OCTOBER 2022

# NSC

Photo © Simon Kennedy

## Structural Steel Design Awards 2022


**Cover Image**
**Esperance Bridge, Kings Cross**
Client: Argent
Architect: Moxon Architects
Main contractor: Galldris
Structural engineer: Arup
Steelwork contractor: S H Structures Ltd

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# Steel sustainability grows as judges praise value of visits

Nick Barrett - Editor

Among the disruptions caused by the COVID-19 pandemic was a halt to the long-established practice of Structural Steel Design Awards being judged on the basis of visits to site by the judges. The 2020 and 2021 judgings were the only occasions in the 54-year history of the Awards that this almost unique feature of the SSDA couldn't happen.

Fortunately, the steel sector and those construction professionals who judge the SSDA entrants were early uptakers of digital technology like Zoom and MS Teams, so they were able to forego the benefits of site visits without missing a step. That way of operating could have been maintained indefinitely if the pandemic had lasted, but the judges were in no doubt that there is no substitute for actually planting feet on the ground and seeing for themselves the quality of the shortlisted projects, so 'normal service' was resumed for the 2022 judging.

Digital technologies have a great role to play in construction, and this will only grow, but the days of visits are far from over. The photography of the Awards' projects in this issue of NSC shows why judges would be pleased to visit these sites. Judges were impressed by the variety of project scale and type, including large City commercial developments and aesthetically pleasing footbridges. As Steven Insley of SSDA sponsors Trimble pointed out at the Awards ceremony, enthusiastic adoption of digitalisation across the structural steelwork industry has contributed significantly to the design, detail, manufacture, and construction of the shortlisted projects.

As in recent years, the judges noted that they are seeing a focus on sustainability issues in the design as well as the construction of projects, illustrating that the steel construction sector is strongly committed to the drive to net-zero carbon. The Award winning 1 Triton Square for example demonstrates that designing with sustainability in mind can also give rise to cost-effective projects. The sustainability focus meant that savings were made in cost and time as well as on carbon measurements.

Biggin Hill's new aircraft hangar shows a range of sustainability benefits being achieved after the design team looked for them, including 'remarkably good' embodied carbon results. Carbon savings of 20% were achieved at the Esperance Bridge over the Regent's Canal, partly by reusing existing sub-structures, while producing a strikingly elegant sculptural solution.

Two new three tier stands were created at Lord's Cricket Ground, where studies at the design stage proved that steel would be the best solution for the iconic stands rather than the originally envisaged concrete. Traditional advantages of steel construction were displayed at Lord's, including offsite fabrication, speed, cost-effectiveness and ability to overcome challenging site conditions.

Providing low carbon energy to Manchester's Civic Quarter gave designers an opportunity to show how high aesthetics could be combined with functionality for the tower of a Combined Heat and Power scheme while reducing embodied carbon when compared to a traditional flue stack.

All the shortlisted projects also show sustainable steel at its finest, and justify the comment of Chairman of the Judges Chris Nash (see News): "There is no better way to assess a project than to see it, touch it and to hear what it is all about from the team that created it." The SSDA is back to its up-close-and-personal best.

# STRUCTURAL STEEL DESIGN AWARDS 2022

## AWARDS

1 Triton Square, London

Bombardier Maintenance Hangar, Biggin Hill

Esperance Bridge, Kings Cross

Lord's Cricket Ground, Compton & Edrich Stands Redevelopment

Tower of Light, Manchester

## COMMENDATIONS

Assembly Bristol, Building A

Britannia Leisure Centre, Hackney

Fire Station Auditorium, Sunderland

Central Atrium at Hilltop, RHS Wisley

One Braham, London

One Crown Place, London

## MERITS

Pace Gallery, Hanover Square, London

LCT 7074 Canopy, The D-Day Story, Portsmouth

Hydro Ness, Inverness

Houlton School, Rugby

## NATIONAL FINALISTS

22 Bishopsgate, London

Abbey-Chesterton Bridge, Cambridge

Bloom Clerkenwell, London

St James Quarter, Edinburgh

Joules Head Office, Market Harborough

The Glass Works, Barnsley

## Winners announced at 54th Structural Steel Design Awards


SSDA Chairman of the Judges, Chris Nash

Five projects were Award winners at this year's Structural Steel Design Awards (SSDA).

The five winning projects at the 54th annual SSDA were 1 Triton Square, London; Bombardier Maintenance Hangar, Biggin Hill; Esperance Bridge, Kings Cross; Lord's Cricket Ground, Compton & Edrich Stands Redevelopment; and Tower of Light, Manchester.

From an initial shortlist of 21 projects, all of this year's entries once again scored highly in terms of sustainability, cost-effectiveness, efficiency and innovation, with six schemes getting Commendations and four collecting Merits.

Chairman of the Judges, Chris Nash said: "Again, this year there was a wide range of types and scale of projects entered for the Awards. Schemes ranged from the largest prestige city office buildings to beautiful footbridges.

"We were particularly interested in projects that reflect a commitment to reducing lifetime carbon use."

Trimble Solutions UK once again partnered the British Constructional Steelwork Association (BCSA) for this year's SSDA.

Trimble Business Director UK & Ireland Steven Insley said: "In its 54th year, Trimble are once again delighted to continue to be associated with the Structural Steel Design Awards and are further inspired with the level of excellence in the use of this adaptable and sustainable structural material that they display.

"The scale, scope and complexity of the projects submitted are a great example of what can be achieved through digitalisation in the structural steelwork industry, enabling the design, detail, manufacture, and construction of such impressive structures.

"The quality of the projects on display here also underlines the capabilities of the project teams here tonight, who clearly know how to get the best out of steel."

British Constructional Steelwork Association President Mark Denham added: "I've thoroughly enjoyed the evening, and what amazes me is the consistently high quality of projects we produce in the UK and Ireland despite everything we've all had to endure. It really does illustrate the strength and resilience of our steel construction sector."


BCSA President, Mark Denham

Trimble Business Director UK & Ireland, Steven Insley

# The Award winning teams

1 Triton Square, London

Bombardier Maintenance Hangar, Biggin Hill

Esperance Bridge, Kings Cross

Lord's Cricket Ground, Compton & Edrich Stands Redevelopment

Tower of Light, Manchester

# NEWS IN BRIEF

**Caunton Engineering** has played its part in Nottingham Forest's return to the Premier League by helping to upgrade the club's Peter Taylor Stand. The work involved a full design appraisal of the existing roof, 3D scanning of the structure and the upgrading of the underslung TV and commentary gantry.

**Mace** has been awarded the initial contract for two new buildings for Oxford University at Begbroke Science Park. They will contain laboratories and office space and have been designed by nbbj architects to perform to high sustainability standards including BREEAM 'Excellent' and WELL Gold Enabled. The development also includes a new cycleway link between Begbroke Science Park and Kidlington, as well as a public art piece by the Turner Prize winning practice Assemble.

A joint venture between **Bruntwood** and **Legal & General** has submitted a planning application to deliver two new buildings for laboratory and office space at Alderley Park, Cheshire. Subject to planning permission, 9,290m² of new world-leading laboratory space will be created. Spanning five floors, it will be suitable for both chemistry and biology uses, while a new office building will provide 9,000m² of workspace across six floors,

Construction of a new 14,900m² warehouse on the site of the former Weetabix factory on the Earlstrees Industrial Estate in **Corby** has been given the go-ahead by the local authority.

Developer Firethorn Trust has appointed **Glencar** to deliver a 31,500m² logistics warehousing scheme in South Yorkshire. The 24-acre site, known as Barnsley340, will include a Grade A warehouse unit spanning 30,000m², along with an attached office block. Work is expected to start shortly, with completion set for late 2023. In line with its enhanced specification, the scheme will be delivered to net-zero carbon in construction and target an 'Excellent' BREEAM rating.

# PRESIDENT'S COLUMN

At the time of writing this column it is the 29th of September 2022, sterling is practically on parity with the dollar. The first time I was lucky enough to visit the USA in 1979 you could get $2.5 dollars to the pound. Energy prices are going through the roof, inflation is close to 10% and some commentators are suggesting that interest rates could triple by next year. The same commentators talk about the recession being a soft or hard landing. I remember back to the days when I was lucky to learn how to fly, after a particularly bumpy landing I apologised to my instructor. He commented, "there are only two kinds of landing, good ones and bad ones. You can walk away from the good ones!" With respect to whether we will have soft or hard landing with the recession facing us, I guess we will be able to walk away, but we might all be hobbling a bit.

It was good news that the government has pledged to give some support for energy prices for the next six months. We have to be thankful for any help, but it does seem to be a little bit of a stay of execution unless the main drivers of these energy spikes are sorted out.

Opinion be divided on future steelwork prices, the clients' QSs think they will be going down and the rest of the world thinks they will rise. How quickly they will rise is a matter of conjecture, but if these rises are large and unexpected, then we can only expect less stable market conditions going forward. There is a price where the client won't go ahead with the project. The majority of steelwork contractors have their own facility and hence reasonable assets to lend against, perhaps this is one of the reasons for the resilience of structural steelwork contractors compared with other Tier 2 sub-contractors.

The new government intends to introduce a "BREXIT Freedom Bill", where they might start to unravel some of the work done by the EU. I don't think we are going to see the end of conformity assessment marking or the reintroduction of the old British codes of practice, but they may make some changes to employment law, which would be welcome. A couple of years ago one of our ex-employees had the audacity to take the company to an employment tribunal. It was the first time we'd been, we thought we had an excellent defence and confidence in a favourable outcome was high. Well, we got absolutely battered from start to finish. It was more like a "trial by ordeal" rather than a court.

I recently attended the AGM of Build UK where they had a "futurist" from South Africa giving his ideas of what life might be like in 50 years-time, let alone next year. He felt that the life expectancy of a man might reach the age of 120. Does this mean he might be expected to work until he is 110? I don't see that in my future. What I do see is some time off, so the next issue of NSC magazine will have a Deputy President's Column from Gary Simmons of William Hare. Something for us all to look forward to.

**Mark Denham**
BCSA President

# SCCS gains further UKAS accreditation

The Steel Construction Certification Scheme (SCCS) is now UKAS accredited to offer UKCA certification to BS EN ISO/IEC 17065:2012 - *Requirements for bodies certifying products, processes and services.*

This new accreditation standard will allow SCCS to continue certifying clients for both UKCA and CE+UKNI marking, which was previously undertaken against BS EN ISO/IEC 17021-1:2015 *Requirements for bodies providing audit and certification of management systems.*

SCCS Director of Certification Stephen Blackman, said: "This extension of SCCS's offering ensures its clients are prepared and have the appropriate certification required from April 2023 when UKAS will no longer accept 17021 accreditation for UKCA marking."

The SCCS is a wholly-owned subsidiary of the British Constructional Steelwork Association. It was established in the early 1980s to provide quality management certification for steelwork contracting organisations.

It now offers a wide range of certification and monitoring services for the structural steelwork sector, including integrated or separate UKAS accredited Quality, Environmental, Welding Quality and Health & Safety management systems, Factory Production Control systems and selected National Highways Sector Schemes.

For more information about SCCS go to *www.steelcertification.co.uk*

# The Institution of Structural Engineers to host steel e-conference


Looking at how to use steel in an effective and sustainable way, the Institution of Structural Engineers (IStructE) is hosting a three-day e-conference (online) starting on November 22.

The climate emergency is one of several drivers forcing professionals across the built environment to consider how to design in an effective and sustainable way.

The Institution's 'Modern uses of steel e-conference' will help structural engineers understand how to deliver good designs that can be fabricated, executed, refurbished, and demounted for reuse, while also considering how to assess, source and reuse steel. The conference will cover real-life examples of how material and design efficiency can be achieved in a changing environment.

Day one of the conference is entitled 'Designing efficiently with steel – design solutions.' Speakers on this day include BCSA CEO David Moore and SCI Chief Executive Graham Couchman.

Day two concentrates on fabrication and execution; while day three's content will be on reuse and refurbishment.

For more information on prices and how to book a place, visit: *https://www.istructe.org/events/hq/2022/modern-uses-of-steel/*

# Plans revealed for Birmingham logistics park expansion

Developer Prologis and Coltham Developments have announced that they plan to expand Prologis Park Midpoint, Birmingham, to provide more urban logistics facilities for its customers in the Midlands.

The companies will develop a new warehouse facility of up to, 15,329m² on the site of a former fulfillment centre which was recently acquired.

According to Prologis, the Birmingham conurbation, which is the second most populated region in the UK, has a dwindling supply of land for industrial use, largely due to a loss of space to residential development and the constraints of the greenbelt.

The new project, which the developer said will help to alleviate the current demand for distribution space, will further expand Prologis Park Midpoint, which currently has over 130,000m² of warehousing in five fully-leased buildings.

Stuart Franks, Development Director at Coltham Developments, said: "It's great to have completed the acquisition of this prime site for Prologis. I wish Prologis every success with their proposals for the site moving forward to provide much needed logistics space within Birmingham."

# Approval given for landmark London Bridge scheme

Southwark Council has given planning approval for the redevelopment of the Colechurch House site near London Bridge.

Designed by Foster + Partners, the steel-framed structure will be an exemplar mixed-use scheme, which aims to be net-zero. The project will provide 48,180m² of prime space for businesses, an expansive new public space as well as a home for the popular Southwark Playhouse theatre.

Luke Fox, Head of Studio, Foster + Partners said. "As architects, we have a responsibility to leverage the power of design to positively influence public life and steer urban development towards a more sustainable, diverse and equitable future. Colechurch House is an exemplar project in this regard, and we look forward to working with developer CIT to make this pioneering project a reality."

The new sustainable development is a striking staggered form, rising to 22 storeys at its highest point. The wellbeing-driven office space is said to be designed to suit the needs of today's workforce. A highly optimised façade will significantly reduce energy consumption, supported by mixed-mode ventilation (opening windows), ground source energy piles and onsite green energy generation comprising extensive photovoltaic panels. Winter gardens on every floor and verdant roof terraces will ensure there is ample outdoor space.

The development will span over an extensive new public park that stretches the length of the site. The scheme will also open up historic views of Southwark Cathedral and local heritage buildings.

# Steel contractor celebrates 30 years by achieving Execution Class 3

Gorge Fabrications will be celebrating its 30th anniversary in November having gained Execution Class 3, which allows the company to undertake a greater variety of steel fabrication and erection.

Gorge Fabrications has recently installed feature steelwork, including an atrium staircase, at Barnfield College in Luton.

"We can now build on our wide experience in multi-sector buildings, and particularly that of multi-storey installations, with Execution Class 3 now enabling us to install structures over 15 storeys in height," said Gorge Fabrications Director Steve Mintchev.

"We are also now a fabrication partner that can assist in ensuring steelwork is fabricated to the more rigorous quality and testing requirements for structures that require Execution Class 3 certification."

The company says gaining the certification is part of a coordinated programme of operational improvement that the business has been undertaking. Consequently, this new certification and associated capability enables Gorge's experienced engineering team to meet and service a more diverse range of demands that may arise.

"It is a sign of the business' maturity that we have reached this major milestone. The business has progressed from minor steelwork fabrications, such as fences and gates to now being able to fabricate and install projects typically up to 500t," added Mr Mintchev.

# Ground broken for new Erith distribution centre

Glencar Construction has been appointed by commercial real estate investor and developer Firethorn Trust, to deliver its 8,700m² logistics scheme, Blueprint Erith in South East London.

The project will involve the demolition and site clearance of an existing warehouse and external concrete yard, followed by the construction of four modern single-storey warehouse units that will all include internal offices.

With a BREEAM 'Very Good' certification, the development is being constructed to achieve net-zero carbon with 15% rooflight coverage, 13 EV charging points and LED lighting.


# Diary

For SCI events contact Jane Burrell, tel: 01344 636500 email: *education@steel-sci.com* web: *https://portal.steel-sci.com/trainingcalendar.html*

**Tuesday 1 November2022**
**SCI Annual Event 2022**
IMechE, 1 Birdcage Walk, London

We will consider how getting the joints and connections right is also critical if we want to save 'carbon', and avoid failures. Getting the joints right is increasingly important as powerful software tools enable ever more complex solutions, and maximising the efficiency of a frame is crucial in the battle to reduce embodied energy. Our event will include a number of other presentations, including consideration of the changes that are on the way in the second generation Eurocodes.This event is free for all to attend.

**Tue 15 November 2022**
**Designing in Stainless Steel**
Webinar, SCI/BCSA members only

This webinar gives an introduction to the use of stainless steel in structural applications. Topics covered include grade selection and the design of members and connections in accordance with Eurocode 3

**Thu 17 & Tue 22 November 2022**
**Floor Vibrations**
Online

This course introduces the topic of vibration and the analysis of vibrations in the context of buildings excited by the footfall of occupants. The fundamental principles of vibration are discussed before moving on to examine the guidance provided in SCI publication "P354 – *Design of Floors for Vibration: A New Approach*". A pdf copy of this book will be provided to each delegate.

# More power to fabricators

**Tekla PowerFab is transforming the way fabrication works by empowering fabricators with full control of their production management.**

When it comes to reducing the construction industry's environmental impact, a lot of attention rightfully falls on the initial design and engineering stages of a project. However, this isn't the only place where change is needed. Here, Chris Gatehouse, Detailing and Manufacture Specialist at Trimble, explores the role a management information system (MIS) can play in the journey to net-zero.

## Smarter fabrication = greener construction

Employed correctly, a digital MIS can be used throughout the entire fabrication workflow, right from the initial estimating and procurement stages through to the shop floor and beyond. Likewise, its capacity and potential for carbon savings can also be felt throughout the same workflow.

Let us take the estimating and bidding stage, as an example. Here, the ability to make more informed and accurate estimates and bids not only helps to protect your all-important profit margin – critical during a time of material cost and availability volatility – but it can also contribute to an improved carbon footprint. A key part of this is being able to generate accurate material lists and quantities, ensuring that you are optimising your steel utilisation, reducing waste, and only ordering the steel and manufacturing elements you need for the job in hand.

By having a 3D model linked to your digital MIS, you can automatically generate quantity take offs (QTOs) using the data contained within the completed model. As well as providing a more efficient process, this streamlined and integrated flow of data can offer the assurance that your QTO is optimised and accurate, reducing the likelihood of human error.

The same benefits can also be felt at the procurement stage with effective stock control management. With everyone invested in and using the software, production managers can have an instant view of where every individual piece of steel currently is within the fabrication sequence. Not only this, but you can also instantly view the level of material stock you currently have, compared to what you need for upcoming jobs.

With these enhanced levels of visibility and traceability, there is no need to manually walk around the factory or shop floor to check stock levels yourself – instead, all information is available digitally. As well as assisting from a monetary perspective, ensuring a smooth cash flow, you are also only ordering what you need.

## No excess materials = no excess carbon

One of Trimble's customers, a structural steel fabricator in the North East of England, is a great example of this new way of working. Their Operations Director, explains: "Since introducing a digital MIS into our workflow, the estimation stage is now a far faster and more automated process. Once we receive the IFC file from the engineer at the initial tender stage, we're able to import this directly into the software. Thanks to its emphasis on data integration and automation, we're then able to generate estimates and quantity take offs directly from the IFC file – overall, a far easier, more efficient and accurate way of working."

"We can also track stock levels with the live inventory, which is a real game changer. Easy to use and offering enhanced levels of visibility, we no longer have to manually and physically check what stock we already have, compared to what stock we need to purchase on every job. Instead, it's all automated, giving us a far better and more informed way to handle stock. We just import files from the drawing office and the digital system will do the rest!"

Of course, another way to reduce carbon and be 'greener' is to improve accuracy levels. Whether caused by errors at the detailing stage or the inefficient transfer of information to fabricators and contractors, material wastage can be a major potential problem on any construction project. This could take the form of structural components being fabricated and delivered to site, only for contractors to then discover that they cannot be used, due to clashing with other sections.

Here, again, a digital MIS continues to deliver. Such software is not just for managers, it is for everyone within a fabrication business, including those on the shop or factory floor. Everyone can benefit from coordinated and easily accessible project data, especially at a time where labour shortages are an issue so many manufacturers are facing.

Using a digital MIS and other technology, fabricators, welders and machine operators can view the corresponding 3D model and 2D drawings on a tablet, taking the model from the drawing office to the shop floor. As well as helping to speedily resolve any queries, having everyone connected to the central BIM model and its high levels of information can contribute to a more efficient and more accurate way of working.

## Fewer mistakes = less rework, waste, and carbon

In fact, with digitisation present throughout the construction sequence, it's possible to achieve an 80% reduction in rework, resulting in significant carbon savings. Trimble's Tekla PowerFab is developed specifically for steel fabricators, offering truly connected steel fabrication management. A comprehensive software suite, it provides a systematic and collaborative approach, delivering a smooth, continuous and real-time flow of information on projects from start to finish.

Connected and sustainable construction needs integrated data across the project lifecycle, with high levels of accuracy and coordination – all of which a management information system can provide. If construction is to green up its image, then it's clear that change is needed. By moving away from the paper-based approach to digital technology, fabricators can make a difference to the environment while also working smarter. ■

For more information about Tekla PowerFab or to speak to Chris Gatehouse directly, please visit *www.tekla.com/uk* and fill in a contact form.

Trimble®

# Structural Steel Design Awards 2022

## Foreword

**By Steven Insley,**
**Business Director UK & Ireland, Trimble**

Every year, we're all blown away by the standard of entries received by the Structural Steel Design Awards and 2022 has been no different.

The scale, scope and complexity of the projects submitted are a great example of what can be achieved through digitalisation in the structural steelwork industry, enabling the design, detail, manufacture, and construction of such impressive structures.

As we continue to face challenging times in our economy, it's refreshing to see the industry recognises how essential it is to adopt new technologies and equip designers, detailers and fabricators with the tools they need to streamline collaboration.

The entrants and winners of the SSDA in 2022 demonstrate that our industry is in a strong place, and, on behalf of Trimble, I would like to congratulate the winning project teams.

Pictured: The Tower of Light, Manchester

# Introduction

## By Christopher Nash RIBA – Chairman of the Judging panel.

The Panel was this year delighted to be able to return to the usual SSDA judging process no longer constrained by restrictions due to the COVID-19 precautions of the previous two years. Again, this year I was very pleased to moderate the discussions of our talented team of architects, engineering designers and experts from the steel fabrication industry. We were able to meet together face-to-face to examine the schemes submitted and debate their merits. Members of the panel brought their normal enthusiasm and enjoyment to the job, as well as fair-minded professional judgement.

