JANUARY 2022

NSC

Net-zero carbon in Leeds

Heat and Power at Edmonton EcoPark

Steel on show at V&A East

Liverpool residential rises with steel

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celebrating

excellence in steel

Call for entries for the 2022 Structural Steel Design Awards

The British Constructional Steelwork Association and Trimble Solutions (UK) Ltd have pleasure in inviting entries for the 2022 Structural Steel Design Awards.

Now in their 54th year, the Awards celebrate the excellence of the United Kingdom and the Republic of Ireland in the field of steel construction, particularly demonstrating its potential in terms of efficiency, cost-effectiveness, aesthetics and innovation. The Awards are open to steel-based structures situated in the UK or overseas that have been built by UK or Irish steelwork contractors.

"Trimble are proud to again be associated with the SSDA and look forward to another successful Awards that showcases the breadth and depth of talent and expertise within our steel construction industry", Steven Insley, National Sales Manager, Trimble Solutions (UK) Ltd.

Why enter?
If your project is shortlisted, your company would have the kudos of being part of a prestigious Awards scheme - one with a long history, focussed solely on steel construction and the only one where expert judges visit every shortlisted project to truly appreciate its qualities. In addition, you'll receive:

- Free publicity for you, your project and your client, both online and in the construction press.
- Free attendance at a major Awards event in central London for your project team.
- Recognition of excellence for your project, be it large or small.

How to succeed?
Plan ahead and involve the whole project team from the outset in preparing a high-quality submission, don't leave it to the last minute. Read the entry criteria and particularly the 'Submission Material' section on the entry form and provide exactly what is required, nothing more, nothing less. In addition:

- High quality photos will portray your project at its best.
- A well written, flowing description of the context, concept design, outstanding features and key construction details will allow the judges to swiftly appreciate the essence of your project.
- Broad representation from all parties at the judges' visit will demonstrate collaboration and enthusiasm.

To find out more and download an entry form visit
https://www.steelconstruction.info/Structural_steel_design_awards
or call Chris Dolling (BCSA) on 020 7747 8133

Closing date for entries: Friday 25th February 2022

BCSA

Trimble

Steel-framed buildings can be net-zero now

Nick Barrett - Editor

Following the United Nation's COP26 climate change conference it seemed that the world united behind the decarbonisation struggle that some characterise as saving the planet. It's that important.

The constructional steelwork sector has certainly thrown its weight behind supporting a decarbonised world and proof of its commitment can be found in the just published 2050 Decarbonisation Roadmap.

What is still unusual among the pledges to decarbonise is to hear exactly what steps will be taken to achieve net-zero carbon; but the BCSA has set out in the Roadmap the steps that the constructional steelwork sector will take - and are already being taken - to achieve net-zero by 2050, with much progress being achieved well before that date.

Significant investments are being made in new technologies all along the supply chain to make achievement of the targets possible, technologies that are either already proven or at least at the pilot stage.

Nothing new has to be developed to deliver net-zero carbon buildings right now. We see examples of sustainability excellence in every issue of NSC, and it is over a year now since the major steel-framed building was completed at 100 Liverpool Street, part of the Broadgate redevelopment, that represented a zero carbon first for major developer British Land (NSC Oct 2018). Sustainability credentials were enhanced by the fact that an original steel frame was reused as well as extended, with significant carbon reductions as a result.

Net-zero carbon steel-framed buildings can also be seen further north. What is possibly the first net-zero carbon BREEAM 'Outstanding' big commercial development in Leeds - Wellington Place - can be read about in this issue of NSC (p12). Steel's ability to provide large column-free spans helped limit the number of piles and columns, which helps limit the embodied carbon of the building.

High sustainability values can be seen in steel-framed projects throughout the UK. Also in Leeds, we see another commercial project at Thorpe Park that aims to achieve BREEAM 'Excellent' (p14). Questions have been raised about the willingness of people to return to offices to work even after the COVID-19 pandemic is behind us. This development aims to tackle that issue by focusing its design on providing an 'exemplar' environment for the building's users.

Part of the decarbonisation drive will focus on how we generate electricity and dispose of waste, and we can see steel supporting that cause in a north London sustainable waste management hub - Edmonton EcoPark - a state of the art heat and power project. Focus on design efficiency - one of the BCSA Roadmap's 'Six Levers' - led to significant carbon savings by using trusses at 24m centres rather than the original 8m centres.

Elsewhere in this issue we also see steel doing what it routinely does, helping architects and engineers deliver on designs with high sustainability credentials, which otherwise might not be technically possible or economically feasible, as at what is billed as one of the world's most significant cultural projects, the V&A East Museum project in London (p18). It is difficult to imagine this intricate geometric design with its articulated facade being achieved in anything other than steel. Fittingly, internal steel will be left exposed, giving the museum a high sustainability exhibit for visitors to appreciate.

