HISTORIC LANDMARK TO CULTURAL HUB

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LOCATED AT THE NORTH EDGE of San Francisco Bay, the historic U.S. Army warehouse Pier 2 at Fort Mason has been transformed into a new campus for San Francisco Art Institute (SFAI), creating a dynamic new hub for arts education and public engagement. San Francisco Art Institute is "dedicated to the intrinsic value of art and its vital role in shaping and enriching society and the individual." In support of this mission, SFAI has created an arts campus at the heart of the vibrant Fort Mason Center for Arts & Culture (FMCAC) in this urban National Park.


Photo © Bruce Damonte

ABOVE The San Francisco Art Institute has opened a new campus at the historic landmark Fort Mason. The campus is a model of adaptive reuse of historic buildings for the arts and community.

RIGHT The steps leading to the second level act as a place for spontaneous meetings and interactions.

The design interweaves historic and contemporary, leveraging the dramatic light filled industrial structure to create 160 studios, workshop, media theater, flexible teaching spaces, and public exhibition galleries.

History and Overview

Built in 1911, the Pier 2 shed served for nearly a half century as the port of embarkation for American military personnel to the Pacific. In the first few months after the United States entered World War II, Fort Mason shipped more military supplies than all other military ports in the United States combined. The Pier 2 shed, designed in the Spanish mission revival style by the Philadelphia firm of Rankin, Kellogg & Crane, served for decades as a warehouse and processing point for military personnel and supplies.

In the 1960s, the U.S. Army closed Fort Mason as an active military base, and in 1972 transferred ownership of the site to the National Park Service (NPS). The Fort Mason Center, a nonprofit organization, was established in 1977 to oversee adaptation of the fort's historic buildings for use as an arts center. The Herbst Pavilion at the south end of the pier shed acted as a public exhibit hall, and the north end was adapted to serve as the 437-seat Cowell Theater.

New Century Upgrades

As decades passed, repairs and upgrades were overdue. By 2003, there was significant pitting, cracking, and spalling in the concrete; steel window frames, roll-up doors, steel columns and trusses were badly corroded. The shed also required seismic strengthening, accessibility upgrades, and a complete roof repair. The NPS had to undertake repairs and seismic upgrades to the pier pilings and substructure, which were completed in 2006.


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Because the pier shed is part of a National Historic Landmark District and under the jurisdiction of the NPS's Golden Gate National Recreation Area (GGNRA), the rehabilitation was designed to meet the requirements of the Secretary of the Interior's Standards for Rehabilitation. These standards are also required by the Federal Historic Tax Program for repairs and alterations of the historic building for an efficient contemporary use; however, these repairs and alterations must not damage or destroy materials, features or finishes that are important in defining the building's historic character.

The Fort Mason Center committed to complete all renovations in conformance with the NPS sustainability guidelines and the U.S. Green Building Council's Leadership in Energy and Environmental Design

BUILDING AT A GLANCE

Name San Francisco Art Institute

Location San Francisco

Miles from nearest major city 0

Owner Fort Mason Center/San Francisco Art Institute

Principal Use Higher education, art school

Includes Studios, galleries, woodshop, media theater, seminar rooms

Employees/Occupants 300

Expected (Design) Occupancy 300

Percent Occupied 100

Gross Square Footage 69,422

Conditioned Space 69,422

Distinctions/Awards
AIA COTE Top Ten, National Trust for Historic Preservation, Trustees' Emeritus Award for Excellence in the Stewardship of Historic Sites California Preservation Foundation, Rehabilitation Award, 2019 ASHRAE Technology Award Honorable Mention

FOR RENOVATIONS

Year Built 1911

Major Renovation 2017

Renovation Scope Historic renovation, seismic upgrade, new radiant flooring topping slab, interior adaptive reuse structure and finishes, 255 kW PV array

Total Renovation Cost $26.5 million

Location
Latitude 37.7 deg N
Orientation Existing: WSW

ENERGY AT A GLANCE

Annual Energy Use Intensity (EUI) (Site) 49 kBtu/ft^2

Electricity (Grid Purchase) 0 kBtu/ft^2

Electricity (On-Site Solar or Wind Installation) 15 kBtu/ft^2

Natural Gas 34 kBtu/ft^2

Annual On-Site Renewable Energy Exported 0.4 kBtu/ft^2

Annual Net Energy Use Intensity 19.1 kBtu/ft^2

Annual Source (Primary) Energy 87.6 kBtu/ft^2

Annual Energy Cost Index (ECI) $0.94/ft^2

Savings vs. California Title 24 19%

ENERGY STAR Rating Not eligible for ENERGY STAR rating; 100% College/University

Carbon Footprint 2.9 kg CO_2e/ft^2

Power Represented by Renewable Energy Certificates (%) 0%

Heating Degree Days (Base 65°F) 2,919

Cooling Degree Days (Base 65°F) 112

Annual Hours Occupied 6,760

KEY SUSTAINABLE FEATURES

Water Conservation No landscaping, irrigation, or site water at historic site. Project scope included ultra low flow fixtures and point of use water heaters.

