Structural Health Monitoring of Signature Bridge in Delhi - the Bridge-Structural-Health-Monitoring-System for the Wazirabad Bridge Project

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Summary

A new cable-stayed bridge is currently under construction across the River Yamuna in Wazirabad, Delhi. The bridge will have a total length of 675 m, with a main span of 251 m. Its steel-concrete composite deck, with a total width of 35.20 m, will carry four lanes of traffic in each direction. Its dramatic inclined steel pylon, with a height of 154 metres, and elegant stay cable design, will make it a particularly attractive and imposing addition to the Wazirabad skyline.

The bridge will be equipped with a sophisticated structural health monitoring system, supplied by a joint venture of Mageba India, Mageba Switzerland and Vienna Consulting Engineers.

The paper describes the purpose of the system and the requirements it will fulfil, and presents the general system layout, a description of the equipment and the technical solution for data transfer. A special focus is given to the subject of data management, which includes the archiving, analysis and presentation of the recorded data. In addition to the compulsory control room devices, the system will include a user interface which allows secure internet access to the monitoring data and results, from any location at any time.

Keywords: SHM, permanent structural health monitoring system, internet user interface, turn-key solution, automatic data analysis, professional monitoring services

1. Introduction

This document describes the bridge structural health monitoring system (BSHMS) which is to be provided for Delhi's new Signature Bridge. It covers the development and design of the instrumentation systems for the monitoring of behaviour, performance and condition of the structure.

The system is intended to fulfil three major purposes:

- structural health monitoring and damage detection;
- monitoring of weather loading (e.g. temperature, storms); and
- earthquake monitoring

The monitoring system needs to be implemented by means of industrial-grade components capable of continuous uninterrupted operation during earthquakes or rough weather conditions. The system will monitor:

- environmental factors;
- load factors; and
- bridge structural response

https://doi.org/10.2749/222137813808627109

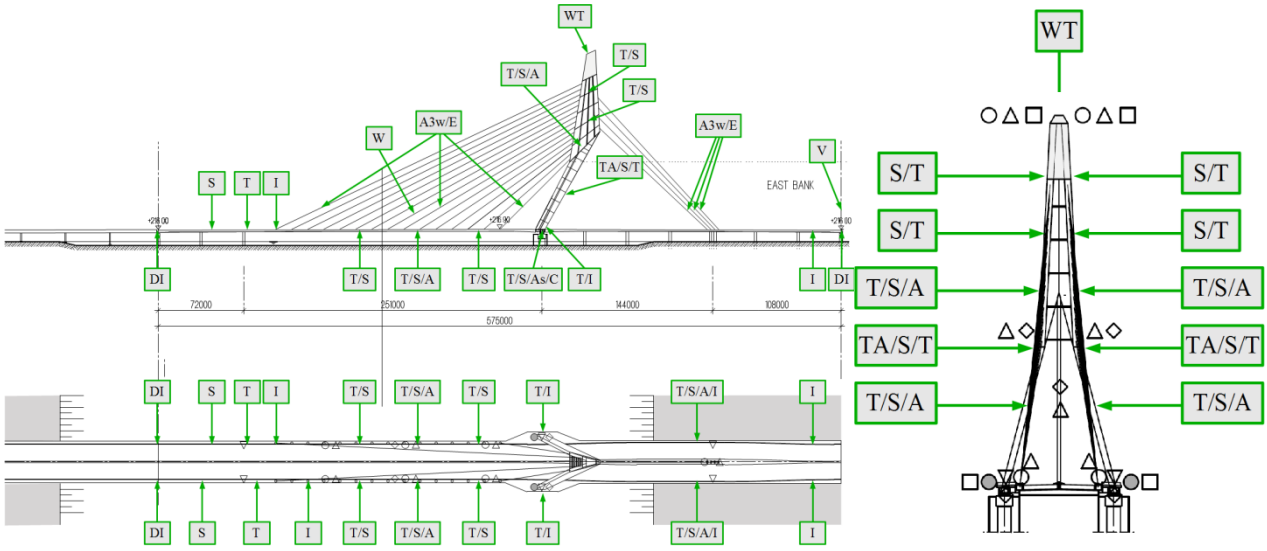

Figure 1: Sensor layout

Sensor	Logo	Sensors according to Specifications	Channels according to Sensors
		Sensors	Channels
Structural temperature	T	20	24
Strain gauge boltable	S	10	10
Strain gauge weldable/ glueable	S	10	10
Wind sensor 3D	W	1	4
Wind multi-sensor (Wind 2D direction and speed, ambient temperature, precipitation levels, barometric pressure, relative humidity)	WT	1	6
3D accelerometers, cables	A3w	18	54
3D accelerometer, deck & pylon	A	8	24
Seismic accelerometers	As	4	12
Displacement sensor	DI	4	4
Inclination, tilt	I	4	8
Corrosion	C	3	6
DV Camera	V	4	
Traffic analyzer	TA	8	
Electromagnetic sensors	E	9	9
Sum		104	171

Figure 2: Summary of sensors included in the monitoring system