PICTURED: HAMS WAY FOOTBRIDGE
PHOTOGRAPH: SIMON KENNEDY

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Introduction

From sophisticated city offices to elegant bridges, quality is the keyword for the Structural Steel Design Awards' 53rd year

Once again, the Structural Steel Design Awards (SSDA) have highlighted and rewarded many of the best examples of excellence, ambition and innovation in our built environment. Now celebrating their 53rd year, the 2021 Awards, jointly sponsored by the British Constructional Steelwork Association and Trimble Solutions (UK), continue that great tradition. This year's collection of entries demonstrate the UK's excellence in steel design, fabrication and construction.

This year the wide range of projects entered for the scheme included large prestige city office buildings and beautifully designed bridges. The judges were particularly interested in projects that reflected a reuse of existing structures and showed a commitment to reducing a project's embodied carbon.

Twenty projects made the shortlist, from which judges presented four Awards, seven Commendations and four Merits. Due to Covid-19 restrictions, the judging panel, who normally visit the shortlisted entries, had to interview the project teams via Microsoft Teams for the second year running.

The SSDA's cross-industry judging panel includes: chairman Chris Nash, Bill Taylor and Oliver Tyler representing the Royal Institute of British Architects; Richard Barrett representing the steelwork contracting industry; Paul Hulme representing the Institution of Civil Engineers; and Sarah Pellereau and Professor Roger Plank representing the Institution of Structural Engineers.

STEEL ON TRACK FOR STATION REDEVELOPMENT

SCOTLAND'S THIRD BUSIEST RAILWAY STATION HAS EXTENDED PLATFORMS, AN EXPANDED CONCOURSE AND A NEW CONTEMPORARY INTERIOR AND EXTERIOR IN ANTICIPATION OF INCREASED PASSENGER NUMBERS

Network Rail expects the number of people using Glasgow Queen Street Station to increase by 40% to reach 28 million by 2030. To manage this growth, a £120m redevelopment programme has provided a spacious and accessible transport facility, designed to be a positive and prominent addition to the city's historic George Square.

With room for expansion to the north restricted by the width of a tunnel entrance, it was necessary to extend the platforms into the existing station concourse to the south.

In order to make space for these platform extensions, as well as a new concourse and station entrances, Network Rail compulsorily purchased and subsequently demolished two

Above: A striking new building wraps around the original 1880s train shed

Produced by the BCSA and Steel for Life
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What the judges said

"This redevelopment has transformed a drab, unpopular station into one that provides an impressive contemporary frontage onto Glasgow's principal square"

buildings between the station and Glasgow's George Square.

The new station concourse is housed in a striking contemporary glass-fronted building which wraps around the historic 1880s train shed and forms the centrepiece of the redevelopment.

Improving the passenger experience was a key focus of the design and the concourse is shaped to respond to pedestrian movement, while the dramatic roof structure floods the station with natural light and creates the desired city gateway.

The concept also creates new perspectives of the Category-A listed train shed, putting the Victorian structure at the heart of the design.

A column-free concourse is created by a 54m-long x 4.5m-deep steel roof truss. Secondary trusses cantilever from this structural spine towards the train shed and the station frontage, which incorporates 15m-high RHS columns that restrain the curtain walled facade.

Weighing 80 tonnes, the roof truss was pre-cambered by over 60mm to remove dead load deflections, fabricated on the ground and lifted into place overnight by two 500-tonne-capacity cranes. The roof has a triangular form and the sloping gold-coloured aluminium soffit demands that the secondary trusses taper to create a thin leading edge where they meet the southern and western facades. Services, having risen through risers from basement level, are distributed from one part of the station to another through roof voids created by the trusses.

Office accommodation for train station staff occupies the upper levels of a new building on the west side of the development. This area is constructed over the top of the existing underground low-level station which was created in the 1890s. An existing bridge structure could not sustain the loads from new columns, so a 38m-span storey-high truss was constructed to support the new office block.

The truss is supported on pile caps, positioned behind an existing retaining wall for the low-level station. In order to protect passengers, this large steel element was lifted into position in sections, during an overnight operation.

The western side of the office block floorplate is supported on 1,050mm-deep plate girders, which span 22m over the low-level station. The suspended floors for the concourse and the upper levels are formed with metal decking and concrete slabs supported on steel beams to form a composite flooring solution.