The sponsors and the judges aim for the Awards to be used to showcase excellence in the use of structural steel by practitioners in the UK and Ireland across the full range of sectors, scale, regional location and budget. We are particularly interested in projects that reflect a commitment to reducing lifetime carbon use.

Again, this year there was a wide range of types of projects entered for the scheme. Scales of entry ranged from the largest prestige city office buildings to beautiful footbridges.

As in previous years, we made a preliminary selection


## The Judges

**Christopher Nash** is a senior Consultant Architect. He graduated in 1978 from Bristol University School of Architecture and was a Director and Partner at Grimshaw Architects until retiring from the Partnership in 2012. While at Grimshaw Chris was responsible for many of the practice's high-profile buildings, through which he developed a working knowledge of the steel construction industry. Chris continues to practise as a consultant in architectural practice management, architectural education and property development.

**Richard Barrett** was Managing Director of Barrett Steel Buildings for over 20 years prior to its sale in 2007 in a management buyout, and is a Director of steel stockholder Barrett Steel. Richard studied engineering at Cambridge University, graduating in 1978. At Barrett Steel Buildings, he developed the business into a leading specialist in the design and build of steel-framed buildings for structures such as distribution warehouses, retail parks, schools, offices and hospitals. He was President of the BCSA from 2007 to 2009, and was a member of BCSA's Council from 1994 to 2017.

**Paul Hulme** joined Robert Watson & Co as an apprentice draughtsman in 1981. In the following 36 years he held positions in all areas of the company, gaining appreciation of all aspects of the steelwork industry, most recently in the role of Project Director. Over the years Paul has been fortunate to be involved in many complex steel structures, both in UK and abroad. Most notable are Kansai and Hong Kong airports, Terminal 5 roof, London 2012 Olympic Stadium and Wimbledon Centre Court Redevelopment. Paul currently works as an independent consultant offering design and buildability advice to the construction industry. Paul is a Fellow of the Institution of Civil Engineering.

**Sarah Pellereau** is an Associate Director at Elliott Wood with 21 years' experience. She has been involved in a number of award-winning schemes including leading a project shortlisted for the Stirling prize. As a Structural Engineer, she is rare in having graduated with a Part 1 in Architecture as well as a Masters in Engineering from the University of Leeds. She has a diverse portfolio of experiences in structural design but also has worked on-site with the CTRL alterations to St Pancras Station and tutored at Nottingham University.

on the basis of a 'desk-top' examination of the entry documents to create a shortlist. A concise, descriptive and well-presented entry helps to get through the first cut, and those good submissions gave themselves a better chance of selection to the shortlist.

The entrants of resultant shortlisted schemes from the initial selection were all then notified and invited to host a visit by the judges. We pride ourselves in this award scheme on making visits to see, understand and experience all shortlisted projects 'in the flesh', and to meet the project teams in person. Our enjoyment of the visits is a large part of why we do it. There is no better way to assess a project than to see it and to hear what it is all about from the team that created it. Projects that are represented by an informed, collaborative and enthusiastic team are a step ahead.

A final summary meeting after all the visits were made required the judges to make a comparative assessment by championing those that each judge visited. We had to consider, compare and assess a great diversity of projects for their architecture and engineering, fabrication and assembly qualities, robustness, innovation and the contribution they make to society at large. These are not easy comparisons to make, and we try to get the balance right.

The awards, commendations, merits and national finalists rewarded by the Structural Steel Design Awards this year reflect the achievements of the current steel construction industry. Everyone involved should be proud of what has been achieved.


**Roger Plank** is a structural engineer and, having recently retired as Professor of Architecture and Structural Engineering at the University of Sheffield, is currently a director of Vulcan Solutions Ltd offering software and consultancy services in fire engineering. He has collaborated extensively with the steel construction sector in the fields of fire engineering and sustainability, and is a Past President of the Institution of Structural Engineers.

**Bill Taylor** is an architect in private practice. Having joined architects Michael and Patty Hopkins straight from Sheffield School of Architecture in 1982, he became their first partner in 1988. In 2010 Bill left Hopkins Architects to concentrate on his own projects and since then he has also collaborated with architect Robin Snell and his practice. Bill is a founding member of Tensinet, the pan European organisation researching lightweight and tensile construction. He has been a member of the RIBA National Awards Group and CABE Panels and is a Senior Assessor and Client Adviser for the RIBA competitions programme.

**Oliver Tyler** joined Wilkinson Eyre Architects (WEA) in 1991 becoming a Director in 1999. He has spent over 25 years in architectural practice and has extensive experience in leading and coordinating the design and construction of many high profile buildings and infrastructure projects. Oliver has led a number of prestigious projects at WEA including Stratford Regional Station in London for the Jubilee Line Extension; the Dyson Headquarters in Wiltshire, regional headquarters for Audi in west London, the Arena and Convention Centre in Liverpool, the UK's first urban cable car, the Emirates Air Line and most recently a new office building in Finsbury Circus. Oliver is currently leading a number of major infrastructure and commercial office schemes in the City of London, including Liverpool Street Station for Crossrail, the Bank Station capacity upgrade project and a 50-storey office tower on Leadenhall Street.

SSDA 2022 AWARD

# 1 Triton Square, London

## A 1990s office block has been redeveloped with steel construction in order to double its floor area and create an exemplary sustainable and healthy workplace.

An increasing trend in the construction sector is the refurbishment and enlargement of existing office blocks, which is a cost-effective and sustainable alternative to demolishing the building and starting again with a blank canvas.

An example of this trend is 1 Triton Square, which was originally built for the First National Bank of Chicago and opened in 1997. This concrete-framed office building was the first structure to be completed at Regent's Place, a 13-acre fully managed mixed-use campus on the north side of London's Euston Road.

Lendlease Project Director Chris Carragher says the decision to refurbish the building instead of demolishing it was all about creating the most sustainable construction solution possible and is testament to British Land's sustainable values.

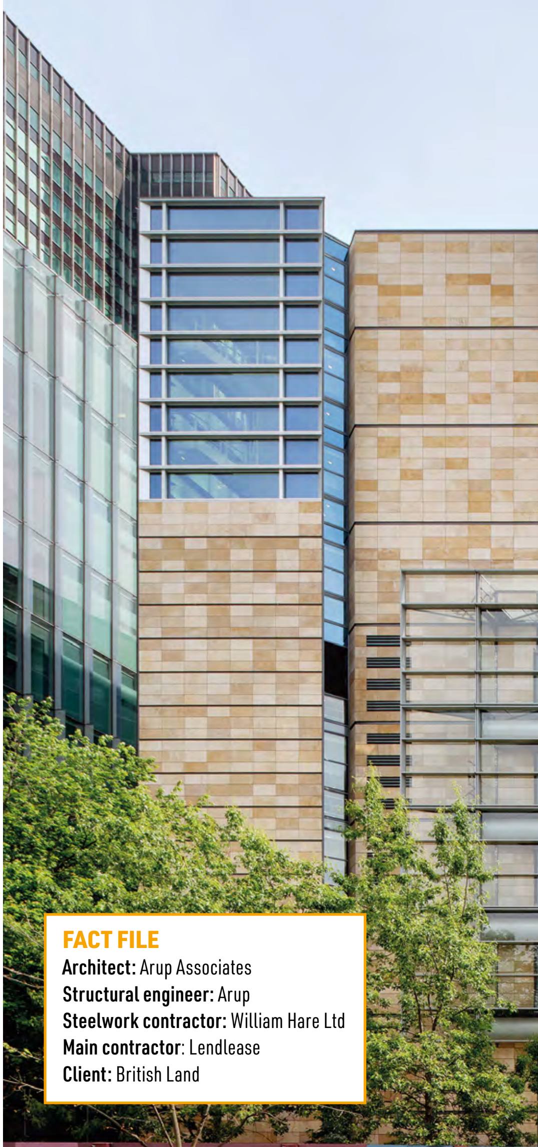
"Refurbishing a project is a more environmentally-friendly option, as well as being cost-effective."

Further highlighting the benefits of the chosen construction method, a 43% cost saving was made compared to a typical commercial building job, while overall it was 30% quicker to complete.

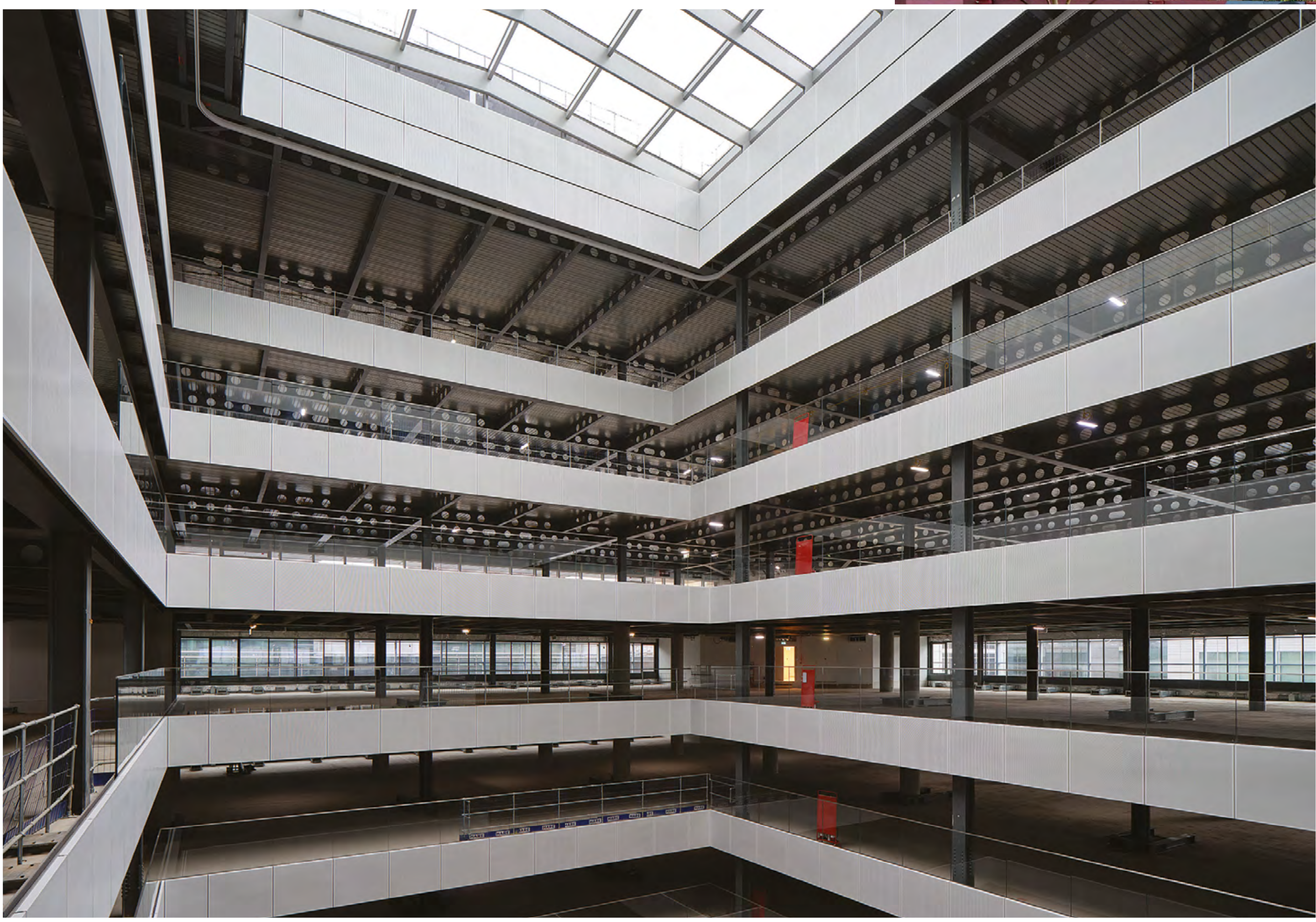
According to Arup Structural Lead Andrew Robertson there have been significant carbon savings for this refurbishment compared with a new build equivalent.

"About 35,000t of concrete and 1,900t of steel have been re-used and saved from demolition. The re-use of the structure and façade elements has resulted in carbon savings equivalent to a gas and electricity emission-free operation for 26 years."

Employing the same design consultant from the original scheme, the existing five-storey building has been extended upwards with the addition of three new steel-framed office floors and a rooftop



**FACT FILE**
**Architect:** Arup Associates
**Structural engineer:** Arup
**Steelwork contractor:** William Hare Ltd
**Main contractor**: Lendlease
**Client:** British Land



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plant level.

Meanwhile, an unusually large 36m-wide atrium has been partially infilled with one new bay of steelwork all the way around, creating more office space for each of the existing floors and a smaller but still impressive 18m-wide atrium space.

Steelwork for the new upper floors is based around a 9m column grid pattern, in line with the existing structure's layout. For the new infill floor areas inside the atrium, a series of long beams create an open-plan floor area.

These new floor beams are all approximately 18m long, but vary in length due to the atrium stepping in and out at every floor with balconies and breakout spaces.

The atrium starts at level one, as this was originally designed as a large trading floor and extends across the building's entire footprint and also has a slightly higher floor-to-ceiling height.

The new nine-storey building is now centred around this reconfigured atrium, which will provide links between floors via internal feature staircases.

All the new steelwork for the scheme is either founded on the existing steel cores or off the existing main frame. Within the atrium, the existing structure was cut and carved down to the basement to allow new lift pits and a ground slab to be constructed, from which the new steelwork for the atrium was erected.

The new scheme has resulted in the existing structure being exposed to significant increases in loading. As a result, prior to steelwork contractor William Hare beginning its package, Lendlease had to undertake preliminary works that included strengthening existing concrete columns as well as installing 180 new piles in preparation for the new steelwork. This early work also included the removal of a steel-framed glazed roof that covered the atrium.

The addition of three new storeys translates to a significant increase of the horizontal loads on the building. Despite the new scheme making use of the existing frame to take some of these stability loads, the capacity of the existing bracing system was exceeded.

Therefore, before starting to add the new steelwork to the cores, the existing diagonal braces were sequentially replaced to accept the additional loads. The new levels required some complex column base connections in the cores as the original steelwork below was found to be out of position in some locations.

Where possible, the strengthening of existing steel core columns was typically undertaken by welding steel plates to the existing UC sections. The majority of these plates were positioned between the flanges of the UC section, allowing the size of the columns to remain largely unchanged while achieving a significant increase in capacity. Work within the existing cores was heavily constrained due to the adjacent precast façade, and so the plate strengthening was arranged to suit the limited access. The steel plate strengthening option was significantly lighter than the concrete encasement option, limiting the impact on the structure below.

British Land set high sustainability aspirations for 1 Triton Square through their Sustainability Brief for Developments, which sets targets for exemplary Wellbeing, Community, Futureproofing, and Skills and Opportunities. The project was awarded a BREEAM 'Outstanding' rating and has been named one of the UK's most sustainable HQs.

Summing up, the judges say this outstanding project is an exemplar of sustainability thanks to the use of steel. It demonstrates how an existing building can be almost doubled in floor area, for a fraction of the embodied carbon of a new building the same size. ■

SSDA 2022 AWARD

# Bombardier Maintenance Hangar, Biggin Hill

## A technically challenging dual cantilever 'super hangar' – the largest in the UK – is now a spectacular feature at Biggin Hill Airport.

Formerly a Royal Air Force base and renowned for being one of the main airfields used during the Battle of Britain, London Biggin Hill is today one of the fastest growing business airports in the UK.

A number of major investments have transformed the airport into a world-class centre of aviation and possibly the most ambitious and challenging development is a recently completed spectacular dual cantilever 'super-hangar' for aerospace giant Bombardier.

Fulfilling the client's vision, the completed project is an advanced Maintenance, Repair and Overhaul (MRO) hangar with two 160m clear span entrances with underslung cranes for servicing aircraft, along with offices and a VIP lounge.

Contributing to the successful completion of this project was the early engagement of REIDsteel, as the structural steel design and build fabricator, the hangar door manufacturer and the cladding company.

The company's input was said to be essential given the need for elements to be erected and aligned on 45m-long cantilever trusses with requirements to accommodate complex hangar door head gear and underslung cranes – both of which required more stringent deflection criteria than usually found on a large span structure.

After investigating traditional hangar solutions, a cost-saving design was proposed, which was highly efficient in its structural performance, with a cantilever truss design for the hangar, conventional 'beam and stick' construction for the offices and an elegant, glazed lounge, which has minimal bracing by virtue of the diaphragm within its roof structure.

The value-engineered cantilever design, along with load sharing elements, allowed significant reductions in material use, producing a much lower steel tonnage at 1,600t compared with more conventional designs.

The design also allowed the roof of the hangar area to safely span without support from internal columns to achieve the client's aspiration for two vast, unobstructed hangar floor spaces of 7,200m² each.

Long span cantilevers are said to be inherently vulnerable to disproportionate collapse, due to the nature of the tension connections in the top chord. To alleviate this, and to help meet the stringent deflection criteria, load sharing trusses were used to ensure that each frame could be supported by its adjacent frames and to reduce differential deflections under crane and wind loads.

This created a new issue, in that fabrication tolerances could cause a frame sitting higher than its neighbours to attract unacceptably high

**FACT FILE**
**Architect:** Civils Contracting Ltd
**Structural engineer:** REIDsteel
**Steelwork contractor:** REIDsteel
**Main contractor:** Civils Contracting Ltd
**Client:** Biggin Hill Airport Development Ltd

loads. The solution to this lay in leaving the load sharing trusses 'loose' until all permanent loads were applied and only then tightening up the slotted preloaded bolted connections. In addition, careful planning of the erection sequence and pre-cambering of the trusses was needed to allow for the temporary condition where one side of the hangar was erected but not the other.

"No other material can match steel for its strength and value for money, which made this project viable on both counts," says REIDsteel Pre-Construction Director Richard Hanson.

Additional floor area above the first-floor offices has been provided which, although not part of the original brief, permitted additional space for all of the M&E equipment, plant and storage. As a result, the mass needed to counterbalance the cantilevers has been used for productive purposes rather than being buried in the ground as part of the foundations.

Another departure from the original brief is that the design caters for 100% coverage of both hangars for the underslung crane, rather than 50% of one, providing the future-proofing required by the end user. The dual cantilever design also means the hangar can be extended to meet changing requirements over its 50-year design life. And with steel providing the primary structure there is potential for life-extension, recycling or reuse in line with circular economy principles.

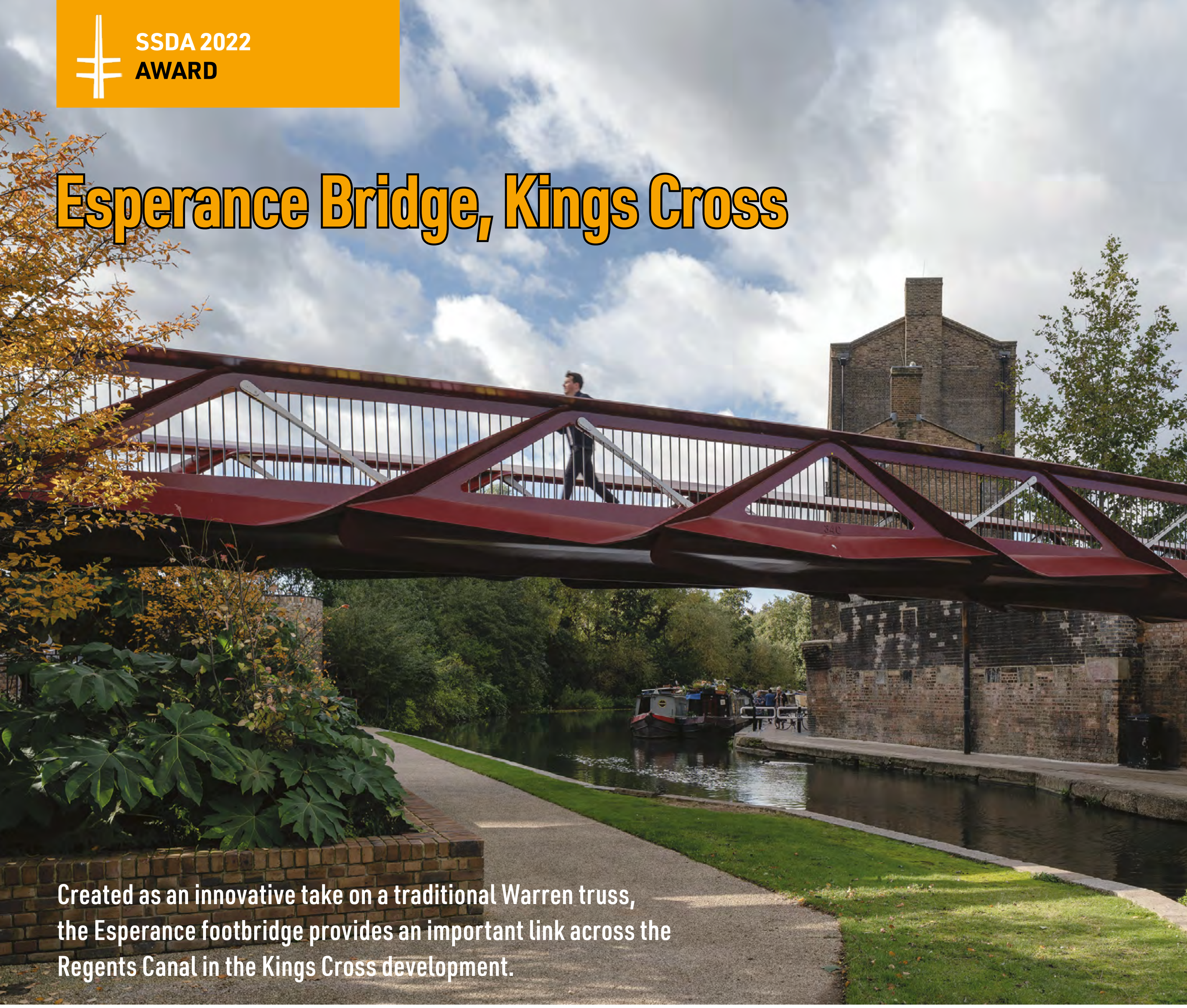
A sustainable structure was also achieved with the value-engineering, as the design process saved on steel, fabrication and erection time as well as reducing the environmental impact of the project. The resulting reduction in steel weight was key in minimising the embodied carbon and saved 850t of $CO_2$. The roof is also designed to take solar panels and assuming that the client achieves 50% coverage, this has the potential to save 300t of operational carbon per year.

