

## IAN FIRTH

*BSc, MSc, DIC, CEng, FEng, FICE, FStructE, HonFRIBA*

### Bridges and Structural Engineering

**Contact:**

email                ian@ianfirth.com  
phone                +44 (0)7840 047738



**Employment:**

2018 – present     Ian Firth Structural Engineering  
2017 – 2018        Technical Director, COWI (UK) Ltd  
2008 – 2016        Director, Flint & Neill Ltd (a COWI Company)  
1990 – 2008        Partner, Flint & Neill Partnership  
1979 – 1990        Engineer, Flint & Neill Partnership

**Education:**

BSc. University of Bristol. 1979  
MSc, DIC. Imperial College of Science and Technology. 1982

**Professional Affiliations:**

Fellow of the Royal Academy of Engineering, FEng. 2007  
Fellow of the Institution of Civil Engineers, FICE. 1998  
Fellow of the Institution of Structural Engineers, FStructE. 2000  
Honorary Fellow of the Royal Institute of British Architects. HonFRIBA, 2018

**Appointments:**

President, Institution of Structural Engineers. 2017  
Chairman, British Group, International Association for Bridge & Structural Engineering. 2013 - ongoing  
Chairman, Bridges to Prosperity UK Charitable Trust. 2014 - ongoing  
Council Member, Construction Industry Council. 2017 - ongoing  
Royal Academy of Engineering Visiting Professor, Warwick University. 2018 - ongoing

**Career Summary:**

Ian Firth has 39 years of experience in the design, assessment and structural investigation of a wide variety of bridges and other structures. These include some highly complex and challenging projects, and range from very long suspension and cable stayed bridges, such as the Messina and Stonecutters Bridges, to much smaller but unique and unusual structures, such as the Bridge of Aspiration, Lockmeadow Footbridge and Taplow Bridge for example. He has designed over 80 bridges (although not all have been built) and has developed a reputation as one of the world's leading bridge designers and strongest advocates for achieving quality and elegance in bridges and infrastructure.

Ian obtained most of his professional experience with Flint & Neill, the world famous engineering consultancy, becoming a Partner in 1990 at the age of 34. He helped to develop the practice's bridge design capability, leading to success in hard-fought international design competitions like the Poole Harbour Crossing (1997) and Stonecutters Bridge (2001). He was jointly responsible for steering the firm towards joining COWI in 2008, whereupon he became Chief Operating Officer of the new entity. Since then, he has continued to direct the designs, independent checks and structural assessments of bridge projects, large and small, around the world.

He is well known for his pioneering work on bridge design, often working alongside leading bridge architects to deliver innovative and elegant design solutions, and is a frequent speaker on the importance of contextual and elegant design in bridges, including in his [2018 TED Talk](#). Ian provides expert, specialist advice to clients on bridge design, construction, operation and maintenance, and participates on jury panels for bridge design competitions.

In addition to his work on bridges, Ian also has considerable experience in the design of complex and major building structures, especially those involving long spans such as stadia and large arenas. Such projects include the refurbishment and extension of London's National Theatre, the O2 Millennium Dome and the London Olympic Stadium.

### **Selection of Project Experience (with completion dates):**

- Ongoing LESOTHO HIGHLANDS WATER PROJECT (PAHSE 2), LESOTHO  
Member of International Panel of Experts advising on design and construction of bridges and other structures.
- Ongoing COLNE VALLEY VIADUCT, HIGH SPEED 2 RAILWAY, ENGLAND  
Design review of critical stretch of elevated high speed railway in post-tensioned concrete.
- Ongoing NINE ELMS TO PIMLICO BRIDGE, LONDON, ENGLAND  
Design of 150m span cable stayed pedestrian and cycle bridge over the river Thames.
- 2019 CAMPBELL PARK FOOTBRIDGE, MILTON KEYNES, ENGLAND  
Design of unusual 3-way steel pedestrian bridge over the Grand Union Canal.
- 2019 SECOND HINTERRHEIN BRIDGE, REICHENAU, SIWTZERLAND  
Design of steel twin box girder railway bridge over the upper reaches of the river Rhine.
- 2019 MONTGOMERY BRIDGE, LONDON  
Design of 35m span steel bascule bridge connecting the new Wood Wharf development to Montgomery Square in Canary Wharf.
- 2018 TAPLOW BRIDGE, MAIDENHEAD, ENGLAND  
Design of slender steel arch footbridge over the Thames, with 40m main span.
- 2016 DESTRUCTOR BRIDGE, BATH, ENGLAND  
Design of 50m steel road bridge over the river Avon, with eccentric shallow steel tied arch, in highly sensitive World Heritage site.
- 2016 INNER HARBOUR BRIDGE, COPENHAGEN, DENMARK  
Design of 180m opening bridge for pedestrians and cyclists with innovative retractable spans.
- 2015 OLYMPIC STADIUM TRANSFORMATION, LONDON  
Erection engineering for replacement of existing tension ring and cable roof structure with new larger lightweight roof for re-use as a football stadium.
- 2015 NATIONAL THEATRE – NT FUTURE, LONDON  
Redevelopment of landmark theatre, including new production, front and back stage facilities, and extensive re-configuration of listed structure. Architect: Haworth Tomkins.