The SSDA judges said this major redevelopment had transformed a drab, unpopular station into one that restores the Victorian train shed and provides an impressive contemporary frontage onto Glasgow's principal square. An exceptional achievement. ●

Right: The roof truss was fabricated on the ground and lifted into place

Award: Glasgow Queen Street Station
Architects: BDP and IDP
Structural engineer: Arup
Main contractor: Balfour Beatty
Client: Network Rail

Below: The sloping gold soffit sits above the column-free station concourse

PHOTOGRAPHS: ARUP

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PHOTO: HUFTON+CROW

REMODEL AND REMAKE

TWO CITY OF LONDON OFFICE BUILDINGS HAVE BEEN RECONFIGURED AND EXTENDED INTO A SINGLE MIXED-USE SCHEME THAT FORMS PART OF THE WIDER BROADGATE REDEVELOPMENT

Totalling 66,000 sq m, 100 Liverpool Street consists of two steel-framed buildings that have been reconfigured and enlarged into a single structure. This has achieved a 40% increase in leasable area while reusing 50% of the existing superstructure and 100% of the foundations.

New steelwork was erected to knit the structures together, replace demolished areas and add four new floors to the top, creating a new 10-storey landmark building.

"The project shows the unique circular economy credentials of steel-framed construction. The steel industry's fantastic quality control processes and provenance have enabled the retention of much of the existing frame, while steel's high durability has easily assured a designed life far beyond these buildings' existing 40 years," explains AKT II technical director David Watson.

Steelwork's high strength has allowed novel strengthening details to carry the additional loads with minimal new material and waste. Steel has made the project's shallow transfer beams and super-slim suspended floor structures possible, allowing these to fit within the existing buildings' limited clearance zones.

"Analysis of the structure allowed us to identify and utilise redundancies in the original design, and work out which areas of the retained steel frames would need strengthening," adds Watson.

"The lightweight nature of a new steel composite design, using Fabsec cellular beams, meant we were able to reuse the foundations and only had to strengthen 33% of the existing columns to support the new build elements," he explains.

The new floors utilise a composite design, with cellular beams supporting metal decking and a concrete topping. New steel columns are bolted to the existing steel frame where possible and the building follows the original structural grid, based around a 7.5m x 7.5m column spacing.

The new office spaces open onto new terraces and atriums, while the station's western pedestrian artery has become a dramatic, full-height

Above: Four new floors were added to create a 10-storey building

What the judges said

"The team has added floors and reworked the existing steel structure to create an elegant new City office with high sustainability credentials"

retail mall. Many of the office floors are extended outwards, while the new upper levels are progressively set back to preserve sunlight down to the adjacent Broadgate Circle plaza. The cores have been upgraded, with new express lifts installed.

AKT II also developed the structural design with proprietary design software that allowed structural performance and embodied carbon analysis directly from the shared model geometry. This included generative parametric modelling, to rapidly iterate and verify design options for balancing the new and existing structure in terms of carbon, logistics, buildability and flexibility.

The team first identified ways to distribute the increased loads with minimal intervention by assessing the buildings' designed capacity along with the consequent occupational, cladding and finishing loadings to date, and analysing the overall balancing to identify possible areas of opportunity. Through back-analysis of the existing structure using 3D finite element modelling (FEM), several existing redundancies were affirmed.

PHOTO: HUFTON + CROW

Above: A new central atrium is at the heart of the building

Below: The original 1980s steel frame has been reused and extended

Tying in a new steel frame to an existing 1980s frame has been done as seamlessly as possible. Floor slab thicknesses vary throughout the scheme, but in areas where the new build meets the retained structure, the new slab corresponds to the old.

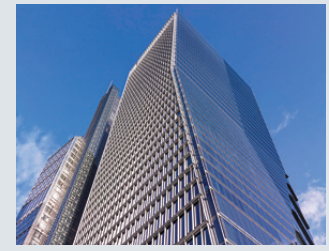
The SSDA judges said the reworking of two 1980s office buildings cleverly presents itself as a new building. On an extremely constrained site, built over a main access into Liverpool Street Station, the team has added floors and reworked the existing steel structure to create an elegant new City office with high sustainability credentials.