Close co-ordination was required between London Biggin Hill, Civils and REIDsteel to ensure the steelwork was delivered efficiently and safely for assembly, which included the choice of opting for tandem lifts of the 45m rafter trusses to reduce jib heights from that required for a single crane. Other logistical challenges of operating in a live airport environment included consideration of flight schedules and restrictions on lifting during poor visibility.

Summing up, the judges say the central spine of the building anchors the cantilevers as well as housing the building functional spaces. The structure achieves remarkably good embodied carbon figures, in line with the LETI 2030 aspirational values. ■

SSDA 2022 AWARD

# Esperance Bridge, Kings Cross



**Created as an innovative take on a traditional Warren truss, the Esperance footbridge provides an important link across the Regents Canal in the Kings Cross development.**

Forming a link between King's Cross and St Pancras stations to the south and the shopping and restaurant outlets at Granary Square and Coal Drops Yard to the north, the 25m-long Esperance Bridge is a structure with tapering and folded steel plates, which is said to create an elegant and sculptural form.

A key aspiration of the design was to extend the existing public realm across the structure. The built solution achieves this with Granary Square's distinct porphyry stone paving flowing onto the bridge deck. The high-quality finishing details, with bespoke drainage channels, tidy movement joints, and custom-made steel balustrades all contribute to a harmonious public realm.

Brick-clad bearing shelf doors allow easy access for inspection whilst ensuring a seamless blend with the existing heritage masonry walls.

Early consideration of the bridge lighting scheme, along with multiple mock-ups of possible details, resulted in a design that brings the bridge to life at night whilst also minimising light pollution and ensuring no impact to one of London's critical bat corridors.

Esperance Bridge is a simply supported Warren truss made of welded steel plates with a steel-concrete composite deck. The reinforced concrete deck controls the dynamic behaviour and acts compositely with a steel 'bathtub' to carry the deck loads to the trusses. The top chord flows into the diagonal compression struts and continues around the 'bathtub' to terminate at a longitudinal stiffener centred under the deck. In this way, the flange provides improved buckling capacity for the struts and simultaneously restrains the top chord.

Fairing plates complete the expression of flow of forces from the top chord, down the diagonal struts and along to the bottom chord. Finally, the ties are stainless steel, expressing their differing function and reducing their visibility to emphasise the repeating truss module.

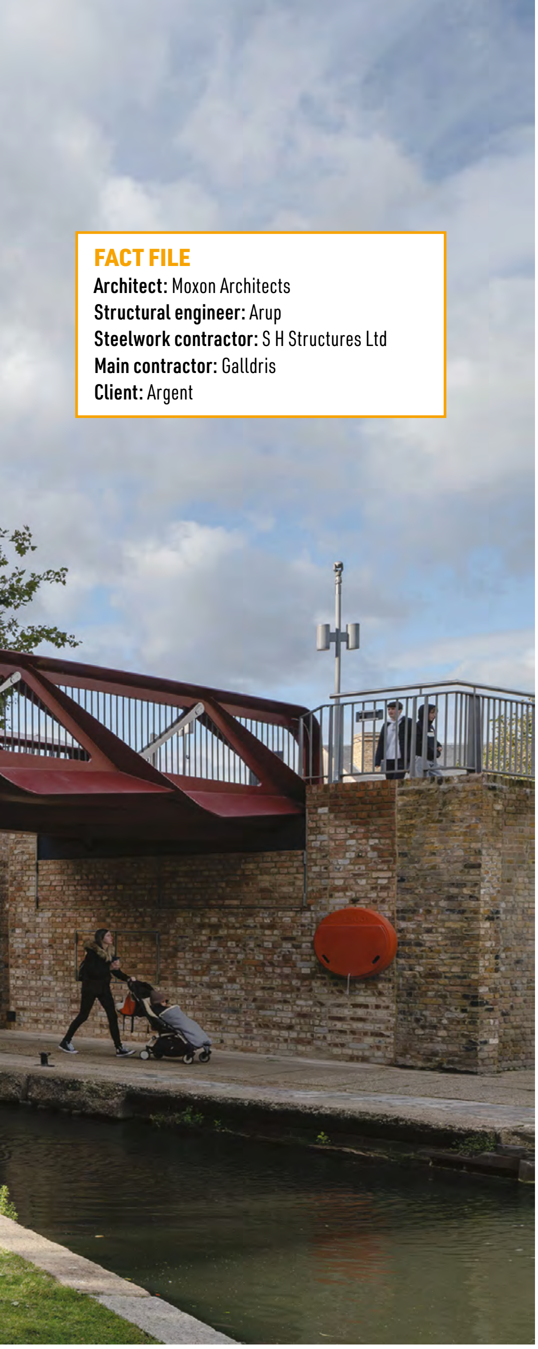
Recognising that the built environment has a critical role to play in reducing carbon emissions, reuse of existing structures was investigated early in the design process. Reuse of the existing Good's Way retaining wall on the south side was made possible with local modifications for the bearing shelf. Reuse of the existing masonry wall for the north abutment was ultimately not pursued as the durability of the solution for a 120-year design life could not be reliably proven. Nevertheless, the final solution and efficient superstructure design resulted in 20% carbon savings relative to 'business as usual'.

The definition of the geometry and the fabrication of the superstructure was challenging due to the complex curved shapes. The project delivery model had a period of early contractor involvement, which brought designer, architect, main contractor, quantity surveyors and steelwork contractor together at an early stage to define key details that were practical to fabricate.

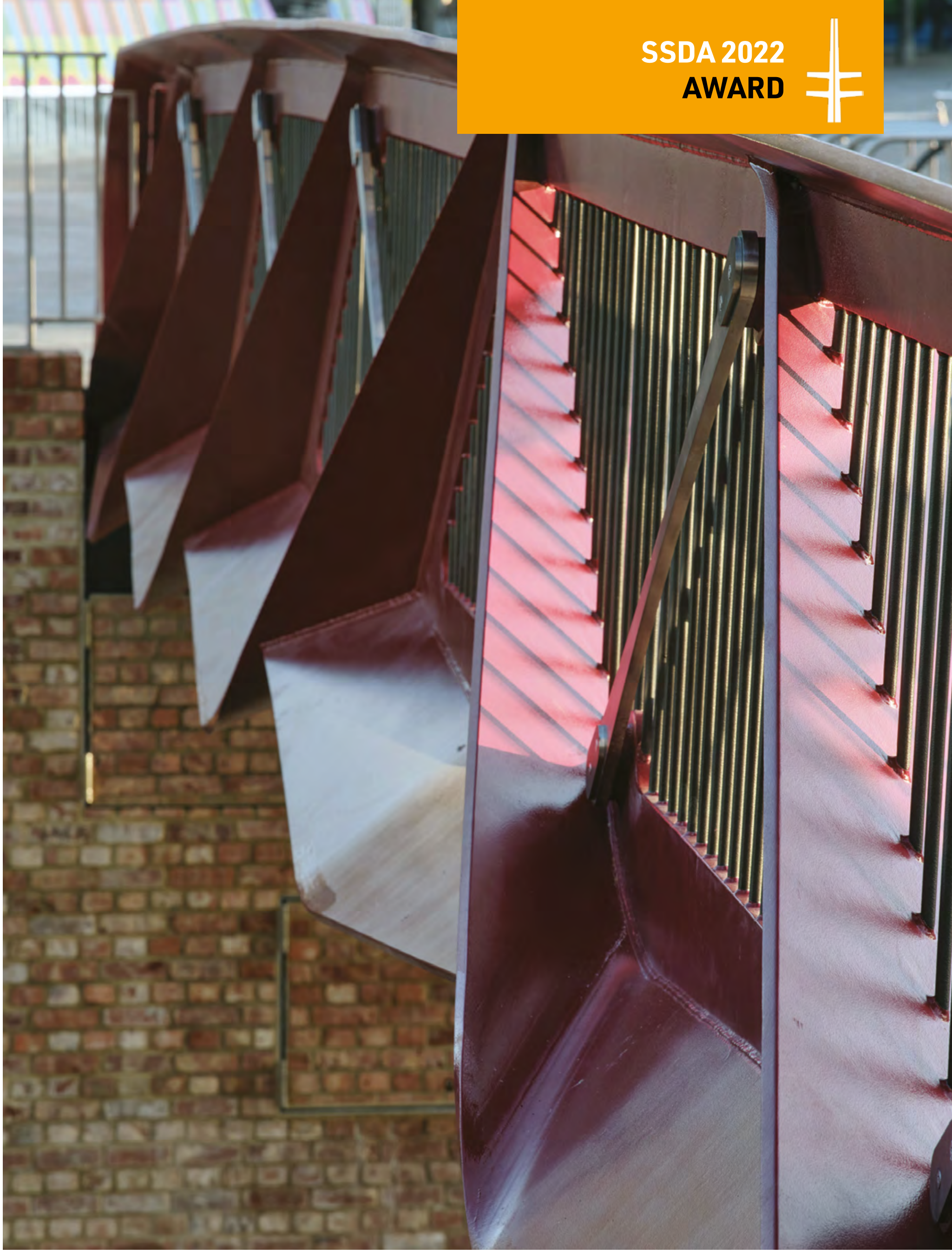
The use of 3D models to review difficult details allowed for effective collaboration. With key details established, a mock-up of a standard truss module was produced to test the fabrication and to confirm the visual appearance of the most important plate interfaces. This allowed the team to hone visual details and push the fabrication and workmanship skills to the highest standard. While complex, the modular nature of the truss form allowed a high degree of repetition, eventually streamlining both design and fabrication.

The curved plates were formed by a specialist contractor before being welded into the final assembly by the steelwork contractor. The bridge steelwork was fully fabricated offsite, providing greater control on quality and ensuring minimal disruption to an active and congested site. The bridge was lifted over the canal in one piece.

"This exceptional design perfectly captures



**FACT FILE**
**Architect:** Moxon Architects
**Structural engineer:** Arup
**Steelwork contractor:** S H Structures Ltd
**Main contractor:** Galldris
**Client:** Argent



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the proud heritage of the area that defines the development. A special thanks to our key partners that meticulously worked through every detail of the design without compromise, and to the delivery team that ensured the bridge was expertly manufactured and installed to sit perfectly across the canal," says Kings Cross Central Limited Partnership Development Manager Ben Cooper.

The choice of steel has allowed the structure to sit comfortably in its surroundings, while the use of modern design and fabrication methods has allowed the traditional bridge form to be elevated to an elegant sculptural object which is still true to its function.

This expressive form meets the client's aspiration of drawing attention and serving as a way marker within the wider pedestrian network. An emphasis on craft and deliberate detailing, together with close collaboration between parties, has resulted in a bridge where pedestrian experience is at the heart, as evidenced in the route's popularity since opening.

In summary, the judges say this is an elegant, pragmatic solution that is carefully crafted and beautifully made. This pedestrian bridge adopts the alignment of a historic bridge with its design appropriately reflecting the site's industrial heritage. ■

SSDA 2022 AWARD

# Lord's Cricket Ground, Compton & Edrich Stands Redevelopment


**Structural steelwork has played an integral role in the redevelopment masterplan of the spiritual home of cricket with the delivery of two new three-tier stands.**

Forming part of Marylebone Cricket Club's (MCC) ongoing masterplan to redevelop the world-famous and historic Lord's Cricket Ground, two new stands have transformed the Nursery End of the ground.

The new Compton and Edrich stands are located either side of the distinctive media centre and their three-tier arrangement increases capacity from 9,000 to 11,600 seats accompanied by two new main sponsor corporate boxes.

The redevelopment vastly improves sightlines, removes obstructed view seats, creates new wheelchair spaces and additional accessible seating, and adds a steel-framed roof, which partially covers the top tier.

The structural challenge was to achieve a light airy feeling to the whole development and very open circulation at ground level, with the outer perimeter of the stands being conceived as being a lighter colonnade using slim columns.

"The design programme presented a significant challenge for which Buro Happold carried out a detailed design, programming and cost option study which determined steel being selected for the main frame, where the initial project assumptions had been for concrete," explains Buro Happold Senior Project Consultant Paul Eddleston.

"Sports projects typically need to respect the event calendar and this was no exception. Optimising the design for minimum construction time enabled the ambitious programme to be realised, although the programme developed during phase one of construction coincided with the COVID-19 pandemic and the cancellation of spectator sports."

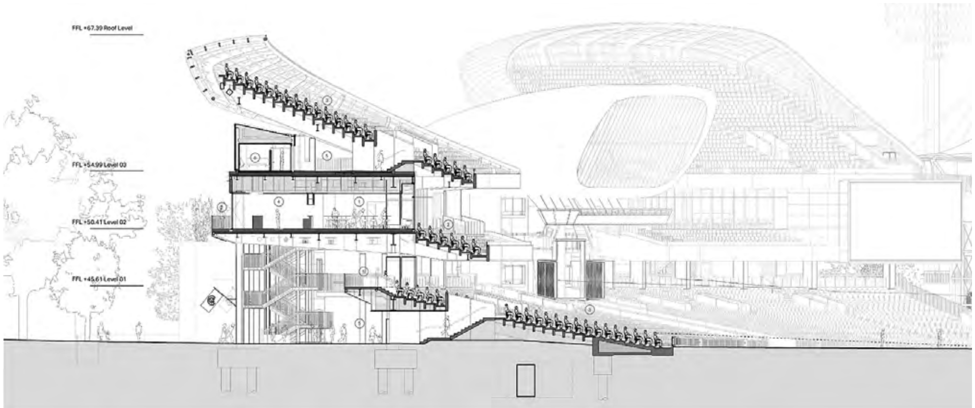
The structural layout of floors and seating responded to the functional requirements with the overall shape developed to complement the media centre. Each stand was spatially offset from the media centre so that the new elevation could be read individually but also allowing the three elements to be seen as a single new composition.

The structural framing developed to being a moment frame in two directions. In cross-section the structure is largely supported on two main columns, with further support to the lower tier. The outer column being pin-ended to respond to the aesthetic requirement of presenting a lighter colonnade façade, whilst the inner column, coupled with the bending resistance of the rakers, provides the lateral and longitudinal strength and stiffness.

To achieve this ,the inner column is a 1,400mm × 500mm fabricated box with 100mm thick base plates anchored with Macalloy bar assemblies. The lower tier was not utilised in the radial stability due to its variable relationship to the primary frame around the stands and was isolated by the use of a movement bearing at the connection to the main column.

The steelwork is largely exposed in the completed structure and therefore design and detailing of the connections and position of splices needed to respond to the aesthetic requirements,

**FACT FILE**
**Architects:** WilkinsonEyre
**Structural engineer:** Buro Happold
**Steelwork contractor:** Severfield
**Main contractor:** ISG Construction
**Client:** Marylebone Cricket Club



as well as cater for the significant forces being transferred through them.

To develop the required structural stiffness, the rakers were designed to be continuous through the main supporting column. This required them to be deep fabricated sections. The back-span element was designed to gently taper to the outer façade to maintain the aesthetic brief for the external view. The deep section has significant service openings through the web which allowed for M&E to be contained within the structural depth.

Design of the structure and foundations had to contend with a shallow depth Thames Water tunnel running through the footprint of the stand. This straight tunnel interfered with the radial structural grid which required special foundations on some grids to transfer loads away from the tunnel.

The roof form is created by a series of curved, plated rafters located on primary grids which in-turn support the timber waffle (purlins and radials) and the tensioned membrane roof covering. An important visual aspect of the roof was to develop a smooth line for the inner dripline of the canopy forming the leading edge. This required all site bolted connections to be maintained and hidden within the Circular Hollow Section diameter, providing a near seamless continuous member.

The complex forces generated within this member, due to its geometry and structural demands, made this particularly challenging and required detailed analysis of specific rather than global forces and careful positioning of splice locations.

The project was challenging in terms of the complex architectural steelwork and very tight offsite lead-in and construction programme. There was less than a year for the old stands to be demolished, all the new piling and foundations installed, and the new stands built, in time for what would have been the start of the 2021 cricket season (postposed due to COVID-19 restrictions).

"Offsite manufacture was a major benefit of using steelwork as it meant the erection of the stands could be done quickly and efficiently," says Mr Eddleston. "As there were many awkward interfaces between the steelwork rakers and precast terrace units the use of BIM allowed the design team to ensure co-ordination in the 3D environment using the fabrication models for both pre-fabricated elements."

The offsite lead-in period was condensed further by a detailed value engineering process, involving Severfield, ISG and the design team, which ensured the contract was as effective and cost-efficient as possible – and ultimately ensured that MCC provided final sign-off for the project to go ahead.

Summing up, the judges say the new twin stands have an apparent easy symmetry that belies the many difficulties of planning sensitivities, timetable, site and ground constraints that were overcome. ■

SSDA 2022 AWARD

# The Tower of Light, Manchester

**Supporting five exhaust flues, a 40m-tall steel tower is a key component of an important Combined Heat and Power energy centre.**

Manchester's Civic Quarter Heat Network project will supply several local buildings with low-carbon energy much of which will be derived from a new Combined Heat and Power (CHP) energy centre.

Because of the CHP's city centre location, the brief for its tower, which supports five flues, needed to include significant architectural merit, and to this end a 40m-tall visually-pleasing steel tower has been constructed.

Commenting on the scheme, Councillor Angeliki Stogia, Manchester City Council's Executive Member for the Environment and Skills says: "This is a fantastic opportunity for Manchester to improve air quality and the environmental quality and attractiveness of the city, and we believe this flagship project will make a significant contribution to achieving those ambitions."

Known as the Tower of Light, the tall flue supporting structure has a white curved steel perimeter shell which is the only vertical structure as there is no additional internal frame.

The tower perimeter shell is tailored from 6-8mm thick laser-cut steel plates which have been curved and welded together to create a stiff, strong shell. The geometric stiffness provided by the curves, folds, and corrugations in the shell enable the thin steel plates to resist buckling without the need for any additional stiffeners.

The perforation pattern of the shell is optimised to reflect the flow of stresses in the structure and, along with the folds, have the additional benefit of making the tower less susceptible to dynamic response to wind effects such as vortex shedding.

The geometry of the shell corrugations and perforations was developed using digital workflows to identify a structurally optimal form. Parametric tools were used to quickly generate and analyse several variations of the geometry, which allowed the design team to study the effect of changes in the form of the shell on the buckling and fatigue performance of the structure.

"Designing and fabricating the complex geometry of the unique structural steel perimeter shell of the tower was very challenging," says Arup Structural Engineer Chris Clarke.

"A structural shell of this form and scale could not have been formed in any other material, so the use of steel was integral to the realisation of the tower."

The perimeter shell structure has the dual purpose of also acting as the façade of the tower. Using the same material to provide both the structure and the façade has a material efficiency benefit over a more conventional braced frame flue tower, which would require a non-structural façade system. A study to compare the embodied carbon of the shell tower with a more conventional flue tower showed that the embodied carbon of the shell tower was lower, with a vastly reduced number of components.

As the forces in the structure due to wind and gravity decrease towards the top of the tower, the shell becomes lighter and increasingly perforated with height, further reducing the steel tonnage.

Due to the high number of edges and corners in the tower shell, there was a risk that a painted corrosion protection system would not be sufficiently reliable. Therefore, stainless steel was selected for the tower shell to ensure excellent durability. The tower is painted white for architectural reasons, but this also allowed a lower grade of stainless steel to be used and avoided

**FACT FILE**
**Architect:** Tonkin Liu
**Structural engineer:** Arup
**Main contractor:** Vital Energi
**Client:** Manchester City Council


Photo © David Valinsky

expensive surface treatments, reducing the project costs.

"As well as excellent durability, the use of stainless steel will also reduce maintenance requirements over the life of the structure," adds Mr Clarke.

A series of decks at 4m intervals up the height of the tower support the flues and transfer their load back to the tower shell. The decks also enable access and maintenance of the flues and have been designed with removable panels to facilitate replacement of the flues if required.

Belying its apparent complexity, the fundamental geometric principals of the shell structure are deceptively simple. All curved, the panels which compose the shell are developable, meaning they are singly curved.

These singly curved surfaces fit together to form the folded geometry of the shell. This was essential to ensure that fabrication of the tower was practical and cost-effective. Nevertheless, tight tolerances were required, and the structure was fabricated to Execution Class 3 due to fatigue requirements.

The design team issued a 3D CAD model of the tower to the steelwork contractor, who used the model to derive the cutting patterns for each of the 432 shell panels. The perforated shell panels were laser cut from 6mm and 8mm thick stainless steel plate, before being rolled to the correct curvature. These rolled panels were then welded together to form a series of 4m-high shell modules.

In total the tower was fabricated as a series of nine modules. Once fabricated, each module was transported to site, stacked on top of one another and fixed together by internal preloaded bolted flange connections at the top and bottom of each module.

Flue sections were pre-installed in each of the modules prior to lifting. These flue sections were then connected when the construction of the tower structure was complete.

