

## HISTORY LESSON

# Weathering the Storm: the Galveston Seawall and Grade Raising

What may be the deadliest natural disaster ever to strike the United States occurred on September 8, 1900. On that day a hurricane of category 4 pounded Galveston Island, just off the coast of Texas, killing more than 6,000 people. The storm surge reached a height of 15 ft (4.6 m) above the island's sandy grade, leaving practically no places of refuge. In the years that followed, three of the nation's most renowned engineers were commissioned to ensure that the tragedy would never be repeated. They undertook one of the most ambitious projects in engineering history as they designed and constructed a large concrete seawall and raised the grade of the entire city of Galveston, which is in the northern part of the island.

At a convention in November 1901 sponsored by the board of trade of Fort Worth, Texas, to discuss the current and future needs of Galveston, a group of wealthy Galveston businessmen proposed a radical program to oust the current municipal government in favor of governor-appointed commissioners. These businessmen, who belonged to a group dubbed the Deep Water Committee (DWC) because of its role in commissioning the construction of two jetties and dredging the harbor near Galveston Island to promote commerce, discredited members of Galveston's current government by blaming them for the city's financial woes. As a result, Governor Joseph D. Sayers refused to offer state financial aid until management of the city's finances changed. With the approval of the legislature, the governor adopted the DWC's plan and replaced Galveston's government with members of that committee.

Among the first acts of the new municipal government was the formation of a board of engineers charged with devising a plan to protect the island from future hurricanes. The three engineers appointed to that board were Henry Martyn Robert, Alfred Noble, and Henry Clay Ripley. Robert was a retired army brigadier general, the author of *Robert's Rules of Order* (full title, *Pocket Manual of Rules of Order for Deliberative Assemblies*)—a work that over the years has helped countless organizations conduct their affairs in a civilized and expeditious manner—and a former chief engineer of the U.S. Army Corps of Engineers. Noble, who served as ASCE's president in 1903, was one of the best known civil engineers in the country. He had been involved in the project that had raised parts of the city of Chicago and constructed its breakwater and had worked with a commission to determine the route of the Panama Canal. Ripley, a civil engineer with the Corps in Galveston, had surveyed Galveston's jetties as well as the alignment of a shipping channel near Houston.



Courtesy of the Rosenberg Library, Galveston, Texas



ASCE Archives

Approximately 12 million cu yd (9.2 million m<sup>3</sup>) of fill was used to raise the city of Galveston, top. Amazingly, sewer, water, and gas mains were raised without breaking lines or interrupting service. Concrete for each section of the seawall was placed in alternate sections of formwork, above, and allowed to cure for seven days. Workers then constructed the intervening sections. The seawall was 16 ft (4.8 m) wide at its bottom and 5 ft (1.5 m) wide at its top.