- 2014 GREENWICH SWING BRIDGE, LONDON  
Design of cable stayed swing bridge with 45m span over Deptford Creek by the Thames.
- 2012 THE SHED, NATIONAL THEATRE, LONDON  
Structural design of temporary theatre, to accommodate experimental and contemporary shows during the main NT Future redevelopment works. Architect: Haworth Tomkins.
- 2012 WEST GATE BRIDGE, MELBOURNE, AUSTRALIA  
Award winning assessment and strengthening of the crossing, including the 336m steel box girder cable stayed main span, to enable it to carry additional traffic lanes.
- 2011 GOODLAND GARDENS MOAT BRIDGE, TAUNTON, ENGLAND  
Design of award winning pedestrian bridge with glass deck and balustrade at Grade 1 listed Castle Green site.
- 2011 MESSINA BRIDGE, ITALY  
Design of suspension system for world record 3300 metre super-long span road and rail suspension bridge between Sicily and Calabria. (Not yet built.)
- 2011 THIRD WAY BRIDGE, TAUNTON, ENGLAND  
Design of award winning steel tied arch highway bridge across River Tone, with 36m skeletal steel arch span.
- 2011 COMPIÈGNE BRIDGE, FRANCE  
Design of award winning two-span arch and catenary highway bridge across the river Oise north east of Paris. Winner of international design competition.
- 2011 PORTH TEIGR BRIDGE, CARDIFF, WALES  
Design of unusual landmark bridge across the listed Roath Basin Lock as part of a major urban development. Dubbed the "Origami Bridge" due to folded plate appearance.
- 2010 OLYMPIC STADIUM, LONDON  
Independent design check of new stadium roof structure, including the tension ring and cable roof structure and the surrounding compression ring truss.
- 2010 ERSKINE BRIDGE, SCOTLAND  
Principal inspection, structural assessment, strengthening and refurbishment of the 305m main span cable-stayed steel box girder bridge over the River Clyde.
- 2010 FEHMARNBELT LINK, DENMARK - GERMANY  
Concept design for 1632m span suspension bridge for road and rail sea crossing. (Unbuilt)
- 2009 QUEENSFERRY CROSSING, SCOTLAND  
Concept and preliminary design of the new three tower cable stayed bridge with twin main spans of 650m, working with Arup and Jacobs as part of a multi-disciplinary team.
- 2009 TAIZHOU SUSPENSION BRIDGE, CHINA  
Independent check, value engineering and specialist advice for 3-tower suspension bridge (2 spans of 1160m) across the Yangtze river.

