



Bhairab Bridge - Bangladesh

The winner of the BCIA International Award 2003, Bhairab Bridge in Bangladesh, takes the Dhaka - Sylhet trunk road across the Meghna River. Benaim designed the bridge with a flexible substructure and a bridge superstructure that sits on large rubber bearings to isolate seismic forces.

Spread across the low lying flood plain of the Bramaputra and the Ganges basin between India and Burma, Bangladesh is a country the size of England that is splintered by the many rivers and tributaries that flow through it on their way into the Bay of Bengal. Bridge building across the major rivers has been a key feature in the country's drive for better road access and economic stability.



The town of Bhairab is located north east of Dhaka the capital city and on the western shore of the Meghna River, one of the rivers in the delta of the mighty Bramaputra. The bridge is a multi-span prestressed concrete box girder structure 920m long, which carries the Dhaka - Sylhet trunk road and provides a direct connection between the riverside towns of Ashuganu and Bhairab. Previously road vehicles and pedestrians had to endure the tedious wait for the car ferry. The only other crossing was an existing multi span rail bridge situated 100m upstream of the new road bridge.

One of the main problems of constructing a bridge of this scale over such a vast flood plain was to secure the foundations and protect the foundations from scour when the river is in flood. In the dry season the river reduces to a depth of 1.5m, but during the monsoons more than 20,000m³/sec may pass through the bridge raising the water level by 6m. Since the railway bridge was built a deeper channel has formed in the river bed to one side of the river bed to one side of the river. Model testing indicated that the channel could move or deepen further. The soil of the river bed comprises soft alluvium deposits of silty sand and clayey silt, which increase in density and compactness with depth. The upper layer of loose material will scour and shift with changing flow regimes, thus meaning that it was important to sink foundation piles deep into the very compact sands.

With such an unstable soil, slip failures can occur and were evident on the river bank quite adjacent to the bridge site. There was concern that if a similar slip occurred under the approach viaducts or link pier with the bridge it could be catastrophic. River training works and embankment protection using dry stone pitching, sand bags and grass covering were incorporated upstream and down stream of the bridge to project the river banks failures. The bed of



the river was reprofiled with sand bags, while 450 metres of the Ashuganu bank and 610m of the Bhairab bank were protected with stone pitching, and bags, soil covering, grass and tree planting. All the sand was dredged from the river bed upstream of the bridge. Labourers employed by the bridge's contractor, Edmund Nuttall, would head pan the sand with their saucer shaped wicker baskets from the barges on to the shore, before the sand was bagged and stock piled ready for placing. It was a well organised, efficient operation that was quicker and cheaper than anything mechanised and an astonishing sight for those more used to mechanised European techniques.

Great ceremony surrounded the opening of the bridge, at which the Prime Minister of Bangladesh and the British High Commissioner spoke. During his speech, the British High Commissioner related a message from the Rt Hon Tony Blair, in which he said:

"It gives me particular pride and pleasure that British funding and know-how, in partnership with your own resources, today results in the completion and opening of this impressive high technology Bangladesh-UK Friendship Bridge. My congratulations to all involved in the project".

The ceremony involved the Prime Minister visiting the foundation stone that she had previously laid and then driving through the tollgate to pay the first 100 taka toll before crossing the bridge. Nuttall made a presentation to the Prime Minister to commemorate the occasion.