Nantucket Navigational Structures—Information Sheet

New England District, US Army Corps of Engineers

NAVIGATION SECTION http://www.nae.usace.army.mil/navigation/index.htm 8 January 2013

Nantucket Jetty History

Considered both a Harbor of Refuge and a Subsistence Harbor, Nantucket Harbor, plays a critical role to the economy of Nantucket Island and the safety of island residents/visitors. In 1829, a channel was dredged through an existing sandbar to allow deep draft vessels passage into the harbor. After a period of just 1 year the channel had completely shoaled in and no further maintenance was considered until the development of a sediment management system (jetties) could constructed.

The project for improvement of Nantucket Harbor was authorized by the River and Harbor Act (RHA) of 1880, and further supplemented by RHAs of 1886, 1945, and 1963. The list to the right shows a timeline of construction activities for each of the jetties.

It has been noted that without the construction of the East and West Jetty dredging would have been required on an annual basis at a cost many times the original cost of jetty construction and current maintenance schedule. The last maintenance on any part of the Jetty system was completed in 1963, some 50 years ago.

- 1880 - West Jetty constructed (3,955 ft in length) with the purpose of concentrating the ebb tide to encourage natural scouring of channel. Jetty Crown above Mean High Water (MHW) through all phases of tide—considered "Full Cross Section".
- 1900—West Jetty extended an additional 600 ft Full Cross Section and 400 ft "Half Tide Section" for a total of 1,000 ft.
- 1907—East Jetty constructed completed after study determines West Jetty alone does not maintain the navigational channel. First 834 feet constructed to Full Cross Section and 6,153 ft of Half-Tide Section for a total of 6,987 ft.
- 1917—Stone mound added to head of East Jetty for the addition of navigation light.
- 1926—Repairs made to all but the last 300 ft of the East Jetty.
- 1937—Repairs made to various spots on the East Jetty.
- 1962—Major rehabilitation increasing the size of armor stones and height of structure above tide level (+3.0 MLW vs past +1.5 MLW); Increasing the interval between maintenance periods and reduce the tidal flow over the jetty during periods of high tide (navigational safety)
- No additional maintenance has been performed to the East or West Jetty since.

Nantucket Jetty Conditions Reports –2012

As a part of its Navigation Operation and Maintenance Program, the US Army Corps of Engineers complete inspections and condition assessments of jetties and breakwaters associated with Federal navigation projects. This information is then used in a District conditional assessment tool to develop Structural and Functional Condition Ratings. These Condition Ratings are the basis of funding and project scheduling prioritization in the Corps Coastal Structures Management, Analysis, and Ranking Tool (CSMART). Both East and West Jetty were inspected in October 2012 just before Hurricane Sandy, and their conditions summarized in CSMART in No-

Structure Name	Inspection Rating (1-5)	Structural Condition Rating (SCR) (A-F)	Functional Condition Rating (FCR) (A-F)	District Conditional Rating (DCR)	Economic Impact / Consequence Category	Description of Damage
East Jetty	4—Serious	D—Seriously Degraded	C—Moderate Functionality	D—Seriously Degraded	II	Multiple displaced armor stones creating many large breaches throughout the length of the structure. Deterioration is noted over a significant portion of the structure. Some area of the structure have settled, collapsed or eroded to an extent that, in the damaged area, no portion of the crest is still located at the original elevation.
West Jetty	4—Serious	D- Seriously Degraded	B—Adequate Functionality	C— Moderately Degraded	II	Multiple displaced armor stones creating many large breaches in certain portions of the structure. The geometry of the structure is shoving significant change in some areas. Some of the structure may have settled, collapsed, or eroded to an extent that other portions of the structure are exposed or left unsupported.

Inspection Photos (2012)—West Jetty

Photo 7—West Jetty Crown displacement / degradation.

Photo 8—Armor stone displacement and Breakwater voids at Low Tide.

Photo 9—Armor stone displacement and Crown elevation loss shown at Mid-Tide.

Photo 10—Breakwater Core exposure and erosion; loss of armor stone units.

Photo 11—Wave protection for Navigation channel in light wind.

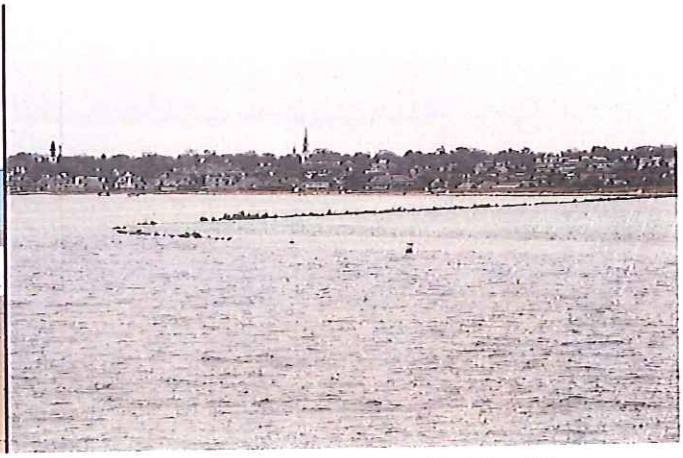

Photo 12—West Jetty wave overtopping in light windsduring Low Tide.