Confidence returns to London office market

According to the latest London Office Crane Survey by Deloitte, the capital's commercial office market is experiencing a significant upturn in confidence as the volume of new starts has increased by 10% from the previous survey in May.

Deloitte's findings show that the volume of new starts has increased from around 280,000m² to 315,000m², above the long-term average. However, the number of new starts has fallen, which means the average scheme size has increased by 28%, which Deloitte says is a sign of a greater appetite for risk among developers.

As in previous surveys, the bulk of new commercial project starts in the capital were concentrated in three main areas: the West End, Midtown and the City.

In the West End, the volume of new starts rose for the third consecutive survey by about one-quarter from 83,600m² to 102,000m².

Of the 12 new starts, three-quarters were refurbishment, the largest at 123 Buckingham Palace Road in Victoria, which highlights the growing trend towards reusing existing buildings.

Midtown recorded its lowest volume of new developments since 2019. There were only three new developments, providing 9,200m² of office space. Of the three schemes, two are refurbishments.

In the City, there was a modest increase in the volume of new starts, which repeats a pattern from the previous two surveys. There were ten new schemes, with an equal split between refurbishments and new builds.

New studios give Liverpool film and TV production boost

The completion of two steel-framed studios in Liverpool are set to provide a significant boost to the local economy and the city's ambition to become the UK's go-to location for film and TV production.

Known as The Depot, the project comprises two 1,850m² sound-proofed film and TV production units, which required Leach Structural Steelwork to fabricate, supply and erect 220t of steel.

Liverpool Film Office (LFO), which is overseeing the management of the space, is keen to find productions that will employ local crew and work with local businesses on training initiatives. A key goal is to develop and strengthen the local talent pool and secure Liverpool's long-term ambition to be a first-class creative and digital content production base

It is predicted that The Depot, which is located adjacent to the soon-to-be redeveloped Littlewoods Pools building, will create a £24M economic boost for the regional economy. It will also create 360 new jobs and 760 indirect jobs, and forms part of Liverpool's 10 post-pandemic pledges to stimulate growth.

A steel-framed design for this scheme has proven to be the most efficient solution as the project team wanted a quick construction programme, a lightweight frame and two buildings with large column-free spaces.

Pictured: (left to right) Lynn Saunders, Head of the Liverpool Film Office, Steve Rotheram, Metro Mayor of Liverpool, Joanna Anderson, Mayor of Liverpool, and Kevin Bell, Operations Manager at the Liverpool Film Office.

Contract awarded for River Clyde crossing

Glasgow City Council has awarded Northern Ireland-based contractor Farrans the contract to build a new steel pedestrian/cycle bridge across the River Clyde.

The cable-stayed opening swing bridge will span between Water Row in Govan and Pointhouse Quay in Partick, a connection that will re-establish the historic link between the two areas.

According to the Council, the bridge will be economically, environmentally and socially important as it will create a link between communities, visitor attractions and institutions of national economic importance, and is a key part of the active travel route between the University of Glasgow's campus at Gilmorehill and the Queen Elizabeth University Hospital.

Works are expected to begin on site in January 2022, with project completion towards the end of 2023.

Tata Steel increases weathering steel availability

Responding to the increased demand for weathering steel hollow sections for use in small-to-medium sized projects, Tata Steel has launched its Enhanced Availability, which offers clients a select range of sizes in smaller amounts.

"There are over 300 unique cross-sectional sizes available in the Tata Steel Celsius® Weathering Grade range. While each of these has its place, we have found that there is a core of sizes which are particularly useful in smaller structures, such as footbridges and gantries," says Tata Steel Marketing Manager Graeme Peacock.

"At the same time, these smaller structures generally require smaller amounts of each size and so we have recently introduced our Enhanced Availability."

The Enhanced Availability offering is available across a range of square and rectangular section sizes in the Tata Steel Celsius® Weathering steel range. The sizes in this range have been specially selected to not only be popular, but to give a good range of structural capability.

The 18 Enhanced Availability sizes of Celsius® Weathering Grade cover the range from 60mm × 60mm × 6.3mm to 300mm × 300mm × 16mm for squares and 80mm × 40mm × 6.3mm to 400mm × 200mm × 16mm for rectangular hollow sections.

Depending on the size, length and production route, they are available with minimum order quantities between 1t and 5.5t, which in some cases, is equivalent to as little as three 12m lengths.

The full range of over 300 sizes of Celsius® Weathering Grade is still available from rollings, with minimum quantities between 15t and 30t, depending on the production route.

"We are sure that the Enhanced Availability range will prove particularly popular and will satisfy many requirements. Utilising these sizes at an early stage in engineering design will help to ensure availability in the right quantities when it comes to fabrication," says Dr Peacock.

