

CASE STUDY

# Virginia Beach Erosion & Hurricane Protection Project

Seawall/Beach Replenishment – Virginia Beach, VA

## History

Since 1950, federal and local government in the United States has worked to replenish more than 350 miles of beachfront along the Atlantic Ocean coastline. As the sea level rises, beach erosion accelerates and the municipalities lose a vital defense against superstorms. The frequency of these storms are on the rise — eight of the 10 costliest hurricanes occurred in the past decade — and more than ever, beachfront communities seek solutions that insure their ocean front structures and the lucrative tourism industry.

The City of Virginia Beach, located just south of the Chesapeake Bay entrance, is a prime beach resort. The city's population welcomes nearly 3 million tourists each year, many that come to enjoy shopping, restaurants, museums and amusements along its 3-mile boardwalk.

## Problem

The concerns for Virginia Beach were two-fold: it needed a structure designed to protect the economic livelihood of its waterfront communities — the fragile foundations of hotels and businesses along the boardwalk — and, secondly, a flexible supply chain of material that would not impede on the vital tourism season (Virginia Beach collects 80 percent of its tax revenue from the tourism industry). "We didn't want to roll trucks when the tourists are enjoying the area," Phil Roehrs, the city's coastal engineer said.

## Solution

The City of Virginia Beach, working alongside the Army Corps of Engineers, concluded the best solution was a steel sheet pile seawall with a concrete cap and a decorative façade. The main

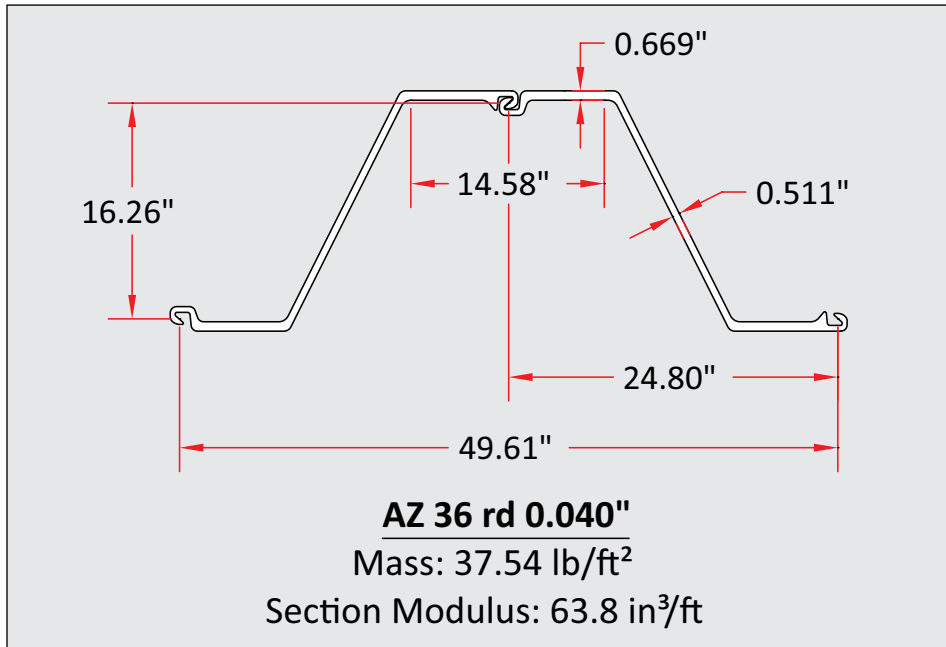


sheet pile wall was constructed with AZ 36 sheet piles (28-foot lengths) supplied by Skyline Steel. The main wall is cantilevered in some sections, and in others, anchored to a secondary wall of AZ 18 sheet pile. According to Roehrs, the design would protect against a 9-foot surge and "survive a 1-in-146-year storm."

The project, under the constraints of a federal formulation project, stayed on its tight schedule because of Skyline's ability to take advance orders and manufacture the sheet piles, apply coating and hold the supply in its Savannah, Ga. stock yard. Despite having just two months from project approval to the

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### Project Partners

Contractors

S.B. Ballard  
Virginia Beach, VA

Waterfront Marine Construction  
Virginia Beach, VA

Designer

Army Corps of Engineers

City of Virginia Beach

### Products

13,000 tons of AZ 36 sheet pile;

2,500 tons of AZ 18 sheet pile  
(for beach access points)

start date of construction, Skyline promptly delivered the sheet piles to Virginia Beach on the first week after the end of the tourist season. Skyline continued to meet the supply demand throughout the length of the project.

The Virginia Beach project area encompassed a 6-mile stretch from Rudee Inlet to 89th Street. Starting in the fall of 1996 and continuing during five subsequent winters and a sixth spring, the project partners constructed 55 blocks of new seawall and 40 blocks of new boardwalk with a bike path. Also included was a storm water pump system that returns sea water back to the ocean. The majority of the project was completed by May 2000, with an average of eight city blocks completed per winter — during one offseason, 16 blocks were constructed. And starting at the end of the summer 2000, the beach was widened to nearly 300 feet as the second measure in a

two-tier system designed by the Army Corps as protection against the storm surge.

The City of Virginia Beach, along with the federal government, spent approximately \$125 million on the hurricane protection and beach replenishment project. The payoff was immediate: in September 2003, just one year after the project was completed, Hurricane Isabel struck the Virginia coastline with nearly a 9-foot surge. According to the Army Corp, nearly \$80 million in storm damage to the Virginia Beach community was avoided because of the project.

During Hurricane Ernesto in 2006, which produced a 6-foot storm tide, approximately \$60 million in damages were avoided. Combined with the forthcoming estimates from Hurricane Irene in 2011 and Hurricane Sandy in 2012, the total amount of money the

project saved the city and federal government is approaching \$300 million in just 10 years.

Critics bemoaned the cost of beach replenishment yet the investment has seen its returns: the tourism industry in Virginia Beach returns net revenue of \$80 million per season while the annualized cost to the city's beach projects and maintenance is just \$2 million per season.