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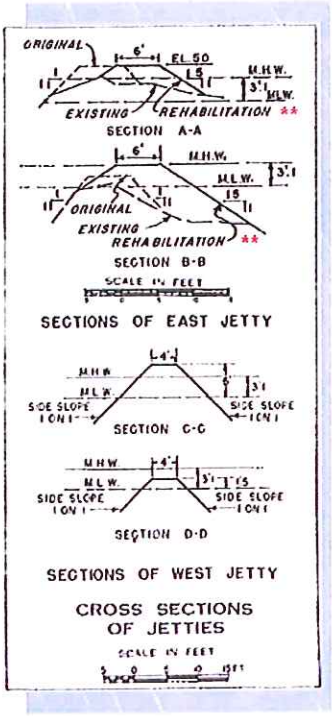
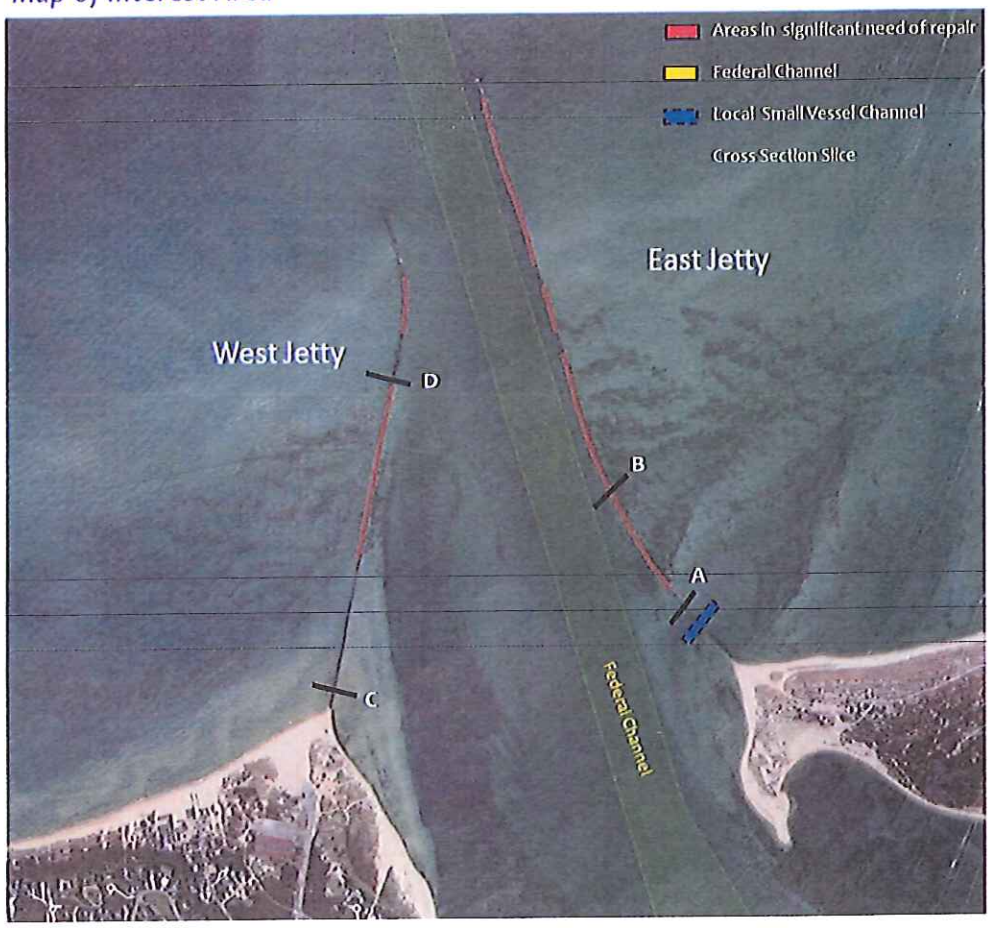
Visual Damage Assessment

Map of Interest Area

Cross sections from Technical Report REMR-CO-3 (1989)



** Rehabilitation completed in 1963



USACE Analysis to Repair Nantucket Jetties

An analysis was undertaken by the New England District in order to convey the extent of repairs and potential costs involved in a maintenance event at the Nantucket east and west jetties. The figures are to be used for planning purposes only and would not for detailed plans and specifications required for a construction contract. The quantity estimates and the drawings prepared for this study were based on the following information sources::

- SHOALS-03003 "HYDROGRAPHIC AND TOPOGRAPHIC LIDAR SURVEY, NANTUCKET HARBOR ENTRANCE - SURVEY REPORT" January 2004.
- The Corps Of Engineers, New England Division, Apr, 1961 "NANTUCKET HARBOR, MASS Plan & Profiles of East & West Breakwater (sic)" Project Drawing Number Nt. 204, sheet 1 OF 6
- The Corps Of Engineers, New England Division, May, 1962 "NANTUCKET HARBOR, MASS Rehabilitation of East Jetty", Project Drawing Number Nt. 206, sheets 1, 2, and 3

NOTE: Volumes of Armor Stone are based on data available in 2005 (LIDAR data). No new data on Armor Stone volume were available at production time of this information sheet. Additional data collection and analysis would be required to confirm and/or revise the official amount of stone needed to complete repairs.

Amount of Stone Required for Repair

East Jetty — 16,100 CY of 2 to 2 1/2 ton stone size

West Jetty — 4,600 CY of 2 to 2 1/2 ton stone size

Estimated Cost to Complete Jetty Repairs

Item	Cost
Development of Environmental Permits, Plans & Specifications, and Supervision & Administration	$400K
Repair of East Jetty	$7.6 M
Repair of West Jetty	$2.2 M
Total	**$10.2 M**

Inspection Photos (2012)—East Jetty

Photo 1— Full Cross Section during *Mid-Tide*

Photo 2— Half Tide Cross Section at *Low Tide*

Photo 3—Vessel passing during High Tide.

Photo 4— Voids in East Jetty during Mid-Tide

Photo 5— Channel Light at the end of East Jetty (structural disrepair).

Photo 6— Displaced Armor stone due to wave activity.