

## Cable Tension Management for Cable-Stayed and Suspension Bridges

# Cable Tension Management Using a High-Performance Laser Doppler Vibrometer

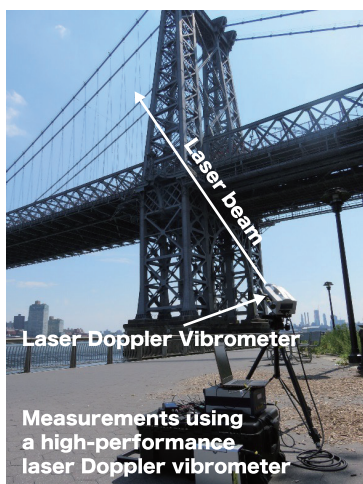
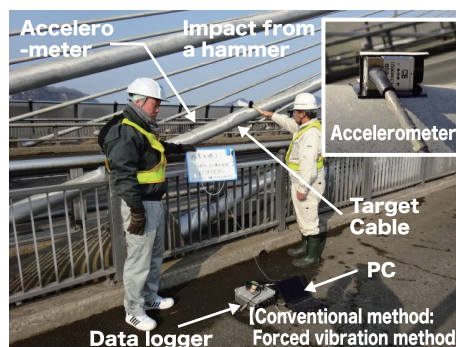


Road projects crossing straits and connecting major cities are accelerating, leading to the construction of numerous large bridges such as cable-stayed bridges and suspension bridges. These bridges feature cable-supported structures, making cable tension management fundamental to ensuring their safety and reliability.

At Kamiharu, we utilize high-performance laser Doppler vibrometers to perform cable tension management for numerous cable-stayed and suspension bridges constructed both domestically and internationally.

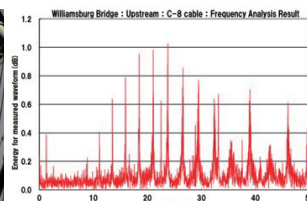
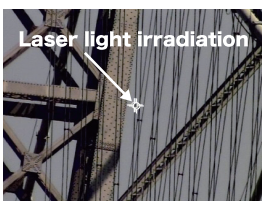
## The Appeal of High-Performance Laser Doppler Vibrometers

Traditionally, cable tension has been estimated indirectly by measuring forced vibrations using accelerometers and applying the relationship between the cable's natural frequency and tension. This method requires installing accelerometers directly on the cable and forcibly vibrating it using tools like hammers. While access to the cable being measured is relatively easy if a walkway is available, large bridges such as cable-stayed bridges and suspension bridges



Using a high-performance laser Doppler vibrometer, Josei can capture multiple higher-order cable vibrations from a distance of up to 600 meters without any contact, simply by shining a laser beam onto the target cable. Since no target is required for the beam, measurements can be taken from any location.

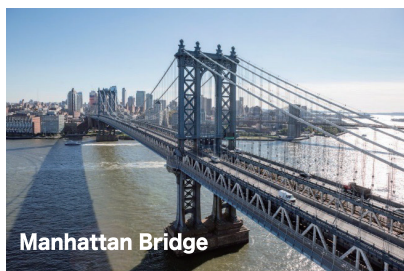
Furthermore, with a sampling frequency of 2.5 MHz, forced cable vibration testing is



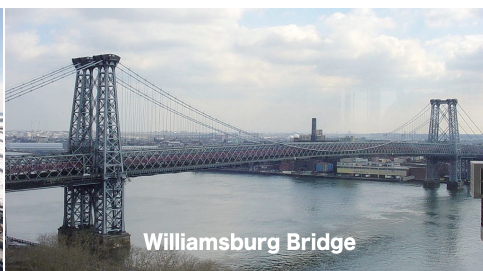
unnecessary, and measurement is possible using micro-vibrations caused by wind or constant loads.

## Domestic and international track record

At Josei, we are involved in cable tension management for cable-stayed bridges and suspension bridges both domestically and internationally. Below are the main bridges where we have conducted measurements.



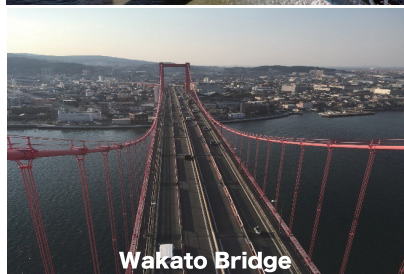
Manhattan Bridge



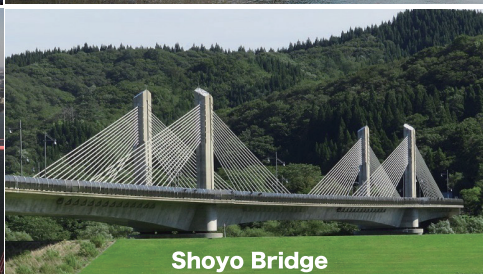
Williamsburg Bridge



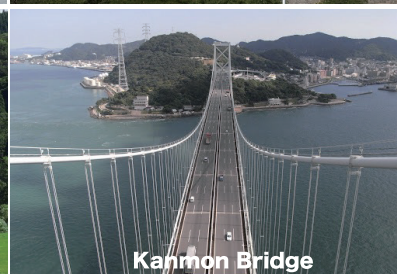
George Washington Bridge



Wakato Bridge



Shoyo Bridge



Kannon Bridge