The Brooklyn Bridge is a hybrid cable-stayed/suspension bridge in New York City. It connects the boroughs of Manhattan and Brooklyn, spanning the East River. The Brooklyn Bridge has a main span of 1,595.5 feet (486.3 m) and a height of 276.5 ft (84.3 m) above mean high water. It is one of the oldest roadway bridges in the United States and was the world's first steel-wire suspension bridge, as well as the first fixed crossing across the East River.

The Brooklyn Bridge started construction in 1869 and was completed fourteen years later in 1883. It was originally called the New York and Brooklyn Bridge and the East River Bridge, but it was later dubbed the Brooklyn Bridge, a name coming from an earlier January 25, 1867 letter to the editor of the Brooklyn Daily Eagle and formally so named by the city government in 1915. Over the years, the Brooklyn Bridge has undergone several reconfigurations; it formerly carried horse-drawn vehicles and elevated railway lines, but now carries vehicular, pedestrian, and bicycle traffic. Commercial vehicles are banned from the bridge.

Design

Although the Brooklyn Bridge is technically a suspension bridge, it uses a hybrid cable-stayed/suspension bridge design. The towers are built of limestone, granite, and Rosendale cement. The limestone was quarried at the Clark Quarry in Essex County, New York. The granite blocks were quarried and shaped on Vinalhaven Island, Maine, under a contract with the Bodwell Granite Company, and delivered from Maine to New York by schooner.

The bridge was built with numerous passageways and compartments in its anchorages. New York City rented out the large vaults under the bridge's Manhattan anchorage in order to fund the bridge. Opened in 1876, the vaults were used to store wine, as they were always at 60 °F (16 °C). This was called the "Blue Grotto" because of a shrine to the Virgin Mary next to an opening at the entrance. When New York magazine visited one of the cellars in 1978, it discovered on the wall a "fading inscription" reading: "Who loveth not wine, women and song, he remaineth a fool his whole life long."

The bridge was conceived by German immigrant John Augustus Roebling in 1852, who spent part of the next 15 years working to sell the idea. He had previously designed and constructed shorter suspension bridges, such as Roebling's Delaware Aqueduct in Lackawaxen, Pennsylvania, and the John A. Roebling Suspension Bridge between Cincinnati, Ohio, and Covington, Kentucky.

In February 1867, the New York State Senate passed a bill that allowed the construction of a suspension bridge from Brooklyn to Manhattan. Two months later, the New York and Brooklyn Bridge Company was incorporated. The company was tasked with constructing what was then known as the New York and Brooklyn Bridge.

While conducting surveys for the bridge project, Roebling sustained a crush injury to his foot when a ferry pinned it against a piling. After amputation of his crushed toes, he developed a tetanus infection that left him incapacitated and soon resulted in his death in 1869. His 32-year-old son, Washington Roebling, was later designated to replace his father. "After a week I had become sufficiently composed to take a sober look at my own situation," Washington later wrote. "Here I was at the age of 32 suddenly put in charge of the most stupendous engineering structure of the age! The prop on which I had hitherto leaned had fallen -- henceforth I must rely on myself -- How much better when this happens early in life, before we realize what it all implies."

Construction of the Brooklyn Bridge began in 1869. The bridge's two towers were built by floating two caissons, giant upside-down boxes made of southern yellow pine, in the span of the East River, and then beginning to build the stone towers on top of them until they sank to the bottom of the river. Compressed air was pumped into the caissons, and workers entered the space to dig the sediment, until the caissons sank to the bedrock. Once the caissons had reached the desired depth, the caissons were filled in with brick piers and concrete. The whole weight of the bridge still rests upon these constructions.

Many workers became sick with the bends during this work. This condition was unknown at the time and was first called "caisson disease" by the project physician, Andrew Smith. Washington Roebling suffered a paralyzing injury as a result of "caisson disease" shortly after ground was broken for the Brooklyn tower foundation on January 3, 1870. Roebling's debilitating condition left him unable to physically supervise the construction firsthand.

As chief engineer, Roebling supervised the entire project from his apartment with a view of the work, designing and redesigning caissons and other equipment. He was aided by his wife, Emily Warren Roebling, who provided the critical written link between her husband and the engineers on site. Emily Warren Roebling understood higher mathematics, calculations of catenary curves, strengths of materials, bridge specifications, and intricacies of cable construction. She spent the next 11 years helping to supervise the bridge's construction.

When iron probes underneath the caisson for the Manhattan tower found the bedrock to be even deeper than expected, Roebling halted construction due to the increased risk of decompression sickness. He later deemed the sandy subsoil overlying the bedrock 30 feet (9.1 m) below it to be firm enough to support the tower base, and construction continued.

The construction of the Brooklyn Bridge is detailed in The Great Bridge (1972), the book by David McCullough, and in Brooklyn Bridge (1981), the first PBS documentary film by Ken Burns. Burns drew heavily on McCullough's book for the film and used him as narrator. It is also described in Seven Wonders of the Industrial World, a BBC docudrama series with an accompanying book, as

well as the book Chief Engineer: Washington Roebling, The Man Who Built the Brooklyn Bridge (2017).