



### LINDON WALLACE BATES

1858 – 1924



Lindon Wallace Bates

Born in Marshfield, Vermont in 1858, Lindon Wallace Bates was a Yale-educated engineer who earned notoriety for prominent global work in building a number of transcontinental railways, international port improvement projects, the enlargement of the Suez Canal, and the “three-lake” design of the Panama Canal, among other worldwide infrastructure projects.

The deadliest natural storm in United States history was the Great Storm of 1900, when a hurricane hit the island city of Galveston off the coast of Texas, resulting in 6,000 – 8,000 deaths. Prior to that storm, Galveston was known as “The Wall Street of the Southwest” and was the largest port west of the Mississippi River. In the late 1800’s, there were more millionaires per capita in Galveston than in any other U.S. city, including NYC. Galveston was the first city in the state to have telegraphs, telephones, electric-powered houses, streetlights and trolleys.

In the wake of the terrible tragedy at Galveston, a massive and unprecedented project was undertaken to **build a 3-mile seawall to protect the city, raise the grade of 500 blocks of the city, and build a permanent concrete bridge between Galveston and the mainland to facilitate evacuations.** The chair of the project was Henry Martyn Robert, an American soldier, engineer and author, whose book “Robert’s Rules of Order,” remains the most common authority on parliamentary procedure today.

Once the massive 3-mile-long seawall was built, the second phase of the project required raising the grade of the land by 17 feet on over 500 city blocks. This was an incredible engineering challenge, never before attempted, and complicated by the location of the site: from where and how would they obtain the sand without harming the beaches?

### Here is where Lindon Bates Comes In...

Bates and his engineering firm were awarded the project. Bates' design called for digging a 3-mile-long canal, 20 feet deep, and 200 feet across, wide enough for two dredges to pass one another, across the island behind the seawall, to allow for digging the sand. Four dredges were built to complete the project; however, two were lost at sea and had to be replaced, and ultimately the firm had to subcontract additional dredge support to complete the job. Buildings to be raised were propped up on stilts, while gigantic pipes crossed the area to pump the water and sand to raise the land level.

By the end of the project, more than 2000 buildings were elevated, including churches, schools, 1,226 cottages, 413 one-story houses and 162 stables. St. Patrick's Catholic Church, the largest of the structures raised in the city at 3,000 tons in weight, **required 100 men working together to raise the church, one-half inch at a time, for 35 days.** It was thought to be an impossible feat. However, once the church was raised, a new concrete foundation was poured beneath. The entire project was completed without cracking the main walls or damaging the interior; and church services continued throughout the duration of the project. In addition to raising the ~2150 structures, all of the water mains, gas and sewer lines, streetcar tracks, streets, sidewalks, fences, outhouses and landscaping had to be raised to the new grade.

The project was extremely successful from an engineering perspective, and when the system was tested in a major hurricane just a few years later in 1915, just 8 lives were lost as compared to the thousands 15 years prior.

**Lindon Wallace Bates and the other engineers' work accomplished the impossible and saved countless lives.**

But Wait, There's More...

Credit to: [Galveston A City on Stilts](#), Tim Heller, 2009



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### The Rest of the Story



A 1903 Photo of Galveston Grade Raising, by Zeva B. Edworthy

When Bates and his engineering partner came to Galveston to bid on the grade raising project, there was quite a buzz because of his notoriety. In order to solve the problem of how to obtain the sand, Bates and his partner were rumored to have a new design that would “knock their competitors sky high.”

Competing engineering firms sought to defeat Bates’ bid through a scheme whereby they banded together to withhold their bids, thinking that if only one bid was placed, the Grade Raising Board would be forced to decline and call for a new round. This would allow the competitors to understand Bates’ approach and attempt to better compete against it. However, the group did not realize that an unknown contractor from Iowa had just arrived and placed a bid, unaware of the scheme. The board reviewed the two submissions and awarded the contract to Bates and his partner!

While the project was extremely successful from an engineering perspective, as tested in subsequent storms; those conniving contractors may have had the last laugh, as **the costs incurred by Bates’ firm exceeded the bid and resulted in them losing a quarter of a million dollars on the project.**

In addition to the Galveston project and the famous design of the Panama Canal, in 1900 the French government conferred on Bates a *Grand Prix* and decoration for "distinguished services to science," and he was chosen to membership in various foreign as well as American engineering societies. He wrote:

- *The Navigation Interests of Nations in Ports and Waterways* (1900; French translation, 1900)
  - *The Panama Canal* (1905)
  - *Retrieval at Panama* (1907)

Bates married in 1881 and had two sons. One was Lindon Wallace Bates, Jr. (1883–1915), who became a renowned engineer in his own right and wrote several books on technical and economic subjects. Lindon Jr. died in the sinking of the RMS Lusitania, a British ocean liner that was sunk on May 7, 1915 by a German U-boat about 11 miles (18 km) off the southern coast of Ireland, killing 1,198 passengers and crew. The sinking occurred about two years before the United States declaration of war on Germany. Perhaps as a result of his son's death in that tragedy, Bates became chairman of the Engineering Committee of the Submarine Defense Association in 1917, supporting the war effort.

Credit to: Story from the December 30, 1904 Galveston Tribune as quoted in the book Galveston A City on Stilts.