

Sustainable Solutions for Major River Crossings in Bangladesh

Paul Sanders, Prof. Jørgen S. Steinfeldt, Dr Amar Bahra, James Worth, Prakash Sahoo

COWI, UK & Denmark

Quasi Mohammed Ferdous

Bangladesh Bridge Authority, Dhaka, Bangladesh

Contact: pass@cowi.com

Abstract

Bangladesh lies on the river delta formed as the Padma River enters the Bay of Bengal. Much of the country sits just above the water level and the topography is characterised by a vast network of rivers, some of which are several kilometres wide. In recent decades, the country has seen the need for development of its transport infrastructure to support its economic growth. A major challenge has been the design and construction of river crossings, which encounter deep scour channels and poor ground in these rivers. COWI has developed designs for a number of major bridge crossings in the south and east of Bangladesh. Along with this, COWI has developed designs for platforms to support high voltage transmission line towers, which adopt the same engineering approach as applied to bridges.

Keywords: bridge; driven-piles; scour; braided river; river-delta; HV crossing; platform; Bangladesh; Padma; Jamuna; Meghna

1 Introduction

Bangladesh's GDP has grown by an average of 6% year on year over the last two decades. Over the same period, its population has grown from 130 million to 170 million and has shifted towards urbanisation. Together with an expansion of the manufacturing base, this has significantly increased the pressure on transportation infrastructure. At the same time, these changes have also significantly increased energy demands, particularly as the country moves away from domestic energy sources.

Much of Bangladesh is low lying and located on a vast delta formed by the river system at the east end of the Himalayas. Dominating the delta is the Padma River, referred to as the Meghna River in its lower reaches, which is formed by the confluence of the Bramaputra River in Bangladesh and the Ganges flowing from India. The Padma River demonstrates the challenge of crossing these

ivers: it is approximately 6km wide at the Padma Bridge, has a mean flow of 30,000m³/s and a peak flow of around 135,000m³/s (50-year return period). It is also subject to scour regimes that, in the vicinity of the Padma Bridge, surveys show have lowered the riverbed to below -40m, PWD - a predicament for the crossing structures, in turn compounded by the seismic activity in the area.

2 Sustainable Solutions

Transportation and power infrastructure in Bangladesh will need to develop significantly over the next 10 years as the economy continues to grow. It is vital that this infrastructure is designed and constructed with sustainability at its heart. In order to deliver on this requirement, coordinated planning is necessary, as well as designs that make best use of the materials required. In this regard, embodied carbon is broadly proportional to the quantity of material utilised in infrastructure, whether that is steel or concrete. Given the