The judges say, this shell lace structure exemplifies perfectly the synthesis of striking architectural form, advanced engineering, iterative technical analysis (Grasshopper and LS Dyna) and craft-based fabrication. A superb example of how design can transform a utilitarian chimney into a piece of urban art, intelligently conceived and impressively executed. ■

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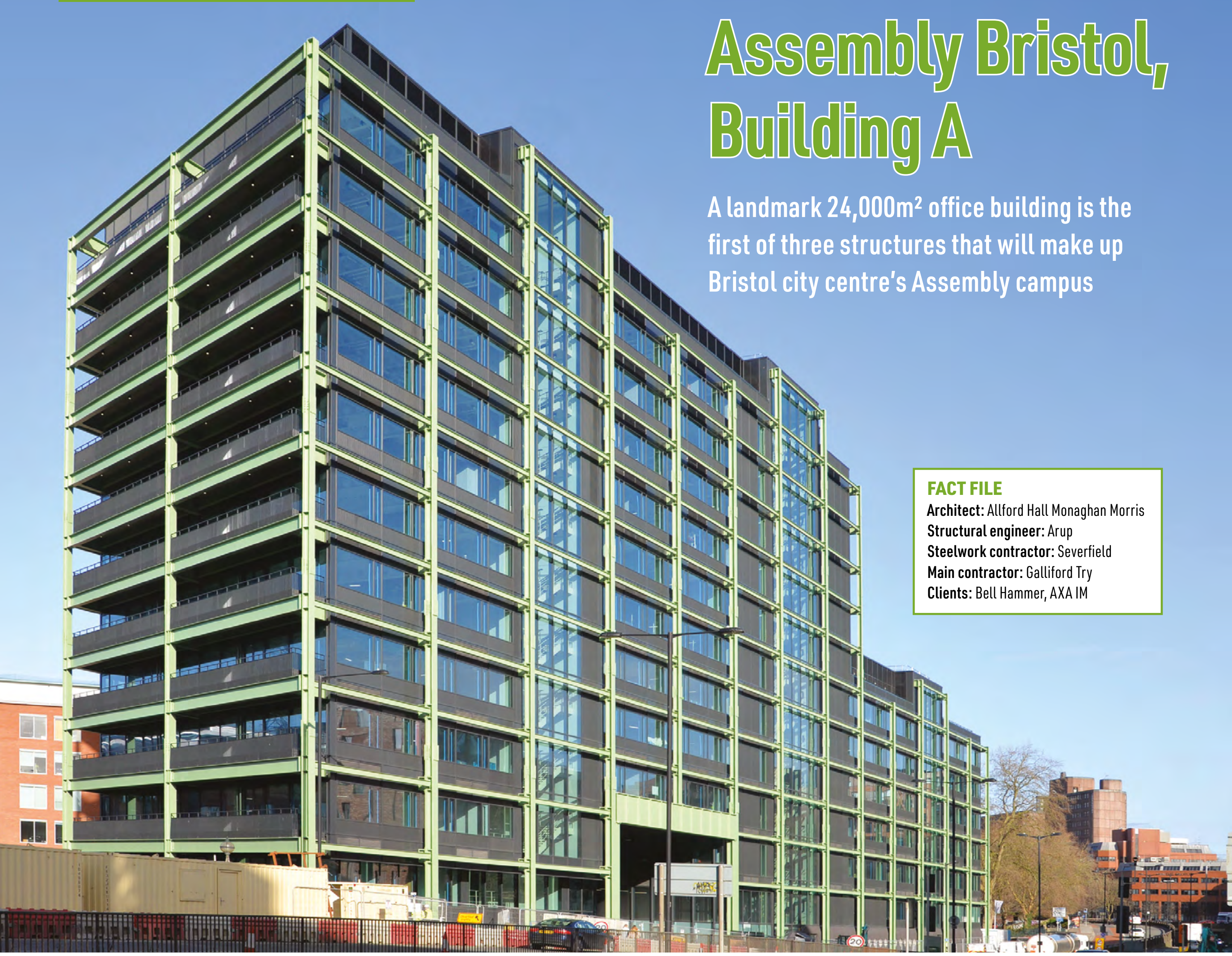
SSDA 2022
COMMENDATION



# Assembly Bristol, Building A

A landmark 24,000m² office building is the first of three structures that will make up Bristol city centre's Assembly campus

**FACT FILE**
**Architect:** Allford Hall Monaghan Morris
**Structural engineer:** Arup
**Steelwork contractor:** Severfield
**Main contractor:** Galliford Try
**Clients:** Bell Hammer, AXA IM

Immediately recognisable for its exposed green-painted steel frame, Assembly Building A is a landmark commercial office and associated public realm adjacent to the Floating Harbour in Bristol City Centre.

Spread across 13 floors, the structure is 120m-long, 25m-wide, and consists of a steel frame on a 9m × 12.5m grid, with a composite floor slab on trapezoidal metal decking.

The beams project through the façade to take support from the external columns. The secondary beams are spaced at 3m intervals and are supported by a central spine primary, and a perimeter edge primary.

The building is stabilised by three separate concrete cores and three 18m-long transfer beams support up to 12 floors and bridge a major brick sewer which crosses the middle of the site.

A key innovation for a structure of this type was designing out the thermal breaks. This was achieved by using fabricated I-sections for the steel stubs that penetrate the façade, allowing the flange and web thicknesses to be optimised and justified through a combination of iterative 3D thermal modelling and advanced structural analysis.

This resulted in a deceivingly simple solution that was thermally 40% more efficient than the traditional approach and eliminated 270 thermal breaks together with associated fabrication, installation and weather sealing complexity.

Further cost and embodied carbon savings were realised below ground. The scheme originally featured a semi-basement used as plant space, bounded by a contiguous piled wall to retain the adjacent highway. This was removed entirely by using Slimdek construction to minimise the structural zone and locally optimising the floor-to-floor heights.

The project team say a major challenge was dealing with thermal expansion and contraction of the external frame and the subsequent differential movement relative to the internal structure. The movements impacted the building's relationship with the façade and, as such, careful thought was given to steel deflections and even the location of the cores to ensure a standard system could be used rather than a bespoke unitised façade.

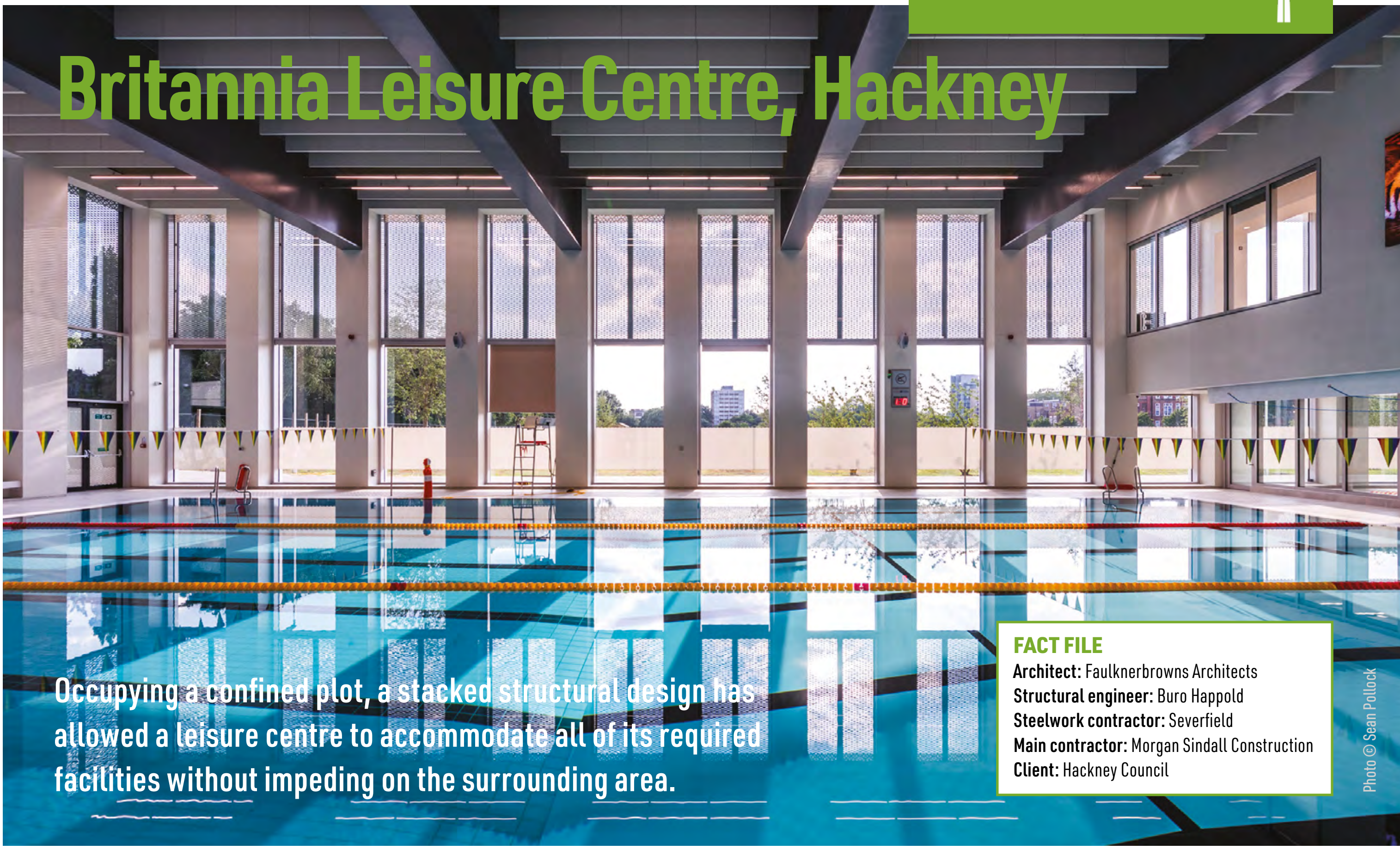
Similar attention was given to the two external transfer beams, where integration between structural engineering and architecture was paramount. Double columns at each end provide a visually simple solution, while allowing expansion and contraction of the transfer beams without the need for bearings and their associated maintenance requirements. A fabricated box section was used with outstand flanges to meet architectural aspirations for an I-beam, while being 30% more structurally efficient.

Steelwork is exposed both internally and externally, and connections have been carefully detailed to ensure visual consistency and elegance.

Intumescent paint was omitted from secondary beams through a detailed fire engineering assessment, which involved complex non-linear structural analysis of the floorplates. This represented 40% of the floorplate and resulted in a significant cost saving.

The building has achieved a BREEAM 'Excellent' rating, is WIRED Platinum and WELL enabled.

In summary, the judges say this new city office complex is striking for its robustly designed and detailed steel exoskeleton, coloured 'Bristol green'. It, and a new pocket park, is squeezed onto a site tightly constrained between Bristol's Floating Harbour, surrounding highways and several immovable ground structures. This new destination development, built at regional economic costs, has attracted the very best tenants. ■



# Britannia Leisure Centre, Hackney

**Occupying a confined plot, a stacked structural design has allowed a leisure centre to accommodate all of its required facilities without impeding on the surrounding area.**

**FACT FILE**
**Architect:** Faulknerbrowns Architects
**Structural engineer:** Buro Happold
**Steelwork contractor:** Severfield
**Main contractor:** Morgan Sindall Construction
**Client:** Hackney Council

Photo © Sean Pollock

Forming part of a multi-million-pound scheme that will transform a large swathe of land bordering Shoreditch Park in east London, the construction of a new leisure centre has provided evidence that steel construction does stack-up when an efficient design is required.

"The main challenge of the scheme was that we had to deliver the new Britannia Leisure Centre on the footprint of the existing hard courts. This was to ensure that we minimised the impact of the building on the Designated Open Space which surrounded it," explains Hackney Council Project Director Hayley Miller.

The solution was a steel frame designed to accommodate numerous facilities in a stacked formation. To this end, the leisure centre has a variety of column-free areas, some of which are double-height and triple-height zones, each positioned on top or adjacent to each other, like a collection of different sized boxes.

The building accommodates extensive wet and dry facilities including a six lane 25m-long pool, a training pool, leisure water, a sports hall, fitness suites, rooftop sports pitches, squash courts and a café.

The client's goal for Britannia Leisure Centre was to create a community hub that encourages more people to participate in sport and adopt a more active and healthier lifestyle. Despite the pandemic, the centre has been hugely successful, welcoming 400,000 visitors in its first six months of operation, a 161% increase from the unsustainable and outdated centre that it replaces, and has achieved a BREEAM 'Excellent' rating, a considerable achievement for a scheme of this nature.

What would historically be a sports/pool hall roof is, at Britannia, a sporting floor level. Swimming pools are at ground level, with sports halls, fitness suits and dance studios above, all topped off with tennis and five-a-side courts on the roof.

"The nature of the leisure spaces means the spaces must be column-free and stacking the centre results in long-span suspended floors. Unlike other building typologies, a leisure centre will be exposed to unusually high dynamic excitation from its users which, if not properly controlled, could resonate with the structure causing adverse movement," says Buro Happold Director John Edgell.

"Lightweight steelwork framing, with its high stiffness, especially when designed compositely with the precast concrete floor was the only material that could meet the spatial requirements and limit vibrations."

To facilitate the stacked building programme, the structure has a pair of long-span transfer trusses which are positioned within wall zones. Steelwork was the only material that could cope with spans of up to 40m, remain light enough to manoeuvre into position and work within the geometrical constraints.

The backbone of the building is the pair of 60t, 10m-high transfer trusses that collect the load and take it down to ground level. The shorter, 28m span truss was erected piece-small, its location making it simpler to build this way without surcharging the sewer. The longer span upstand truss at roof level was assembled on site using temporary trestles then installed via a tandem lift using two 500-tonne capacity mobile cranes.

Summing up, the judges say a multitude of diverse and highly popular leisure spaces have been cleverly interlocked and stacked to reduce the building footprint. This has generated great civic presence and released land to help fund the development. ■

SSDA 2022 COMMENDATION

# Fire Station Auditorium, Sunderland


**FACT FILE**
**Architects:** Flanagan Lawrence, Howarth Litchfield
**Structural engineer**: JC Consulting
**Main contractor:** Brims Construction Ltd
**Client:** The Sunderland Music, Arts & Culture Trust

**A central feature of the Sunderland Music and Culture Quarter, a new steel-framed performance space has combined flexibility, architectural excellence and value for money.**

Complementing a number of other Sunderland city centre developments and refurbishments, the Fire Station Auditorium has delivered a new multi-functional destination for music and culture.

The project is located next to the former fire station building, which had previously been refurbished to form offices and a bar restaurant, as well as both the Sunderland Empire theatre and the Dunn Cow pub.

The auditorium is a flexible space and suitable for multiple performance types, allowing a quick transition between events to maximise the use of the venue. At a cost of £7M, this is said to be a unique value for money offering with a high-quality build and architectural excellence.

Initially designed as a reinforced concrete box containing some steel elements, a value engineering exercise was undertaken, whereby the design was switched to an entirely steel-framed project.

The design change was said to have made the project more suitable to the local supply chain, as well as improving the sequencing of the works and reducing the foundation works.

According to the project engineers, the building has some very strong architectural features and is designed to sit alongside and within an environment of heritage buildings. While it is very striking when viewed in isolation, with its overhanging front entrance glass and terracotta façade and the large open atrium, it is only when viewed in context to the entire area that these elements don't show off, but actually give prominence to the surrounding buildings.

The use of steel to form a double cantilever is said to be key to the success in allowing the ground floor to be seamless with the inside outside intent of the structure's main façade.

The steel members cantilever internally to support the first floor around the voided atrium as well as externally to support the main façade and roof. The mass of the brickwork, built over the bar area and supported by a steel truss, is also key to delivering the architectural impact of the auditorium with the building and the foyer being the transition from public realm to the performance space.

The truss was designed to exploit the available depth of the elevation to ensure a very stiff structure, with economical use of material, to carry a significant load over a significant span while limiting dead load deflection to appropriate limits.

"The adoption of a primary steel structure, in place of reinforced concrete, resulted in a saving of around £300,000," says JC Consulting Director Craig Higgins.

"Simply, the scheme would have been unable to have achieved the same success without the adoption of a structural steel frame."

Internally, one of the key aspects of the project was the ability for the space to be multi-functional with efficient change over between performance types. Flexibility is provided by multiple stage positions, and numerous seating and standing arrangements. This is complemented by collapsing handrails, moveable stairs and retractable seating.

Summing up, the judges say acoustic considerations initially suggested a concrete solution, but the frame was changed to a fully steel structure resulting in excellent acoustic performance in a very flexible facility, that was produced at substantially lower cost. ■

SSDA 2022
COMMENDATION

# Central Atrium at Hilltop, RHS Wisley

## Structural steelwork provided all the answers for a new sustainably-designed education and science centre formed with two 'wings' that are connected by an atrium.

Opened in 1903, the Royal Horticultural Society (RHS) Garden at Wisley, which is now designated as a Grade II* Historic Park, is one of Surrey's leading visitor destinations.

Adding to the garden's attractions, the Hilltop Building provides a new education and science centre that will attract a wide range of audiences and provide a destination for learning and events, science and research, interpretation, and enjoyment of horticulture.

The building is a 'Y' shape in plan, a form that is said to integrate with the landscape and encourages visitor flow through the building and surrounding gardens. It is divided into two functional 'wings' with a central atrium forming an adaptable, multi-use public space linking them together.

At ground level, the atrium acts as a flexible public engagement space and provides the public with access to the café, events space, classrooms, and library. At first floor level, via cantilevered walkways and a bridge, the atrium space links the more restricted-access areas such as laboratories and offices. The north end of the atrium forms the main entrance to the building and opens out onto long views across the site.

According to the project engineers, Michael Barclay Partnership, a steel frame was selected to achieve a lightweight, filigree and curved grillage that could be detailed to incorporate drainage, ventilation, movement, and thermal separation.

A steel roof meant the design achieved an elegant, exposed aesthetic with a repeated and cohesive set of unobtrusive bolted connections. With all steelwork fabrication done offsite, the finished quality was controlled to a greater degree than with other materials and site waste was minimised.

The atrium roof springs off the eaves of the adjacent two-storey wings, creating the large double-height space. The roof is composed of three roof planes with two lines of supporting columns below.

The clerestory at one of the roof junctions is formed with a Vierendeel truss to create a line of unobstructed glazing. This provides the area with natural ventilation, and an area for smoke vents. A valley gutter is formed in the other roof junction, which is built into the profile of the steelwork to ensure that the overall construction remained slim.

Adding some flexibility into the scheme, both the valley and Vierendeel truss lines have fixing points that will allow the RHS to suspend exhibition artwork or lighting from the atrium roof.

The atrium roof has a varying solid to void ratio, increasing from the north to the south, and this provides a balance of natural daylight and thermal gain to fit with summer and winter months.

Overall, the atrium structure relies for its lateral stability on the adjoining wings but, since the atrium is subject to a different thermal environment, movement joints are provided. These minimise the restraint against longitudinal movement and comprise bolted joints with slotted holes and a PTFE sliding interface.

Building Information Modelling (BIM) level 2.5 was used throughout the design process with Revit software used in the design stage, which was said to have helped the team to overlay the architectural, structural and services to coordinate in detail.

The judges say the elegant steel grillage gives a lightweight aesthetic to the glass atrium and external canopy that would not have been possible in other materials. The attention to detailing on all the exposed connections, despite the complex geometry of the roof, was truly commendable. ■

**FACT FILE**
**Architect:** WilkinsonEyre
**Structural engineer:** Michael Barclay Partnership LLP
**Steelwork contractor:** Hillcrest Structural Ltd
**Main contractor:** Osborne
**Client:** Royal Horticultural Society

SSDA 2022
COMMENDATION

**FACT FILE**
**Architect:** WilkinsonEyre
**Structural engineer:** Arup
**Steelwork contractor:** Severfield
**Main contractor:** McLaughlin & Harvey
**Client:** Aldgate Developments

Photo © Mediamixer New Media

# One Braham, London

## Featuring large amounts of exposed internal steelwork, a prestigious bespoke commercial development forms part of a wider Aldgate masterplan.

Located in Aldgate, on the edge of the City of London, One Braham forms part of Aldgate Developments masterplan for the area, which has transformed a number of plots with desirable commercial buildings.

Achieving a BREEAM 'Excellent' rating, the structure offers 27,700m² of office space across 19 floors, including two large open terraces on the 15th and 17th floors.

The ground floor accommodates two retail spaces totaling 930m², a delivery area and a two-storey reception area that can be accessed from Braham Square to the north and Leman Street to the east.

The façades to the office accommodation are fully glazed with vertical brise-soleil to the east, south and west façades. The ground floor is set back to form a colonnade modulating between a new park, the building entrance, and adjacent shops.

The client's request was to have an 'industrial feel' to the office, which meant a large amount of the completed steel frame has been left exposed.

"The building's large spans, which are up to 13.7m-long, are challenging and the exposed steel frame with carefully detailed connections are part of the architecture, as the offices are aimed at tech market end-users," says Arup Principal Engineer Greg Garson.

"Structural steelwork helped create the architectural character of the building with exposed elements and intricate detailing on show, as well as seamless interfaces with façade restraints, particularly behind the scenic lift and in the atrium."

From ground level upwards, the structure has composite slabs, comprising metal decking with exposed soffits and an insitu concrete topping that acts compositely with the steel plate girders to maximise strength and stiffness. The mobilised mass also helps to minimise floor vibrations from the tenant's footfall.

Keeping within a permitted height due to project sight line restrictions, the design has used fabricated plate girders to support the metal deck flooring system. These girders have bespoke holes to allow all the services to be accommodated within their depth. This service integration and the use of shallow heavy plate girders allowed one extra floor to be incorporated into the scheme.

The stability for the building is provided by a reinforced concrete core and shear walls. This is said to avoid the need for vertical diagonal bracing in the building, which minimises the impact of the frame on the remainder of the floorplate and facilitates a flexible design and open-plan floorplates.

On plan, the rectangular structure is divided into four blocks with two portions on the northern elevation topping out at levels 15 and 17 respectively. Meanwhile, on the southern façade, there is a further rooftop step as one portion accommodates a two-level plant deck.

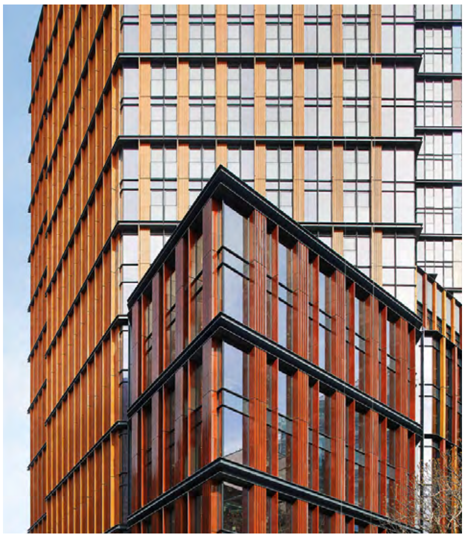
To help create the 15th floor step in the building, two large transfer girders, with depths of 590mm and each weighing 11.5t, have been installed to support the set-back columns above. In order to accommodate the girders into the overall shallow floor design, the beam's top flanges are exposed at the structural slab level with no concrete topping.

The step at floor 17 is close to primary columns so the floor edge is cantilevered and does not require transfer beams. The uppermost step at roof level supports two plant decks, which is off the main column line. A transfer beam is included here, as there is greater structural depth available.

In summary, the judges say this office building is a fine example of the use of steelwork to meet the demanding commercial requirements of the client. Fabricated plate girders, composite beams, higher grades of steel and pre-cambering resulted in a ruggedly practical finish. ■

# One Crown Place, London

## Forming the centrepiece of a central London mixed-use development, two residential towers are supported by 15 steel trusses.



