



PROJECT PROFILE

Cape Hatteras Lighthouse

Preservation Consultant and Instrumentation Engineering | Cape Hatteras, NC



CLIENT

National Park Service

BACKGROUND

Constructed in 1870 to illuminate the treacherous waters of North Carolina’s Outer Banks, the Cape Hatteras Lighthouse is now a National Historic Landmark and popular tourist attraction. The 4,800-ton masonry structure consists of concentric brick cylinders connected by rigid brick cross walls resting on a solid granite foundation. Recognized as the tallest brick lighthouse in the world, the 208-foot-tall tapered tower is adorned with distinctive spiraling black and white stripes and an operational rotating beacon that is visible up to 20 miles at sea.

A century of coastal erosion threatened to finally close the gap between the historic lighthouse and the encroaching sea. To preserve the structure, the National Park Service resolved to relocate the lighthouse and several smaller companion structures to a new site 2,900 feet from their original location. This unprecedented endeavor required the support of expert preservationists and a sophisticated monitoring system to detect potential distress during transportation.

SOLUTION

WJE played an integral role at every stage of the successful relocation effort. As part of the pre-move survey, WJE preservationists conducted laboratory analyses of the historic mortar to determine its material properties; documented existing distress and cracking; and compression tested core samples from the granite plinth and brick shaft to establish the strength of the existing materials.

From the thorough assessment, WJE engineers developed a computerized monitoring system to ensure the safe movement of the lighthouse. Fifty-six sensors installed in the structure measured tilt, vibration, acceleration, strain, and climate conditions, relaying data in real-time to the design-build team.

After twenty-three days of incremental movement, the lighthouse arrived at its new location, where WJE preservationists oversaw the construction of a new brick base and performed a post-move survey. Despite the arduous 2,900-foot move, no existing cracks increased, and no new cracks developed. As a final testament to WJE’s meticulous efforts to preserve and strengthen the structure, the newly placed lighthouse weathered two hurricanes without damage just one month after relocation.

