO HISTORIC DISTRICT National Register Nomination

Planning Policy Background

In 1997, the San Francisco Port Commission approved the Waterfront Land Use Plan, a blueprint for transforming piers now obsolete to the cargo industry into urban waterfront developments that attract the public to enjoy San Francisco Bay. The Port developed the Waterfront Land Use Plan with an understanding that the Port and the Bay Conservation and Development Commission (BCDC) would have to work together to develop amendments to BCDC's Bay Plan and San Francisco Special Area Plan to bring the Port's and BCDC's policies into alignment. At the time, BCDC's policies effectively precluded major repairs and seismic retrofit necessary to stem the deterioration of the Port's aging historic piers and pile-supported structures, as well as the type of maritime-oriented mixed use developments promoted in the Waterfront Plan. Furthermore, BCDC's legislative mandate and policies promoting the removal of Bay fill -- that is, the Port's piers and pile-supported structures-- did not recognize the historic value of the Port's historic resources. As part of the Special Area Plan process the Port and BCDC consulted with the historic preservation community to determine an appropriate balance of fill removal, creation of new public open space, and historic preservation. This consultation process resulted in a Special Area Plan requirement that the Port create a National Register historic district in the Pier 45 to Pier 48 area of the waterfront.

Historic Preservation Consultant Team

In December 2001, the Port hired URS Corporation to prepare a nomination report for the historic district. URS Corporation headed a consultant team led by Michael Corbett, a prominent Architectural Historian, that included Marjorie Dobkin, Ph.D., a labor history expert. At key points in the nomination preparation process the consultant team received advice and guidance from Port staff, a round table of local preservation experts, and the staff's of the Office of Historic Preservation as well as the National Park Service.

Nomination Organization

The nomination document is organized into 11 sections as required by the National Register of Historic Places Registration Form. To assist the reader to understand the structure and format of the nomination the Port included a Guide to Users. In addition, the document is subdivided with tabs at key sections to facilitate the reader's ability to quickly access specific components such as the map of the district boundaries. The bulk of the nomination can be found in Sections 7 and 8, Description and Significance, respectively. The introduction to Section 7 provides the reader with a summary of the historic district boundaries and the types of resource within it, followed by a very detailed description of each resource, including a brief account of the resource's construction, use and alteration during the historic district's period of significance. Section 8 is more reader friendly and tells the story of the Port by providing a very detailed account of its history and significance under the applicable National Register Criteria.

District Boundaries

The district includes an approximately three-mile curving stretch of San Francisco's northeastern waterfront from Pier 45 at Fisherman's Wharf, south to Pier 48 at China Basin. The district includes pier structures, other waterfront structures such as the Ferry Building, Agriculture Building and the Fireboat House, as well as the waterside portion of the Embarcadero corridor including the Seawall, Herb Caen Way/Embarcadero Promenade and the Bulkhead Wharf. The bulkhead wharf is an asphalt covered open wharf between piers that parallels the Embarcadero, and in some locations of the district is the supporting platform and substructure that supports bulkhead building portions of piers. Most of the district resources were constructed between 1908 and 1938, however the construction of the seawall dates from 1896 and the construction and the Ferry Building to 1896.

Period of Significance

The historic district period of significance is 1878 to 1946 beginning with the construction of the seawall and continuing through the end of World War II when the breakbulk activity of the Port significantly declined. Within this broad 68 year period of significance there are more specific shorter periods associated with each of the district's historic themes as follows:

- 1878 – 1946 Government, Commerce, Transportation and Engineering
- 1934 Labor
- 1898 - 1903 and 1912 -1938 Architecture
- 1878 – 1938 Community Planning and Development

National Register Criteria

The draft nomination is a comprehensive and detailed description of the history of the Port, from 1878 to the end of World War II in 1946. Its scope includes physical structures and an extensive discussion of the forces that shaped the waterfront over 68 years, including its governance, technological changes and labor. While many structures have been lost or altered, San Francisco's remaining piers, bulkhead buildings, wharves and related waterfront structures appear to be the most intact breakbulk Port in the country. The district is eligible for listing on National Register under the following criteria:

Criterion A

Government – For the association with the State Board of Harbor Commissioners, the entity that constructed and administered the Port during the period of significance.

Commerce – For the Port's role in the economic development of San Francisco and the State of California.

Transportation – For the Port's role in local and long-distance transportation including ships, ferries, railroads, trucks and street cars.

Criterion B

Labor – For the district's association with the general strike of 1934 and significant labor leader Harry Bridges.

Criterion C

Engineering – The Port is a surviving example of a rare property type, a breakbulk port comprised of elements such as a seawall, wharves and piers.

Architecture – For the Port’s architectural representation of the City Beautiful Movement.

Community Planning and Development – For the district’s contribution to the shape and character of San Francisco, including the creation of a permanent, orderly and attractive waterfront line.

District and Resource Integrity

The historic district is strongly identifiable as the Port of San Francisco, when viewed from the Bay or the Embarcadero and is a rare example of a once common breakbulk port. As measured by the seven aspects of integrity the historic district retains a substantial degree of integrity in all aspects despite numerous losses and changes. The district has suffered a substantial diminishing of its integrity of Design through the loss of many piers and the Belt Railroad, but this is mitigated to a degree by the presence of integrity in other aspects perhaps mostly integrity of Feeling. To provide the reader with a greater understanding of the district’s history and the integrity of the surviving resources the nomination includes information on sites of lost features and related features outside the district boundaries. This information provides limited descriptive information about each of these altered or demolished resources.

Contributing Resources

The district is comprised of 47 contributing resources, several of which are individually listed on the National Register, including:

The Ferry Building

The Agriculture Building

The Central Embarcadero Piers (1 to 5) National Register Historic District.

The area and physical resources contained within the proposed historic district can be summarized in the following basic elements:

Seawall:

from Pier 45 to China Basin– structure
at Pier 48 – structure

Bulkhead Wharf:

Pier 45 Section – structure
Section 2 – structure
Section 3 – structure
Section 4 – structure
Section 5 – structure
Section 6 – structure
Section 7 – structure
Section 8a – structure

Section 8b – structure
Section 8 – structure
Section 9 – structure
Section 10 – structure
Section 11a – structure
Section 11 – structure
Section 12 – structure
Pier 48 Section– structure

Piers and Buildings:

Pier 45 – building
Pier 43 (Car Ferry Headhouse) – structure
Pier 35 – building
Pier 33 – building
Pier 31 – building
Pier 29 – building
Pier 29 Annex (Belt Railroad) – building
Pier 23 Restaurant – building
Pier 23 – building
Pier 19 – building
Pier 17 – building
Pier 15 – building
Pier 9 – building
Pier 5 – building
Pier 3 (including Pier 1½) – building
Pier 1 – building
Ferry Building – building
Agriculture Building – building
Fire Station 35 (at Pier 22½) – building
Pier 24 Annex – building
Pier 26 – building
Pier 26 Annex – building
Pier 28 – building
Pier 28½ Restaurant – building
Pier 36 – building
Pier 38 – building
Pier 40 – building
Java House Restaurant, near Pier 40 – building
Pier 48 – building

Non-contributing resources are as follows:

Bulkhead wharf Section B – structure
Franciscan Restaurant, near Pier 43½ – building
Bulkhead wharf Section A – structure
Pier 41½ (portion on bulkhead wharf) – building
Bulkhead wharf Section 1 – structure
Pier 39 (portion on bulkhead wharf) – building
Pier 29 Office building – building

Pier 27 Terminal – building
Pier 15-17 Quay – structure
Terminal Office Building, Pier 15-17 – building
Pier 7 (Waterfront Restaurant) – building
Bulkhead wharf Section 13 – structure
Pier 46 Bulkhead Wharf Section - structure

Archeological resources are not addressed in the Embarcadero Historic District nomination.