Full details of Celsius® Weathering Grade, including the Enhanced Availability sizes, are available in a new, updated datasheet which can be downloaded from *https://www.tatasteeleurope.com/construction/blogs-news/blogs/weathering-grade-hollow-sections-availability*.

Steel-framed Dyson innovation centre opens to pupils

Located in Holt, Norfolk, Gresham's School has opened its new Dyson Building, a centre for science, technology, engineering, arts and maths.

Funded by the James Dyson Foundation (James Dyson is a former Gresham's pupil) the £19M centre will help educate and train future scientists and engineers.

The building is said to include classes that open to an interactive and welcoming courtyard, which is not solely a circulation space. The central areas of the school feature art hubs and open-plan communal break-out spaces. The internal configuration of the rooms has the workshops of the art department separate to the science department for sound-proofing reasons and external access matters.

Working on behalf of Kier, A.C Bacon Engineering fabricated, supplied and erected 276t of steelwork for the project.

Bouygues to build Swansea carbon-zero office scheme

Bouygues UK has signed the contract with Swansea Council to build the city centre's new high-tech, carbon-zero office development that will provide space for 600 jobs.

The contractor will break ground in the coming weeks on the site of the former Oceana nightclub at 71/72 The Kingsway.

Set for completion in the summer of 2023, the five-storey development will include 10,500m² of commercial space, providing flexible co-working and office opportunities for innovative tech, digital and creative businesses.

The development, led by Swansea Council, will be worth £32.6M a year to the local economy and will also feature

state-of-the-art digital connectivity, a roof terrace, greenery and balconies overlooking the city centre and Swansea Bay.

NEWS IN BRIEF

BAM Nuttall has been appointed to build the new southern entrance of Sunderland's railway station. The new entrance features a large glass wrap around design, and will include a new ticket office and reception, public toilets, retail space and cafes, comfortable waiting areas, as well as a new mezzanine level that will have office space reserved for railway industry staff.

Mixed-use developer First Base and investors Patron Capital have received planning consent for the £180M redevelopment of Saxon Court, a former council building in **Milton Keynes**. The development will see the retention, refurbishment, and extension of the original Saxon Court building, which the project team said will save over 3,750 tonnes of CO_2.

A hybrid planning application has been submitted for the regeneration of Atlantic Wharf in **Cardiff**, with phase one of the scheme delivering a 17,000-capacity arena, hotel and associated parking. The arena, which is set to create 1,000 jobs when complete, is being developed by Robertson Group and will be operated by Live Nation and Oak View Group.

Architects Holmes Miller and Northern Light Arena Europe (NLAE) have put forward proposals for a multi-purpose e-sports arena on **Dundee**'s waterfront. The 4,000-capacity venue will be Europe's first truly digital-enabled arena space and attract top gamers and entertainers from across the globe. It is due to be delivered in 2024.

PRESIDENT'S COLUMN

Late last year BCSA published its 2050 Decarbonisation Roadmap that sets out how the UK constructional steelwork sector will transition to net-zero by 2050. It will be a complex journey involving a diverse mix of innovative technologies and is based on six decarbonisation strategies, or 'levers', that the sector will develop and deploy concurrently. But, it is achievable and shows how a genuinely circular and sustainable net-zero carbon structural steel sector will be in place by 2050, with substantial progress achieved by 2030. It was good to end the year on such a positive note with hope for the future, particularly after the year we've all just had.

One of those 'levers', and one that has the potential to deliver a quick win, is improving design efficiency, with a carbon reduction target of 17.5%. In this day and age, with 3D design engines and a fiercely competitive market, it seems strange to think that our structures are over designed by 17.5%. But there are certainly things that can be improved such as reducing over-specification of design loads, optimising section sizes and using S460 steel where appropriate.

What this 'lever' is definitely not about is absolute minimum weight design. As we have known for years, minimum steel weight does not equal minimum cost, and the same goes for carbon. If you slim your sections down too much, then connections become complex and more temporary works are required for steel erection, costing more money and carbon – a point I made in my column last time.

What this 'lever' is about is carbon-optimised design or design for sustainable construction, a holistic approach to minimise overall carbon. With this in mind, BCSA and SCI are currently working on a new design guide that sets out all of the issues to consider in order to achieve an optimised design.

I look forward to reading that publication, but what I know will be required for optimised designs is time, more time for designers to think through the issues and consider the implications of design decisions on serviceability, constructability, adaptability, longevity and potential for re-use and recycling.

Today, even with email, extranet sites and BIM, many projects suffer from a lack of timely and complete information, which impacts on the number and value of variations often at a late stage. This tells me that designers need more time from their clients already, even before we start thinking about achieving carbon-optimised designs. We all know that late design changes have a disproportionate effect on cost, but the same goes for carbon in terms of wasted fabrication, inefficient transportation and disrupted erection sequencing.