PHOTO: AKT II

Award: 100 Liverpool Street, London
Architect: Hopkins Architects
Structural engineer: AKT II
Steelwork contractor: William Hare Ltd
Main contractor: Sir Robert McAlpine
Client: British Land

Shapeshifting tower overcomes site complexities

The unusual twisting form of 100 Bishopsgate was achieved with the flexibility of steel



CHARLES HOSEA PHOTOGRAPHY

Commendation:
100 Bishopsgate, London
Architect: Allies and Morrison
Structural engineer: Robert Bird Group
Steelwork contractor: William Hare Ltd
Main contractor: Multiplex Construction Europe Ltd
Client: Brookfield Properties

Featuring a shape that transforms from a parallelogram at its base to a rectangle at the top, the 40-storey 100 Bishopsgate development is the latest landmark City of London office scheme, featuring flexible, high-quality open floorplates more often associated with shorter, wider HQ buildings.

At low level the scheme features a six-storey contiguous 60m-long podium, adjoining the main tower, which accommodates large column-free floors in excess of 4,080 sq m. It is topped by a landscaped roof terrace, offering tenants a large breakout or entertaining space.

The main 40-storey tower provides the main standout element of the project and has floorplates ranging from 1,800 sq m to 2,300 sq m.

To form its eye-catching twisting shape, two facades, north and south, feature a series of inclined columns. They are installed in a staggered configuration from ground level up to level 24, where the building straightens into a rectangle.

The judges said this city tower is a fine example of good Chicago-style commercial architecture. The simplicity and refinement of design and execution conceal the considerable site and logistical complexities that this project had to overcome.

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STEEL CREATES ELEGANT AND LIGHTWEIGHT BRIDGE

SPANNING ONE OF WORCESTER'S BUSIEST ROADS, HAMS WAY FOOTBRIDGE HAS A TRUSSED-ARCH MAIN SPAN AND REPLACES A SIGNAL-CONTROLLED PEDESTRIAN CROSSING

PHOTOGRAPHS: SIMON KENNEDY

Forming part of the Worcester Southern Link Road Phase 4 and spanning the A4440, Hams Way Footbridge is a 300m-long pedestrian and cycle bridge with an elegant trussed-arch main span.

Client Worcestershire County Council expressed a preference for the arch-type main span design as it would be consistent with other footbridges in the region. Aware that traditional steel arch bridges with vertical hangers can fall foul of the Eurocode pedestrian dynamics requirements, the design team proposed a 42m-long bowstring truss.

The truss diagonals provide additional stiffness and push the resonant frequencies above the limits for pedestrian excitation. The 6m-high trusses lean inward by 7.5 degrees and are unbraced to give what has been described as a dramatic user experience when crossing on foot.

Above: The truss diagonals lean inward by 7.5 degrees

The main span chords and diagonal members are formed from square hollow sections (SHS) rotated through 45 degrees. These diagonal sections are said to mirror a similar detail on the nearby Diglis Footbridge and are designed to catch light on their upper

Left: The main span is reached via multispan approach ramps

Below left: Standardised 12m steel spans on single RHS piers

half with shadow cast on the lower, which makes them appear slender.

The bridge's deck plate is 10mm thick and is stiffened with flat plate stiffeners welded beneath and two edge stiffeners above, formed by folding up the edges of the deck plate. The crossbeams are rolled universal beam sections at 3m centres, designed with stiffened connections to the truss chords to provide a degree of 'U-frame' stiffness, stabilising the unbraced top chord.

At the ends of the arches the top and bottom chords meet at a tight curve, hiding the supports and giving the impression that the bridge is floating above the piers. This element of the bridge is fabricated from conically curved steel plate, stiffened internally.

"This was an important part of the bridge design, as the architectural detail needed to resist significant forces at the junction of the arch and the hidden bearing crossbeam," says COWI associate Ben Curry.

"Early collaboration between the design and fabrication teams was key in achieving a detail that is efficient in both structural performance and fabrication effort. The finished product is said to be seamless, giving no hint of the complicated engineering within."

The bridge's main span is reached via multi-span approach ramps with an overall length of 250m, as well as a staircase at the northern end. Because of the ramps' length, an economic method and one that was quick to construct was required. The solution was to use standardised 12m-long steel spans on single rectangular hollow section steel piers.

The ramp edge beams feature the same rotated SHS form as the main span chords, but use simplified flat plate crossbeams for economy. The ramp edge beams mirror the tightly curved arch end segments at the junction between the ramps and the main span.

The steel piers were required to be relatively flexible in the longitudinal direction to accommodate thermal expansion in flexure, but stiff enough in the transverse direction to provide stiffness and restraint to eccentric loading.