With a blend of residential apartments and a Grade A office, alongside a boutique hotel and restaurant, One Crown Place has reinvigorated an area close to both Liverpool Street and Moorgate stations.

The main part of the development is positioned at the eastern end of the site where a six-storey podium supports two apartment towers, that reach heights of 33 and 29 levels respectively.

This part is reliant on structural steelwork as the podium is a steel-framed structure topped by a series of 15 trusses. These steel trusses have three functions. Firstly, they help to create the clear column-free internal office spans of up to 12m for the floors up to level 6.

Secondly, levels 7 and 8 are accommodated within their depth, where the truss elements will be left exposed as architectural highlights. Level 7 will accommodate a gym, a work hub, private screening room, meeting space and other exclusive amenities for the residents, while level 8 is given over to apartments.

And thirdly and possibly most importantly, the trusses support the two reinforced concrete (RC) residential towers that begin at level 9.

The change in construction materials at level 9 presented a challenge of transferring the smaller RC column grid of the towers to the larger steel structural grid below. This was resolved by using the trusses to support the change in the column grid pattern.

"Realistically, steel was the only material to respond to the spans and loads involved, while providing a relatively high level of spatial flexibility/fluidity within the transfer floors and system itself," says AKT II Director Steve Toon.

"Adopting steel at transfer level lead to adopting a steel structure for the office spaces below, which provides the material and construction continuity within the podium, up to the commencement of the residential spaces above."

The trusses are up to 25m-long and include eight double-storey trusses and seven single storey trusses. The single storey trusses are generally positioned in areas of lower loading, and where the massing steps back to create habitable terraces.

A variety of UC section sizes were used to form the trusses, including several heavy 356 × 406 × 634s. In some areas, the diagonal bracing elements are pulled apart (un-noded) to accommodate doorways, wherein the standard rolled UCs are replaced with larger fabricated plate girder sections to provide the necessary capacity.

The trusses are supported at each end on 600mm x 600mm double-webbed mega-columns, each of which was fabricated from four plates. All of the podium's columns are founded at ground level, above the new two-storey reinforced concrete basement.

Throughout the office floors, cellular beams span outwards from the centralised core to the perimeter, creating the column-free floorspace, while also accommodating the building's services within their depth.

Within the office levels, approximately 50% of the columns are fabricated as mega-sections that are spliced at every second floor. As with all the project's steelwork, each of these mega-sections had to weigh less than 9t, in order to stay within the lifting capability of the site's tower cranes.

The judges say two 28 floor concrete-framed residential towers are, remarkably, supported on a steel-framed office block. A two-storey transfer structure of 15 steel trusses transfers the dense residential column loads over the largely column-free workspace floors below. ■


**FACT FILE**
**Architect:** KPF
**Structural engineer:** AKT II
**Steelwork contractor:** Severfield
**Main contractor:** Mace
**Client:** AlloyMtd

SSDA 2022
MERIT

FACT FILE
**Architect:** Jamie Fobert Architects
**Structural engineer**: Price & Myers
**Main contractor:** QOB Interiors
**Client:** Pace Gallery

# Pace Gallery, Hanover Square, London

## A cleverly reconfigured space, with a central steel staircase, is the new home for a leading international art gallery

Pace Gallery, one of London's leading international art galleries, that represents some of the most influential contemporary artists from the past 100 years, has a new home on Hanover Square.

Accommodated within an existing gallery, the space has been transformed with the construction of two new galleries on the first floor and an opened-up basement level that creates an additional third 100m² public volume.

The three new galleries are highly flexible spaces, allowing the Pace team to show various types and scales of art by adding or removing internal walls and covering or revealing the windows to control the daylight.

A key feature of the brief was to create the impression of a fully integrated space, which was expertly achieved by the creation of a feature staircase. Exquisitely rendered in black steel, it not only connects the basement and entry level, but its form allows for sunlight to pour into the basement offices, making them feel more open and connected to the main space.

By introducing a new lift within the existing staircase, for disabled access as well as art handling, it became possible for the lower ground floor to become a public space. An opening was cut in the existing ground floor slab allowing daylight down into the workspaces below. The new staircase within the void makes a strong vertical connection between the two floor levels.

The stair is fabricated from waxed raw mild steel, showing the colours of all the heat marks and manufacturing processes that have gone into the material. The development of the sculptural staircase involved close collaboration with the architect, engineer, and steelwork contractor.

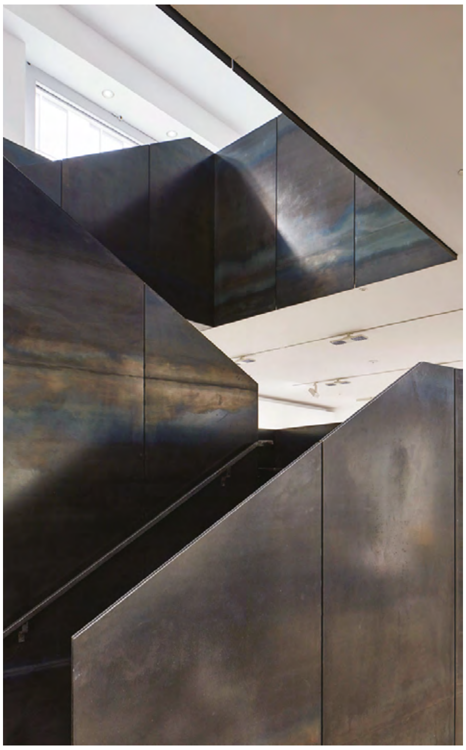
The stair is configured with three flights between two intermediate landings. The bottom landing is supported on the basement slab while the middle landing is both hung from the ground floor and supported on a slender wall panel. Flights were designed as prefabricated treads, risers and stringers which could be assembled along with the balustrade panels on site.

The stair balustrade was designed as a sandwich with three layers of 6mm steel plate with the middle panel offset to create a continuous rebate detail across the top of the panels. The balustrade panels were integral to stiffening the stair to mitigate vibration and conceal fixings between elements.

Steel hollow sections were integrated into the shallow middle landing to resist the high torsional stresses generated at the intersection of the upper and lower flights.

Balustrades around the stair at ground floor level were designed as cantilevers with vertical spacers welded together in-situ at joint locations and a horizontal spacer panel to the top edge. This was installed on site to transfer shear between panels and avoid differential deflection. The cantilever was achieved with fixings anchored to the top and bottom of the existing slab with the balustrade extending below the slab soffit to the dropped ceiling below.

Summing up, the judges say the attention to detail in both design and manufacture have resulted in an exemplary and beautiful structure which embraces the steel manufacturing process from rolling mill to final welding. ■



# LCT 7074 Canopy, The D-Day Story, Portsmouth

## A slender steel canopy protects and highlights the sole surviving Landing Craft Tank (LCT) from the D-Day landings.

Sitting adjacent to the D-Day Story Museum on Southsea (Portsmouth) seafront, a cantilevered steel canopy showcases the conservation of the sole surviving Landing Craft Tank (LCT) from the D-Day landings on 6th June 1944.

The brief entailed the design of a protective canopy structure that covers the vessel and its visitors from inclement weather, together with providing clear access along the entire length of one side for LCT 7074 to be manoeuvred into her final resting place.

The aesthetics of the canopy required an elegance and simplicity that is empathetic to its sensitive surroundings, while still having a presence that physically relates to the robustness and mass of the ship itself.

A locally-listed historic wall to the rear of the canopy provides weathering protection to the lower part of the tapered steel columns and the hull of the LCT. The initial design appraisal calculated a minimum 6-degree angle of protection for the canopy covering from the edge of the ship. This was required to protect visitors against the weather and prevent further deterioration of the vessel.

Structural steelwork provided an efficient and cost-effective design solution for the canopy structure, owing to its high strength-to-weight ratio, which facilitated the slender yet robust form of construction.

"Although a plethora of structural solutions were explored, a steel frame was finally opted for as it was decided that the slender profile of the canopy would be much better served by bespoke steel girders," says Mann Williams Engineer Iasonas Bakas.

"The inherently lighter steel construction made the long cantilevers achievable, maintaining the thin edge profiles required by the architectural design."

The canopy frame primary elements consist of a series of fabricated front and rear tapered cantilever arms. To the front and rear elevations, curved perimeter 219 CHS members fit between the arms and a full roof bracing system provides stability to the frame.

The canopy is supported on one side by 12 bespoke tapered fabricated mast columns, each 12m-tall and weighing 7.5t, formed from 25mm-thick plates. The columns line through with the piers of the historic wall behind, keeping one side of the ship clear of visual distraction and providing uninterrupted views of vessel from the roadside.

The tapered fabricated front rafter arms cantilever up to 13m with a robust preloaded bolted splice positioned 1.6m from the column face. These 300mm-wide plate girders are 1m-deep at the column face and taper down to 200mm-deep at the ends.

A high specification galvanized and painted corrosion protection system, workshop applied to the canopy steelwork, provides an effective corrosion protection solution for the required 50-year design life.

A high tensile fabric covering provided a low carbon option for the canopy compared to materials such as glass or profiled metal cladding. The underside of the primary roof steelwork was detailed with small, profiled angle cleats at 300mm-centres to support the fabric sail membrane.

The judges say, a floating canopy supported by raking steel pylons reminiscent of beach defences of the past announces this new museum. ■

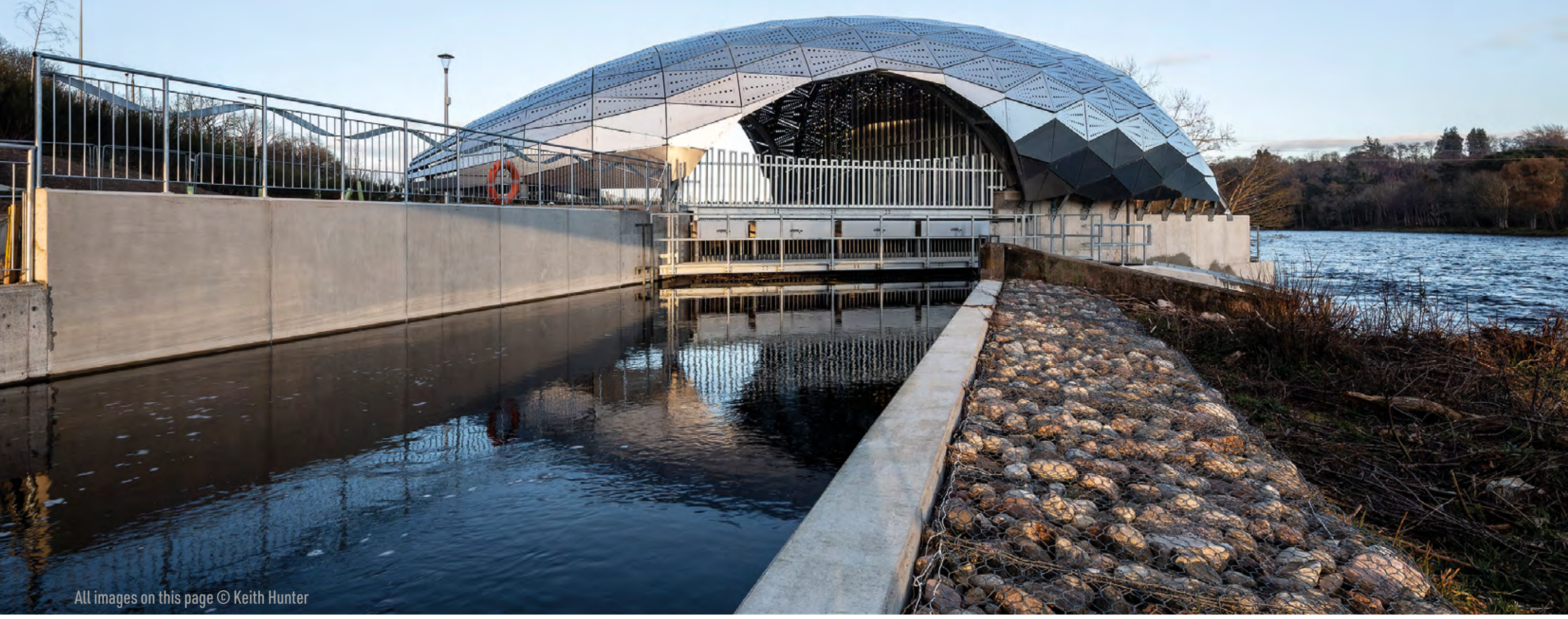

**FACT FILE**
**Architect:** Pritchard Architecture
**Structural engineer:** Mann Williams
**Steelwork contractor:** Hillcrest Structural Ltd
**Main contractor:** Ascia Construction Ltd
**Clients:** The National Museum of the Royal Navy, Portsmouth City Council

Photo © Peter Langdown

# Hydro Ness, Inverness

**Taking the inspiration for its shape from salmon swimming upstream, a unique riverside scheme will generate approximately 550,000 kWh of renewable electricity annually.**

**FACT FILE**
**Architect:** Leslie Hutt Architect
**Structural engineer:** Hasson Engineering Solutions
**Steelwork contractor:** M Hasson and Sons Ltd
**Main contractors:** Bradley and Company, Hydro NI
**Client:** Highland Council



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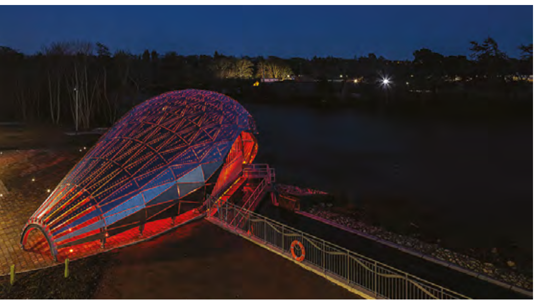


Signposting the benefits of renewable energy sourced from the River Ness, the Highland Council's Hydro Ness scheme is said to offer a unique and accessible opportunity for young people to visit and better understand key Science, Technology, Engineering and Mathematics (STEM) skills and learning in practice.

As well as generating renewable electricity and reducing carbon emissions, the scheme will attract visitors, providing an interactive experience and a learning hub for climate change, local ecology, engineering and renewables.

Housed within a curved steel-framed canopy, the inspiration for this interestingly shaped building is said to be found in the motif of the salmon, making its way upstream along the River Ness.

The idea was conceived by local artist, Claire Maclean, and further developed by Inverness architect, Les Hutt.

The structure is highly visible from one of the main arterial routes into and out of Inverness City, and tremendous care was taken to deliver a finished structure worthy of such a prominent location.

As the prominent architectural feature of the Hydro Ness installation, the canopy structure presented a number of significant design, detailing and fabrication challenges. Foremost among these was achieving the doubly-curved, faceted external envelope that required almost 400 uniquely shaped, planar cladding facets.

"These facets were kept planar to reduce fabrication burden, but shaped and closely spaced in order to achieve the appearance of smooth curvature over most of the canopy," says Hasson Engineering Solutions' Michael Hasson.

The process of transforming the original vision into a structure suitable for fabrication and erection relied on extensive use of parametric modelling, finite element analysis and detailed BIM modelling.

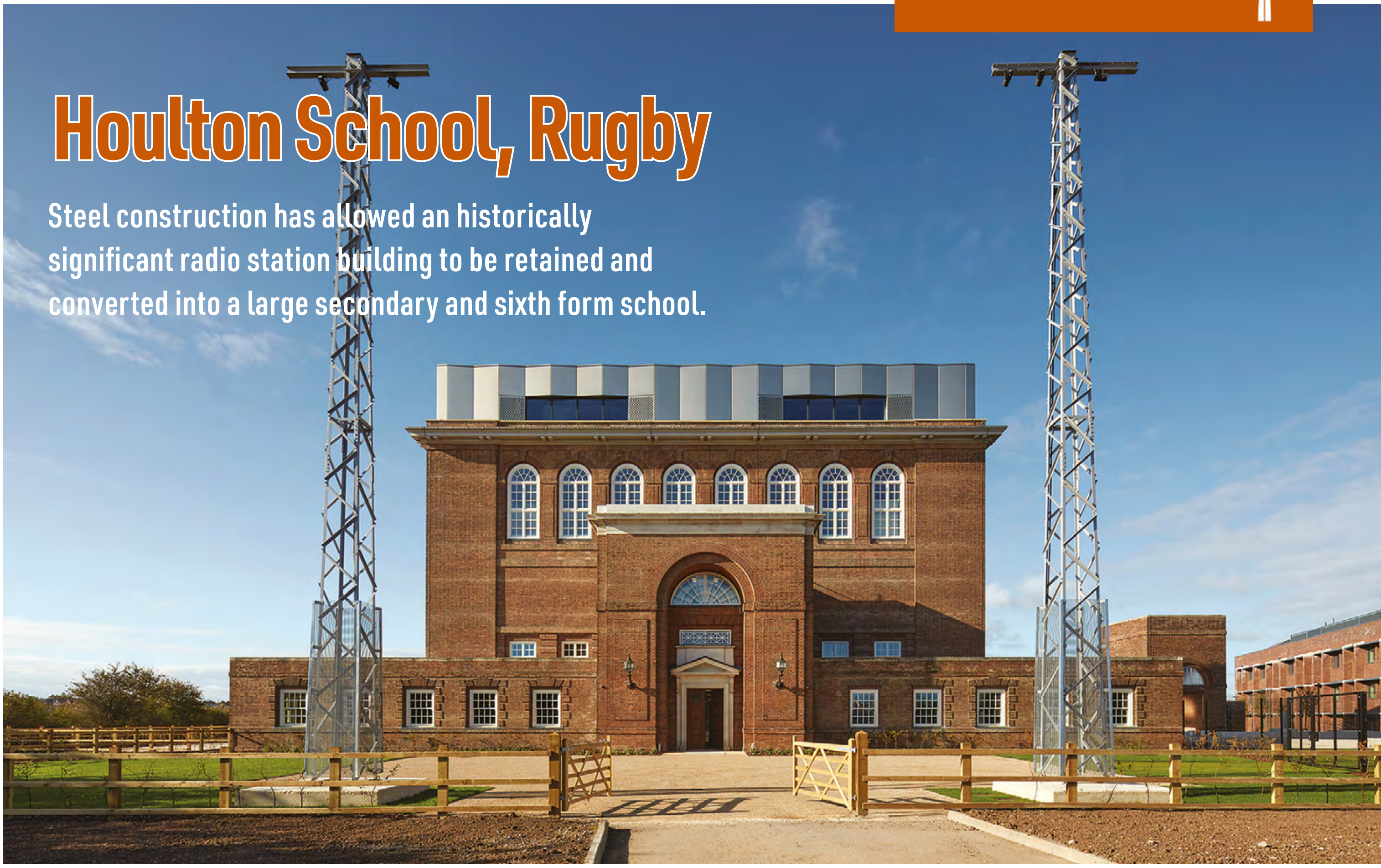
The main frame comprises curved UC sections, all of which were curved to differing radii. The framing for the cladding panels is all made from SHS, welded into co-planar triangles.

In total, there are 384 cladding panels, with each of these being unique. All the conventional structural steelwork used throughout this project was galvanized to ensure longevity. The cladding panels which complete the canopy are all made from stainless steel with a swirl finish to enhance the architectural intention of 'looking like scales of a fish'.

"The geometric complexity of the canopy structure, and the need to provide a robust, stiff structure with significant openings in two elevations were key motivations for the use of structural steel," adds Mr Hasson.

"Furthermore, a key aesthetic requirement was to provide a vivid, shimmering exterior envelope, amenable to dramatic illumination at night. These factors, along with consideration of resilience to demanding, and changing, environmental conditions further underpinned the choice of structural steel framing and stainless steel cladding elements."

The judges say, this unusual steel structure houses a small hydroelectric unit producing renewable energy and providing schoolchildren with a practical educational opportunity. A small but significant project demonstrating the versatility of steel. ■



# Houlton School, Rugby

**Steel construction has allowed an historically significant radio station building to be retained and converted into a large secondary and sixth form school.**

Built in 1926, a Grade II listed building that was formerly occupied by Rugby Radio Station (C-Station) has been refurbished and altered in order to accommodate the new Houlton School.

The existing building hosted the first transatlantic telephone call to New York, transmitted telegraph messages to the Commonwealth, and communicated with nuclear submarines during the cold war, all via 250m tall aerial masts.

With so much history, the brief for this project called for a significant amount of adaption to allow the new secondary school to incorporate the former C-Station on the eight-hectare site.

It had to cater for 1,260 pupils and over 100 staff when fully occupied. The school was designed to the standard Department for Education brief for mainstream schools, and complies with the School Output Specification. The sports block has been enhanced to meet the Sport England guidance for a community facility, with a bigger hall and a viewing gallery.

A new steelwork frame was threaded through the first floor of the existing Transmission Block to provide an additional four floors of accommodation, while leaving the existing first floor steel beams exposed and intact. The new steel frame sits on piled foundations, constructed so as not to undermine the existing foundations. The roof of the Transmission Block has been raised, and a cornice reinstated to match one destroyed by a fire in 1943.

To improve circulation throughout the buildings, two steelwork scissor stairs have been constructed at each end of the Transmission Block, and ring beams added to restrain the existing walls around the new stair voids. Two further steel staircases are inserted into the Accommodation Block.

**FACT FILE**
**Architect:** Van Heyningen and Haward Architects
**Structural engineer:** Price & Myers
**Steelwork contractor (new blocks):** Mifflin Construction Ltd
**Main contractor:** Morgan Sindall Construction
**Client:** Urban&Civic plc

External openings have been adjusted in the Power Hall to suit its new use as a dining and main hall. New steel frames were inserted, on local spread foundations cut through the existing slab, to support a sixth form dining area over the new kitchen and control room space to serve the main hall.

"The use of steel frames suit the layout of the new teaching blocks with their central corridors, while the use of steel beams provides clear-span support over the sports hall," says Price & Myers Partner John Helyer.

While the tall aerial masts were demolished in 2007, the four smaller masts that remained were dismantled, cleaned, repaired and reinstated.

The thermal performance of the existing and new buildings was paramount. Thermal breaks have been used throughout to isolate the new steel frames from the foundations and external cladding.

The project adapted the existing fabric to provide much better airtightness and thermal values, while respecting the significance of the buildings. The thermal performance of the Power Hall and Transmission Block has been enhanced by repairing and repointing the façades.

