

Urban Infrastructure: The Signature Cable-Stayed Bridge in Delhi

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1 Abstract

To relief the heavily congested north-eastern access to the metropolis of Delhi a new eight-lane bridge across the Yamuna river was required. The new bridge shall not only resolve the traffic problem but in a holistic approach become a new landmark for the northern part of Delhi and the seed of a new recreational area along the cleaned and recultivated Yamuna shores.

A single-pylon cable-stayed bridge now crosses the Yamuna river bed with a main span of 250 m to leave ample space for the future lake created here. The inverted Y-shaped pylon with a height of 150 m is leaning backwards to counterbalance the weight of the composite deck above the river. Also, the two cable planes of the main span are merged in the pylon to a central cable plane that leads to the backstay anchorages. The outcome was a uniquely shaped, origami-like pylon that is topped by a glass tip to act as a beacon at night.

The combination of a robust composite concrete deck with a prefabricated steel pylon made such a design feasible in the seismic area of Delhi. The bridge is equipped with an advanced monitoring system to ensure its anticipated durability into the next century.

Keywords: cable-stayed bridges, conceptual design, composite deck, signature bridges, bridge construction, India, urban infrastructure, bridge monitoring.

2 Introduction

Urban infrastructure has typically more facets compared to infrastructure far away from habitats. In all cases infrastructure must fulfill its designated function properly and, if it is not for a temporary purpose, it needs to be robust and ideally redundant. Infrastructure always underlies some economic constraints. So, what is different with urban infrastructure? Especially bridges in an urban context are often heavily used by commuters and

goods delivery so that a closure due to damage or repair easily leads to a partial collapse of a city's traffic, affecting thousands of inhabitants. This raises the need for robustness and durability.

Another facet is that urban infrastructure is constructed in a man-made environment, which it should respect and also integrate somehow into it. Since our cities evolve with time and follow certain "fashions", urban infrastructure must develop more