The judges said this is an excellent example of how inspired architectural details can create a 'statement' bridge. ●

Award: Hams Way Footbridge
Architect: Moxon Architects
Structural engineer: COWI
Steelwork contractor: S H Structures Ltd
Main contractor: Alun Griffiths (Contractors) Ltd
Client: Worcestershire County Council

What the judges said

"This is an excellent example of how inspired architectural details can create a 'statement' bridge"

Hull's sculptural steel footbridge connects the city

Unusual pressed-steel form provides a welcome crossing, say the judges

Commendation: Murdoch's Connection
Architect: Matter Architects
Structural engineer: Arup
Steelwork contractor: S H Structures Ltd
Main contractor: Tilbury Douglas Construction
Client: Highways England

With a span of 40m (54m long including cantilever ends) Murdoch's Connection is named after Dr Mary Murdoch, Hull's first female GP, and is one of the most important elements in Hull City Council's (HCC) masterplan for joining the north of the city centre to the vibrant southern waterfront.

Crossing the busy A63, the pedestrian bridge was funded by the Humber Local Enterprise Partnership and Highways England. Recognising the long-term role of the bridge within a developing city centre, the design makes passive allowances for future connections to adjacent areas as well as lifts and retail spaces underneath.

The steel superstructure has a hybrid shell form with a conventional tied arch formed of steel circular sections and an integrated structural canopy acting compositely with the perimeter tubes. Below the deck, the perimeter tubes transition through 'arch-feet' units, which gather the arch forces and transfer them through to the substructure on piled foundations.

The judges said the bridge provides a welcome crossing over a busy inner-city road. The unusual, sculpted form uses pressed steel plates that connect the tubular structure together resulting in a complex geometric 'roof'. This is not just a bridge but an integral part of a new urban public space.

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PHOTOGRAPHS: TOM MCNALLY / ERIC WRIGHT AND CUMBRIA COUNTY COUNCIL

CROSSING RESURRECTED WITH STAINLESS STEEL

AN HISTORIC CUMBRIAN BRIDGE, DAMAGED BY FLOODS IN 2015, HAS BEEN REPLACED BY THE UK'S FIRST STAINLESS STEEL ROAD BRIDGE

Storm Desmond caused havoc in many areas of the UK in 2015 and this disruption was keenly felt in the Cumbrian village of Pooley Bridge where its historic Grade-II listed stone arch bridge collapsed due to severe flooding.

The installation of a temporary bridge relieved the pressure on local roads, but a new permanent crossing was deemed necessary and bridge specialist Knight Architects was appointed by Cumbria County Council (CCC) in mid-2017 for the concept design of a new structure.

The objective was to conceive a flood-resilient and future-proof bridge, complying with the current technical standards and the Environment Agency (EA) regulations and supported by the community.

Above: The light design minimises obstruction to water in flood events

The new bridge is said to be a unique and exceptionally slender 40m-span open-spandrel arch with an innovative composite stainless steel and high strength concrete structure that emerges from reinforced concrete abutments clad in local sandstone. The single clear span minimises environmental impact and flood risk.

According to the SSDA judges, ingenuity, innovation and beauty have been combined in this remarkable replacement bridge, which is the UK's first structural stainless steel road bridge.

Importantly, the new bridge pays homage to its predecessor and other examples of British bridge heritage. It also looks to the future, becoming a fitting addition to the site thanks to its lightness and transparency, not only providing unhindered views but minimising obstruction to water in flood events.

The bridge has 7.5m-long hidden back-spans within the abutments to transfer the horizontal component of the arch compression to the deck. This provides a traditional deck-arch appearance, but without transferring horizontal reactions to the low-capacity ground conditions.

According to the project team, the use of lean duplex stainless steel made it possible to deliver a bridge that looks contemporary, will age naturally like the previous historic bridge, has excellent durability without the need for maintenance and has about 25% more structural capacity than a conventional steel bridge.

Stainless steel has also allowed the bridge to be lighter, both for construction and in terms of slenderness. The choice of material was also based on whole life cost, having been considered by the client as a cost-effective solution when taking maintenance savings into account.

The slender design, made possible by the high strength stainless steel, minimised the amount of material used and its associated embodied CO_2 content. The specific type of steel used has one-fifth of the embodied carbon of the global average of stainless steel, due to its 85% recycled content and the low-carbon energy at production sites.