Summing up, the judges say after cleaning and repainting, the original steelwork was fully expressed and new steelwork carefully integrated, creating an excellent internal environment. A very high-quality heritage project of which all users are justly proud. ■

All images on this page © James Brittain

# 22 Bishopsgate, London

**FACT FILE**
**Architect:** PLP Architecture
**Structural engineer:** WSP
**Steelwork contractor**: Severfield
**Main contractor:** Multiplex
**Client:** Lipton Rogers Developments

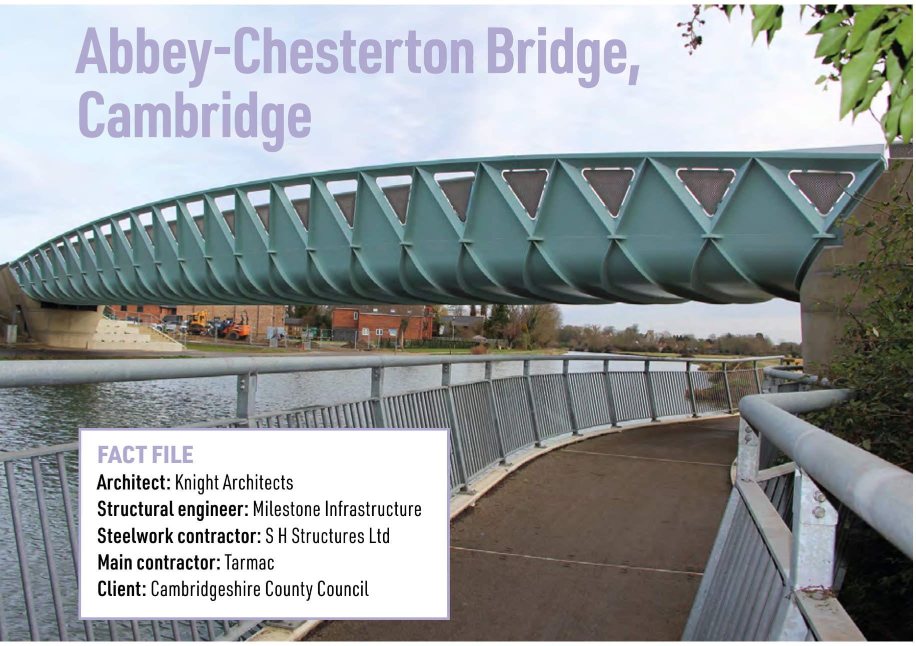
A 62-storey City of London tower, 22 Bishopsgate was completed in 2020 on the site of an abandoned project. It has re-used 100% of the existing foundations, and incorporated more than 50% of the previous building's basement.

The superstructure is a traditional steel-framed form of construction with a concrete core, which steps in at levels 27, 41 and 58.

The building's vertical transportation (VT) strategy, with some lifts serving different groups of floors, results in a large rectangular central core. This is beneficial in the 'wide' north-south direction in terms of providing lateral stability against wind forces. However, in the 'narrow' east-west direction, the core is only 14m-wide and this orientation is subject to the largest wind force.

At 278m tall, such a narrow core is insufficient to resist the large wind forces alone, so stability is provided by a set of outrigger trusses located at levels 25 and 41, which are double-height floors hosting plant room and other shared amenities including the gym and spa. ■

# Abbey-Chesterton Bridge, Cambridge



**FACT FILE**
**Architect:** Knight Architects
**Structural engineer:** Milestone Infrastructure
**Steelwork contractor:** S H Structures Ltd
**Main contractor:** Tarmac
**Client:** Cambridgeshire County Council

The 44m-span footbridge forms an important element of the Chisholm Trail, a new walking and cycling route that connects Cambridge Station and the new Cambridge North Station.

The bridge is an ornate lattice U-beam, with a structural pattern of stiffeners wrapped around the deck. It has a wide deck with clear delineation separating cycle traffic from pedestrians.

The inclined parapet follows a gently curving profile on which the intersecting ribs create a pattern of 'picture window' openings, through which bridge users can enjoy views of the surrounding meadows and the River Cam below.

The addition of LED lighting in the handrails illuminates the deck without spilling excess light onto the water below.

The bridge runs parallel to an existing railway bridge with a clearance of only around 10m. The proximity of the live railway meant the installation of the new bridge had to be carried out during a planned weekend railway closure.

The project was delivered safely and efficiently during a period of strict social distancing measures and the bridge has rapidly become a well-used local landmark. ■

# Bloom Clerkenwell, London

Designed as an over-site development above the new Crossrail station at Farringdon, Bloom Clerkenwell is a central London 18,100m² multi-purpose and contemporary office building.

As future flexibility was a key design requirement, a steel-framed solution was adopted, comprising fabricated cellular beams with composite slabs on metal decking.

The use of composite cellular beams facilitated both long spans and service integration within the structural zone, and also minimised the loading on the Crossrail station below.

Primary and secondary composite steel beams typically span 9m and 12m to provide flexible space for tenants' fit out. Transfer beams are located on three floors to allow for a 'cascade' building layout, supporting a varying number of storeys depending on their location.

For the largest transfer beams located on level 4, welded steel box sections 1,030mm-deep were designed in order to achieve strict deflection limits. Diagonal bracings suspend cantilevered slab edges to limit their deflection and some floor zones are supported from above on hangers to avoid loading the station below. ■

**FACT FILE**
**Architect:** John Robertson Architects Ltd
**Structural engineer**: Buro Happold
**Steelwork contractor:** Severfield
**Main contractor**: HB Reavis UK Ltd
**Client:** HB Reavis UK Ltd

# St James Quarter, Edinburgh

Occupying a prime city centre plot, the St James Quarter redevelopment in Edinburgh includes a mix of retail and leisure space, the iconic egg-shaped W Hotel and 150 private residential apartments.

The scheme is one large steel frame sub-divided by movement joints, which are mainly located either side of the 20 bridges that span the main semi-circular retail galleria.

Different column grids had to be used to accommodate the car parking floors and the retail levels above. This was achieved with the use of numerous transfer structures, which are generally 970mm-deep x 800mm-wide plate girders.

Above five levels of retail, the column pattern changes again to accommodate three floors of residential apartments, necessitating the use of more transfer girders.

A John Lewis store, on the eastern side of the scheme, which remained open throughout the construction work, provided one of the main challenges as part of its footprint covers the site's basement car park.

Some of the store's concrete columns had to be removed and the floorplates temporarily propped, so the subterranean levels could be excavated for the steel-framed car park. ■

**FACT FILE**
**Architect:** BDP
**Structural engineer:** Arup
**Steelwork contractor:** BHC Ltd
**Main contractor:** Laing O'Rourke
**Client:** Nuveen

# Joules Head Office, Market Harborough

**FACT FILE**
**Architect:** Edge
**Structural engineer:** Cundall
**Main contractor:** Bailey Construction Ltd
**Client:** Joules

Previously spread across five sites, Joules' UK-based office teams have now relocated into one building, following the construction of a significant extension to its existing Market Harborough head office.

The south wing of the existing building was demolished and extended with a new building forming an L-shape around a new double-height atrium space, that links the new and old buildings. The new building has been designed with a barn-like aesthetic, paying homage to Joules' outdoor heritage.

The extension comprises a three-storey steel braced frame, with a ground floor bearing slab and composite slabs supported on downstand steel beams at higher levels. Steel trusses support four duo-pitch roofs and were designed to imitate wooden trusses found in barn structures.

The trusses were prefabricated at the steel fabrication shop and delivered to site as fully assembled units, which facilitated a faster erection programme as there were fewer components.

A central 'tree' structure was designed to support the glazed roof in the new double-height atrium space. The 'tree' and part of the 'branches' were welded together and delivered to site prefabricated. ■

# The Glass Works, Barnsley

Barnsley town centre has been transformed with the opening of The Glass Works, a flagship scheme that offers new retail, leisure, and public realm facilities.

The 54,800m² project features a number of steel-framed elements, including 25 shops, a 13-screen Cineworld with 4DX technology, Superbowl UK bowling alley, laser quest and soft play, seven family-friendly restaurants, a public square, multi-storey car park and a feature footbridge.

The retail block, cinema and car park are centred around a 10m-wide covered boulevard, which separates the three buildings. Spanning the boulevard and forming a glazed canopy are a series of galvanized RHS steel members that connect to the adjoining structures at second floor level.

Separated from the main boulevard section of the development by a new landscaped public space, the bowling alley building is a standalone steel-framed structure measuring 59m × 35m. ■

**FACT FILE**
**Architect:** IBI Group
**Structural engineer:** Adept Civil and Structural Consulting Engineers
**Steelwork contractor:** Billington Structures Ltd
**Main contractor:** Henry Boot Construction Ltd
**Client:** Barnsley Metropolitan Borough Council

# More from the history of steel design code development

David Brown of the SCI looks at the work of Professor J. F. Baker, author of *The Steel Skeleton*, finding many issues of direct relevance to today's designers and originally presented in a highly engaging style.

Certain publications in the SCI library have an elevated status, indicated by the note "Important historically – keep for reference". One of these special publications is *The Steel Skeleton* by Professor Baker, which comes in two volumes. Volume 1 (1954) covers elastic behaviour and design. Volume 2 (1956) is co-authored with Horne and Heyman (all from the University of Cambridge) and addresses plastic behaviour and design.

Of particular interest – at least to the present author – is the writing style found in Volume 1. In addition to the technical guidance, Professor Baker offers a commentary on the changes to BS 449, the design standard of the time. The Professor had proposed revised approaches which were not adopted – the text reveals his disappointment often in an amusing style rather different to most sterile discussions found in text books. Although references were made to Professor Baker's comments in the *New Steel Construction* article of September 2020, this article looks at some of the background and the sometimes pointed comments found in Volume 1.

## The Background

Back in 1929 a Steel Structures Research Committee was established to develop the existing design rules which were felt to be too conservative. The Committee produced a *First Report* in 1931, which was embodied in BS 449. This report did not include the results of any new research, but was based on current practice. The Committee continued its work, including tests on existing buildings and showed that the method of design inherent in BS 449 was "almost entirely irrational and therefore incapable of refinement". Professor Baker did not mince his words!

In 1936, the Committee produced a *Final Report* containing completely new "rational" design rules. When BS 449 was revised some 12 years later, in 1948, the Committee's recommendations were ignored. Professor Baker postulates one reason for this neglect may have been that the store of *Final Report* was destroyed by enemy action in World War II. Professor Baker does not hide his disappointment in Volume 1, describing the guidance in BS 449 as "irrational rules". Part of Professor Baker's introduction expresses his view of the Committee's objectives:

"While the pure scientist, secure in the 'disinterested' status of his research, can often follow the path of least resistance, skirting some nasty jagged rocks, the applied scientist must concentrate on those difficult places. He must get to the top of a particular rock. Not content with that achievement, he must prepare an easy road so that others, with less time and less elaborate equipment, can get there without difficulty whenever they wish".

One of the founding objectives of SCI was to make steel easy to choose and use. Not so elegant as Professor Baker, but the same ideal.

## Effective lengths

Professor Baker is most exercised by column design as presented in BS 449 (notably the very same requirements are followed in BS 5950 and presented in NCCI for design to EN 1993). When deciding column effective lengths, designers are directed to consider the restraint offered by beams connected to the column. Professor Baker describes the clauses as "irrational because no mention is made of the stiffness of the beams or the rigidities of the connexions on which the restraint at the end of the stanchion length must depend. Worse than this, such argument that there is for the assumption of an effective length less than the actual length is only tenable for the condition of pure axial load which is found nowhere but in that rare member, a symmetrically loaded internal stanchion".

## Ahead of his time?

Professor Baker also notes that as a column deflects under axial load, "restraining moments are introduced at the end of each storey length by the beams, which frame into the stanchion through connnexions of some rigidity, offering resistance to the change of slope. The presence of these restraining moments means that a member of given section can carry a greater axial load before the yield stress is developed than would have been the case had it been pin-ended". Professor Baker points out the inconsistency of designing a beam as pin-ended, then "remembering" the rigidities of the connections when determining an effective length, and then conveniently forgetting the rigidity of the connections when calculating applied moments introduced by eccentric reactions.

Some 40 years later, Gibbons *et al*[1] considered the same issue. The research investigated non-sway frames, aimed at quantifying the adverse effect of the moment transferred through simple beam to column connections on the column capacity. The study showed that in many cases, the benefit of the rotational restraint offered by the connection outweighs the detrimental effect of the moment transferred through it – exactly as Professor Baker had observed in the 1930s. Gibbons *et al* also concluded that the present methods of simple frame design (still used today in 2022) are highly conservative, sharing that view with Professor Baker. A second shared opinion is that "this approach"… (the verification of columns in braced frames in clause 4.7.7 of BS 5950) … "does not assist in the understanding of true behaviour and is not therefore likely to facilitate innovative design. Indeed, reliance on such approaches can be seen as a definite barrier to progress as the designer is not encouraged to develop a physical understanding of the way in which the structure actually 'works'". Not as colourful language as Professor Baker, who wished to stop designers "blindly applying irrational rules", but the same sentiment!

## Choice of a strain gauge

The Committee wished to undertake testing of physical buildings – and required a reliable strain gauge which would deliver a high order of accuracy "maintained under conditions of dirt, vibration, exposure and hurry which would seem intolerable to the laboratory worker". The extensive reporting of the Committee's efforts to obtain a strain gauge meeting those demands are entertaining and entirely unexpected in a highly technical publication. Professor Baker reports that "Every known type of strain gauge was examined to see if one could be modified to fit the rigorous specification". A brochure was obtained describing an instrument, the Maihak extensometer, of German origin, as shown in Figure 1 (over page).

We read that "The claims made for it seemed so fantastic that the brochure was relegated to the waste-paper basket. When all other hope had gone, the waste-paper basket was searched and the brochure again studied". The instrument involved an audible comparison between the note from a stressed wire (on the structure) and a gauge wire in the instrument. ▶ 38

▶ 36

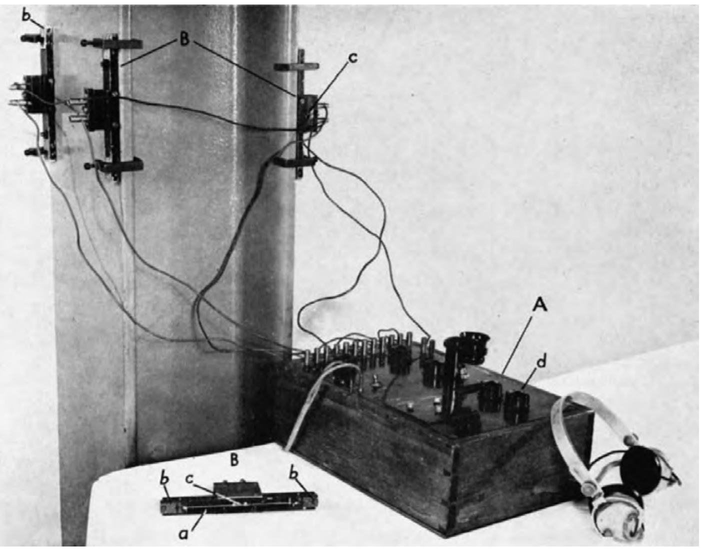



Figure 1: Maihak extensometer

The initial tests were disappointing – "Other observers were called in, some with an ear for music, some without. The results were uniformly bad, and so with regret, the agent, who had brought the instrument to the test house, was dismissed".

The reader then learns that on reflection, the Committee decided that perhaps greater amplification of the sounds was needed. The agent was called (who had conveniently mentioned where he was staying) and his departure delayed. This second test took place in the agent's bedroom, with the instrument clamped to the agent's brass bedstead. It is reported that "the scene was set – the morse key was pressed and a strong sustained note was heard. The investigator, full of hope, proceeded to match the notes, easily detected the beats and attempted to eliminate them by turning the micrometer head. Just when success seemed to be within his grasp, the beats would mysteriously appear again then disappear and so on." They were about to condemn the instrument, but noticed that the agent was leaning over to look at the micrometer reading – "in doing so his weight came on the bed rail and so subjected it to a not inconsiderable strain which the gauge reported". We go on to read that the party returned to the test house "triumphantly". The prose in our modern reports, technical papers and publications appears rather bland in comparison.

Vibrating wire strain gauges using the principles of the Maihak extensometer are still used today – as seen in Figure 2.

## Neglected recommendations

In summary, the Committee's proposals for a more rational design method recommended using the beneficial effects of connection stiffness for beam design. For column design, rigid connections are assumed, but the moments in the column are determined from the stiffnesses of the beams and columns. The Committee's recommendations were not accepted. The additional effort in the proposed design method did not deliver an advantage "which the average client would appreciate". The proposed method would mean that a structure designed as a residential building, on change of use "might well prove strong enough for use as a light warehouse". Again in eloquent language, Professor Baker envisaged a spreading of suburbia, meaning that urban flats might be reused as warehouses. In recent times, the opposite is true – urban structures are converted for residential use. At the time, Professor Baker commented that "Though the representatives of local authorities delight to argue, when faced with the request that a block of flats be designed for the intensity of load actually to be experienced in them, that the west-end of every city is continually moving farther westward so that the fashionable flats today will be the warehouses of tomorrow, such considerations are unlikely to weigh heavily with the prospective building owner"

## BS 449 of 1948

There is understandable bitterness when Professor Baker comments on the 1948 revision of BS 449 which declined to adopt the Committee's recommendations. He comments that the Committee's work has been disregarded "and the designer has taken a step in the dark. If his position could be viewed dispassionately, it would be interesting to see if there was a tendency for the ground to crumble under his feet, for nothing has such a tonic effect as a threatened disaster". Strong language indeed! Experience since 1948 suggests that the design methods remain safe, if conservative.

Figure 2: Vibrating wire strain gauges installed on steelwork (courtesy *Sisgeo.com*)

One of Professor Baker's comments was that the recommendations failed "first because they did not lead to certain economy of material and second because they were complex". It is interesting to reflect on the transition from BS 449 to BS 5950, the latter being considered more involved but producing some economy. One wonders what would be thought of the subsequent transition to the Eurocodes, with numerous Parts, National Annexes and NCCI. ■

1 Gibbons, C. Nethercot, D. A. Kirby, P.A. Wang, Y. C. *An appraisal of partially restrained column behaviour in non-sway steel frames* Proceedings of the Institution of Civil Engineers. Structures and Buildings, 1993

# AD 493:
# Steel grade based on tested samples

The SCI has recently received a number of questions relating to the sampling of existing steelwork to determine the steel grade. In each case, no records of the steelwork exist, so samples have been obtained and tested. For understandable reasons, only a limited number of samples have been obtained, taken from different steel members within the structure. The testing has determined the yield strength and ultimate strength of each sample. The purpose of this Note is to remind engineers that the steel grade designation is related to the characteristic yield strength – which is significantly lower than the average yield strength

If a large number of samples in one steel grade were obtained and measured, the results would be expected to follow a normal curve as shown in Figure 1.

The minimum yield strength (for example 355 N/mm²) for S355 steel grade is at the extreme left of the distribution. Note that there is always a very small probability that a result might be less than the specified minimum.

If samples of existing steelwork are taken, it should be expected from Figure 1 that generally the tested strengths should be higher (and sometimes much higher) than the specified minimum for any particular grade.

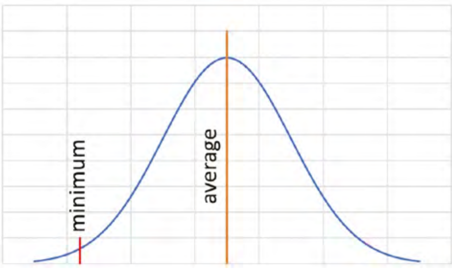


Figure 1: Typical normal distribution

Engineers are directed to Appendix C of SCI publication P427, which gives the minimum and mean values for test results which may be used to identify the likely steel grade. As an example, if the anticipated steel grade is S355, then according to Table C.1, the minimum and average yield strength of the tested samples should exceed 391 N/mm² and 426 N/mm² respectively.

In a small population of tested results, it is not sufficient to determine the steel grade simply based on all samples exceeding the specified minimum strength for that steel grade. Unless the average of the test results is significantly higher than the specified minimum, as demanded in P427, the form of the normal curve implies a high probability that other samples will be lower than the specified minimum.

Section C.3.3 of P427 covers a more comprehensive testing regime of members within the same group (same serial size, same function and detailing, as described in section 6.1 of P427). If this more extensive testing is undertaken, the calculated characteristic strengths should be compared to the minimum yield strength and ultimate strength tabulated in the appropriate material standards.

P427 is appropriate for steel used after 1970. The strength values tabulated in P427 are taken from Annex E of the proposed revisions to EN 1993-1-1.