Non-Contributing Resources

The district includes 13 non-contributing resources:

Section B - Bulkhead Wharf
The Franciscan Restaurant between Piers 43 and 45
Section A Bulkhead Wharf
Pier 41-1/2 (portion on the bulkhead wharf)
Section 1 – Bulkhead Wharf
Pier 39 (portion on the bulkhead wharf)
Pier 29 Office Building
Pier 27 Terminal
Pier 15-17 Quay
Pier 15-17 Terminal Building
The Waterfront Restaurant between Piers 7 and 9
Section 13 – Bulkhead Wharf
Pier 46 Section – Bulkhead Wharf

Implementation

Labor History

The inclusion of the labor history discussion in the nomination report provides an interesting account of the culture of the historic working waterfront. This treatise, based on extensive research and oral histories, includes a description of working conditions, types of work required to conduct shipping and port operations, the relationships between workers and employers, and the events that led to the rise of unionized labor in San Francisco. The Port will continue to expand this body of labor history research and information for the public's appreciation and general reference by conducting further site specific research. The research would be conducted as part of the pre-development analysis for major historic rehabilitation/development projects within the historic district. This additional research will focus on the relationship between the physical resource and the history of uses and labor activities that it accommodated, and would include information on tenancies and the work force.

Historic Tax Credits

The Embarcadero Historic District will greatly benefit the Port's public private historic rehabilitation projects. By listing the historic district on the National Register, waterfront historic rehabilitation projects will have access to the Federal Rehabilitation Tax Credit program. Currently, the Ferry Building, Agriculture Building and Piers 1 to 5 resources are listed on the

National Register, of which all but the Agriculture Building were rehabilitated under this federal tax credit program.

Secretary of the Interior's Standards

The creation of the Embarcadero Historic District will not change the Port's current practice of reviewing maintenance, repair, alteration and construction proposals involving the Port's eligible and listed historic resources for consistency with the Secretary of the Interior's Standards for Rehabilitation.

Date of Designation

On May 12, 2006 the National Park Service placed the Embarcadero Historic District on the National Register of Historic Places.

Prepared by:

Mark Paez, Port Planning & Development

**OFFICE OF HISTORIC PRESERVATION
DEPARTMENT OF PARKS AND RECREATION**

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December 15, 2005

Port of San Francisco
Pier 1, The Embarcadero
San Francisco, CA 94111
ATTN: Diane Oshima, Assistant Deputy Director, Waterfront Planning

Dear Ms. Oshima:

Request for Review and Support
San Francisco Embarcadero Historic District - Historic Preservation Review Guidelines

The Office of Historic Preservation (OHP) sends this letter to address the Port's Historic Preservation Review Guidelines for Pier and Bulkhead Wharf Substructures (Guidelines) for the proposed Embarcadero National Register Historic District. We understand the desire of the Port and San Francisco preservation community to provide direction on the types of repairs and maintenance approaches for these historic resources, which are based on the Secretary of the Interior's Standards. They are an important tool that will facilitate the Port's continuing efforts to rehabilitate its resources consistent with the Standards. We have reviewed and support the most recent revised version of the Guidelines reflected in a December 15, 2005 email from the Port.

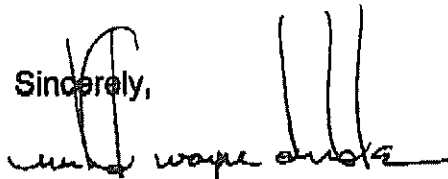
We understand that in instances where OHP, or the National Park Service have no regulatory authority to review a proposed project within the proposed historic district, the Port's qualified historic preservation expert will review and evaluate proposed work for conformance with the Guidelines and believe that this is an appropriate local review process.

The Port is reminded of several provisions of the Rehabilitation Tax Credit program (36 CFR Part 67) that may affect local approval under your Guidelines. For review under the tax program requirements an entire project will be reviewed for conformance to the Standards and not simply the portions for which the tax credit will be sought; all elements of the rehabilitation project must meet the Secretary's ten Standards; whenever possible the Part 2 should be completed and submitted prior to the initiation of any rehabilitation work, and; because the circumstances of each rehabilitation project are unique to the particular certified historic structure involved, certifications that may have been granted to other rehabilitations are not specifically applicable and may not be relied on by owners as applicable to other projects (i.e. no projects set a precedent).

Ms. Diane Oshima
December 15, 2005
Page Two

The Embarcadero Historic District is an unprecedented historic preservation achievement not only for San Francisco but for the entire State. We commend San Francisco's community effort to recognize and protect this rare collection of industrial maritime resources.

Sincerely,

A handwritten signature in black ink, appearing to read "Milford Wayne Donaldson". The signature is written in a cursive style with a large initial "M" and "W".

Milford Wayne Donaldson, FAIA
State Historic Preservation Officer

cc: Charles Chase, SF Heritage

Port of San Francisco Historic Preservation Review Guidelines for Pier and Bulkhead Wharf Substructures

Approved by San Francisco Port Commission, October 26, 2004, with proposed amendments to respond to comments from California State Office of Historic Preservation.

Background

As part of the preparation of the Port of San Francisco Embarcadero Waterfront National Register Historic District nomination, the Port has developed Historic Preservation Review Guidelines (Guidelines) to define how the Secretary of the Interior's Standards for Rehabilitation (Secretary's Standards) should be interpreted and applied to the historic resources within the District, to ensure its responsible management and stewardship. The set of Guidelines below focuses on Pier and Bulkhead Wharf Substructures, providing an important tool to be used by the Port's historic preservation experts to define parameters for the repair, maintenance or alterations to the pile foundations, substructures and decks of piers and bulkhead wharves upon which pier sheds, bulkhead buildings and other waterfront structures sit.

These Guidelines were developed by the Port's historic preservation expert staff in concert with San Francisco Architectural Heritage and preservation experts familiar with the specific historic resources in the District¹. The Guidelines were approved by the San Francisco Port Commission in October 2004, and further amended to respond to comments from the California State Office of Historic Preservation (OHP). The Guidelines will be used in the review of pier and bulkhead wharf substructure projects that are subject only to approval by the Port. Projects affecting District resources which are subject to review and approval by any of the following entities are not subject to these Guidelines, in recognition of the separate review criteria and practices employed by those agencies to administer the Secretary's Standards:

- 1) Federal Undertakings - Requiring Section 106 consultation
 - Projects receiving federal funding
 - Transfer of federal property
 - Approval of a federal permit, license or similar entitlement (i.e. Army Corps. of Engineers)
- 2) Federal Historic Preservation Tax Credit Projects – Requiring State Office of Historic Preservation and National Park Service approvals
- 3) San Francisco Landmarks Preservation Advisory Board – Subject to Planning Code Article 10 Provisions for City Landmarks and City Historic Districts

Port of San Francisco Review Process – Overview

For projects affecting historic resources within the Embarcadero Historic District that are subject only to the Port's review and approval, the Port conducts its review in conjunction with use of Historic Preservation Guidelines, where applicable, to direct actions that comply with the Secretary's Standards.

All projects undergo case-specific review to determine the appropriate application of the Guidelines and other related Port design reviews. The Port maintains qualified historic preservation expertise on staff and may work with other qualified historic preservation

professionals to review projects for consistency with the Secretary's Standards and any applicable Guidelines.

In the case of repairing and managing pier and bulkhead wharf substructures, the Guidelines below are to be used in the Port review process. The process follows the principles of the Secretary's Standards for Rehabilitation and the Port's longstanding practice of repairing existing materials wherever feasible. Replacement of historic materials, if deterioration makes such repair infeasible, is limited to replacement in-kind (use of the same materials) whenever possible. Where replacement in-kind is infeasible, the Port directs use of new substitute materials that are compatible with the character defining features of the subject historic resource to preserve the historic integrity of Contributing resources or, in the case of reviewing Non-Contributing resources, the integrity of the Historic District.