When it came to the construction programme, a number of challenges had to be overcome. The construction of the bridge was constrained by environmental and economic aspects as the work had to happen outside of the salmon spawning season, but without impacting on tourism.

These issues left a very short window for the onsite works and encouraged maximising offsite construction. Using steel as part of the structure was fundamental to achieving these requirements. The 110 tonnes of steelwork, all made up of bespoke sections, was fabricated in four quarters, taking approximately 22,000 man-hours to complete.

Award: Pooley New Bridge
Architect: Knight Architects
Structural engineer: GHD
Main contractor: Eric Wright Civil Engineering
Client: Cumbria County Council

Above: The single clear span helps to minimise environmental impact

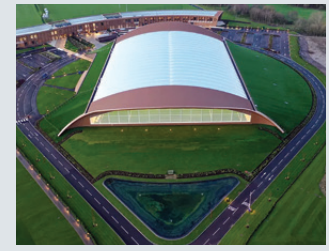
Below: The partially complete structure is lifted into place

What the judges said

"Ingenuity, innovation and beauty have been combined in this remarkable bridge"

Leicester dome blends into the landscape

A steel-framed building is at the centre of city football club's training facilities



Commendation: Leicester City FC Training Ground
Architect: KSS Group Ltd
Structural engineer: TRP Consulting
Steelwork contractor: BHC Ltd
Main contractor: McLaren
Client: Leicester City Football Club

Premier League side Leicester City has recently taken up residency in a new state-of-the-art training ground set around a main signature steel-framed building that houses an air-conditioned full-size indoor artificial pitch.

Designed to blend into the landscape, this spectacular domed structure also houses a media centre, press conference room, broadcast facilities and hospitality space.

The steel-framed building is set within a gently sloping earth embankment that blends seamlessly into the surrounding landscape.

The dome offers clear spans of 74m x 122m, achieved by using a series of 13 arched steel trusses, set at approximately 9.3m centres, supporting a box-section steel diagrid and a series of intermediate arched rafters set at 4.65m centres.

The site also features a three-storey S-shaped training centre to accommodate the first team and academy squads, while other steel-framed buildings on site include the two-storey sports turf academy and a 499-seat grandstand for a junior pitch.

The judges said changing the design to a full steel frame saved valuable programme time and resulted in an efficient and economic solution.

Bringing together old steel and new

Reuse and extension give a tired City office block a new lease of life

Located in the City of London, 60 London Wall consists of a complex redevelopment of an existing post-modern office block. Previously a tired and outdated steel-framed building, the seven-storey structure has been partially retained, strengthened and enlarged to create a new 11-storey structure with adaptable floorplates and a new communal atrium.

The building's extensions are formed from new steelwork, requiring a complex coordination programme to integrate the new and existing steel frames. This required a substantial number of new connection designs to support the new framing and ensure level finishes between floor levels.

By opting to reuse much of the steel frame, the original columns and beams were surveyed and back analysed to ensure they could carry the additional loads from the new floors and to keep strengthening works to a minimum. Much of the new and existing steelwork has been left exposed internally, giving the lettable floor area a modern, industrial aesthetic.

In summary, the judges said, through careful analysis of the existing structure, this redevelopment has provided a 50% increase in floor area, including the addition of five new floors, and made major savings in carbon. An excellent achievement.

Commendation: 60 London Wall
Architect: EPR Architects
Structural engineer: Heyne Tillett Steel
Steelwork contractor: Severfield
Main contractor: Skanska
Client: LaSalle Investment Management

PHOTO: MAX BROOK

PHOTO: JACK HOBHOUSE

Elegant industrial look for 80 Charlotte Street

Steelwork and services are exposed in this net-zero contemporary commercial scheme

Comprising three separate buildings, 80 Charlotte Street is a prime central London commercial scheme incorporating new steel-framed elements as well as retained and renovated structures.

Exposed steelwork throughout, combined with a 9m x 6m column grid pattern, has been used to create a contemporary and spacious office environment. The exposed nature of the internal steelwork meant the detailing of the connections needed to be simple, clean and elegant. Flush end plates have been used, with toe plates to beam and column flanges.

Within the building, the services, accommodated in bespoke cells cut into the plate girder beams, are also exposed, adding to the scheme's industrial look.

