



Pacifica Pier Restoration Project: Final Programmatic Report (AMENDED)

Recipient Organization/Agency: City of Pacifica

Date Submitted: Revised July 2, 2018

Award Amount: \$374,895.30

Matching Contributions: \$254,000.00

Total Disbursement: \$374,895.30

Project Number: #8006.12.033220/33220

1. Summary of Accomplishments

The Pacifica Municipal Pier is the only public ocean-access pier in San Mateo County and one of only a few on the entire west coast of the U.S. It extends nearly a quarter mile into the Pacific Ocean, carrying visitors out over the surf zone to the waters beyond. Experiencing the ocean environment from an elevated, stationary pier is quite different - and in many ways superior to - experiencing it from a boat riding on the surface. The Pier allows the public to approach the many types of fish and marine mammals that frequent the surrounding waters, including some that are protected by the Marine Mammal Protection Act, enabling visitors to experience these animals relatively closely.

It has been estimated that on the order of one hundred thousand people visit the Pier each year from throughout the United States and from all parts of the world. Families from all over the San Francisco Bay Area come regularly to the pier for fishing, crabbing, whale watching and even a simple stroll. Fishing and crabbing from a pier does not require a fishing license from the Department of Fish and Game.

Constructed in 1973, the Pacifica Pier has withstood the relentless battering by the Pacific Ocean and the continuous exposure to the corrosive salt air for 45 years. Over that time, the elements have taken their toll, and if left uncorrected the resulting damage would have soon rendered the Pier unsafe and unusable. The work funded by this grant from the Foundation has extended the Pier's useful life and has improved the users' experience for many years to come.

The Pacifica Municipal Fishing Pier is a major landmark and an important regional recreational facility. The money invested by the Foundation has ensured its continued survival to be enjoyed by yet another generation of appreciative visitors to the California coast.

2. Project Activities & Outcomes

Activities

The structure of the Pier consists of pairs of concrete box beams spanning from one set of pre-cast concrete piles to the next. In each section, a concrete deck was cast flush between the beams, forming the surface that the users walk on, and another deck was cast between the bottoms of the beams, creating a hollow chamber for the electrical and plumbing lines serving the Pier.

The underside of the Pier was spalling badly, and the reinforcing was rusting away. This project replaced the most degraded reinforcing and placed a protective layer of waterproof mortar where the original concrete had spalled away.

Most of the concrete piles were not in need of immediate attention, but at several locations where spalling had exposed the reinforcing the project repaired the damage.

Each section of the Pier has hatches in the upper deck allowing access to the chamber for maintenance. At three locations, the steel support ledges around the edges of the openings had rusted through, and the hatches had collapsed into the chambers. This project replaced the failed hatches and the supporting deck areas around them.

In order to expedite the process of replacing other deck hatches in the future, as is likely to be necessary, this project produced a design documents package that will allow the City to obtain construction bids relatively quickly whenever a hatch fails.

At night, the Pier is illuminated by streetlights spread out along its length. The original lights were so badly corroded that several had already fallen down and been removed. This project replaced all of the lights with new ones (matching those installed in a newly improved commercial/retail district just a block away).

Low concrete parapet walls run along both sides of the deck, with wood caps on their top edges. The original wood caps had become badly cracked and splintered from exposure to the elements. Some pieces had deteriorated so badly that they had fallen off entirely. This project replaced the wood caps with a long-lasting hardwood, imported from Asia, which is so tough it is used for truck beds. New expansion bolts anchor the wood down, and the holes were sealed with matching wood plugs.

It had been presumed that the interior electrical wiring would need to be substantially replaced, but a thorough examination found that it was still in good condition.

Benefits

Although concrete is very strong in compression, a concrete structure relies on its internal reinforcing for strength in tension; in a beam spanning between end supports, the underside of the beam is in tension. Because of this, the reinforcing in the bottom surface of this concrete structure is critically important. On this Pier, high over a continuously moving ocean, it is very difficult to get to the underside for maintenance. This project made it possible to bring in a contractor with specialized equipment that provided access to the underside of the Pier, allowing the badly needed repairs to be performed. Without this work, the Pier would become structurally unsafe, and it would have to be closed to the public. The project extended the useful life of this very popular regional recreational facility.