I. Pier and Bulkhead Wharf Substructures

The historic piers and resources in the Embarcadero Historic District are made up of pile-supported platforms upon which pier shed and bulkhead building structures were built to conduct maritime commerce. The substructure of the piers and bulkhead wharf, described in detail in Section 7 of the Embarcadero Historic District nomination, consists of vertically driven piles, topped by stringer and pile cap beams, which create the horizontal structural framework upon which pier decks rest. Beneath these structures, the tides of the San Francisco Bay ebb and flow. Pier substructures are defined to include pier aprons, which are constructed at the perimeter of piers, generally used to provide a pile-supported platform for ship berthing, an outdoor work area, and in more recent times a public access and recreation area. In most instances, pier aprons are constructed of wood and have a shorter life span, historically requiring more maintenance and repair than steel and concrete substructures.

Within this complex, the bulkhead wharf is an important feature. It is comprised of 23 individual sections that extend end to end throughout the historic district, adjacent and connected to the Seawall, which establishes the constructed edge of the waterfront between piers (see Figures 1 and 2). In addition, the bulkhead wharf plays an important role in defining the Embarcadero's urban form, which supports maritime, public access and commercial recreation/retail functions.

FIGURE 1

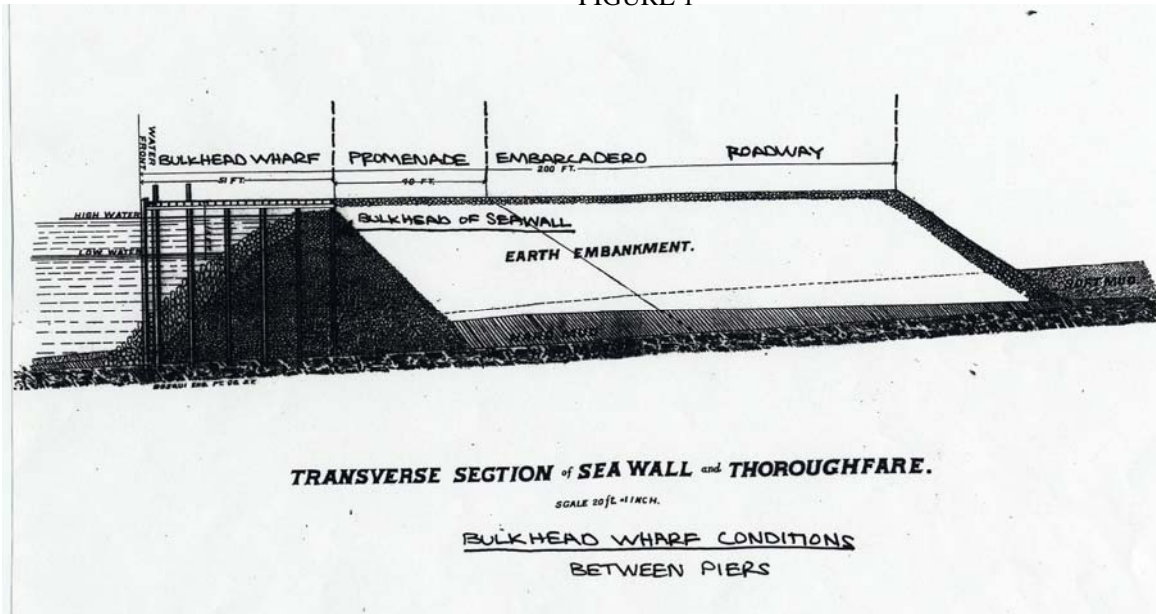
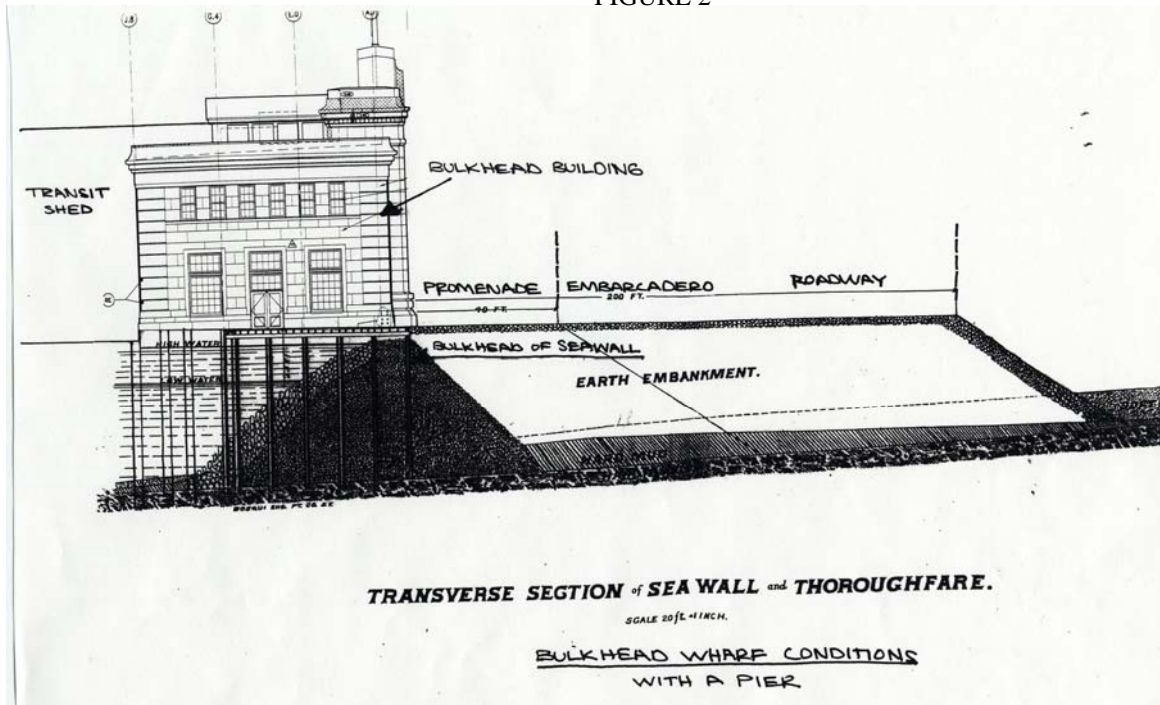


FIGURE 2



The character defining features of pier and bulkhead wharf substructures include:

- Location – Arranged perpendicular to the seawall projecting out into the Bay (piers and aprons), or parallel and attached to the Seawall (bulkhead wharves) throughout the district, forming the Bay edge.
- Dimensions - Variable width, length and elevation. The dimensions of the bulkhead wharf, the width, length and elevation of the resource generally corresponds to the dimensions of the underlying section of the seawall to which it is attached.
- Design - A cantilevered, pile-supported deck that extends out ward into the Bay from the top of the seawall or bay edge of the bulkhead wharf. Pier and bulkhead substructures also serve as supporting foundations for pier/transit sheds, bulkhead and other buildings, or provide open air access between pier facilities, berthed vessels, and the Embarcadero. Numerous different substructure designs were utilized by Port’s Engineers to respond to seawall and pier conditions.
- Materials – Generally, concrete and steel construction (see Section 7 for site-specific details). Pier aprons may be constructed of wood or concrete. Decking material may be wood or concrete, with or without an asphalt or concrete surface treatment and protection.
- Function - Utilitarian function as a maritime, public access, commercial recreation/retail facility.

The Port reviews projects in the early design phase to guide them so that they comply with these Guidelines (if they pertain to pier or bulkhead wharf substructures), or the Secretary’s Standards. This review is an iterative process and may require a project to undergo a number of review rounds to achieve compliance. The Port’s review takes into account the individual circumstances and context of each project and the subject resource(s) involved in determining whether the proposal meets the applicable criteria of these Guidelines or Secretary’s Standards.

Proposed projects that are found consistent with the Guidelines below would be considered consistent with the following applicable Secretary’s Standards unless otherwise discussed by the Port’s historic preservation expert in the review analysis and findings.

GUIDELINES FOR PIER AND BULKHEAD WHARF SUBSTRUCTURE PROJECTS

1. Ordinary Maintenance, Repair

For the purposes of applying the Standards to the pier and bulkhead wharf substructures, ordinary maintenance and repair shall be defined as any work to abate deterioration, decay or damage of existing substructure building materials, including damage caused by fire, and minor work necessary to meet current public and life safety requirements.

