

## Severn Bridge, UK



The Severn Bridge was the first steel box girder suspension bridge in the world and was completed in 1966. The bridge is the major structure of the original 3km long Severn Crossing which now carries the M48 motorway across the Severn Estuary. The bridge is 1.6km in length and has a main span of 988m. The ground breaking aerodynamic steel box girder deck is suspended via inclined hangers from 510mm diameter main cables which are supported by 136m high steel box towers. The Crossing was constructed by the Associated Bridge Builders Consortium.

Flint & Neill Limited have had an extensive involvement with this structure over many years, including checking the design of the Merrison Strengthening works in the mid 1970's.

F&N undertook further studies, inspections and assessments during the 1980's, which led to the design and supervision of major refurbishment and strengthening works. These works included the complete replacement of all the hangers, replacement of the rocker bearings, reinforcement of the deck boxes and strengthening of the steel towers. This latter scheme involved an innovative solution whereby four new tubular steel columns were placed within each tower leg and jacked up against the cable saddles to relieve the tower walls of about 2000t of dead load. The works also included extensive repairs and improvements to the trough to deck and cross-girder weld defects, and the complete resurfacing of the steel deck. Both of these involved extensive prior research and development which was carried out by F&N in collaboration with TRL, the University of Bristol and others. F&N has also prepared a comprehensive Maintenance Manual which, among other things, identifies all critical and vulnerable parts requiring particular scrutiny during inspection.

The complex problems presented by the bridge required the development of unique, bold and innovative solutions, and necessitated meticulous planning in order to minimise costs and traffic disruption. The motorway was kept open to traffic throughout these works. Flint & Neill were responsible for the conception, detailed design, investigation and supervision of all aspects of the works, and the project received the Supreme British Construction Industry Award in 1990.



The firm had a continuing involvement in the long term health of the bridge as the Government's Representative overseeing the Severn River Crossing Concession until June 2005. This involved advising on the operation, inspection and maintenance of both the original crossing, including the Wye Bridge and connecting viaducts, and the new cable stayed Second Severn Bridge which is located downstream. The practice continues to advise the Highways Agency and the operators in connection with the crossing.