

A Job That Nobody Wanted

San Francisco, CA

Submitted by John F. Maillard, CSI-CDT

This building, built in 1927, is reinforced concrete with concrete ornamental units anchored to the exterior walls. This project is special for several reasons:

- The city of San Francisco was pressuring the owners and threatening to condemn the building. The owners (two elderly widows) were left with a giant headache and the pressure from the neighborhood to do something with the crumbling exterior;
- The building was not a registered landmark in the San Francisco Registry but was considered one by the neighbors;
- The preservation architects and experts wanted to treat it as a restoration or preservation project at a cost of \$1,350,000—way beyond the financial resources of the owners and the bank;
- After the 1989 earthquake, the owners repaired the damage with an application of a cementitious parge over the ornamental units and painted the building with a faux finish imitating oxidized copper. The preservation and restoration experts wanted to remove this parging to expose the original ornamental units. The cost of this process was prohibitive; and
- After a preliminary survey of the building, the project engineer knew that this was a case of concrete repairs and could be done at a lower cost.

PROBLEMS THAT PROMPTED REPAIRS

- The city of San Francisco had cited the owners for immediate dangerous conditions and threatened to red tag the building;



Project before repair work

- The consequences were that all tenants would be required to vacate the property until the repairs were performed and approved by the city;
- The owners needed the income from the building. Their livelihood depended on the building being occupied; and
- The deterioration of the building would not stop unless the water intrusion—the cause of the spalling—was addressed.

INSPECTION AND EVALUATION METHODS

When the project engineer first met with the owners, he explained that a thorough inspection and evaluation was necessary before he could provide a specification and cost estimate. It took 12 hours to thoroughly survey the existing conditions and provide an inventory of the required repairs. The inspection was performed with the use of a Schmidt hammer, a man-lift for access to all surfaces, and a digital camera.

During the evaluation, it was observed that after 3 months of dry weather, the water was still running behind the capitals of the columns. The water running behind the columns had rusted the reinforcing steel and destroyed the column. The existing concrete walls were diagnosed as safe and well within the required psi (MPa), and anchoring of the new units was not a problem.

Damages were documented and an inventory was provided. The project engineer provided a detailed cost estimate of \$288,000 based on the survey. This was promptly approved by the banker and the owners.

Bidders were asked to be members of ICRI and/or the Sealant Waterproofing and Restoration Institute (SWRI). The first bid came from an approved contractor and was 10% below the estimate. The owners and the banker were delighted and immediately signed the contract.

CAUSES OF DETERIORATION

Water intrusion from the parapet behind the ornamental concrete units had rusted the reinforcing steel. This created the expansion of the reinforcing steel and the spalling of the units. There were several cracks, especially at the parapet and upper section of the structure. The 1989 earthquake did not damage this building. The parging did not address the source

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of water intrusion. The first priority in surveying this type of project is to determine the cause of deterioration; thus, the project engineer set out to solve the existing severe waterproofing problems.

REPAIR SYSTEM SELECTION

1. The water intrusion problems needed to be solved. This was done by waterproofing the top of the parapet using an elastomeric system. Then, the ornamental units were repaired by providing a urethane sealant joint at the perimeter instead of the typical mortar joints. In the case of an earthquake or other type of movement, the water could not get behind the units.
2. The concrete repairs were performed to ICRI and ASTM standards. The project engineer made sure that the density or psi (MPa) measurements of the existing surfaces were compatible so the repairs would marry and move together. The profiles of the hand-repaired units were carved using modified polymer mortars.
3. The replacement units were cast in fiber-loaded concrete without reinforcing steel. It was useless to insert reinforcing because they could not be



The spalled ornamental units created a dangerous condition



Demolition to remove unsound concrete

tied vertically to the units above and below. It was important, however, that the density be the same as the existing units so that they would move the same way. It was equally as important that they match the texture of the existing units. The existing units were repaired before making the cast, so they matched perfectly.

SITE PREPARATION

The ground-floor restaurant was concerned about losing business during this project. The awning became the perfect protection because it was shored to structural requirements. The section above was scaffold and protected with netting. The restaurant actually increased its business as people came to see what was going on. The only complaint was that the netting prevented the people from watching the operation.

DEMOLITION AND SURFACE PREPARATION

The demolition was strictly hand demolition, removing all unsound concrete units below 3000 psi (20.7 MPa). Precaution was taken to protect adjacent sound units.

The surface preparation was typical, making sure that all unsound concrete was removed and that all remaining units and concrete walls were sound, cleaned, and ready for reconstruction.

Samples of existing coatings were analyzed. There was no lead or asbestos detected.



Freehand work to repair unsound concrete and match existing units

APPLICATION METHOD SELECTION

The installation of the replacement units was well organized. Craftsmen used the assembly line system. All columns were installed by the same craftsman, who became very proficient.

The following describes the application:

1. Make sure that the substrate is at least 3000 psi (20.7 MPa) and clean. Drill the anchorage holes 0.625 x 4 in. (16 x 102 mm) deep and insert epoxy.
2. Apply setting mortar at the back of the unit.
3. Set the unit and make the last vertical and horizontal adjustments. Secure the unit until epoxy has adequately set before removing the temporary supports.

REPAIR PROCESS EXECUTION

The field repairs were performed freehand using polymer-modified repair mortars with the same density as the adjacent units—approximately 3000 psi (20.7 MPa). The reinforcing stainless steel pins and wires were installed first, and then the repairs were performed by lifts. Then, the carving was done by following and duplicating the adjacent profiles. This process is more technical/mechanical than artistic, and many craftsmen are proficient at it today.

UNFORESEEN CONDITIONS

As work progressed, there were more field repairs than originally in the inventory, but the project engineer had included a 10% contingency in the estimate and the additional cost was well within this contingency.

The other unforeseen condition was that seagulls harassed the crew at lunchtime, so the crew was brought inside the restaurant during that time. The owner of the café was more than happy to oblige because his business improved considerably during the project.

SPECIAL FEATURES

This project was completed on schedule and within budget and, most importantly, with great results and profitability.

This project was a great success for the following reasons:

- Without the ingenuity of the team, this building would have been destroyed instead of beautifully repaired and waterproofed. It has become the center of attention of the neighborhood in the most positive way. Now other buildings are being repaired.
- Several procedures were developed on this project that made it economically and aesthetically feasible.
- The general contractor, subcontractors, and suppliers all made their normal profit and overhead while learning a lot on this job. They



Close-up of completed repair



Project completed on schedule and within budget

found out that with a good team—focusing on the cost and result—nothing is impossible.

- The two widowed owners of this building were able to protect their investment and are now receiving the revenues needed to live their lives without worry.
- It shows that ICRI members are professionals and are willing to accept challenges.

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OWNER

Cutler Properties LLC
San Francisco, CA

PROJECT ENGINEER/DESIGNER

John F. Maillard, CSI-CDT
San Francisco, CA

REPAIR CONTRACTOR

Rainbow Waterproofing & Restoration Company
San Francisco, CA

MATERIAL SUPPLIERS/MANUFACTURERS

Sika Corporation
Lyndhurst, NJ

The Sherwin-Williams Company
San Francisco, CA