Review Criteria

Ordinary maintenance and repair of pier and bulkhead wharf substructures shall seek to maintain the character defining features including location, dimensions and arrangement

and design concept (a pile-supported, cantilevered deck located on, above, or attached to the bulkhead wharf or Seawall), consistent with the Embarcadero Historic District's period of significance .

The Port, in reviewing and authorizing ordinary maintenance and repair work for pier or bulkhead wharf substructures within the Historic District, shall make reasonable efforts to maintain, rehabilitate and minimize damage to existing historic materials.

Any work that does not qualify as ordinary maintenance and repair shall be subject to review for conformity with the Secretary's Standards by the Port's Qualified Historic Preservation Expert. In addition, ordinary maintenance and repair shall also be subject to applicable Port lease requirements, the Port's Waterfront Land Use Plan (including the Waterfront Design & Access element), BCDC Special Area Plan and other applicable land use regulations and policies, including review by the Waterfront Design Advisory Committee, BCDC's Design Review and Engineering Criteria Review Boards.

Examples of Ordinary Maintenance and Repair

Includes, but is not limited to the following:

- *Cleaning*
- *Removal of spalling concrete and application of non-structural shotcrete to the substructure*
- *Deck repair*
- *Repair of historic material*
- *Pile repair*
- *Repair of batter piles*
- *Cap or stringer beam repair*
- *Concrete slab repair*
- *Repair of reinforcing steel bars*
- *Ordinary maintenance and repair of existing contributing and non-contributing resources, or features associated with or attached to a substructure*

2. Replacement In-kind

For the purposes of applying the Secretary's Standards to the pier and bulkhead wharf substructures, replacement in-kind shall be defined as any work that involves the replacement of deteriorated historic materials with like materials, where repair of existing building materials are determined to be infeasible to abate deterioration, decay or damage, including minor damage caused by fire, and/or to repair current facilities to meet current public and life safety requirements.

Review Criteria

Replacement of historic materials in-kind for pier and bulkhead wharf substructures shall be reviewed to match the old in design, color, texture, and other visual qualities and, where possible, materials. Replacement shall be consistent with the Embarcadero Historic District's period of significance, and shall be substantiated by documentary, physical, or pictorial evidence. See Appendix II – National Park Service Preservation

Brief #16 The use of substitute materials on historic building exteriors. The Port, in reviewing and authorizing projects involving replacement in-kind of deteriorated historic materials of substructures within the Historic District, shall make reasonable efforts to maintain, rehabilitate and minimize damage to existing historic materials and to faithfully match the materials being replaced in quality, design, configuration, color, texture and appearance.

Any work that does not qualify as ordinary maintenance and repair, or in-kind replacement shall be subject to review for conformity with the Secretary's Standards by the Port's Qualified Historic Preservation Expert. In addition, all in-kind replacement work shall also be subject to applicable Port lease requirements, the Port's Waterfront Land Use Plan (including the Waterfront Design & Access element), BCDC Special Area Plan and other applicable land use regulations and policies, including review by the Waterfront Design Advisory Committee, BCDC's Design Review and Engineering Criteria Review Boards.

Examples of Replacement in-kind includes but is not limited to the following:

- *Deck replacement with in-kind materials or with compatible substitute materials that match the existing in-place materials*
- *Replacement of deteriorated surface materials such as asphalt, wood or concrete with in-kind materials or with compatible substitute materials.*
- *Deteriorated pile replacement with new in-kind wood or concrete materials or with compatible substitute materials that match the existing in-place materials.*
- *Replacement of deteriorated batter piles with new in-kind concrete and steel materials or with compatible substitute materials that match the existing in-place materials.*
- *Deteriorated cap or stringer beam replacement with new in-kind concrete and steel materials or with compatible substitute materials that match the existing in-place materials.*
- *Deteriorated concrete slab replacement with new in-kind concrete materials or with compatible substitute materials that match the existing in-place materials.*
- *Replacement of deteriorated reinforcing steel with new in-kind steel materials or with compatible substitute materials that match the existing in-place materials.*
- *Replacement of deteriorated materials with new in-kind materials or with compatible substitute materials as required to correct damage caused by fire or other disasters.*

2. Alteration of Contributing Resources

Alteration of Contributing pier and bulkhead wharf substructures, or portions thereof, not otherwise allowed within the scope of ordinary maintenance and repair, and replacement in-kind, as defined above, shall be subject to review for consistency with the Secretary's Standards for Rehabilitation as presented in Appendix I. Alteration of contributing resources shall include work such as structural and seismic upgrades to maintain or improve the structural integrity of pier and bulkhead wharf substructures, to allow them to continue to support existing features, structures, uses and activities, including associated Non-contributing resources and features. This work may include the use of substitute materials as necessary to meet applicable life safety

and other Code requirements where it is determined after careful review by Port's Qualified Historic Preservation Expert that in-kind replacement is not feasible.

In addition, such work shall be subject to applicable Port lease requirements, the Port's Waterfront Land Use Plan (including its Waterfront Design & Access element), BCDC Special Area Plan and other applicable land use regulations and policies, including design review by the Waterfront Design Advisory Committee and BCDC's Design and Engineering Criteria Review Boards.

Review Criteria

The Port shall seek to maintain the character defining features of the bulkhead wharf and promote, enhance and strengthen the historic qualities and characteristics of the individual sections of bulkhead wharf consistent with the Historic District's period of significance, and the collective value of the wharves to the waterfront's urban design and form. In evaluating proposals to alter, replace, or remove limited portions of pier or bulkhead wharf substructures, the Port shall also consider the overall compatibility of the proposal with the aesthetic quality, public access and active use of substructures.

Examples of Alterations to Contributing Resources

Includes but not limited to:

- *Alteration not within the definition of ordinary maintenance and repair, or replacement in-kind of historic materials, including such things as the replacement of historic materials with substitute materials(i.e .removal of deteriorated wood piles and replacement with steel piles)*
- *Repair of major damage caused by fire or natural disaster*
- *Alterations, additions or extensions to substructures*
- *Alterations required to meet current public and life safety requirements*
- *Structural work to substructures including seismic upgrades, replacement of structural elements, use of structural fiberglass wrapping, application of structural shotcrete, and installation of seismic separations*
- *Removal of limited portions of pier or bulkhead wharf substructures to expose open water area to meet public access requirements.*

3. Alteration of Non-contributing Resources and Associated Features

The alteration of existing non-contributing resources or associated features that are located on or attached to substructures within the Historic District shall be subject to review for conformity with the Secretary's Standards as expressed in the Port's Waterfront Design & Access element.

Review Criteria

The Design & Access element has undergone careful review by the San Francisco preservation expert community, and found to provide a comprehensive set of policies and site-specific design criteria that achieve the same and related objectives called for by the Secretary's Standards. The review of such proposals to alter non-contributing resources, by the Port's Qualified Historic Preservation Expert also will consider the degree to which the proposed work would expand the footprint, bulk or height of the feature or structure; and whether it would maintain the character defining features of the Historic District.

In addition, alteration, replacement, relocation, or expansion of non-contributing resources and features on the pier or bulkhead wharf substructures shall be subject to applicable Port lease requirements, the Waterfront Land Use Plan, BCDC Special Area Plan and other applicable land use regulations and policies, including design review by the Waterfront Design Advisory Committee and BCDC Design and Engineering Criteria Review Boards.