Contact: **David Brown**
Tel: **01344 636555**
Email: **advisory@steel-sci.com**

# New and revised codes and standards

**From BSI Updates September 2022**

## BS EN PUBLICATIONS

**BS EN ISO 17636-1:2022**
Non-destructive testing of welds. Radiographic testing. X- and gamma-ray techniques with film
*supersedes BS EN ISO 17636-1:2013*

## BS IMPLEMENTATIONS

**BS ISO 21931-1:2022**
Sustainability in buildings and civil engineering works. Framework for methods of assessment of the environmental, social and economic performance of construction works as a basis for sustainability assessment. Buildings
*supersedes BS ISO 21931-1:2010*

## CORRIGENDA TO BRITISH STANDARDS

**BS EN ISO 2553:2019**
Welding and allied processes. Symbolic representation on drawings. Welded joints
*Corrigendum, July 2022*

## NEW WORK STARTED

**EN 1994-1-2**
Design of composite steel and concrete structures. General rules. Structural fire design
*will supersede BS EN 1994-1-2:2005+A1:2014*

**EN ISO 23387**
Building information modelling (BIM). Data templates for construction objects used in the life cycle of built assets. Concepts and principles
*will supersede BS EN ISO 23387:2020*

**CEN/TS WI 00250283**
Design of composite steel and concrete structures. Design of double and single skin steel concrete composite (SC) structures
*will supersede None*

## DRAFT BRITISH STANDARDS FOR PUBLIC COMMENT – ADOPTIONS

**22/30427287 DC**
BS EN ISO 15611 Specification and qualification of welding procedures for metallic materials. Qualification based on previous welding experience
*Comments for the above document were required by 11 September 2022*

**22/30427291 DC**
BS EN ISO 15613 Specification and qualification of welding procedures for metallic materials. Qualification based on pre-production welding test
*Comments for the above document were required by 26 September 2022*

**22/30427355 DC**
BS ISO 630-5 Structural steels. Technical delivery conditions for structural steels with improved atmospheric corrosion resistance
*Comments for the above document were required by 17 September 2022*

**22/30445368 DC**
BS EN ISO 6507-1 Metallic materials. Vickers hardness test. Test method
*Comments for the above document were required by 4 September 2022*

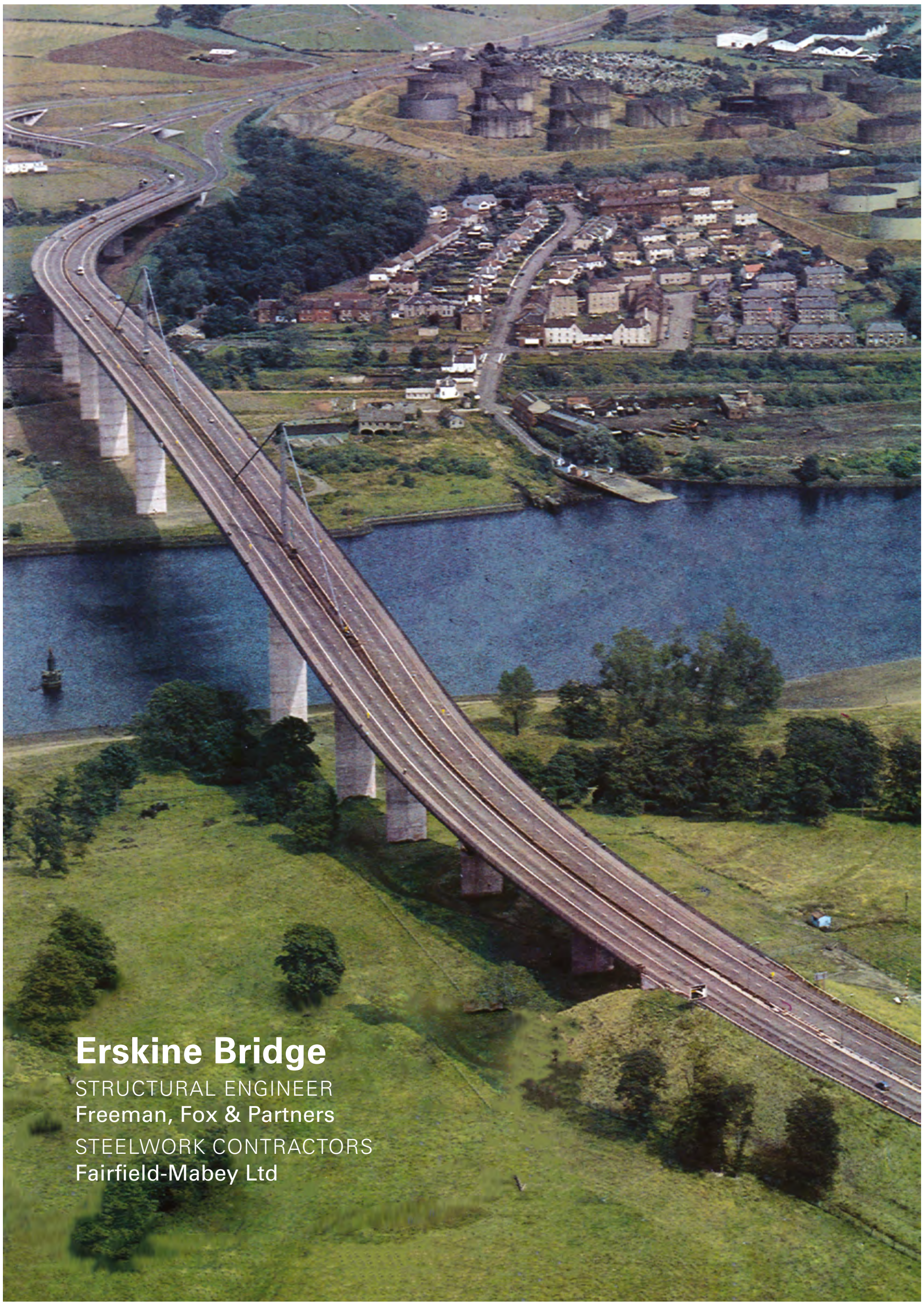
**22/30455142 DC**
BS EN 508-3 Roofing and cladding products from metal sheet. Specification for self-supporting products of steel, aluminium or stainless steel sheet. Stainless steel
*Comments for the above document were required by 20 September 2022*


Image courtesy of
Billington Structures Ltd

# The Structural Steel Design Awards 1972

FROM **Building with Steel** November 1972

The British Steel Corporation in conjunction with the British Constructional Steelwork Association Ltd has now presented awards for the fourth structural steelwork design competition. As in previous years the aim was 'to recognise high standards of design... in terms of efficiency, economy and aesthetics' while in addition a new category was introduced recognizing innovation. Altogether, then, there were four sections this year – Buildings, Bridgework, Miscellaneous and Innovation and, as can be seen, each has attracted most interesting entries. Next year, for the first time, there is to be a European Structural Steelwork Design Award and each member country of the European Convention of Structural Steelwork is permitted to submit one entry. The judges for the UK competition were unanimous in selecting the Erskine Bridge for this role and additionally deciding that it was worthy of the special award for 1972.



**Erskine Bridge**
STRUCTURAL ENGINEER
Freeman, Fox & Partners
STEELWORK CONTRACTORS
Fairfield-Mabey Ltd

## 1 Special Facilities Building

ARCHITECTS
SBT (Scott, Brownrigg & Turner)
STRUCTURAL ENGINEERS
Leonard & Partners
STEELWORK CONTRACTORS
Modern Engineering (Bristol) Ltd

## 2 Pilot Head Office

ARCHITECTS
Foster Associates
STRUCTURAL ENGINEERS
Anthony Hunt Associates
STEELWORK CONTRACTORS
Metal Sections Ltd

## 3 Servicing Hangar

ARCHITECTS
Murray Ward & Partners
STRUCTURAL ENGINEERS
Scott Wilson Kirkpatrick & Partners
STEELWORK CONTRACTORS
Braithwaite & Co. Structural Ltd

## 4 Almond Valley Bridge

STRUCTURAL ENGINEERS
Chief Engineer's Department, Livingston Development Corporation (Chief Engineer J. Munro, C Eng, MICE, MIMunE)
STEELWORK CONTRACTORS
Cleveland Bridge & Engineering Company Ltd

## 5 Footbridge at Torquay

STRUCTURAL ENGINEERS
Butterley Engineering Co. Ltd
STEELWORK CONTRACTORS
Butterley Engineering Co. Ltd

## 6 Sbi Prototype

ARCHITECTS
Department of Architecture and Planning, Milton Keynes Development Corporation (Chief Architect and Planning Officer: Derek Walker, DipArch, FRI BA)
STRUCTURAL ENGINEERS
Anthony Hunt Associates in association with Department of Engineering, Milton Keynes Development Corporation (Chief Engineer: Ernest Pye, M Eng, FICE, FI Mun E, MTPI)
STEELWORK CONTRACTORS
Bromwich Structures Ltd

## 7 Steel Lining to Second Mersey Tunnel

DESIGNERS
Mott, Hay & Anderson

## 8 Demountable Car Park

DESIGNERS
BOAC Properties Branch
STRUCTURAL ENGINEERS
Robert Frazer & Sons Ltd
STEELWORK CONTRACTORS
Robert Frazer & Sons Ltd


1


2


3


4


5


6

7


8

# Steelwork contractors for buildings

Membership of BCSA is open to any Steelwork Contractor who has a fabrication facility within the United Kingdom or Republic of Ireland. Details of BCSA membership and services can be obtained from

Lorraine MacKinder, Membership Manager
The British Constructional Steelwork Association Limited, Unit 4 Hayfield Business Park, Field Lane, Auckley, Doncaster DN9 3FL
Tel: 020 7747 8121 Email: *lorraine.mackinder@steelconstruction.org*

Applicants may be registered in one or more Buildings category to undertake the fabrication and the responsibility for any design and erection of:

- **C** Heavy industrial platework for plant structures, bunkers, hoppers, silos etc
- **D** High rise buildings (offices etc over 15 storeys)
- **E** Large span portals (over 30m)
- **F** Medium/small span portals (up to 30m) and low rise buildings (up to 4 storeys)
- **G** Medium rise buildings (from 5 to 15 storeys)
- **H** Large span trusswork (over 20m)
- **J** Tubular steelwork where tubular construction forms a major part of the structure
- **K** Towers and masts
- **L** Architectural steelwork for staircases, balconies, canopies etc
- **M** Frames for machinery, supports for plant and conveyors
- **N** Large grandstands and stadia (over 5000 persons)
- **Q** Specialist fabrication services (eg bending, cellular/castellated beams, plate girders)
- **R** Refurbishment
- **S** Lighter fabrications including fire escapes, ladders and catwalks

- **FPC** Factory Production Control certification to BS EN 1090-1
  - 1 – Execution Class 1 2 – Execution Class 2
  - 3 – Execution Class 3 4 – Execution Class 4
- **BIM** BIM Level 2 assessed
- **QM** Quality management certification to ISO 9001
- **SCM** Steel Construction Sustainability Charter
  - ● = Gold ● = Silver, ● = Bronze, ● = Certificate

Notes
(1) Contracts which are primarily steelwork but which may include associated works. The steelwork contract value for which a company is pre-qualified under the Scheme is intended to give guidance on the size of steelwork contract that can be undertaken; where a project lasts longer than a year, the value is the proportion of the steelwork contract to be undertaken within a 12 month period.

Where an asterisk (*) appears against any company's classification number, this indicates that the assets required for this classification level are those of the parent company.

| Company name | Tel | C | D | E | F | G | H | J | K | L | M | N | Q | R | S | QM | FPC | BIM | SCM | Guide Contract Value (1) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A C Bacon Engineering Ltd | 01953 850611 | | | ● | ● | ● | ● | | | | ● | | | ● | | ✔ | 2 | | | Up to £3,000,000 |
| Adey Steel Ltd | 01509 556677 | ● | | ● | ● | ● | ● | ● | ● | ● | ● | | | ● | ● | ✔ | 3 | | ● Silver | Up to £3,000,000 |
| Adstone Construction Ltd | 01905 794561 | | | ● | ● | ● | ● | | | | | | | ● | | ✔ | 2 | ✔ | ● Gold | Up to £3,000,000 |
| AJ Engineering & Construction Services Ltd | 01309 671919 | | | ● | ● | | ● | | ● | ● | ● | | | ● | ● | ✔ | 4 | | ● Silver | Up to £3,000,000 |
| Angle Ring Company Ltd | 0121 557 7241 | | | | | | | | | | | | ● | | | ✔ | 4 | | | Up to £1,400,000* |
| Arminhall Engineering Ltd | 01799 524510 | ● | | | ● | ● | | ● | | ● | ● | | | ● | ● | ✔ | 2 | | ● Bronze | Up to £1,400,000 |
| Arromax Structures Ltd | 01623 747466 | | | ● | ● | ● | ● | ● | ● | ● | ● | | | | ● | | 2 | | | Up to £800,000 |
| ASME Engineering Ltd | 020 8966 7150 | | | ● | ● | ● | | ● | | ● | ● | | | ● | ● | ✔ | 4 | | ● Gold | Up to £4,000,000 |
| Atlasco Constructional Engineers Ltd | 01782 564711 | | | ● | ● | ● | ● | | | ● | ● | | | ● | ● | ✔ | 2 | | | Up to £1,400,000 |
| B D Structures Ltd | 01942 817770 | | | ● | ● | ● | ● | | | | ● | ● | | ● | ● | ✔ | 2 | ✔ | ● Silver | Up to £1,400,000 |
| Ballykine Structural Engineers Ltd | 028 9756 2560 | | | ● | ● | ● | ● | ● | | | | ● | | | ● | ✔ | 4 | ✔ | ● Silver | Up to £1,400,000 |
| Barnshaw Section Benders Ltd | 0121 557 8261 | | | | | | | | | | | | ● | | | ✔ | 4 | | | Up to £1,400,000 |
| BHC Ltd | 01555 840006 | ● | ● | ● | ● | ● | ● | ● | | ● | ● | ● | | ● | ● | ✔ | 4 | ✔ | ● Silver | Above £6,000,000 |
| Billington Structures Ltd | 01226 340666 | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ✔ | 4 | ✔ | ● Gold | Above £6,000,000 |
| Border Steelwork Structures Ltd | 01228 548744 | | | ● | ● | ● | ● | | | ● | ● | | | | ● | | 4 | | | Up to £3,000,000 |
| Bourne Group Ltd | 01202 746666 | | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ✔ | 4 | ✔ | ● Gold | Above £6,000,000 |
| Briton Fabricators Ltd | 0115 963 2901 | ● | | ● | ● | ● | ● | ● | ● | ● | ● | | ● | ● | ● | ✔ | 4 | | ● Bronze | Up to £6,000,000 |
| Cairnhill Structures Ltd | 01236 449393 | ● | | | ● | ● | ● | ● | ● | | | | | | ● | ✔ | 4 | | ● Gold | Up to £6,000,000 |
| Caunton Engineering Ltd | 01773 531111 | ● | ● | ● | ● | ● | ● | ● | | ● | ● | ● | | ● | ● | ✔ | 4 | ✔ | ● Gold | Above £6,000,000 |
| Cementation Fabrications | 0300 105 0135 | ● | | | ● | | ● | ● | ● | ● | ● | | ● | ● | ● | ✔ | 3 | | ● Gold | Up to £6,000,000 |
| CMF Ltd | 020 8844 0940 | | | | ● | | ● | ● | | ● | ● | | | | ● | ✔ | 4 | | | Up to £6,000,000 |
| Cook Fabrications Ltd | 01303 893011 | | | ● | | | ● | ● | | ● | ● | | | ● | ● | ✔ | 2 | | | Up to £1,400,000 |
| Coventry Construction Ltd | 024 7646 4484 | | | ● | ● | ● | ● | | ● | ● | ● | | | ● | ● | ✔ | 4 | | | Up to £1,400,000 |
| DAM Structures Ltd | 01377 271843 | ● | | ● | ● | ● | | ● | ● | ● | ● | | | ● | | ✔ | 4 | | | Up to £6,000,000 |
| D H Structures Ltd | 01785 246269 | | | ● | ● | | ● | | | | ● | | | | | | 2 | | | Up to £200,000 |
| D Hughes Welding & Fabrication Ltd | 01248 421104 | | | | ● | ● | ● | ● | ● | ● | ● | | ● | ● | ● | ✔ | 4 | | | Up to £800,000 |
| Donyal Engineering Ltd | 01207 270909 | ● | | | ● | | | ● | | ● | | | | ● | ● | | 3 | | | Up to £1,400,000 |
| Duggan Steel | 00 353 29 70072 | ● | ● | ● | ● | ● | ● | ● | ● | | ● | | | | ● | ✔ | 4 | | | Up to £6,000,000 |
| ECS Engineering Services Ltd | 01773 860001 | ● | | ● | ● | ● | ● | ● | ● | ● | ● | | | ● | ● | ✔ | 4 | | ● Gold | Up to £3,000,000 |
| Elland Steel Structures Ltd | 01422 380262 | | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | | ● | ● | ✔ | 4 | ✔ | ● Gold | Above £6,000,000 |
| EvadX Ltd | 01745 336413 | | ● | ● | ● | ● | ● | ● | | ● | ● | ● | | | ● | ✔ | 3 | | ● Gold | Up to £4,000,000 |
| Four Bay Structures Ltd | 01603 758141 | | | ● | ● | ● | ● | ● | | ● | ● | | | ● | ● | | 2 | | | Up to £1,400,000 |
| Four-Tees Engineers Ltd | 01489 885899 | ● | | | ● | | ● | ● | ● | ● | ● | | ● | ● | ● | ✔ | 3 | | ● Bronze | Up to £2,000,000 |
| **Company name** | **Tel** | **C** | **D** | **E** | **F** | **G** | **H** | **J** | **K** | **L** | **M** | **N** | **Q** | **R** | **S** | **QM** | **FPC** | **BIM** | **SCM** | **Guide Contract Value (1)** |

| Company name | Tel | C | D | E | F | G | H | J | K | L | M | N | Q | R | S | QM | FPC | BIM | SCM | Guide Contract Value (1) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Gorge Fabrications Ltd | 0121 522 5770 | | | | ● | ● | ● | ● | | ● | | | | ● | ● | ✔ | 3 | | | Up to £1,400,000 |
| G.R. Carr (Essex) Ltd | 01286 535501 | ● | | ● | ● | | | ● | | | ● | | | ● | ● | ✔ | 4 | | | Up to £800,000 |
| H Young Structures Ltd | 01953 601881 | | | ● | ● | ● | ● | ● | | | ● | | | ● | ● | ✔ | 4 | ✔ | ● (green) | Up to £3,000,000 |
| Had Fab Ltd | 01875 611711 | | | | ● | | | | ● | ● | ● | | | | ● | ✔ | 4 | | | Up to £3,000,000 |
| HBE Services Ltd | 01525 854110 | | | | ● | ● | | | | ● | | | | ● | ● | ✔ | 2 | | | Up to £800,000 |
| Hescott Engineering Company Ltd | 01324 556610 | | | ● | ● | ● | ● | | | ● | | | | ● | ● | ✔ | 2 | | | Up to £3,000,000 |
| Hillcrest Structural Steel Ltd | 023 8064 1373 | | | ● | ● | ● | ● | ● | | ● | ● | | | ● | ● | ✔ | 3 | | ● (lilac) | Up to £3,000,000 |
| Intersteels Ltd | 01322 337766 | ● | | | ● | ● | ● | ● | ● | ● | | | ● | ● | ● | ✔ | 3 | ✔ | | Up to £3,000,000 |
| J & A Plant Ltd | 01942 713511 | | | | ● | ● | | | | | | | | | ● | | 4 | | | Up to £40,000 |
| James Killelea & Co Ltd | 01706 229411 | | ● | ● | ● | ● | ● | | | | ● | ● | | | | | 4 | | | Up to £6,000,000* |
| Kiernan Structural Steel Ltd | 00 353 43 334 1445 | ● | | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ✔ | 4 | ✔ | ● (lilac) | Above £6,000,000 |
| Kloeckner Metals UK Westok | 0113 205 5270 | | | | | | | | | | | | ● | | | ✔ | 4 | | ● (lilac) | Up to £6,000,000 |
| Leach Structural Steelwork Ltd | 01995 642000 | | | ● | ● | ● | ● | ● | | | ● | | | | | ✔ | 2 | | ● (lilac) | Up to £6,000,000 |
| Legge Steel (Fabrications) Ltd | 01592 205320 | | | ● | ● | | | | ● | ● | ● | | | ● | ● | | 2 | | | Up to £800,000 |
| Littleton Steel Ltd | 01275 333431 | | | | ● | | | | | ● | ● | | | ● | ● | ✔ | 3 | | | Up to £1,400,000 |
| Loaninghill Fabrications Ltd | 01506 858466 | | | | ● | | | | ● | ● | ● | | | ● | ● | | 3 | | | Up to £400,000 |
| M Hasson & Sons Ltd | 028 2957 1281 | | | ● | ● | ● | ● | ● | ● | ● | ● | | | ● | ● | ✔ | 4 | | ● (green) | Up to £1,400,000 |
| M&S Engineering Ltd | 01461 40111 | | | | ● | | | | ● | ● | ● | | | ● | ● | | 3 | | | Up to £2,000,000 |
| Mackay Steelwork & Cladding Ltd | 01862 843910 | | | ● | ● | | ● | | | ● | ● | | | ● | ● | ✔ | 4 | | | Up to £1,400,000 |
| Maldon Marine Ltd | 01621 859000 | | | | ● | ● | | | ● | ● | ● | | | | ● | ✔ | 3 | | | Up to £1,400,000 |
| Mifflin Construction Ltd | 01568 613311 | | | ● | ● | ● | ● | | | | ● | | | | | | 3 | | | Up to £3,000,000 |
| Murphy International Ltd | 00 353 45 431384 | ● | | | ● | | ● | ● | ● | | ● | | | | ● | ✔ | 4 | | | Up to £2,000,000 |
| Newbridge Engineering Ltd | 01429 866722 | ● | ● | ● | ● | ● | ● | ● | | | ● | ● | | | | ✔ | 4 | | ● (lilac) | Up to £2,000,000 |
| North Lincs Structures | 01724 855512 | | | ● | ● | | | | | ● | ● | | | | ● | | 2 | | | Up to £400,000 |
| Nusteel Structures Ltd | 01303 268112 | | | | | | ● | ● | ● | ● | | | | ● | | ✔ | 4 | | ● (yellow) | Up to £6,000,000 |
| Painter Brothers Ltd | 01432 374400 | ● | | | ● | | | | ● | ● | ● | | | | ● | ✔ | 3 | | | Up to £6,000,000* |
| Peter Marshall (Steel Stairs) Ltd | 0113 307 6730 | | | | ● | ● | | | | ● | ● | | | | ● | ✔ | 3 | | | Up to £1,400,000* |
| PMS Fabrications Ltd | 01228 599090 | | | ● | ● | ● | ● | | ● | ● | ● | | | ● | ● | | 3 | | | Up to £1,400,000 |
| REIDsteel | 01202 483333 | | | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | | ● | ✔ | 4 | | ● (green) | Up to £6,000,000 |
| SAH Luton Ltd | 01582 805741 | | | ● | ● | ● | | | | ● | ● | | | ● | ● | | 2 | | | Up to £400,000 |
| S H Structures Ltd | 01977 681931 | ● | | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | | ● | ✔ | 4 | ✔ | ● (yellow) | Up to £3,000,000 |
| SDM Fabrication Ltd | 01354 660895 | ● | ● | ● | ● | ● | ● | | | ● | ● | | | ● | ● | ✔ | 4 | | | Up to £2,000,000 |
| Severfield plc | 01845 577896 | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ✔ | 4 | ✔ | ● (yellow) | Above £6,000,000 |
| Severfield Nuclear and Infrastructure Limited | 01204 528393 | ● | | ● | ● | ● | ● | ● | ● | | ● | | | | | ✔ | 4 | | | Above £6,000,000 |
| Shaun Hodgson Engineering Ltd | 01553 766499 | ● | | ● | ● | | ● | | | ● | | | | ● | ● | ✔ | 3 | | | Up to £800,000 |
| Shipley Structures Ltd | 01400 251480 | | | ● | ● | ● | ● | | ● | ● | ● | | | ● | ● | ✔ | 2 | | | Up to £3,000,000 |
| Snashall Steel Fabrications Co Ltd | 01300 345588 | | | ● | ● | ● | ● | ● | | | ● | | | | ● | | 2 | ✔ | | Up to £2,000,000 |
| Southern Fabrications (Sussex) Ltd | 01243 649000 | | | | ● | ● | | | | ● | ● | | | ● | ● | ✔ | 2 | | | Up to £1,400,000 |
| Steel & Roofing Systems | 00 353 56 444 1855 | ● | | ● | ● | ● | ● | | | | ● | ● | | ● | ● | ✔ | 4 | | | Up to £4,000,000 |
| Taziker Industrial Ltd | 01204 468080 | ● | | ● | ● | | ● | ● | | ● | ● | | ● | ● | ● | ✔ | 3 | | ● (yellow) | Above £6,000,000 |
| Temple Mill Fabrications Ltd | 01623 741720 | | | ● | ● | | | | | ● | ● | | | | ● | ✔ | 2 | | | Up to £400,000 |
| Traditional Structures Ltd | 01922 414172 | | | ● | ● | ● | ● | ● | ● | | ● | | | ● | ● | ✔ | 3 | ✔ | ● (lilac) | Up to £2,000,000 |
| TSI Structures Ltd | 01603 720031 | | | ● | ● | ● | ● | ● | | | ● | | | ● | | | 2 | ✔ | | Up to £2,000,000 |
| Underhill Engineering Ltd | 01752 752483 | | | | ● | | ● | ● | ● | ● | ● | | | ● | ● | ✔ | 4 | ✔ | | Up to £3,000,000 |
| W I G Engineering Ltd | 01869 320515 | | | | ● | | | | | ● | ● | | | ● | ● | ✔ | 2 | | ● (orange) | Up to £400,000 |
| Walter Watson Ltd | 028 4377 8711 | | | ● | ● | ● | ● | ● | | | | ● | | | | ✔ | 4 | | | Above £6,000,000 |
| Westbury Park Engineering Ltd | 01373 825500 | ● | | ● | ● | ● | ● | ● | ● | ● | ● | | | | ● | ✔ | 4 | | ● (green) | Up to £800,000 |
| William Hare Ltd | 0161 609 0000 | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ✔ | 4 | ✔ | ● (yellow) | Above £6,000,000 |
| Company name | Tel | C | D | E | F | G | H | J | K | L | M | N | Q | R | S | QM | FPC | BIM | SCM | Guide Contract Value (1) |

# Steelwork contractors for bridgeworks

The Register of Qualified Steelwork Contractors Scheme for Bridgeworks (RQSC) is open to any Steelwork Contractor who has a fabrication facility within the UK or European Union.

