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## **THE PADMA MULTIPURPOSE BRIDGE, BANGLADESH'S LONGEST BRIDGE, PRESENTS UNIQUE ENGINEERING CHALLENGES AND AN IMPRESSIVE OUTCOME**

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### **ABSTRACT**

The Padma Multipurpose Bridge, commonly known as the Padma Bridge, is a two-level steel truss bridge with a four-lane highway on the upper level and a single-track railway on the lower level that has been under construction since 2014 and opened to traffic in June 2022. The upper and lower levels act compositely for live loading with a reinforced concrete deck slab. The bridge presented technical challenges to the client, consultants, and contractors, including river training work and deep foundations in an alluvial flood plain, where the rock formation lies several kilometers below the river bed. Major vessel traffic and ship impact were also challenges. The Padma is one of the world's mightiest rivers, being a distributary of the Ganges and the Jamuna rivers and winding its way through Bangladesh to the Bay of Bengal. Engineers faced many challenges while designing the Padma Multipurpose Bridge, one of the biggest challenges being how to design a structure that could withstand the extreme conditions of the river. The structure consists of main bridge piers, which require "base grouting" and "skin grouting" to verify that they can withstand the required design loads. The largest hydraulic hammers in the world were used to install the steel tubular piles for the main bridge piers. When it is operational, the bridge is expected to boost Bangladesh's GDP by 1.2 percent. The Padma Bridge, which cost \$3.87 billion to construct, is one of Bangladesh's largest construction projects ever and was funded by the Government of Bangladesh (GoB). In the case of Bangladesh, the GoB funded the country's largest construction projects ever.

**Keywords:** Padma Multipurpose Bridge, Road-rail bridge, Engineering challenges, Base & skin grouting, Steel tubular piles.

### **1 INTRODUCTION**

The Padma Bridge, which connects Bangladesh's southwest region with its northern and eastern regions, stands as a testament to the dignity, honor, and distinction of the nation. A recognized cultural UNESCO World Heritage Site, the largest mangrove forest in the country is located in the south. Because of natural calamities, poor connectivity, and a lack of communication, it is currently in imminent danger (Mukul et al., 2020). The honorable Bangladeshi Prime Minister Sheikh Hasina has taken a strong stand to restore the nation's respect and unity in this circumstance through her foresight and strategic preparation (Aditya, 2021).