Examples of Alterations to Non-Contributing Resources and Associated Features includes but is not limited to:

- *Removal or alteration of non-contributing concrete seats or step platforms in the Pier 7 public access area that are partially located on the bulkhead wharf.*
- *Removal of the Art Ribbon or other works of public art, interpretive exhibits, memorials and monuments that post date the Historic District period of significance.*
- *Alteration or replacement of existing non-contributing features, or structures, such as the non-historic connector building between Piers 15-17 and 19 - 23.*
- *Relocation, replacement or expansion of existing non-contributing resources or features located on the bulkhead wharf such as the Aquarium of the Bay, or the Pier 41 Blue and Gold Building*
- *Expansion of existing non-contributing resources or features, such as pier and bulkhead buildings, public access walkways and related improvements, landscape planters and beds, ticket booths and related vending and other accessory structures*

APPENDIX I – SECRETARY’S STANDARDS FOR REHABILITATION

1. A property will be used as it was historically or be given a new use that requires minimal change to its distinctive materials, features, spaces, and spatial relationships.
2. The historic character of a property will be retained and preserved. The removal of distinctive materials or alteration of features, spaces, and spatial relationships that characterize a property will be avoided.
3. Each property will 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 elements from other historic properties, will not be undertaken.
4. Changes to a property that have acquired historic significance in their own right will be retained and preserved.
5. Distinctive materials, features, finishes, and construction techniques or examples of craftsmanship that characterize a property will be preserved.
6. Deteriorated historic features will be repaired rather than replaced. Where the severity of deterioration requires replacement of a distinctive feature, the new feature will match the old in design, color, texture, and, where possible, materials. Replacement of missing features will be substantiated by documentary and physical evidence.
7. Chemical or physical treatments, if appropriate, will be undertaken using the gentlest means possible. Treatments that cause damage to historic materials will not be used.
8. Archeological resources will be protected and preserved in place. If such resources must be disturbed, mitigation measures will be undertaken.
9. New additions, exterior alterations, or related new construction will not destroy historic materials, features, and spatial relationships that characterize the property. The new work shall be differentiated from the old and will be compatible with the historic materials, features, size, scale and proportion, and massing to protect the integrity of the property and its environment.
10. New additions and adjacent or related new construction will be undertaken in a such a manner that, if removed in the future, the essential form and integrity of the historic property and its environment would be unimpaired.

**APPENDIX I I – NATIONAL PARK SERVICE PRESERVATION BRIEF
NO. 16, The Use of Substitute Materials on Historic Building Exteriors**

16 Preservation Briefs

Technical Preservation Services

National Park Service
U.S. Department of the Interior



The Use of Substitute Materials on Historic Building Exteriors

Sharon C. Park, AIA

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A NOTE TO OUR USERS: The web versions of the **Preservation Briefs** differ somewhat from the printed versions. Many illustrations are new, captions are simplified, illustrations are typically in color rather than black and white, and some complex charts have been omitted.

The Secretary of the Interior's Standards for Rehabilitation require that "deteriorated architectural features be repaired rather than replaced, wherever possible. In the event that replacement is necessary, the new material should match the material being replaced in composition, design, color, texture, and other visual properties." Substitute materials should be used only on a limited basis and only when they will match the appearance and general properties of the historic material and will not damage the historic resource.

Introduction

When deteriorated, damaged, or lost features of a historic building need repair or replacement, it is almost always best to use historic materials. In limited circumstances substitute materials that imitate historic materials may be used if the appearance and properties of the historic materials can be matched closely and no damage to the remaining historic fabric will result.

Great care must be taken if substitute materials are used on the exteriors of historic buildings. Ultraviolet light, moisture penetration behind joints, and stresses caused by changing temperatures can greatly impair the performance of substitute materials over time. Only after consideration of all options, in consultation with qualified professionals, experienced fabricators and contractors, and development of carefully written specifications should this work be undertaken.



In the reconstruction of the clock tower at Independence Hall, the substitute materials used were cast stone and wood with fiberglass and polyester bronze ornamentation. Photo: NPS files.

The practice of using substitute materials in architecture is not new, yet it continues to pose practical problems and to raise philosophical questions. On the practical level the inappropriate choice or improper installation of substitute materials can cause a radical change in a building's appearance and can cause extensive physical damage over time. On the more philosophical level, the wholesale use of substitute materials can raise questions concerning the integrity of historic buildings largely comprised of new materials. In both cases the integrity of the historic resource can be destroyed.

Some preservationists advocate that substitute materials should be avoided in all but the most limited cases. The fact is, however, that substitute materials are being used more frequently than ever in preservation projects, and in many cases with positive results. They can be cost-effective, can permit the accurate visual duplication of historic materials, and last a reasonable time. Growing evidence indicates that with proper planning, careful specifications and supervision, substitute materials can be used successfully in the process of restoring the visual appearance of historic resources.

This Brief provides general guidance on the use of substitute materials on the exteriors of historic buildings. While substitute materials are frequently used on interiors, these applications are not subject to weathering and moisture penetration, and will not be discussed in this Brief. Given the general nature of this publication, specifications for substitute materials are not provided. The guidance provided should not be used in place of consultations with qualified professionals. This Brief includes a discussion of when to use substitute materials, cautions regarding their expected performance, and descriptions of several substitute materials, their advantages and disadvantages. This review of materials is by no means comprehensive, and attitudes and findings will change as technology develops.

Historical Use of Substitute Materials

The tradition of using cheaper and more common materials in imitation of more expensive and less available materials is a long one. George Washington, for example, used wood painted with sand-impregnated paint at Mount Vernon to imitate cut ashlar stone. This technique along with scoring stucco into block patterns was fairly common in colonial America to imitate stone.

Molded or cast masonry substitutes, such as dry-tamp cast stone and poured concrete, became popular in place of quarried stone during the 19th century. These masonry units were fabricated locally, avoiding expensive quarrying and shipping costs, and were versatile in representing either ornately carved blocks, plain wall stones or rough cut textured surfaces. The end result depended on the type of patterned or textured mold used and was particularly popular in conjunction with mail order houses. Later, panels of cementitious permastone or formstone and less expensive asphalt and sheet metal panels were used to imitate brick or stone.

Metal (cast, stamped, or brake-formed) was used for storefronts, canopies, railings, and other features, such as galvanized metal cornices substituting for wood or stone, stamped metal panels for Spanish clay roofing tiles, and cast-iron column capitals and even entire building fronts in imitation of building stone.

Terra-cotta, a molded fired clay product, was itself a substitute material and was very popular in the late 19th and early 20th centuries. It simulated the appearance of intricately carved stonework, which was expensive and time-consuming to produce. Terra cotta could be glazed to imitate a variety of natural stones, from brownstones to limestones, or could be colored for a polychrome effect.

Nineteenth century technology made a variety of materials readily available that not only were able to imitate more expensive materials but were also cheaper to fabricate and easier to use. Throughout the century, imitative materials continued to evolve. For example, ornamental window hoods were originally made of wood or carved stone. In an effort to find a cheaper substitute for carved stone and to speed fabrication time, cast stone, an early form of concrete, or cast-iron hoods often replaced stone. Toward the end of the century, even less expensive sheet metal hoods, imitating stone, also came into widespread use. All of these materials, stone, cast stone, cast iron, and various pressed metals were in production at the same time and were selected on the basis of the availability of materials and local craftsmanship, as well as durability and cost. The criteria for selection today are not much different.

Many of the materials used historically to imitate other materials are still available. These are often referred to as the traditional materials: wood, cast stone, concrete, terra cotta and cast metals. In the last few decades, however, and partly as a result of the historic preservation movement, new families of synthetic materials, such as fiberglass, acrylic polymers, and epoxy resins, have been developed and are being used as substitute materials in construction. In some respects these newer products (often referred to as high tech materials) show great promise; in others, they are less satisfactory, since they are often difficult to integrate physically with the porous historic materials and may be too new to have established solid performance records.



Substitute materials need to be located with care to avoid damage. The fiberglass column base has chipped, whereas the historic cast iron would have remained sound. Photo: NPS files.

When to Consider Using Substitute Materials in Preservation Projects

Because the overzealous use of substitute materials can greatly impair the historic character of a historic structure, all preservation options should be explored thoroughly before substitute materials are used. It is important to remember that the purpose of repairing damaged features and of replacing lost and irreparably damaged ones is both to match visually what was there and to cause no further deterioration. For these reasons it is not appropriate to cover up historic materials with synthetic materials that will alter the appearance, proportions and details of a historic building and that will conceal future deterioration.