The collapsed deck hatches had been covered with thick steel plates (intended for covering trenches in roadways). This temporary “band-aid” solution allowed people to continue to walk out onto the Pier, but the raised edges of the plates were a tripping hazard even with patching material ramped around them, and the steel plates were relatively slippery in that (almost always) wet environment. To permanently repair these hatch failures, portions of the concrete deck were removed and replaced, and new concrete hatch sections were fabricated and installed. In addition to restoring the safe walking surface, it will now be possible to access the interior chamber for servicing the utility lines.

The new light fixtures have been very well-received by the public. These bright LED fixtures improve public safety as well as making the Pier an inviting place to be at night (the number of people on the Pier after dark is actually rather surprising). Using the same fixtures as the nearby commercial/retail boulevard, with its shops and restaurants, helps provide a synergistic tie-in between the Pier and these other facilities, which enhances the appeal of this visitor destination and can promote the economic development of Pacifica’s little downtown.

Despite the importance of the structural repairs to the Pier, the users do not directly appreciate that work. From the perspective of the users, this facility was still feeling sadly neglected until the wood guardrail wall caps were replaced. These provide a comfortable surface for people to lean on while looking out at the water and the coastline. They also provide a non-abrasive edge for the many sport-fishing users to rest their fiberglass fishing rods against while their lines are in the water. The beautiful wood caps are a primary visual element and a functionally important feature in making the Pier user-friendly.

The structural repairs proved to be more costly than had been anticipated when the City applied for this grant, but being critical to the survival of the Pier the City had no choice but to complete that work. Fortunately, the Foundation was able to provide additional funding to allow the wood wall caps to be replaced as well. Thus, all of the objectives of the original application have been achieved.

3. The Future

This landmark structure will continue to suffer from the ceaseless pounding of the ocean swells and the on-going corrosion of the salt water and spray. As a unique and irreplaceable public asset the City will continue its efforts to preserve it, including seeking additional funding from any available sources. This project allowed many improvements to be made, but maintenance will continue and more repairs will be needed in the future.

During the project, it was discovered that another deck hatch was failing, and it was shored-up for the time being. At some point, it will need to be replaced, and similar repairs will likely be needed over time. As part of this project, the Foundation agreed to fund the preparation of generic design documents for future hatch replacements, based on the documents prepared for the specific locations repaired at this time. This will save substantial time in arranging for contractors to make the repairs and re-open the Pier to the public relatively quickly when the need for such work arises.

4. Lessons Learned

An artificial structure in the coastal environment will require continuing and on-going efforts to maintain it and to periodically repair the degradation that will occur.

5. Project Documents

- Photos are attached

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Figure 1: Upon delivery of the scaffold truck, and before it was driven out onto the Pier to begin the work, the scaffolding was checked-out. This machine allowed the crew to work safely on the underside of the Pier (the platform section can swing around to any angle underneath) and on the piles. A boat or barge could not have worked between the piles and in the surf zone. (Photo by Lee Panza)



Figure 2: Spalling of the concrete had exposed the reinforcing, and many of the outer bars had rusted completely through. (Photo by Lee Panza)



Figure 3: After chipping-away the loose concrete, the most seriously damaged reinforcing was replaced. These angled pieces of rebar were epoxied into holes drilled up into the outer wall of the beam, and they are coupled to existing bars that had been cut back to competent steel. (Photo by Ramon Bernardo)



Figure 4: After replacing the damaged steel reinforcement, the spalled areas were filled and sealed with waterproof mortar. (Photo by Ramon Bernardo)



Figure 5: On the deteriorating piles, the loose concrete was chipped away, but the reinforcing was found to be still in reasonable condition; it was wire-brushed clear of rust. (Photo by Lee Panza)



Figure 6: The spalled concrete on the piles was replaced with waterproof mortar.



Figure 7: The crew is just completing the replacement of a portion of deck that would support the new pre-cast concrete hatch units, which are stacked on dollies at the left rear of the photo. (Photo by Lee Panza)



Figure 8: The wood caps on the parapet wall guardrails had deteriorated to such an extent that some had already fallen off and those remaining were not much better off. (Photo by Lee Panza)



Figure 9: New lumber, of a type that is so tough and durable it is used for truck beds, was fitted and bolted down to the walls. The lighting fixtures were all replaced with LED units. (Photo by Lee Panza)