



**Alcatraz Quartermaster Building Seismic Upgrade  
ICRI Northern California Chapter  
2017 Concrete Repair Awards Submission**



## PROJECT BACKGROUND

Alcatraz prison is one of the most famous penal facilities in the world. Constructed in 1909 as a military prison, it became a maximum-security federal prison in the early 1930s. The Quartermaster Warehouse is a reinforced concrete structure with two upper floors over a mezzanine and basement. It was originally constructed as a multi-use building by the U.S. Army in 1921, and remains in active use as a storage, office and workshop facility.

The majority of the Quartermaster Warehouse structure is made of reinforced concrete. The exterior board-formed concrete walls are covered with a thin cement parge coat throughout. Interior columns are reinforced concrete at the basement, mezzanine, and first floor, and wood at the second floor. Floor slabs are concrete at the upper two floors, and wood frame at the mezzanine level.

In 1963, Alcatraz prison was classified as surplus government property, and the unused structure placed under the stewardship of the General Services Administration. In 1972, the island and prison became part of the newly formed Golden Gate National Recreation Area administered by the National Park Service. In 1986, Alcatraz Island became a National Historic Landmark District, with the Quartermaster Warehouse identified as a contributing feature.



*Alcatraz Quartermaster Building, West Elevation c.1935. Photo NPS, Golden Gate National Recreation Area, Waller Collection.*





*Quartermaster Building before Restoration, c.2013*

## **REPAIRED CONDITIONS**

The building remained in use as a storage and workshop space, but the hostile marine environment of San Francisco Bay had taken a significant toll on the structure by the late 20th century. By 2010, deterioration was visible at nearly all concrete elements,



*Quartermaster Building after Restoration, 2016*

including large spalls and exposed corroded reinforcing steel at the walls, beams, columns, and floor slabs. Deterioration was most severe at the exterior walls, but also visible throughout the interior. In many cases, rebar was observed very close to the surface at cracks and spalls.





Starting in the late 1990s, a series of assessments evaluated the building's structural systems, which were inadequate under on current seismic and structural codes. Additional strengthening was designed in the form of new shotcrete at select interior walls and FRP reinforcing at walls and some floor slabs. For the new strengthening systems to succeed, extensive concrete repairs were also necessary.

## REPAIR DESIGN

Concrete repair systems were evaluated based on their compatibility with the historic concrete and its finish system. Existing conditions were typically either severe or good – there was very little small-scale or shallow repair. For example, there were large areas of severely deteriorated concrete, with large surface spalls, crumbling concrete substrate, and heavily corroded exposed rebar, but just a few feet down the wall the concrete would be completely intact and undamaged. For these reasons, a comprehensive repair system that could be used for all levels of repair and coatings was sought. The repair system also needed to be able to blend with the historic concrete finishes, and cost was a concern due to the large volume of repairs needed.



A Sika repair system, including a large-repair concrete mix product, small-scale repair mortar, repair mortar for the parge coat, bonding agents, and a series of protective finish coatings, was used to create a comprehensive repair assembly.



## SPECIAL PROJECT CONDITIONS

In addition to the historic preservation requirements of the project, a number of other special conditions, both anticipated and unanticipated, made the project complex.

### *Cold Joint*

It is assumed that the Quartermaster Warehouse was constructed using Army prison labor, and the building's original craftsmanship was accordingly low in quality. During demolition of the damaged concrete and parge coat, it was discovered that the four building stories had been poured in separate lifts and were not structurally connected to each other. The discovery of these cold joints required the modification of repair details, including the addition of FRP reinforcement at each horizontal joint. The FRP was ultimately concealed behind the new parge coat, allow for repair without any visual change to the historic façade.

### *NPS Working Constraints*

In addition to the difficulties posed by working on an island without a permanent water connection, the National Park Service restricted work at the exterior to protect nesting birds. The east side of the building is located next to a steep slope that extends down to the San Francisco Bay, creating an ideal nesting area for wildlife. Per NPS requirements, exterior construction had to be coordinated to prevent disruptions during water bird breeding season, which lasts from February 15 until all young in the area have fledged, typically around September 15.



Quartermaster Building conditions during construction including (top) the cold joint revealed during parge coat demolition, which was repaired through the exterior application of FRP (below), which was then concealed behind the new parge coat.





### *Historic Graffiti*

In November of 1969, a small group of Native Americans crossed the bay in boats and landed on Alcatraz Island. Soon, many other Native Americans joined them including students and families, in what became known as the Alcatraz Occupation. Citing the 19th century Treaty of Laramie, which stipulated that unused Federal lands could be returned to Native Americans, the occupiers offered \$24 in exchange for Alcatraz Island. To promote their cause and solidarity, occupiers painted political statements (also referred to as graffiti) with surplus paint found in prison buildings onto building walls, signs, and water towers. The Alcatraz occupation became a symbol of the Native American struggle for autonomy and was covered in the National Press.

*Restoring the Political Statement after concrete repair at the Quartermaster Warehouse, 2016.*



*Typical conditions at locations of Political Statement prior to concrete repairs, 2014.*

The Quartermaster Warehouse has several painted political statements throughout the building. Most significantly, on the east elevation the words “Indian Land” are written in yellow paint. The concrete substrate that the political statement was painted on was deteriorated and needed to be included in the concrete repair project. The NPS maintains an agreement to work with a council of Native Americans when rehabilitations could impact the painted political statements, and they were consulted as part of this repair project.

In addition to the concrete deterioration, the painted words were fading. Working directly with the Native Americans, the NPS proposed three alternatives:

1. Preserve and protect the failing painting in place;
2. Remove the painting for display in the Alcatraz museum collection, or
3. Restore the painting by repairing the concrete and parge finish and repainting the Political Statement.

The decision was unanimous, to restore the painting after repair of the exterior wall surface. The Political Statement was recorded with a full size tracing of the lettering created with the support of a decorative painter. After repair of the wall surface, the tracing was transferred to the wall surface by the Contractor for the rehabilitation project. In March 2016, Native Americans from various tribes gathered to complete the painting. The political statement is now more visible and rests on a stable, repaired concrete substrate.





Conditions at east elevation of Quartermaster Warehouse c.2014.



Conditions at east elevation of Quartermaster Warehouse following repair project, 2016.





*Interior and exterior conditions before (top) and after repair project. After photos throughout submission are by Michael David Rose, 2016.*