Some materials have been used successfully for the repair of damaged features such as

for masonry repairs. Repairs are preferable to replacement whether or not the repairs are in kind or with a synthetic substitute material.

In general, four circumstances warrant the consideration of substitute materials: 1) the unavailability of historic materials; 2) the unavailability of skilled craftsmen; 3) inherent flaws in the original materials; and 4) code-required changes (which in many cases can be extremely destructive of historic resources).

Cost may or may not be a determining factor in considering the use of substitute materials. Depending on the area of the country, the amount of material needed, and the projected life of less durable substitute materials, it may be cheaper in the long run to use the original material, even though it may be harder to find.



The core of a deteriorated wood outrigger was first drilled out. Photos (left and right): Courtesy, Harrison Goodall.



An inert material was injected into the hollow outrigger, permitting the outer wood to be retained and preserved.

Due to many early failures of substitute materials, some preservationist are looking abroad to find materials (especially stone) that match the historic materials in an effort to restore historic buildings accurately and to avoid many of the uncertainties that come with the use of substitute materials.

1. The unavailability of the historic material.

The most common reason for considering substitute materials is the difficulty in finding a good match for the historic material (particularly a problem for masonry materials where the color and texture are derived from the material itself). This may be due to the actual unavailability of the material or to protracted delivery dates. For example, the local quarry that supplied the sandstone for a building may no longer be in operation. All efforts should be made to locate another quarry that could supply a satisfactory match. If this approach fails, substitute materials such as dry-tamp cast stone or textured precast concrete may be a suitable substitute if care is taken to ensure that the detail, color and texture of the original stone are matched. In some cases, it may be possible to use a sand-impregnated paint on wood as a replacement section, achieved using readily available traditional materials, conventional tools and work skills. Simple solutions should not be overlooked.

2. The unavailability of historic craft techniques and lack of skilled artisans.

These two reasons complicate any preservation or rehabilitation project. This is particularly true for intricate ornamental work, such as carved wood, carved stone, wrought iron, cast iron, or molded terra cotta. However, a number of stone and wood

possible to cast substitute replacement pieces using aluminum, cast stone, fiberglass, polymer concretes, glass fiber reinforced concretes and terra cotta. Mold making and casting takes skill and craftsmen who can undertake this work are available. Efforts should always be made, prior to replacement, to seek out artisans who might be able to repair ornamental elements and thereby save the historic features in place.

3. Poor original building materials.

Some historic building materials were of inherently poor quality or their modern counterparts are inferior. In addition, some materials were naturally incompatible with other materials on the building, causing staining or galvanic corrosion. Examples of poor quality materials were the very soft sandstones which eroded quickly. An example of poor quality modern replacement material is the tin coated steel roofing which is much less durable than the historic tin or terne iron which is no longer available. In some cases, more durable natural stones or precast concrete might be available as substitutes for the soft stones and modern terne-coated stainless steel or lead-coated copper might produce a more durable yet visually compatible replacement roofing.

4. Code-related changes.

Sometimes referred to as life and safety codes, building codes often require changes to historic buildings. Many cities in earthquake zones, for example, have laws requiring that overhanging masonry parapets and cornices, or freestanding urns or finials be securely re-anchored to new structural frames or be removed completely. In some cases, it may be acceptable to replace these heavy historic elements with light replicas. In other cases, the extent of historic fabric removed may be so great as to diminish the integrity of the resource. This could affect the significance of the structure and jeopardize National Register status. In addition, removal of repairable historic materials could result in loss of Federal tax credits for rehabilitation. Department of the Interior regulations make clear that the Secretary of the Interior's Standards for Rehabilitation take precedence over other regulations and codes in determining whether a project is consistent with the historic character of the building undergoing rehabilitation.

Two secondary reasons for considering the use of substitute materials are their lighter weight and for some materials, a reduced need of maintenance. These reasons can become important if there is a need to keep dead loads to a minimum or if the feature being replaced is relatively inaccessible for routine maintenance.



Cast aluminum has been used as a replacement material for cast iron. Photo: NPS files.

Cautions and Concerns

In dealing with exterior features and materials, it must be remembered that moisture penetration, ultraviolet degradation, and differing thermal expansion and contraction rates of dissimilar materials make any repair or replacement problematic. To ensure that a repair or replacement will perform well over time, it is critical to understand fully the properties of both the original and the substitute materials, to install replacement materials correctly, to assess their impact on adjacent historic materials, and to have reasonable expectations of future performance.

Many high tech materials are too new to have been tested thoroughly. The differences in vapor permeability between some synthetic materials and the historic materials have in

recommend substitute materials if the historic materials are still available. As previously mentioned, consideration should always be given first to using traditional materials and methods of repair or replacement before accepting unproven techniques, materials or applications.

Substitute materials must meet three basic criteria before being considered: they must be compatible with the historic materials in appearance; their physical properties must be similar to those of the historic materials, or be installed in a manner that tolerates differences; and they must meet certain basic performance expectations over an extended period of time.

Matching the Appearance of the Historic Materials

In order to provide an appearance that is compatible with the historic material, the new material should match the details and craftsmanship of the original as well as the color, surface texture, surface reflectivity and finish of the original material. The closer an element is to the viewer, the more closely the material and craftsmanship must match the original.

Matching the color and surface texture of the historic material with a substitute material is normally difficult. To enhance the chances of a good match, it is advisable to clean a portion of the building where new materials are to be used. If pigments are to be added to the substitute material, a specialist should determine the formulation of the mix, the natural aggregates and the types of pigments to be used. As all exposed material is subject to ultraviolet degradation, if possible, samples of the new materials made during the early planning phases should be tested or allowed to weather over several seasons to test for color stability.

Fabricators should supply a sufficient number of samples to permit onsite comparison of color, texture, detailing, and other critical qualities. In situations where there are subtle variations in color and texture within the original materials, the substitute materials should be similarly varied so that they are not conspicuous by their uniformity.

Substitute materials, notably the masonry ones, may be more water-absorbent than the historic material. If this is visually distracting, it may be appropriate to apply a protective vapor-permeable coating on the substitute material. However, these clear coatings tend to alter the reflectivity of the material, must be reapplied periodically, and may trap salts and moisture, which can in turn produce spalling. For these reasons, they are not recommended for use on historic materials.

Matching the Physical Properties

While substitute materials can closely match the appearance of historic ones, their physical properties may differ greatly. The chemical composition of the material (i.e., presence of acids, alkalines, salts, or metals) should be evaluated to ensure that the replacement materials will be compatible with the historic resource. Special care must therefore be taken to integrate and to anchor the new materials properly. The thermal expansion and contraction coefficients of each adjacent material must be within tolerable limits. The function of joints must be understood and detailed either to eliminate



A waterproof coating is an inappropriate substitute material to apply to adobe as it seals in moisture and may result in spalling. Photo: NPS files.

moisture penetration or to allow vapor permeability. Materials that will cause galvanic corrosion or other chemical reactions must be isolated from one another.

To ensure proper attachment, surface preparation is critical. Deteriorated underlying material must be cleaned out. Noncorrosive anchoring devices or fasteners that are designed to carry the new material and to withstand wind, snow and other destructive elements should be used. Properly chosen fasteners allow attached materials to expand and contract at their own rates. Caulking, flexible sealants or expansion joints between the historic material and the substitute material can absorb slight differences of movement. Since physical failures often result from poor anchorage or improper installation techniques, a structural engineer should be a member of any team undertaking major repairs.

Some of the new high tech materials such as epoxies and polymers are much stronger than historic materials and generally impermeable to moisture. These differences can cause serious problems unless the new materials are modified to match the expansion and contraction properties of adjacent historic materials more closely, or unless the new materials are isolated from the historic ones altogether. When stronger or vapor impermeable new materials are used alongside historic ones, stresses from trapped moisture or differing expansion and contraction rates generally hasten deterioration of the weaker historic material. For this reason, a conservative approach to repair or replacement is recommended, one that uses more pliant materials rather than high-strength ones. Since it is almost impossible for substitute materials to match the properties of historic materials perfectly, the new system incorporating new and historic materials should be designed so that if material failures occur, they occur within the new material rather than the historic material.

