

Manalapan Seawall

Storm Protection/Erosion Control – Palm Beach, Florida

HISTORY

In the two decades following World War II, the luxurious resort area of West Palm Beach nearly doubled in population as veterans stationed at the local air base returned to the city to live at the end of the war. Located on the east coast of Florida along the Atlantic Ocean, large estates were built seaside in the town of Manalapan, creating breathtaking views of the barrier islands while facing up against the most active hurricane path in the world.

In the 1960s, residents sought to protect the nearly 170 oceanfront properties against the ocean's surge by constructing sea walls of PMA22 steel sheet piles driven into the beach sand with steel tiebacks anchored to concrete deadmen approximately 10 to 12 feet inland.

PROBLEM

In late October 2012, Hurricane Sandy roared up the East Coast and produced a storm surge that overtopped the sea walls in South West Palm Beach. Stretching its damaging winds over 900 miles, Hurricane Sandy generated a destructive surge over an expansive part of the Atlantic coastline. Damage costs wreaked by Hurricane Sandy are well over \$50 billion, making it the second-most devastating storm in U.S. history.

In Manalapan, the sea water over topped the sea walls, washed away the soil, exposed the concrete deadmen and the steel tieback anchors snapped. With its support system compromised, the steel sheet piles failed and fell toward the ocean. Sea water flooded the oceanfront properties and caused significant damage to the ultra prime real estate.

The home owners needed to fix the damaged



sea walls before the next hurricane season. To further complicate things the regulation from the Environmental Protection Agency further expedited the timeline. The removal of the old steel sheet piles and the driving of the new sheet piles was to cease by the start of March to keep from interrupting the seasonal nesting of sea turtles on the beach.

SOLUTION

As with several other Sandy related projects along the East Coast, Nucor Skyline moved quickly to offer design solutions and steel products to afflicted areas. In Manalapan, Skyline collaborated with the home owner's association and their engineer to replace the damaged sea walls.

When the old sheets were extracted from the soil, the steel below the mud line was still 3/8" thick, a testimony to the lack of corrosion when oxygen is not present. The steel sheet piles, having proved the 50-year life rating from the first installation, were chosen again, but this time the product chosen for the main sea wall was coated piles at a thickness of 1/2" (with a 100-year design life).

In a majority of the ocean-side properties, Skyline assisted with the design of a T-wall, with the main wall at a height of 8 feet above the mud line, an increase from the previous height of 5 feet. To stabilize the sea wall, shorter steel sheets were driven into the limestone at 28' to 30' depth. The anchor walls were connected to the main wall using C9

CASE STUDY

Manalapan Sea Wall

connectors. The C9s were welded to the sheets to provide the 90 degree T-wall connection.

As the stabilizing sheets got further inland, shorter lengths of sheet pile were needed. Skyline cut considerable time off its supply timeline by using drops from longer sheets.

In an undamaged property at the southernmost tip of the island, the owner sought to prevent future damage by replacing the current sea wall with steel sheet pile, coated, with a cap and concrete deadmen with steel rod tiebacks (25 feet back from new wall).

At the end of the sea turtle nesting season, the Manalapan properties on the intracoastal side of the island will begin a second phase of the project and steel sheet pile walls for boat slips will be installed.



PROJECT PARTNERS

Owner

Housing Association

Contractors

Hayward Baker
Miami, FL

Subcontractors

Murray Logan Construction
West Palm Beach, Florida

Interlaken

Lantana, Florida

PRODUCTS

1,190 tons of Z-shaped sheets
180 tons of short sheets