Recycled Materials Interior steel structure, metal deck

Daylighting Ample daylighting from existing clerestories and historic windows result in 71% of studio spaces achieving adequate lighting using natural daylight.

Individual Controls Each studio space has individual control of electric light; each studio pod has control over the stratification fans above their zones.

Carbon Reduction Strategies Adaptive reuse of existing structure; energy efficient heating, cooling and ventilation strategies; 255 kW PV array; selective use of materials and finishes.

Transportation Mitigation Strategies Walk Score is 72. SFAI provides shuttle for students to connect to transit.

BUILDING TEAM

Building Owner/Representative
San Francisco Art Institute

Architect LEDDY MAYTUM STACY Architects

General Contractor Oliver and Company

Mechanical Engineer Integral Group Engineers

Electrical Engineer Integral Group Engineers

Energy Modeler Integral Group Engineers

Structural Engineer Rutherford & Chekene Structural Engineers

Civil Engineer Moffatt & Nichol

Lighting Design Architectural Lighting Design

(LEED) program, though the Fort Mason Center decided not to proceed with the final LEED certification.

The renovations incorporate a variety of sustainability strategies, including installation of a 255 kW photovoltaic (PV) solar panel array that meets up to 100% of the building's electricity needs, an economical heating/cooling system that incorporates cool bay air, radiant-floor heating, enhanced roof and slab insulation, and high-efficiency lighting.

Historic Adaptive Reuse

The Fort Mason Pier 2 renovation project required creative solutions for transforming the building for the new arts use, integrating new building systems, and successfully financing the rehabilitation within the National Park Service (NPS) requirements. A unique public/private partnership was formed between SFAI, FMCAC, and the National Park Service (NPS) to create the new arts center in the Golden Gate National Parks. The collaborative process was supported by a complex funding program – a combination of federal historic tax credits, federal energy credits, local energy incentives, philanthropic contributions, a commercial loan, and a federal Save America's Treasures grant.

The 69,000 ft^2 (6410 m^2) historic landmark offered SFAI a dramatic industrial space that could be creatively transformed to meet their pedagogical goals, expand their programs and provide active engagement with the public in this established arts and cultural center. This historic adaptive reuse preserves the

Photo © Bruce Damonte

The Pier 2 restoration included the installation of a 255 kW photovoltaic array on the roof of the historic shed. The net annual electricity generated by the solar panels exceeds the electricity use of the building, and excess electricity generation is exported to other buildings on the Fort Mason campus.

industrial integrity of the landmark structure, supports the school's goals, and integrates advanced sustainable building systems. The design interweaves historic and contemporary, leveraging the dramatic light-filled industrial structure to create 160 studios, workshop, theater, flexible teaching spaces, and public exhibition galleries creating a dynamic new learning environment, which respects the integrity of the historic landmark. The rehabilitation of this structure capitalizes not only on the embodied energy of the existing building materials but also on the embodied cultural history.

Envelope and Architecture

A primary goal of the SFAI renovation was to maintain the abundant access to the natural daylight in existing historic volume; not only would delivery of natural daylight reduce electric lighting costs for FMCAC, but it was also in keeping with the Secretary of Interior's Standards for Rehabilitation to maintain the original character of the historic space. The new partial second floor was added at the perimeter of the pier shed to preserve the full historic volume of the industrial space at the central atrium. Access to natural daylight was also a goal of the art school, as daylight is the most effective light source for rendering color of objects. The renovation thus maximized the light delivery of the central clerestory monitor, and all studio spaces were designed to have partial height walls, allowing for daylight to reflect into each space. All instructional spaces and public areas are daylit with views to the surrounding bay, city and park; a wintertime, midday post-occupancy study indicated that 72% of regularly occupied spaces are adequately daylit, and use of electric lighting was minimal.

The daylight goals ran parallel to the overall approach of the architecture's minimal footprint within the historic shed. The design maintained a spatial logic that located and sized program areas within the rhythm and dimensions of the historic bays and trusses, which resulted in a modular, flexible system, including HVAC duct layout and lighting. The simple palette of materials maintained visual continuity and visual connection between spaces and levels; use of perforated metal grating at certain areas of the second floor deck, as well as minimal wire guardrail material, kept the structural design both physically and visually light.

Acoustic comfort was also a focus of the design, especially due to the open atrium and studio design. Acoustic panels were added to the historic ceiling, and the second floor deck included integral acoustic absorption, resulting in a reduced reverberation time. The workshop and media theater are acoustically isolated with high performance acoustic wall separations and glazing, with an STC rating of 45.

