

OUR CREDENTIALS

We safely maximise the capacity of existing structures and, where unavoidable, define complex strengthening schemes within significant operational constraints.

As Technical Lead for phase 2 strengthening of The Hammersmith Flyover we applied our extensive experience, which is based on major historic input across all forms of bridges as follows:

PUBLICATIONS and RESEARCH	CONCRETE and POST-TENSIONED CONCRETE BRIDGES	METAL BRIDGES	MASONRY BRIDGES	TECHNOLOGY FOR BRIDGE ASSESSMENT
<p>Our experts have published more than 35 technical papers on assessment of historic structures, and contributed to many significant industry reports and international standards.</p>	<p>We've carried out 95 post-tensioned concrete bridge special investigations since 1971</p>	<p>We pioneered the realistic assessment of structures and assessed 100s of historic metal bridges including steel and cast and wrought iron and many half through girder bridges</p>	<p>Since 1998 we have developed arch standards for Network Rail and provided specialist investigations of masonry structures</p>	<p>In 1990 we started using failure mode effect analysis as an alternative to traditional assessment methods, leading to engineering simulation and 3D computational design</p>
<p>Developed assessment and investigation codes for Department of Transport (1990 to 2016) and Network Rail (1998)</p> <p>Bridgeguard 3 - Specialist Engineering Support Services to Network Rail for the Assessment of 2000 Bridges including Technical Approval, development of sensitivity analysis, code development, advice to 60 Local Authorities and 10 consultants (1996 to 2010)</p> <p>Development of liability guidance for Network Rail and undertaking of over 300 BE4 assessments (1996 to 2010)</p> <p>Developed standards for Network Rail on assessment of jack arch bridges, semi through deck girder and also all forms of deck plates (1996 to 2010)</p> <p>Contributed to Highways England book 'Conservation of Bridges: A Guide to Good Practice' (includes concrete, PT, metal and masonry) (2002)</p> <p>Contributed to CBDG publication TG9 Assessment of Concrete Bridges (2007)</p> <p>CIRIA publication on condition appraisal of Iron and Steel Bridges (2008)</p> <p>Spandrel wall behaviour investigations for Network Rail (2011)</p> <p>Author of 'How to Model Structural Concrete using Finite Element Analysis' for NAFEMS (2015)</p> <p>Major contributor to CIRIA report C764 Hidden defects in bridges - Guidance on detection and management (2017)</p>	<p>95 post-tensioned concrete bridge special investigations (1971 to 2016)</p> <p>Braidley Road Bridge tendon replacement under live traffic (1978 to 1980)</p> <p>M8 Kingston Bridge strengthening (1993). Included the biggest post-tensioning cables ever used in an existing bridge.</p> <p>Cat III check of Medway Bridge strengthening and widening also using additional prestress (1995 to 2003)</p> <p>Major refurbishments including replacing concrete suspended span of Bann Bridge with steel, making it continuous for live load (2003)</p> <p>Specialist support to Network Rail on post-tensioned bridges including Potters Bar station after derailment (2002), and demolition of West Egerton St Bridge (2004)</p> <p>Widening of motorway bridges including on M1 (2008) and M9 (2015)</p> <p>Hammersmith Flyover phase 2. Many innovations including post-tensioning with Ultra High Performance Fibre Reinforced Concrete anchors (2013 to 2015)</p> <p>Investigation of the Varsova Bridge in India - two 112m spans (current)</p> <p>NEXCO. Developing standards for the management of 11,000 post-tensioned concrete bridges in Japan (current)</p>	<p>Coalport Bridge assessment and strengthening (2001)</p> <p>Major Grade listed (2*) bridge assessment and strengthening for Network Rail: Ouseburn, Nene and Chelsea (2002 to 2011)</p> <p>Britannia Bridge: Assessment for Network Rail (2001)</p> <p>The non-linear finite element analysis of bridge D70 for LUL which assessed the construction sequence of a half through girder bridge during strengthening. Saving strengthening costs and significantly reducing the number of road closures. (2006)</p> <p>DLR 3 Car Enhancement project - £6m worth of strengthening saved by reassessment using novel techniques including strain gauge monitoring and novel use of Ultrasonic Impact Treatment Peening (2010)</p> <p>Llangollen Chain Bridge refurbishment of wrought iron chains and deck (2012)</p> <p>The Iron Bridge risk and strength assessment (2013)</p> <p>21 Wrought iron bridges strengthened for the Thameslink K02 scheme (2016)</p>	<p>Repair and assessment of William Edwards footbridge (1997 & 2015)</p> <p>Contributed to development of arch standards for Network Rail (1998)</p> <p>350 Archtec projects assessment and strengthening (1998 to 2016)</p> <p>Strength assessment of Leeds Station vaults (1999 & 2015)</p> <p>Winner of Queen's Award for Enterprise : Innovation, for Archtec (2002)</p> <p>Specialist support to Network Rail on fire damaged arches, part of London's first railway (2003)</p> <p>Full repair strategy for Worcester Viaduct for Network Rail (2006)</p> <p>Assessment of the influence of the construction of the Shard of Glass on London Bridge Station (2007)</p> <p>Britannia Bridge Improvements for North Wales Trunk Road Agency (2009)</p> <p>5000 Thameslink Masonry Arches assessed in 6 months using 'Level 0' tool (2010 to 2013)</p> <p>68 Arch Spans modified for the Bermondsey Dive Under (2012 to 2016)</p> <p>Northern Hub - Specialist support to Network Rail and Contractors (current)</p>	<p>Advanced non-linear FEA and concrete / reinforcement modelling has increased assessed capacity of more than 100 rail bridges from zero live load to full 40t assessment loading saving significant strengthening costs (1990 to date)</p> <p>Use of Hidden Strength in Assessment, including use of compressive membrane action and non-linear analysis (1990 to date)</p> <p>Development of Finite Discrete Element for detailed masonry bridge assessment (1997)</p> <p>Advanced non-linear buckling analysis to improve half through edge girder strength assessments (2004)</p> <p>FMEA used as an alternative to traditional assessment (2009)</p> <p>Laser aided modelling LAM® developed to accelerate bridge modelling and analysis (2009) enables FE models to be developed direct from point clouds</p> <p>Digital photogrammetry and UAVs used for capturing bridge geometry and visual inspection (2015)</p> <p>BIM LoD2 used in design of bridge strengthening (2015)</p> <p>Web hosted wireless instruments used for monitoring (2016)</p>

GET IN TOUCH

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ABOUT RAMBOLL

Ramboll is a leading engineering, design and consultancy company founded in Denmark in 1945. The company employs 13,000 experts and works across the markets: Buildings, Transport, Planning & Urban Design, Water, Environment & Health, Energy, Oil & Gas and Management Consulting.

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