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Modern Matière Pre-cast Concrete Arch Bridge with Heritage Style

Faced with a failing jack-arch bridge over the Birmingham Canal in Smethwick, Sandwell Borough Council and their engineering consultants Jacobs UK Ltd. have opted for a radical solution.

/24-7PressRelease/ - NOTTINGHAMSHIRE, UK, December 20, 2007 - Faced with a failing jack-arch bridge over the Birmingham Canal in Smethwick, Sandwell Borough Council and their engineering consultants Jacobs UK Ltd. have opted for a radical solution. A Matière pre-cast concrete arch from ABM Design and Build has been installed alongside a century old brick arch structure and an earlier Brindley designed bridge of 1772. The new bridge spans the canal and towpath and is sympathetic in profile and external finish to the earlier structures.

The new bridge completes a programme of works to upgrade bridge decks in the area to meet EU Directive 89/460/EEC for conveying 40 tonne trucks. A council survey in 1994 found the older brick bridges satisfactory, but serious deficiencies in the main beam of the jack-arch extension. These deficiencies were remedied, but a recent resurvey by Jacobs found substantial deterioration and a decision was made to design a replacement for the failed bridge section while retaining the older, but sound, brick arch bridges.

In considering the replacement, the Council considered carefully the practical and aesthetic requirements, including the heritage value of the site. British Waterways, the owner of the original Brindley bridge, were consulted and agreement was reached to use an arch structure in preference to conventional piers and deck. British Waterways also agreed to hand over their heritage bridges to the control of the Council so that future maintenance could be administered by a single body.

British Waterways were insistent on keeping the canal open to navigation during the construction works. This precluded the use of a cast in-situ arch and after consideration the three element pre-cast Matière soil-interactive arch was selected.

ABM is the UK and Ireland licensee for the Matière system, of which there are over 10,000 installations throughout the world. Within the catalogue there are many arch and box bridge configurations, but all have in common the same 4-pin design which provides stability during construction with a single element overbridging unit so that possession time and disruption to under-bridge traffic is minimised.

Main contractors Currall Lewis & Martin (Construction) Ltd. began work in January 2007 on the demolition of the old bridge and the completed structure was handed over in early November. Complications arose because utility services were incorporated in the deck of the old bridge. These were supported by a temporary space frame structure during the works. This gave rise to access difficulties for the placement of the Matière outer arch ring of the bridge that were overcome by the use of a beam and chain support system to allow the ring to be manoeuvred under the service bridge.

The new road bridge is formed from three specially shaped rings with an overall diameter of 9.2 metres. The original canal bridges are flattened arches and so the lower sections of the Matière arches are buried in the earth to give the correct height to span ratio with a navigable height of 4.6 metres.

Disruption to traffic on the canal during the works was minimal. The walls of the Matière bridge were craned into position with only limited need for over canal working. Canal traffic did need to be stopped as the overbridging elements were placed, but once these were fully positioned canal traffic could proceed unhindered as waterproofing, backfilling and compaction proceeded.

The completed structure is faced with class A blue engineering brick, respecting the heritage of the site, but also offering practical advantages of long life and low maintenance. Detailing in the brickwork has been used to emphasise the curvature of the arch and recycled bricks from the old jack arches have been used for towpath paving. The new arch echoes the symmetry of the earlier structures and creates a pleasing sight line.

More Information

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High/low resolution images are on the web at ainsmag.co.uk/ab237/4433ab1a.htm

About ABM Design and Build

ABM Design and Build manufacture pre-cast concrete components that speed road construction and civil engineering projects. Bridge beams, parapets, tunnels, car park components, earth retaining systems, tanks, buried structures and other precision cast concrete elements are delivered to site ready for construction.