

# Lincoln Harbor Pier & Bulkhead Rehabilitation Weehawken, NJ

The Hartz Group  
New Jersey Department of Environmental Protection (NJDEP)  
McLaren Engineering Group

May 2010



# Marine Structure

## Lincoln Harbor Pier & Bulkhead Rehabilitation Project

**Project Name:**

Lincoln Harbor Pier & Bulkhead Rehabilitation

**Location:**

Weehawken, NJ



**Owner:**

The Hartz Group

**Contractor:**

Trevcon Construction Company

**Engineer:**

McLaren Engineering Group

**Date:**

May 2010

### 1. Background

Lincoln Harbor is a large, upscale, mixed-use development located on the Hudson River near the Lincoln Tunnel. It is comprised of multiple piers, a marina and two residential and commercial buildings. The pier sections are supported by a system of hundreds of wooden piles. Over time, the structural integrity of the wooden pile system had been compromised due to damage from marine borer attacks. This type of “shipworm” damage is not uncommon in the NY/NJ waters. Recent environmental regulations have improved the water quality of the Hudson river so much so that marine organisms, especially those that eat wood, have begun to thrive. Settling and cracking of concrete structures including a parking lot was further evidence of the severe structural problem.

### 2. Project Scope

The Hartz Group, which is one of the largest privately held real estate owners in the United States, retained the McLaren Engineering Group to evaluate the site. McLaren thoroughly analyzed loading capacities, soil conditions, wooden pile conditions, and damage to the concrete structure. After the study, it was determined the best remedy would be to use corrugated sheet piling driven around the entire perimeter of the piers. Then, underneath the piers, water would be pumped out and engineered fill would be pumped in to stabilize the structures. Resurfacing the concrete pier with composite sheet pile was the most environmentally friendly solution to protect the pier from scour.

### 3. Performance

The use of steel sheet piling was disallowed by the New Jersey Department of Environmental Protection. Due to maintenance (sandblasting) and pollutant (epoxy coatings) concerns the NJDEP permitted only PVC or FRP sheet piling. To meet their engineered specifications, McLaren required UC-50 UltraComposite FRP to be installed. UC-50 is a 36” wide “box” shaped profile which greatly reduced the amount of interlocks on the face of the wall. The UC-50 is the widest synthetic sheet piling produced in the world and can be manufactured to any transportable length. The reduced interlocks and the sufficient effective permeability of UC-50 allowed for installation without costly interlock sealants. Given the complex nature of FRP products and the difficulty in manufacturing them to their design specifications, quality control is a critical component that ultimately determines long-term product performance. Quality at this level can only be delivered when the most stringent steps are followed using an ISO certified manufacturing process.

### 4. Construction

Trevcon Construction, a large local firm familiar with similar type projects drove the sheet piling. Two methods were used to drive the sheets depending on the position at the job site. First, and most often, a large excavator with bucket attachment. Secondly, a crane supported ICE vibratory hammer model 14. Average production was 100 feet per day. The sheets varied from 15’ to 30’ long and were driven into various soil conditions including silty sand, moist medium firm to dense clays with some gravels.

### 5. Wall Specifications

UC-50

Depth	22 ft	7 m
Length	3,250 ft	991 m
Wall Area	90,000 ft <sup>2</sup>	8361 m <sup>2</sup>

## Lincoln Harbor Pier & Bulkhead Rehabilitation Project Photos



The use of composite sheet piling was allowed by the New Jersey Department of Environmental Protection.



Settling and cracking of concrete structures and parking lot was further evidence of the severe structural problem.



Lincoln Harbor is comprised of multiple piers, a marina and two residential and commercial buildings.



The sheets varied from 15' to 30' long and were driven into various soil conditions at an average of 100 feet per day.



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