

THE MUNICIPAL PIER PREVENTATIVE MAINTENANCE PROGRAM

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The Municipal Pier Preventative Maintenance Program was designed to extend the remaining life of St. Petersburg, FL's most recognized waterfront landmark. The St. Petersburg Pier, built in 1926, is a reinforced concrete structure that was rehabilitated in 1934 and 1978 before the maintenance program was initiated in 1989.

The pier sits at the end of a 100 ft (30.5 m) wide 1 mile (1.6 km) long approach into the Gulf of Mexico. The approach consists of 15 in. (380 mm)

thick cast-in-place concrete slabs, 3 in. (76 mm) wide beams, 20 x 30 in. (508 x 762 mm) caps, and 6 x 2 ft (1.8 x 0.6 m) struts. The end of the pier is the 300 x 423 ft (91 x 129 m) pier head on which the unique five-story inverted pyramid building sits. The structure is home to specialty shops, boutiques, galleries, restaurants, meeting space, and The Pier Aquarium. The pier is open 365 days a year.

MAINTENANCE PROGRAM DEVELOPED

In 1989, severe deterioration prompted the creation of a long-term maintenance program. The very aggressive saltwater environment had caused damage to the concrete and corrosion of the reinforcing steel. A Pier Maintenance Report, completed in 1990 by a team of engineers, detailed inspection of the pier following ACI 345.1R-92, "Routine Maintenance of Concrete Bridges." This guideline covers various potential sources of distress and possible areas affected in the roadway superstructure, substructure, approaches, and slopes. During the inspection, corrosion of the reinforcing steel and concrete spalling due to the aggressive marine environment was discovered. Repairs were planned according to the dry-mix method site preparation in ACI 506R-05, "Guide to Shotcrete," and ICRI Technical Guideline No. 310.1R-2008, "Guide for Surface Preparation for the Repair of Deteriorated Concrete Resulting from Reinforcing Steel Corrosion." The ICRI Guideline covers the removal geometry, exposing and undercutting of reinforced steel, cleaning and repair of reinforcing steel, and edge and surface conditioning of concrete.

The comprehensive investigation provided recommendations for future care of the structure, including periodic evaluation and regular maintenance. The initial assessment called for the replacement of expansion joints and adjacent spans, including the substructures and superstructure. This was a one-time repair in 1990 that is not included in the periodic maintenance program.

After the initial repairs were complete, the Preventative Maintenance Program was created to inspect the pier every 3 months. This inspection is completed by the Project Manager of the Engineering Department of the city of St. Petersburg. Based on



View of pier from water



Approach to pier



Corrosion on underside of deck



Floating work area under pier



Damage from harsh environment



Newly exposed reinforcing steel protected with a water-based epoxy-cementitious coating

the quarterly inspections, the city prepares a repair document for bidding with outside contractors for any necessary repairs every 2 years. The city selects a management company to run pier operations, which includes leasing the stores and restaurants and keeping up with the daily routine maintenance of the pier building and pier approach.

To repair the damaged sections after inspections in 1994, 1996, 2002, 2005, and 2008, a unique strategy had to be created to accommodate the conditions of the pier. A barge was used to allow workers to reach the areas under the pier that needed repair. The barge work platform was tied to the pier pilings and all debris from the demolition was gathered on the barge. A floating barrier was also installed near the work area to contain debris.

Repairs were completed from underneath the deck, removing 3 to 6 in. (76 to 152 mm) of concrete with chipping hammers and preparing the area with an abrasive blast. The newly exposed reinforcing steel was protected with a water-based epoxy-cementitious coating containing an integral corrosion inhibitor for additional protection. The concrete was then repaired using a fiber-reinforced shotcrete mortar, which also had an integral corrosion inhibitor. The unique shotcrete used to repair the pier is designed for docks, dams, and pier structures in extreme marine environments. The integral corrosion inhibitor minimizes effects from the extreme Gulf saltwater damage.

The times that work could be completed were limited due to high- and low-tide conditions. At high tide, the water was too close to the pier's underside to allow the barge and workers adequate space to work.

The methods, knowledge, and materials used in this ongoing maintenance program are able to extend the life of this historic structure that creates revenue for the city of St. Petersburg. Open 365 days a year, this major tourist attraction is an important piece of the city's history and tourism.

St. Petersburg Municipal Pier

OWNER

City of St. Petersburg
St. Petersburg, FL

PROJECT ENGINEER

City of St. Petersburg Engineering Dept.
St. Petersburg, FL

REPAIR CONTRACTOR

B & A Contractors, Inc.
Muscle Shoals, AL

MATERIAL SUPPLIER

BASF Building Systems
Shakopee, MN