Performance Expectations

While a substitute material may appear to be acceptable at the time of installation, both its appearance and its performance may deteriorate rapidly. Some materials are so new that industry standards are not available, thus making it difficult to specify quality control in fabrication, or to predict maintenance requirements and long term performance. Where possible, projects involving substitute materials in similar circumstances should be examined. Material specifications outlining stability of color and texture; compressive or tensile strengths if appropriate; the acceptable range of thermal coefficients, and the durability of coatings and finishes should be included in the contract documents. Without these written documents, the owner may be left with little recourse if failure occurs.



The historic cornice was successfully replaced with a fiberglass cornice. Photo: NPS files.

The tight controls necessary to ensure long-term performance extend beyond having written performance standards and selecting materials that have a successful track record. It is important to select qualified fabricators and installers who know what they are doing and who can follow up if repairs are necessary. Installers and contractors unfamiliar with specific substitute materials and how they function in your local environmental conditions should be avoided.

The surfaces of substitute materials may need special care once installed. For

example, chemical residues or mold release agents should be removed completely prior to installation, since they attract pollutants and cause the replacement materials to appear dirtier than the adjacent historic materials. Furthermore, substitute materials may require more frequent cleaning, special cleaning products and protection from impact by hanging window-cleaning scaffolding. Finally, it is critical that the substitute materials be identified as part of the historical record of the building so that proper care and maintenance of all the building materials continue to ensure the life of the historic resource.

Choosing an Appropriate Substitute Material

Once all reasonable options for repair or replacement in kind have been exhausted, the choice among a wide variety of substitute materials currently on the market must be made. The charts at the end of this Brief describe a number of such materials, many of them in the family of modified concretes which are gaining greater use. The charts do not include wood, stamped metal, mineral fiber cement shingles and some other traditional imitative materials, since their properties and performance are better known. Nor do the charts include vinyls or molded urethanes which are sometimes used as cosmetic claddings or as substitutes for wooden millwork. Because millwork is still readily available, it should be replaced in kind.

The charts describe the properties and uses of several materials finding greater use in historic preservation projects, and outline advantages and disadvantages of each. It should not be read as an endorsement of any of these materials, but serves as a reminder that numerous materials must be studied carefully before selecting the appropriate treatment. Included are three predominantly masonry materials (cast stone, precast concrete, and glass fiber reinforced concrete); two predominantly resinous materials (epoxy and glass fiber reinforced polymers also known as fiberglass), and cast aluminum which has been used as a substitute for various metals and woods.

Pros and Cons of Various Substitute Materials

Cast Aluminum

Material: Cast aluminum is a molten aluminum alloy cast in permanent (metal) molds or onetime sand molds which must be adjusted for shrinkage during the curing process. Color is from paint applied to primed aluminum or from a factory finished coating. Small sections can be bolted together to achieve intricate or sculptural details. Unit castings are also available for items such as column plinth blocks.

Application: Cast aluminum can be a substitute for cast iron or other decorative elements. This would include grillwork, roof crestings, cornices, ornamental spandrels, storefront elements, columns, capitals, and column bases and plinth blocks. If not self-supporting, elements are generally screwed or bolted to a structural frame. As a result of galvanic corrosion problems with dissimilar metals, joint details are very important.

Advantages:

- light weight (1/2 of castiron)
- corrosion-resistant, noncombustible
- intricate castings possible

- easily assembled, good delivery time
- can be prepared for a variety of colors
- long life, durable, less brittle than cast iron

Disadvantages:

- lower structural strength than cast iron
- difficult to prevent galvanic corrosion with other metals
- greater expansion and contraction than cast iron; requires
- gaskets or caulked joints
- difficult to keep paint on aluminum

Checklist:

- Can existing be repaired or replaced in kind?
- How is cast aluminum to be with other metals attached?
- Have full-size details been developed for each piece to be cast?
- How are expansion joints detailed?
- Will there be a galvanic corrosion problem?
-
- Are fabricators/installers experienced?

Cast Stone (dry tamped)

Material: Cast stone is an almost-dry cement, lime and aggregate mixture which is dry-tamped into a mold to produce a dense stone-like unit. Confusion arises in the building industry as many refer to high quality precast concrete as cast stone. In fact, while it is a form of precast concrete, the drytamp fabrication method produces an outer surface resembling a stone surface. The inner core can be either drytamped or poured full of concrete. Reinforcing bars and anchorage devices can be installed during fabrication.

Application: Cast stone is often the most visually similar material as a replacement for unveined deteriorated stone, such as brownstone or sandstone, or terra cotta in imitation of stone. It is used both for surface wall stones and for ornamental features such as window and door surrounds, voussoirs, brackets and hoods. Rubberlike molds can be taken of good stones on site or made up at the factory from shop drawings.

Advantages:

- replicates stone texture with good molds (which can come from extant stone) and fabrication
- expansion/contraction similar to stone
- minimal shrinkage of material

- anchors and reinforcing bars can be built in
- material is fire-rated
- range of color available
- vapor permeable

Disadvantages:

- heavy units may require additional anchorage
- color can fade in sunlight
- may be more absorbent than natural stone
- replacement stones are obvious if too few models and molds are made

Checklist:

- Are the original or similar materials available?
- How are units to be installed and anchored?
- Have performance standards been developed to ensure color stability?
- Have large samples been delivered to site for color, finish and absorption testing?
- Has mortar been matched to adjacent historic mortar to achieve a good color/tooling match?
- Are fabricators/installers experienced?

Glass Fiber Reinforced Concretes (GFRC)

Material: Glass fiber reinforced concretes are lightweight concrete compounds modified with additives and reinforced with glass fibers. They are generally fabricated as thin shelled panels and applied to a separate structural frame or anchorage system. The GFRC is most commonly sprayed into forms although it can be poured. The glass must be alkaline resistant to avoid deteriorating effects caused by the cement mix. The color is derived from the natural aggregates and if necessary a small percentage of added pigments.

Application: Glass fiber reinforced concretes are used in place of features originally made of stone, terra cotta, metal or wood, such as cornices, projecting window and door trims, brackets, finials, or wall murals. As a molded product it can be produced in long sections of repetitive designs or as sculptural elements. Because of its low shrinkage, it can be produced from molds taken directly from the building. It is installed with a separate noncorrosive anchorage system. As a predominantly cementitious material, it is vapor permeable.

Advantages:

- lightweight, easily installed
- good molding ability, crisp detail possible
- weather resistant

- can be left uncoated or else painted
- little shrinkage during fabrication
- molds made directly from historic features
- cements generally breathable
- material is fire-rated

Disadvantages:

- non-loadbearing use only
- generally requires separate anchorage system
- large panels must be reinforced
- color additives may fade with sunlight
- joints must be properly detailed
- may have different absorption rate than adjacent historic material

Checklist:

- Are the original materials and craftsmanship still available?
- Have samples been inspected on the site to ensure detail/texture match?
- Has anchorage system been properly designed?
- Have performance standards been developed?
- Are fabricators/installers experienced?

Precast Concrete

Material: Precast concrete is a wet mix of cement and aggregate poured into molds to create masonry units. Molds can be made from existing good surfaces on the building. Color is generally integral to the mix as a natural coloration of the sand or aggregate, or as a small percentage of pigment. To avoid unsightly air bubbles that result from the natural curing process, great care must be taken in the initial and longterm vibration of the mix. Because of its weight it is generally used to reproduce individual units of masonry and not thin shell panels.

Application: Precast concrete is generally used in place of masonry materials such as stone or terra cotta. It is used both for flat wall surfaces and for textured or ornamental elements. This includes wall stones, window and door surrounds, stair treads, paving pieces, parapets, urns, balusters and other decorative elements. It differs from cast stone in that the surface is more dependent on the textured mold than the hand tamping method of fabrication.