- 2007 PADMA BRIDGE, BANGLADESH  
Preparation of Terms of Reference for 5.8km long bridge and associated works.
- 2006 BELGRADE THEATRE, COVENTRY, ENGLAND  
Structural design of £7.5m re-development involving a new auditorium, rehearsal spaces, front of house and back stage facilities. Architect: Stanton Williams.
- 2006 STRUCTURES FOR INDOOR TENNIS, UK  
Design and structural advice for several indoor tennis facilities, including lightweight and air supported membrane structures. For the Lawn Tennis Association.
- 2005 CHACAO CHANNEL BRIDGE, CHINA  
Independent design check for three tower steel box girder suspension bridge with main spans of 1100 and 1055m.
- 2005 MESSINA STRAIT BRIDGE, ITALY  
Specialist long span design advice to client the world's longest suspension bridge. Member of the tender evaluation committee for the appointment of the General Contractor.
- 2004 UNIVERSITY SWING BRIDGE, MALMÖ, SWEDEN  
Design of 70m cable-stayed swing bridge carrying highway, cycle track and pedestrians over the inner harbour.
- 2004 CLEDDAU BRIDGE, MILFORD HAVEN, WALES  
Principal inspection, structural assessment, design of strengthening and resurfacing of the steel box girder bridge (main span 213m).
- 2003 SAIL BRIDGE, SWANSEA, WALES  
Design of award-winning and innovative 140m landmark cable stayed pedestrian and cycle bridge over River Tawe, with stays along one edge.
- 2003 BARRAGE BRIDGE, SWANSEA, WALES  
Design of pedestrian and cycle crossing of the River Tawe tidal barrage, including a fixed 80m steel truss span and a swing bridge with a 16m opening span.
- 2002 BRIDGE OF ASPIRATION, COVENT GARDEN, LONDON  
Design of award-winning high level pedestrian link across Floral Street between the Royal Opera House and Royal Ballet School, with unusual, characteristic and dynamic twisted form.
- 2001 HALGAVOR BRIDGE, CORNWALL, ENGLAND  
Design of award winning 47m suspension footbridge over A30 highway, with an innovative glass fibre reinforced polymer bridge deck – the first of its kind in the UK.
- 2001 STONECUTTERS BRIDGE, HONG KONG.  
Competition winning conceptual design of the award winning cable stayed highway bridge with a 1,018m main span and twin steel box girder decks.
- 1999 KENT MESSENGER MILLENNIUM BRIDGE, MAIDSTONE, ENGLAND  
Independent design check of an unusual cranked two-span concrete stressed ribbon bridge over the River Medway.

- 1999 WHATMANS FIELD DOWNSTREAM BRIDGE, MAIDSTONE, ENGLAND  
Design of steel footbridge over the River Medway with inclined steel props, large soffit openings and unusual "upside down" deck section to emphasise slender appearance.
- 1999 LOCKMEADOW FOOTBRIDGE, MAIDSTONE, ENGLAND  
Design of award winning 90m cable-stayed bridge over the River Medway, with a unique multi-cellular aluminium deck system and carbon fibre parapet posts.
- 1999 TING KAU BRIDGE AND APPROACH VIADUCTS, HONG KONG  
Independent design check and construction supervision of triple tower cable stayed bridge and high level, post-tensioned, cast-in-situ, concrete box girder viaducts.
- 1998 MILLENNIUM DOME (O<sub>2</sub> ARENA), LONDON  
Independent design of the large circular dome structure including the steel masts, cable net system and fabric roof enclosure.
- 1997 POOLE HARBOUR CROSSING.  
Competition-winning design for a 700m multi-span cable stayed bridge crossing an extremely environmentally sensitive site. (Unbuilt)
- 1997 KAP SHUI MUN BRIDGE, HONG KONG  
Independent design check and specialist construction advice for 430m main span steel composite cable-stayed bridge carrying both road and rail traffic.
- 1997 TSING MA BRIDGE, HONG KONG  
Independent design check, tender assessment, economic and security review and specialist construction advice for the 1377m suspension bridge carrying both road and rail traffic.
- 1990 WYE BRIDGE AND BEACHLEY VIADUCT STRENGTHENING, ENGLAND-WALES.  
Structural assessment, design and supervision of complex strengthening works to 1.2km steel box girder structure, including cable stayed main span.

**Selection of Publications:**

*Going for Gold in a Changing World.* President's inaugural lecture, Institution of Structural Engineers, January 2017

*The Design and Construction of Greenwich Reach Swing Bridge.* IABSE Congress, Stockholm, September 2016.

*Copenhagen Inner Harbour Bridge,* Bahra & Firth. IABSE Congress, Stockholm, September 2016.

*Engineering Elegant Bridges – The Process and the Outcome,* IABSE Conference, Nara, May 2015.

*The Copenhagen Kissing Bridge – A Bashful Landmark,* Bahra & Firth. IABSE Symposium, Madrid, September 2014.

*A New Opening Bridge for Copenhagen,* Bahra & Firth. International Footbridge Conference, London, July 2014.

*The Development of a footbridge design through the UK planning process – the Greenwich Reach footbridge*, Firth, Knight & Taylor. International Footbridge Conference, London, July 2014.