The steel plate girder design provided a customised depth of steel beam with limiting deflection values. As floor-to-ceiling heights were critical, Bourne invested in advanced robotic manufacturing techniques to ensure the quality of the assembled girders met the enhanced manufacturing tolerances.

Summing up, the SSDA judges said the team had achieved the surprisingly difficult task of making a complex building look simple.

Optimising beam spans reduces embodied carbon and an all-electric power system that uses renewable electricity ensures the building is net-zero carbon.

Commendation: 80 Charlotte Street, London
Architect: Make
Structural engineer: Arup
Steelwork contractor: Bourne Group Ltd
Main contractor: Multiplex Construction Europe Ltd
Client: Derwent London

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Steel brings in complex Catalyst on time and budget

Sloping facades and a triangular site called for the adaptability of a structural steel frame

Located in the heart of Newcastle city centre, The Catalyst is the new steel-framed home of the National Innovation Centre for Ageing and National Innovation Centre for Data.

A striking and unique exterior has been created by sloping the facades, while the triangular site, which dictated the structure's shape on plan, has been softened by curving the three corners.

This exciting and yet simple and elegant architectural solution was then combined with the structural engineering to create the finished standout building.

The structural steel frame is highlighted by expressed sloping diagrid facades and triple-storey diagrid trusses that span the open landscaping area at the front of the building.

According to s h e d managing director Marc Horn, the innovative diagrid solution was made possible by the very close collaboration between the architect, engineer, steelwork contractor and main contractor.

"The complex intertwining of different uses alongside the building services meant that the main internal spaces are largely column-free, using shallow cellular beams for service integration."

Structural steelwork allowed the building to be built in a short construction programme and under budget. Using an alternative framing solution would have meant an increased budget, a longer programme and more of an environmental impact on the surrounding area.

Commendation: The Catalyst, Newcastle upon Tyne
Architect: GSSArchitecture
Structural engineer: s h e d
Main contractor: Bowmer and Kirkland Ltd
Client: Newcastle University

PHOTO: BOWMER AND KIRKLAND LTD

Wraparound stadium meets Brentford's design goals

A restricted site posed complex structural challenges

Back in English football's top flight for the first time since 1947, Brentford kicked off the current Premier League campaign in a new 17,250-capacity stadium.

The Brentford Community Stadium's design responds to a site bounded closely by three railway lines, which truncate two corners of the typical stadium footprint. This posed the challenge of integrating the taller south stand with the three remaining lower height stands.

By sloping the gable ends of the south stand, the design achieves a continuous plane, dynamically connecting the cantilevering tips of the roofs.

This not only achieves the client's ambition for a continuous seating bowl, a remarkable achievement for such a constrained site, but it also symbolically frames the view of the historic Kew Bridge Standpipe tower.

Lightweight steelwork roof options were used to achieve a continuous roof concept without movement joints. The longest span in the south stand roof is formed from a series of 37m-long cantilever trusses.

The judges said this simple wrap-around stadium has a clean uncluttered appearance, with no tension bracing despite some long, cantilevered sections. Careful design and planning resulted in significant savings in both cost and carbon.

PHOTO: ARUP

Commendation: Brentford Community Stadium
Architect: AFL Architects
Structural engineer: Arup
Main contractor: Buckingham Group Contracting Ltd
Client: Lionel Road Developments Ltd

Other finalists:
- Majestic, Leeds
- Manchester Airport Terminal 2 Transformation
- Pinewood Studios Phase II
- Royal College of Obstetricians and Gynaecologists, Union Street
- The University of Winchester, West Downs Campus

Steel spans revive Lake District sites

As well as constructing two new bridges on the Railway Trail, a third was needed for their installation

Brundholme and Low Pearson are two new steel truss bridges that have been installed as part of the reconstruction of the Lake District's popular Railway Trail walking route.

Beaver Bridges developed a build sequence in agreement with the main contractor which eliminated the need for disruptive concrete works in the Greta river and reduced programme time and associated costs.

Because the Low Pearson site required access via the Brundholme site, the proposal included a modular temporary steel bridge designed to accommodate construction traffic up to 44 tonnes in weight.

Applying the principles of DfMA (Design for Manufacture and Assembly), the Low Pearson bridge was fabricated in three sections, delivered to a compound next to the Brundholme site, loaded on temporary vehicle bogies and moved to site by tractor.

On site, the sections were bolted together, fitted with a temporary launch nose adapter, launch frame and lower boom launch runway beams, which enabled the bridge to be launched into position without damaging the permanent works. The same system was used for the Brundholme bridge.