Applicants may be registered in one or more category to undertake the fabrication and the responsibility for any design and erection of:

**FB** Footbridges
**CF** Complex footbridges
**SG** Sign gantries
**PG** Bridges made principally from plate girders
**TW** Bridges made principally from trusswork
**BA** Bridges with stiffened complex platework (eg in decks, box girders or arch boxes)
**CM** Cable-supported bridges (eg cable-stayed or suspension) and other major structures (eg 100 metre span)
**MB** Moving bridges
**SRF** Site-based bridge refurbishment
**FRF** Factory-based bridge refurbishment
**AS** Ancilliary structures in steel associated with bridges, footbridges or sign gantries (eg grillages, purpose-made temporary works)
**QM** Quality management certification to ISO 9001
**FPC** Factory Production Control certification to BS EN 1090-1
1 - Execution Class 1  2 - Execution Class 2
3 - Execution Class 3  4 - Execution Class 4
**BIM** BIM Level 2 compliant
**SCM** Steel Construction Sustainability Charter
● = Gold ● = Silver ● = Bronze ● = Certificate

**Notes**

(1) Contracts which are primarily steelwork but which may include associated works. The steelwork contract value for which a company is pre-qualified under the Scheme is intended to give guidance on the size of steelwork contract that can be undertaken; where a project lasts longer than a year, the value is the proportion of the steelwork contract to be undertaken within a 12 month period.

Where an asterisk (*) appears against any company's classification number, this indicates that the assets required for this classification level are those of the parent company.

| BCSA steelwork contractor member | Tel | FB | CF | SG | PG | TW | BA | CM | MB | SRF | FRF | AS | QM | FPC | BIM | NHSS 19A | NHSS 20 | SCM | Guide Contract Value (1) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Adey Steel Ltd | 01509 556677 | ● | | ● | ● | ● | ● | | | | ● | ● | ✓ | 3 | | | ✓ | Silver | Up to £3,000,000 |
| AJ Engineering & Construction Services Ltd | 01309 671919 | ● | | | ● | ● | ● | ● | ● | ● | ● | ● | ✓ | 4 | | | | Silver | Up to £3,000,000 |
| Billington Structures Ltd | 01226 340666 | ● | | ● | ● | ● | ● | | | | | ● | ✓ | 4 | ✓ | ✓ | ✓ | Gold | Above £6,000,000 |
| Bourne Group Ltd | 01202 746666 | ● | | ● | ● | ● | | | | ● | | ● | ✓ | 4 | ✓ | | ✓ | Gold | Above £6,000,000 |
| Briton Fabricators Ltd | 0115 963 2901 | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ✓ | 4 | | | ✓ | Bronze | Up to £6,000,000 |
| Cairnhill Structures Ltd | 01236 449393 | ● | ● | ● | ● | ● | ● | ● | | ● | ● | ● | ✓ | 4 | | | ✓ | Gold | Up to £6,000,000 |
| Cementation Fabrications | 0300 105 0135 | ● | | ● | ● | ● | ● | | | | | ● | ✓ | 3 | | | ✓ | Gold | Up to £6,000,000 |
| D Hughes Welding & Fabrication Ltd | 01248 421104 | ● | | ● | | ● | | | ● | ● | ● | ● | ✓ | 4 | | | ✓ | | Up to £800,000 |
| Donyal Engineering Ltd | 01207 270909 | ● | | ● | | | | | | ● | ● | ● | ✓ | 3 | | ✓ | ✓ | Silver | Up to £1,400,000 |
| ECS Engineering Services Ltd | 01773 860001 | ● | | ● | ● | ● | ● | | ● | | | ● | ✓ | 4 | | | | Gold | Up to £3,000,000 |
| Four-Tees Engineers Ltd | 01489 885899 | ● | ● | ● | ● | ● | ● | | ● | ● | ● | ● | ✓ | 3 | | | ✓ | Bronze | Up to £2,000,000 |
| Kiernan Structural Steel Ltd | 00 353 43 334 1445 | ● | | | ● | ● | | | | ● | ● | ● | ✓ | 4 | ✓ | | ✓ | Gold | Above £6,000,000 |
| M Hasson & Sons Ltd | 028 2957 1281 | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ✓ | 4 | | | ✓ | Certificate | Up to £1,400,000 |
| Millar Callaghan Engineering Services Ltd | 01294 217711 | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ✓ | 4 | | | ✓ | | Up to £1,400,000 |
| Murphy International Ltd | 00 353 45 431384 | ● | ● | ● | ● | ● | ● | | | | | ● | ✓ | 4 | | | ✓ | | Up to £2,000,000 |
| Nusteel Structures Ltd | 01303 268112 | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ✓ | 4 | | ✓ | ✓ | Gold | Up to £6,000,000 |
| REIDsteel | 01202 483333 | ● | | ● | | ● | ● | ● | | | | ● | ✓ | 4 | | | | Certificate | Up to £6,000,000 |
| S H Structures Ltd | 01977 681931 | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ✓ | 4 | ✓ | | ✓ | Gold | Up to £3,000,000 |
| Severfield plc | 01204 699999 | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ✓ | 4 | ✓ | ✓ | ✓ | Gold | Above £6,000,000 |
| Shaun Hodgson Engineering Ltd | 01553 766499 | | | | | | | | | | | ● | ✓ | 3 | | | | | Up to £800,000 |
| Taziker Industrial Ltd | 01204 468080 | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ✓ | 3 | | ✓ | ✓ | Gold | Above £6,000,000 |
| Underhill Engineering Ltd | 01752 752483 | ● | ● | ● | ● | ● | | | | ● | ● | ● | ✓ | 4 | ✓ | | ✓ | Gold | Up to £3,000,000 |
| William Hare Ltd | 0161 609 0000 | ● | ● | ● | ● | ● | ● | ● | ● | ● | | ● | ✓ | 4 | ✓ | ✓ | ✓ | Gold | Above £6,000,000 |
| **Non-BCSA member** | | | | | | | | | | | | | | | | | | | |
| Allerton Steel Ltd | 01609 774471 | ● | ● | ● | ● | ● | ● | ● | | | ● | ● | ✓ | 4 | ✓ | | ✓ | Certificate | Up to £3,000,000 |
| Carver Engineering Services Ltd | 01302 751900 | ● | | ● | ● | ● | ● | | ● | ● | ● | ● | ✓ | 4 | | | ✓ | | Up to £3,000,000 |
| Centregreat Engineering Ltd | 029 2046 5683 | ● | | ● | ● | ● | ● | ● | ● | ● | ● | ● | ✓ | 4 | | | | | Up to £3,000,000 |
| Cimolai SpA | 01223 836299 | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ✓ | 4 | | ✓ | ✓ | Certificate | Above £6,000,000 |
| CTS Bridges Ltd | 01484 606416 | ● | ● | ● | ● | ● | ● | ● | ● | | ● | ● | ✓ | 4 | | | ✓ | Certificate | Up to £1,400,000 |
| Eiffage Metal | 00 33 388 946 856 | ● | ● | ● | ● | ● | ● | ● | ● | | | ● | ✓ | 4 | | | | | Above £6,000,000 |
| Harrisons Engineering (Lancashire) Ltd | 01254 823993 | | | ● | ● | ● | ● | ● | ● | ● | | ● | ✓ | 3 | | ✓ | | | Up to £1,400,000 |
| Hollandia Infra BV | 00 31 180 540 540 | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ✓ | 4 | | | | | Above £6,000,000* |
| HS Carlsteel Engineering Ltd | 020 8312 1879 | | | | | | | | | ● | ● | ● | ✓ | 3 | | | ✓ | | Up to £800,000 |
| In-Spec Manufacturing Ltd | 01642 210716 | | | | | | | | | ● | ● | ● | ✓ | 4 | | | ✓ | | Up to £800,000 |
| J&D Pierce Contracts Ltd | 01505 683724 | ● | | ● | ● | ● | ● | ● | ● | | ● | ● | ✓ | 4 | | | ✓ | | Above £6,000,000 |
| Kelly's Welders & Blacksmiths Ltd | 01383 512 517 | | | | | | | | | | | ● | ✓ | 2 | | | ✓ | | Up to £200,000 |
| Lanarkshire Welding Company Ltd | 01698 264271 | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ✓ | 4 | | ✓ | ✓ | Gold | Up to £3,000,000 |
| Malin Group | 0141 370 5467 | ● | | | ● | ● | ● | | | ● | ● | ● | ✓ | 4 | | | ✓ | | Up to £4,000,000 |
| North View Engineering Solutions Ltd | 01325 464558 | | | | | | | | | | | ● | ✓ | 3 | | | | | Up to £800,000 |
| Smulders Projects UK Ltd | 0191 295 8700 | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ✓ | 4 | | | | | Above £6,000,000 |
| Tecade S.A.U. | 00 34 955 833 811 | | ● | ● | ● | ● | ● | ● | ● | | | ● | ✓ | 4 | | ✓ | ✓ | | Up to £6,000,000 |
| Total Steelwork & Fabrication Ltd | 01925 234320 | ● | | ● | | ● | | | | ● | ● | ● | ✓ | 3 | | | ✓ | | Up to £3,000,000 |
| Victor Buyck Steel Construction | 00 32 9 376 2211 | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ✓ | 4 | | ✓ | ✓ | Silver | Above £6,000,000 |

# Corporate Members

Corporate Members are clients, professional offices, educational establishments etc which support the development of national specifications, quality, fabrication and erection techniques, overall industry efficiency and good practice.

| Company name | Tel |
|---|---|
| Gene Mathers | 0115 974 7831 |
| Griffiths & Armour | 0151 236 5656 |
| Highways England Company Ltd | 0300 123 5000 |
| Keiths Welding Limited | 07791 432 078 |
| MMCEngineer Ltd | 01423 855939 |
| Paul Hulme Engineering Ltd | 07801 216858 |
| QHSE-Interspect Ltd | 07438 413849 |
| Sandberg LLP | 020 7565 7000 |
| Structural & Weld Testing Services Ltd | 01795 420264 |
| SUM ADR Ltd | 07960 775772 |

BCSA

# Industry Members

Industry Members are those principal companies involved in the direct supply to all or some Steelwork Contractor Members of components, materials or products. Industry member companies must have a registered office within the United Kingdom or Republic of Ireland.

**QM** Quality management certification to ISO 9001
**FPC** Factory Production Control certification to BS EN 1090-1
1 Execution class 1 2 Execution class 2
3 Execution class 3 4 Execution class 4
**NHSS** National Highway Sector Scheme

**CA** Conformity Assessment
UKCA and/or CE Marking compliant, where relevant:
**M** manufacturer (products UKCA and/or CE Marked)
**D/I** distributor/importer (systems comply with the CPR)
**N/A** CPR not applicable

**SCM** Steel Construction Sustainability Charter
● (yellow) = Gold ● (lilac) = Silver
● (brown) = Bronze ● (green) = Certificate

**SfL** Steel for Life Sponsor

## Structural components

| Company name | Tel | QM | CA | FPC | NHSS | SCM | SfL |
|---|---|---|---|---|---|---|---|
| Albion Sections Ltd | 0121 553 1877 | ✓ | M | 4 | | | |
| BW Industries Ltd | 01262 400088 | ✓ | M | 3 | | | |
| Cellbeam Ltd | 01937 840600 | ✓ | M | 4 | 20 | | |
| Composite Profiles UK Ltd | 01202 659237 | | D/I | | | | |
| Construction Metal Forming Ltd | 01495 761080 | ✓ | M | 3 | | | |
| Daver Steels Ltd | 0114 261 1999 | ✓ | M | 3 | | | |
| Farrat Isolevel | 0161 924 1600 | ✓ | N/A | | | | |
| FLI Structures | 01452 722200 | ✓ | M | 4 | 20 | ● (yellow) | |
| Hadley Industries Plc | 0121 555 1342 | ✓ | M | 4 | | ● (yellow) | |
| Hi-Span Ltd | 01953 603081 | ✓ | M | 4 | | ● (green) | |
| **Jamestown Manufacturing Ltd** | **00 353 45 434288** | ✓ | **M** | 4 | 20 | | **Gold** |
| Kingspan Structural Products | 01944 712000 | ✓ | M | 4 | | ● (yellow) | |
| MSW UK Ltd | 0115 946 2316 | | D/I | | | | |
| Prodeck-Fixing Ltd | 01278 780586 | ✓ | D/I | | | | |
| Structural Metal Decks Ltd | 01202 718898 | ✓ | M | 4 | | | |
| Stud-Deck Services Ltd | 01335 390069 | | D/I | | | | |
| Tata Steel - ComFlor | 01244 892199 | ✓ | M | 4 | | | |
| **voestalpine Metsec plc** | **0121 601 6000** | ✓ | **M** | 4 | | ● (yellow) | **Gold** |

## Computer software

| Company name | Tel | QM | CA | FPC | NHSS | SCM | SfL |
|---|---|---|---|---|---|---|---|
| Autodesk Ltd | 01252456600 | | N/A | | | | |
| Fabsec Ltd | 01937 840641 | | N/A | | | | |
| Idea Statica UK Ltd | 02035 799397 | | N/A | | | | |
| StruMIS Ltd | 01332 545800 | | N/A | | | | |
| Trimble Solutions (UK) Ltd | 0113 887 9790 | | N/A | | | | |

## Steel producers

| Company name | Tel | QM | CA | FPC | NHSS | SCM | SfL |
|---|---|---|---|---|---|---|---|
| British Steel Ltd | 01724 404040 | ✓ | M | | 3B | | |
| Tata Steel - Tubes | 01536 402121 | ✓ | M | | 3B | | |

## Manufacturing equipment

| Company name | Tel | QM | CA | FPC | NHSS | SCM | SfL |
|---|---|---|---|---|---|---|---|
| Behringer Ltd | 01296 668259 | | N/A | | | | |
| **Cutmaster Machines (UK) Ltd** | **07799 740191** | | **N/A** | | | | **Silver** |
| **Ficep (UK) Ltd** | **01924 223530** | | **N/A** | | | | **Silver** |
| Kaltenbach Ltd | 01234 213201 | | N/A | | | | |
| Lincoln Electric (UK) Ltd | 0114 287 2401 | ✓ | N/A | | | | |
| Peddinghaus Corporation UK Ltd | 01952 200377 | | N/A | | | | |

## Membership services

| Company name | Tel | QM | CA | FPC | NHSS | SCM | SfL |
|---|---|---|---|---|---|---|---|
| Deconstruct UK Ltd | 02035 799397 | ✓ | N/A | | | | |

## Protective systems

| Company name | Tel | QM | CA | FPC | NHSS | SCM | SfL |
|---|---|---|---|---|---|---|---|
| Forward Protective Coatings Ltd | 01623 748323 | ✓ | N/A | | | | |
| **Hempel UK Ltd** | **01633 874024** | ✓ | **N/A** | | | | **Silver** |
| Highland Metals Ltd | 01343 548855 | ✓ | N/A | | | | |
| International Paint Ltd | 0191 469 6111 | ✓ | N/A | | | | |
| Jack Tighe Ltd | 01302 880360 | ✓ | N/A | | 19A | | |
| Joseph Ash Galvanizing | 01246 854650 | ✓ | N/A | | | | |
| PPG Architectural Coatings UK & Ireland | 01924 354233 | ✓ | N/A | | | | |
| Sherwin-Williams UK Ltd | 01204 521771 | ✓ | N/A | | | ● (lilac) | |
| Vale Protective Coatings Ltd | 01949 869784 | | N/A | | | | |
| **Wedge Group Galvanizing Ltd** | **01902 601944** | ✓ | **N/A** | | | | **Gold** |

## Safety systems

| Company name | Tel | QM | CA | FPC | NHSS | SCM | SfL |
|---|---|---|---|---|---|---|---|
| easi-edge Ltd | 01777 870901 | ✓ | N/A | | | ● (yellow) | |
| TRAD Hire & Sales Ltd | 01614 304666 | ✓ | N/A | | | | |

## Steel stockholders

| Company name | Tel | QM | CA | FPC | NHSS | SCM | SfL |
|---|---|---|---|---|---|---|---|
| AJN Steelstock Ltd | 01638 555500 | ✓ | M | 4 | | | |
| **Arcelor Mittal Distribution - Scunthorpe** | **01724 810810** | ✓ | **D/I** | **4** | **3B** | | **Headline** |
| **Barrett Steel Services Limited** | **01274 682281** | ✓ | **M** | **4** | **3B** | | **Headline** |
| British Steel Distribution | 01642 405040 | ✓ | D/I | 4 | 3B | | |
| **Cleveland Steel & Tubes Ltd** | **01845 577789** | ✓ | **M** | **3** | **3B** | | **Gold** |
| Dent Steel Services (Yorkshire) Ltd | 01274 607070 | ✓ | M | 4 | 3B | | |
| Dillinger Hutte U.K. Limited | 01724 231176 | ✓ | D/I | 4 | | ● (yellow) | |
| Duggan Profiles & Steel Service Centre Ltd | 00 353 567722485 | ✓ | M | 4 | | | |
| Kloeckner Metals UK | 0113 254 0711 | ✓ | D/I | 4 | 3B | ● (yellow) | |
| Murray Plate Group Ltd | 0161 866 0266 | ✓ | D/I | 4 | 3B | | |
| **NationalTube Stockholders Ltd** | **01845 577440** | ✓ | **D/I** | **4** | **3B** | | **Gold** |
| Rainham Steel Co Ltd | 01708 522311 | ✓ | D/I | 4 | 3B | | |
| The Alternative Steel Co Ltd | 01942 826677 | ✓ | D/I | | | | |

## Structural fasteners

| Company name | Tel | QM | CA | FPC | NHSS | SCM | SfL |
|---|---|---|---|---|---|---|---|
| BAPP Group Ltd | 01226 383824 | ✓ | M | | 3 | | |
| Cooper & Turner Ltd | 0114 256 0057 | ✓ | M | | 3 | | |
| Lindapter International | 01274 521444 | ✓ | M | | | | |
| **Tension Control Bolts Ltd** | **01978 661122** | ✓ | **M** | | **3** | | **Silver** |

## Welding equipment and consumables

| Company name | Tel | QM | CA | FPC | NHSS | SCM | SfL |
|---|---|---|---|---|---|---|---|
| Air Products PLC | 01270 614167 | | N/A | | | | |

XCarb®
Recycled and renewably produced

ArcelorMittal

# Towards carbon neutral steel with XCarb®


© Shutterstock

## Decarbonisation is the most important aspect of ArcelorMittal's long-term strategy.

XCarb® is designed to bring together all of ArcelorMittal's reduced, low and zero-carbon products and steelmaking activities. One of our first ready-for-market XCarb® products is XCarb® recycled and renewably produced.

### The synergy of scrap and renewable electricity

In making XCarb® recycled and renewably produced steel, ArcelorMittal uses up to 100 percent scrap and all of the electricity needed to transform the scrap comes from renewable sources such as solar and wind power.

This combination allows ArcelorMittal to offer steel with very low embodied carbon.

**100%** green electricity

Up to **100%** recycled scrap

### Environmental Product Declaration

ArcelorMittal can also release an Environmental Product Declaration (EPD) for each product family produced under XCarb® recycled and renewably produced conditions. The EPD details the complete environmental impact of the specific product range.

ArcelorMittal estimates that XCarb® recycled and renewably produced steel will have a carbon footprint as low as 0.3 tonnes of $CO_2e$ per tonne of steel when made with 100% scrap.

### 90% reduction with two complementary carbon partners

When lean design using high strength HISTAR® 460 sections is combined with XCarb® recycled and renewably produced steel, designers can drive down low carbon solutions. Pairing a low embodied carbon manufacturing process with high strength steel can deliver carbon reductions of up to 90%.

XCarb®

*Scan for more information*

HISTAR®

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