*Messina Strait Bridge - Suspension System*, Walker, Firth & Yamasaki. IABSE Symposium, London, September 2011.

*Lessons from history - the steel box girder story*. James Sutherland History Lecture, Institution of Structural Engineers 2010.

*Bridge-specific assessment techniques for the strengthening and refurbishment of the West Gate Bridge, Melbourne*. IABSE Symposium, Bangkok, September 2009.

*Adding confidence and reducing risk – the role of independent design checking in major projects*. IABSE Symposium, Weimar, September 2007.

*Essential ingredients for a good design competition*. Henderson Colloquium 2007, Magdalene College, Cambridge, July 2007.

*Ten Years in the life of a 35 year old cable stayed bridge*, Adamson & Firth. IABSE Conference, Copenhagen, Denmark, 2006

*The Messina Strait Bridge – Design Requirements for Economic Construction and Maintenance of the Steel Structure*, Firth & Fiammenghi. 6th International Symposium on Steel Bridges, Prague, Czech Republic, 2006.

*The Architecture of Bridge Engineering: Exploring the boundaries to achieve lasting excellence in bridge design*. Conference on Advances in Bridge Engineering, Brunel University, 2006.

*The Challenge of Super-Long Spans: Lessons from Messina*, Firth & Fiammenghi. Hong Kong Institute of Engineers, International Conference on Bridge Engineering, Hong Kong, 2006

*Design & Construction of Sail Bridge, Swansea*, Firth & Sanders. Bridge Engineering 158, Issue BE4, ICE

*Landmark Footbridges in the Urban Environment*. IABSE Symposium, Shanghai, September 2004.

*The Design and Construction of the Port Tawe Bridges, Swansea*, Firth & Sanders. International Symposium on Steel Bridges, Millau, France, 2004.

*The Assessment and Strengthening of the Milford Haven and Erskine Bridges*. 5th International Symposium on Steel Bridges, Barcelona, 2003.

*New Materials for Modern Footbridges*. Inaugural Footbridge Conference, Paris, 2002.

*The Refurbishment of Erskine Bridge, Scotland*, Firth, Adamson & Huband. IABSE Symposium, Melbourne, September 2002.

*Glass Fibre Reinforced Plastic Bridges: Three UK Examples*, Firth & Cooper. IABSE Symposium, Melbourne, September 2002.

*Polymer Composites in UK Bridge Construction*, Firth & Cooper. SMSB Conference, Vancouver, 2002

*A Tale of Two Bridges – A case study on the Lockmeadow and Halgavor bridges*. Institution of Structural Engineers, 2002.

*The Havgavor Bridge – The use of glass-fibre reinforced polymer composites as the primary structural material in new bridge construction*, Firth & Cooper. NGCC Conference, BRE, 2002.

*The Ribble Way Bridge – Characteristics of a Three-Way Arch*, Firth & Kassabian. International Arch Bridges conference, Paris, 2001.

*The Design of the Stonecutters Bridge, Hong Kong*. International Conference, Hong Kong, 2001.

*Making the Most of Our Structures - The Importance of Good Design*. IABSE Henderson Colloquium, Cambridge, July 2000.

*The Design of the Java Bali Bridge*. ABSE Conference on Cable Stayed Bridges - Past, Present and Future, Malmö, Sweden, 1999.

*The Design and Construction of Lockmeadow Footbridge, Maidstone*. IABSE Conference, Malmö, 1999.

*Lockmeadow Footbridge, Maidstone, UK*. IABSE Journal Structural Engineering International, 1999.

*Poole Harbour Bridge - Innovation in Cable Stayed Bridge Design*. IABSE Symposium, Kobe, Japan, September 1998.

*Masts and Towers and Air Supported Structures*. IABSE Henderson Colloquium, Cambridge, July 1998.

*The Replacement and Transformation of the Wye Bridge Cable System*. International Conference on Cable-Stayed and Suspension Bridges, Deauville, France, A.F.P.C. 1994.

*The Wye Bridge: Strengthening by Cable Replacement*. International Symposium on Cable-Stayed Bridges, Shanghai, 1994.

*Design, Construction and Maintenance of Air-Supported Membrane Structures in the UK*. 4th International Conference on Space Structures, University of Surrey, 1993.