The Brooklyn Bridge

by ***Ir. Tham Kum Weng***

JAMES Finley (1762-1828) has been generally acknowledged as the first designer and builder of the modern age suspension bridge. His claim to fame is the Jacob's Creek Bridge (1801) in Pennsylvania in the United States (US). Since then, engineers have developed and gained scientific engineering knowledge and artistic ingenuity to design and construct many such long bridges to span large waterways to meet the growing land transportation needs of the human civilisation. At present time, the longest suspension bridge is the Akashi Kaikyo Bridge (Japan) built in 1998 with a main span of 1991m.

The Brooklyn Bridge in New York City, US, opened on May 24, 1883, is the first steel-wire suspension bridge and has remained an iconic part of the skyline of the growing metropolis. It connects the New York City island boroughs of Manhattan and Brooklyn. The bridge is 1825m long and 26m wide with 41m of clearance over the waterway. It remained the longest suspension bridge (486.3m main span) in the world until 1903. Since then, two other parallel linkages (i.e. Williamsburg Bridge (1903) 487m main span and Manhattan Bridge (1912) 450m main span) have also been built to complement the Brooklyn Bridge.

On my recent trip to New York City, I was able to walk on the pedestrian walkway built above the median of the two 3-lane carriageways. The walkway enables pedestrians a panoramic view of the surrounding in a very safe environment. In my opinion, this must certainly be the unique feature of the Brooklyn Bridge. I spent some moments to admire the beauty and intricacies of the bridge which embodies a good harmony of the human spirit and nature in this wonderful creation of mankind. I returned in the evening to enjoy a spectacular view of the bridge against a backdrop of illuminated skyscrapers of the famed Manhattan skyline.

The Brooklyn Bridge was designed by John Augustus Roebling to be six times stronger than it needed to be at that time. Hence, it is still able to sustain the present 21st Century traffic. However, the New York City Department of Transportation has now placed a 3-ton maximum vehicle weight restriction on the bridge. Nevertheless, the bridge has to be regularly and properly maintained. An extensive remodelling was completed in 1952. Further rehabilitation works are being planned to ensure continued safe operating condition of the bridge.

Incidentally, the construction of the bridge has an ironic history. It also recorded the role of a woman in engineering 140 years ago. Unfortunately for John Roebling, he succumbed to a severe foot injury during survey works. His son, Washington Roebling, took over the construction of the bridge on January 1870. He too suffered a paralysing injury known as "caisson disease", a condition which plagued many of the underwater workers. John Roebling's remarkable wife, Emily Warren, then stepped in and provided the critical written link between her husband and the engineers on site. She spent the next 11 years assisting Washington to supervise the bridge's construction. Now, who says civil engineering is not for women?

The bridge came to reflect the progressiveness of New York at the end of the 19th Century. Till today, tourists continue to admire the essential city landmark of outstanding engineering accomplishment that is still renowned across the world. It is a living testimony of the engineering ingenuity and innovation of engineers in the past, who were able to combine form, aesthetics and functional requirements to bring about the realisation of a vision. We too, perhaps, can continue to learn from such great personalities, and maybe to leave some footprints in our engineering career. ■