The existing envelope is an effective source of thermal mass, resisting outside temperature fluctuations and reducing load demands within. The envelope also received some thermal upgrades, with increased roof and slab insulation. The damaged roof was entirely replaced in the rehabilitation, and the replacement integrated increased insulation of R-26. The slab, hovering above the San Francisco Bay, does not have the usual benefit of earth mass to reduce

The design offers access to views of the surrounding bay through the historic façade.

Photo © Bruce Damonte

heat transfer to the environment. The existing slab had historic train tracks for cargo delivery that required a topping slab for encapsulation. While undertaking this repair work, polyisocyanurate foam insulation was added above the existing slab and below the topping slab. The topping slab also integrated a radiant heating system, discussed in the Systems & IAQ section below.

The architecture of the art studios was designed for short- and long-term flexibility. In the short term, studios and teaching spaces can be easily reconfigured and adapted to serve evolving programs and technologies. The studio entrances are enclosed by a simple curtain system, providing privacy and allowing for flexible, wide openings for moving art or equipment. The building spaces are generalized to allow for future adaptation for alternative uses in the long term (SFAI is a tenant of FMCAC).

Systems and IAQ

The building's MEP systems were carefully integrated with the architecture, with simple low energy systems. During heating periods, the radiant slab, with assistance from tempered mechanical ventilation air, is able to heat all the occupied zones within the large volume of the building. Small destratification fans at the existing ceiling help to re-distribute the heated air down to the occupied zones. Due to the temperate bay area climate and the building's existing thermal mass, no cooling is provided for 90% of spaces. Highly efficient VRF systems provide cooling for conference rooms with higher internal loads and exterior windows. Limited high-occupancy program spaces have separate local HVAC units.

The building uses both natural and mechanical ventilation to meet ANSI/ASHRAE Standards 55-2013 and 62.1-2013. A dedicated outdoor air system (DOAS) was integrated to ensure a comfortable and healthy environment throughout the space with user-controlled supply ventilation. The clustered studio layout demonstrates an effective ventilation plan as opposed to a more typical design, which would rely on a high air change rate. At studio pods and brush washing stations, low level exhaust captures heavier fumes and particulates resulting from art supply work in the studios.

For both cost effectiveness and ease of operation, there are few systems that require control or maintenance. Boilers, pumps, DOAS air handler fans, radiant zone valves and VRF systems are integrated to provide a system that is simple to operate and maintain. Easily accessible valves and manifolds allow ease of maintenance, and the simplified system has fewer components, fewer controls, and ultimately reduced cost.

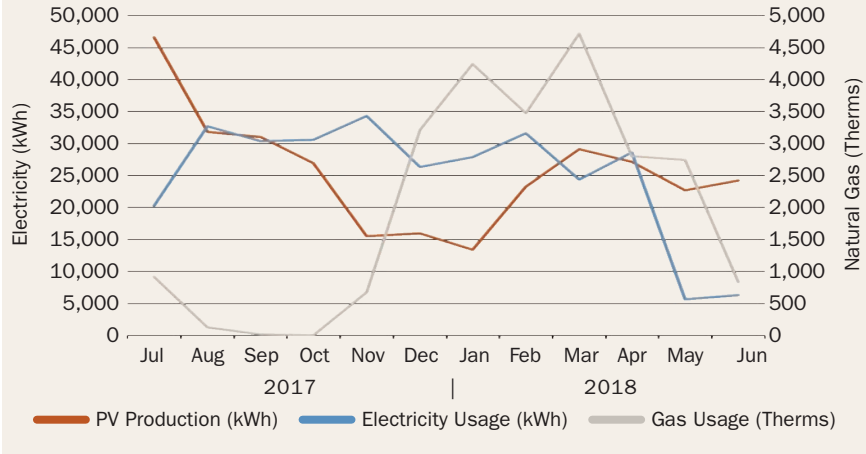
Since the project is located on a 500 ft (152 m) pier over San Francisco Bay, the design of the new plumbing system presented a challenge, with the point of connection

being at one end of the long axis. The new fixtures and routing were efficiently and strategically placed to minimize costly slab penetrations and under-pier work between the existing building slab and the Bay surface. The art studio sink "pods" were consolidated to optimize the length of supply and waste piping, minimizing material consumption and reducing construction cost. The plumbing design is estimated to reduce building water consumption by 32% from baseline through the selection of ultra-low flow fixtures and point-of-use water heaters.

Embodied Energy and Culture

The San Francisco Art Institute leverages a significant cultural landmark of the 1911 pier shed and provides a new arts cultural hub for the city. This cost-effective rehabilitation project achieves enhanced energy performance goals within a myriad of constraints, serving as a model for other adaptive reuse opportunities. ●

Figure 1 SFAI ENERGY SUMMARY.



ABOUT THE AUTHORS

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