Merit: Brundholme and Low Pearson Bridges
Architect: Capita
Structural engineer: Beaver Bridges Ltd
Steelwork contractor: Jamestown Manufacturing Ltd
Main contractor: Cubby Construction Ltd
Client: Lake District National Park Authority

A lightweight solution for Heron Quay Pavilion

Canary Wharf estate needed the right frame to work with 1980s Docklands foundations

Sitting on a weathering steel grillage, spanning over a portion of Middle Dock in London's Canary Wharf estate, Heron Quay Pavilion is a unique structure 63m-wide x 23m-deep,

The five-storey building is mixed-use housing restaurants, guest rooms and leisure spaces including a gym and spa.

Its 6,000 sq m internal floor space includes open terraces at every level and a roof terrace giving visitors views across the wharf.

The project utilises a series of marine piles and pile caps, constructed in the early 1980s to support low-rise office buildings, and a logistics dockside deck, which were demolished in 2017.

The foundations are a major factor in the design of the building as they limit the size and weight of the new structure. Because of this, the choice of a steel framing solution for the building was said to be the only option.

Using steel for the structure also delivered the principal stability system, using steel bracing, and allowed for control of individual beam stiffness – essential for the steel members supporting the facade, which had onerous deflection criteria.

Merit: Heron Quay Pavilion
Architect: Adamson Associates
Structural engineer: Arup
Steelwork contractor: Elland Steel Structures Ltd
Main contractor: Canary Wharf Contractors
Client: Canary Wharf Group

PHOTO: PETER MATTHEWS

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The Hickman uses steel to express Whitechapel's industrial past

A group of separate buildings in a conservation area have become a unified modern workplace and retained their history

PHOTO: ZISHAN KHAN

Situated within the Whitechapel High Street Conservation Area, The Hickman is a contemporary workplace formed by unifying a collection of separate buildings that had evolved over the past two centuries.

The site comprised six buildings, patched together and reconstructed over time, each with varying structures, the earliest of which dated back to 1800s.

The original main building had five storeys plus a part basement. The roof and part of the fourth floor had been demolished several years ago and replaced with a new lightweight steel structure. As part of the new scheme, the building now rises to level seven, with three further steel-framed storeys added.

Internally, to express the building's industrial past, the structure is left exposed. On the original floors, the concrete encasement to the columns has been stripped back, exposing the riveted plates.

The judges said that, despite an almost total absence of base building information, through an exemplary level of investigation, an intensely forensic analysis of fire insurance documents and a highly responsive approach to 'as found' construction, which included innovative digital modelling of the completed work, this project showcased the potential of structural steel in repurposing and adding value to even the most challenging projects.

Merit: The Hickman
Architect: DSDHA
Structural engineer: Heyne Tillett Steel
Steelwork contractor: Hillcrest Structural Ltd
Main contractor: Ellmer Construction
Client: Great Portland Estates plc

New steel roof structure lifts Wenlock Works

Concrete-framed Shoreditch offices from the 1980s are given a new lease of life

Wenlock Works in Shoreditch, east London, is a former 1980s concrete-framed building that was once divided into two parts to accommodate offices and a printing press. It has now been completely refurbished and enlarged with new steelwork to create approximately 14,000 sq m of high quality commercial space.

The client's brief included a number of architectural and structural improvements for the building, most notably an increase in the net internal area (NIA), a new services strategy, rejuvenation of the facade and a comprehensive redevelopment of the architectural and structural features.

To increase the building's NIA, the existing roof structure was removed and replaced with a lightweight, two-storey, plus plant deck, steel structure.

Through careful design of the new lightweight steel storeys, the fifth-floor slab was retained to become the transfer element, thereby saving significant time, money and embodied carbon. The slab was strengthened where required using carbon fibre to avoid the need for transfer beams that would have compromised the floor-to-ceiling heights.

The judges said it was a good example of sustainable construction. By using steel to open up an existing building, extend it upwards and outwards with a lightweight frame, this 1980s office building has been repurposed with a 40% increase in floor area and greater flexibility.

PHOTO: BETH DAVIS

Merit: Wenlock Works
Architect: Buckley Gray Yeoman
Structural engineer: Heyne Tillett Steel
Steelwork contractor: Billington Structures Ltd
Main contractor: Sir Robert McAlpine
Client: Stanhope PLC