Advantages:

- easily fabricated, takes shape well
- rubber molds can be made from building stones

- minimal shrinkage of material
- can be load bearing or anchorage can be cast in
- expansion/contraction similar to stone
- material is fire-rated
- range of color and aggregate available
- vapor permeable

Disadvantages:

- may be more moisture absorbent than stone although coatings may be applied
- color fades in sunlight
- small air bubbles may disfigure units
- replacement stones are conspicuous if too few models and molds are made

Checklist:

- Is the historic material still available?
- What are the structural/anchorage requirements?
- Have samples been matched for color/texture/absorption? Have shop drawings been made for each shape?
- Are there performance standards?
- Has mortar been matched to adjacent historic mortar to achieve good color/tooling match?
- Are fabricators/installers experienced?

Fiber Reinforced Polymers (FRP, Fiberglass)

Material: Fiberglass is the most well known of the FRP products generally produced as a thin rigid laminate shell formed by pouring a polyester or epoxy resin gelcoat into a mold. When tack-free, layers of chopped glass or glass fabric are added along with additional resins. Reinforcing rods and struts can be added if necessary; the gel coat can be pigmented or painted.

Application: Fiberglass, a non load-bearing material attached to a separate structural frame, is frequently used as a replacement where a lightweight element is needed or an inaccessible location makes frequent maintenance of historic materials difficult. Its good molding ability and versatility to represent stone, wood, metal and terra cotta make it an alternative to ornate or carved building elements such as column capitals, bases, spandrel panels, beltcourses, balustrades, window hoods or parapets. Its ability to reproduce bright colors is a great advantage.

Advantages:

- lightweight, long spans available with a separate structural frame

- high ratio of strength to weight
- good molding ability
- integral color with exposed high quality pigmented gel-coat or takes paint well
- easily installed, can be cut, patched, sanded
- non-corrosive, rot-resistant

Disadvantages:

- requires separate anchorage system
- combustible (fire retardants can be added); fragile to impact.
- high coefficient of expansion and contraction requires frequently placed expansion joints
- ultraviolet sensitive unless surface is coated or pigments are in gelcoat
- vapor impermeability may require ventilation detail

Checklist:

- Can original materials be saved/used?
- Have expansion joints been designed to avoid unsightly appearance?
- Are there standards for color stability/durability?
- Have shop drawings been made for each piece?
- Have samples been matched for color and texture?
- Are fabricators/installers experienced?
- Do codes restrict use of FRP?

Epoxies (Epoxy Concretes, Polymer Concretes)

Material: Epoxy is a resinous two-part thermosetting material used as a consolidant, an adhesive, a patching compound, and as a molding resin. It can repair damaged material or recreate lost features. The resins which are poured into molds are usually mixed with fillers such as sand, or glass spheres, to lighten the mix and modify their expansion/contraction properties. When mixed with aggregates, such as sand or stone chips, they are often called epoxy concrete or polymer concrete, which is a misnomer as there are no cementitious materials contained within the mix. Epoxies are vapor impermeable, which makes detailing of the new elements extremely important so as to avoid trapping moisture behind the replacement material. It can be used with wood, stone, terra cotta, and various metals.

Application: Epoxy is one of the most versatile of the new materials. It can be used to bind together broken fragments of terra cotta; to build up or infill missing sections of ornamental metal; or to cast missing elements of wooden ornaments. Small cast elements can be attached to existing materials or entire new features can be cast. The resins are poured into molds and due to the rapid setting of the material and the need to

be combined for larger elements. With special rods, the epoxies can be structurally reinforced. Examples of epoxy replacement pieces include: finials, sculptural details, small column capitals, and medallions.

Advantages:

- can be used for repair/replacement
- lightweight, easily installed
- good casting ability; molds can be taken from building material can be sanded and carved.
- color and ultraviolet screening can be added; takes paint well
- durable, rot and fungus resistant

Disadvantages:

- materials are flammable and generate heat as they cure and may be toxic when burned
- toxic materials require special protection for operator and adequate ventilation while curing
- material may be subject to ultraviolet deterioration unless coated or filters added rigidity of material
- often must be modified with fillers to match expansion coefficients
- vapor impermeable

Checklist:

- Are historic materials available for molds, or for splicing-in as a repair option?
- Has the epoxy resin been formulated within the expansion/contraction coefficients of adjacent materials?
- Have samples been matched for color/finish?
- Are fabricators/installers experienced?
- Is there a sound substrate of material to avoid deterioration behind new material?
- Are there performance standards?

Summary

Substitute materials--those products used to imitate historic materials--should be used only after all other options for repair and replacement in kind have been ruled out. Because there are so many unknowns regarding the longterm performance of substitute materials, their use should not be considered without a thorough investigation into the proposed materials, the fabricator, the installer, the availability of specifications, and the use of that material in a similar situation in a similar environment.

Substitute materials are normally used when the historic materials or craftsmanship are no longer available, if the original materials are of a poor quality or are causing damage to adjacent materials, or if there are specific code requirements that preclude the use of historic materials. Use of these materials should be limited, since replacement of historic materials on a large scale may jeopardize the integrity of a historic resource. Every means of repairing deteriorating historic materials or replacing them with identical materials should be examined before turning to substitute materials.

The importance of matching the appearance and physical properties of historic materials and, thus, of finding a successful longterm solution cannot be overstated. The successful solutions illustrated in this Brief were from historic preservation projects involving professional teams of architects, engineers, fabricators, and other specialists. Cost was not necessarily a factor, and all agreed that whenever possible, the historic materials should be used. When substitute materials were selected, the solutions were often expensive and were reached only after careful consideration of all options, and with the assistance of expert professionals.

Further Reading

Berryman, Nancy D.; Susan M. Tindal, Terra-Cotta; Preservation of an Historic Material. Chicago: Landmarks Preservation Council of Illinois, 1984.

Brookes, A.J., Cladding of Buildings. New York: Longman Inc., 1983.

Fisher, Thomas, "The Sincerest Form of Flattery," Progressive Architecture (Nov. 1985).

Gayle Margot; David W. Look, AIA; John G. Waite, *Metals in America's Historic Buildings: Uses and Preservation Treatments*. Washington, D.C.: Preservation Assistance Division, National Park Service, U.S. Department of the Interior, 1980.

Historic Building Facades. New York: New York Landmarks Conservancy, 1986.

Hornbostel, Caleb, *Construction Materials: Types, Uses and Applications*, New York: John Wiley and Sons, Inc., 1978.

Lynch, Michael F; William J. Higgins, *The Maintenance and Repair of Architectural Sandstone*, New York Landmarks Conservancy, 1982.

National Park Service, Rocky Mountain Regional Office, *Preservation Briefs 12: The Preservation of Historic Pigmented Structural Glass*. Washington, D.C.: Preservation Assistance Division, National Park Service, U.S. Department of the Interior, 1984.

Phillips, Morgan and Judith Selwyn, *Epoxies for Wood Repairs in Historic Buildings*. Washington, D.C.: Preservation Assistance Division, National Park Service, U.S. Department of the Interior, 1978.

Phillips, Morgan W., *The Morse-Libby Mansion: A Report on Restoration Work*. Washington, D.C.: Preservation Assistance Division, National Park Service, U.S. Department of the Interior, 1977.

Tiller, deTeel Patterson, *Preservation Briefs 7: The Preservation of Historic Glazed Architectural Terra-Cotta*. Washington, D.C.: Preservation Assistance Division, National Park Service, U.S. Department of the Interior, 1979.

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Home page logo: Cast aluminum used as a replacement for cast iron. Photo: NPS files.

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¹ Historic Preservation Experts consulted:

Charles Chase, SF Heritage
Gee Platt, SF Heritage
Nancy Shanahan, SF Heritage
Michael Corbett, Historian
Bridget Maley, Architectural Resources Group
Alice Carey, Carey & Company
Chris Ver Planck, Page & Turnbull
Ward Hill, Historian
Tim Kelley, SF Landmarks Board