So, as I look forward to 2022, with some optimism due to the buoyant state of our industry, I have three wishes for the construction genie. Firstly, we all want to minimise carbon on our projects, so clients please allow our designers the time to achieve that. Secondly, designers, please use that time wisely when optimising your designs, and think how your design will be built. Lastly, please engage with steelwork contractors and other relevant Tier 2 contractors early in the design process, as I see that as essential to achieve carbon-optimised designs.

Happy New Year to you all.

Mark Denham
BCSA President

Another City of London tower gets approval

The City of London Corporation has approved plans for a 24-storey office-led development on Houndsditch, the seventh tall building to be approved this year.

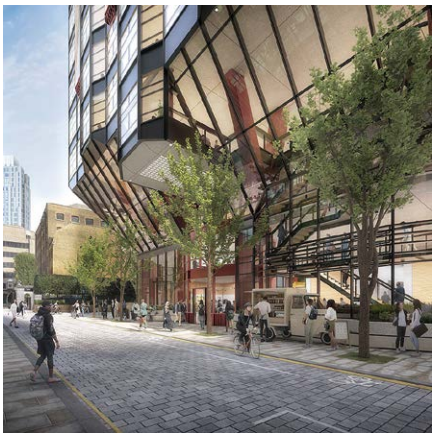
The Planning and Transportation Committee backed Brockton Everlast's scheme, designed by architects AHMM, which offers more than 56,500m² of office space as well as flexible retail/café space, community space, basement cycle parking and new public realm.

The office areas are flexible and adaptable, specifically designed to meet new ways of working and to meet the demands of different types of business occupiers including incubators, start-ups and SMEs.

The development has a strong focus on sustainability with the proposals aiming to reduce operational carbon emissions by 44% (when compared to a Building Regulations compliant building) and reducing whole-life carbon emissions.

It also includes ambitious urban greening including green walls and various landscaped terraces and balconies for office occupiers.

Chair of the City Corporation's Planning and Transportation Committee, Alastair Moss, said: "115-123 Houndsditch is the seventh office-led tall building scheme to secure planning permission in the Square Mile this calendar year.



"This is not only an unprecedented number of major developments to come for decision, but it also clearly illustrates the enduring strength of the office market in the City of London and unwavering confidence from developers.

"With ambitious sustainability credentials, a focus on occupier well-being and offering in-demand flexible office floorspace for all variety of business, this development on Houndsditch will be an exemplar of the future of the Square Mile."

Victoria Nova scheme expands with steel

Steelwork erection is progressing on the n2 building, which represents phase two of the Nova development adjacent to London Victoria railway station.

The 17-storey commercial building will eventually require William Hare to erect 3,300t of steelwork.

Landsec Project Director Damien Bettles said: "Built on one of London's most bustling sites, n2 can only be supported on a small number of large diameter foundation piles positioned in between London Underground and Thames Water assets.

"To overcome this challenge, the ground floor and first floor spaces are cleverly designed around a system of steelwork trusses, able to transfer the optimised commercial grid of the 17-storey superstructure to the foundation piles. With spans of up to 45m, the use of steelwork for the truss system is key to delivering a sustainable design solution."

The n2 scheme is due to complete in mid-2023.

New sheds award for Midlands rail freight terminal

VolkerFitzpatrick has been selected by Prologis to design and build two new production units at its Daventry International Rail Freight Terminal (DIRFT) site.

Each steel-framed warehouse will have an internal height of 18m, with one facility having an internal footprint of 21,500m², and the other of 26,188m².

The units will largely be used for goods storage and will be equipped with two-storey main office accommodation, as well as smaller hub offices,

which will sit outside the warehouse perimeter. Each unit will also feature a reception area, kitchen and welfare facilities. External works to the site will include hardstanding areas, car parking facilities, landscaping and drainage.

The project is worth over £26M and is scheduled to run until August 2022.

Fire testing completed on Lindapter decking fixings

Lindapter's extensive range of decking fixings have now been independently fire tested by BRE Global.

The company said in order to provide specifiers with additional confidence, Lindapter commissioned third party fire tests on a range of decking fixings installed in concrete backed composite decking profiles.

The BRE Global test report verified load limits for 60 minutes and 90 minutes fire ratings in accordance with BS EN 1991-1-2.

Additionally, Lindapter's range of decking fixings are also considered to satisfy the requirements of performance Class A1 (non-combustible) for the characteristic reaction to fire, also in accordance with the EC decision 96/603/EC.

Lindapter decking fixings are installed by locking inside the dovetail re-entrant channels. This technique is said to provide an adjustable fixing point for suspending M&E equipment safely and quickly.

More information on Lindapter products and their fire ratings can be found on the company's new website: *www.lindapter.com*

Pre-construction deal signed for British Library archive

Wates Construction has been appointed as pre-construction stage partner for the redevelopment of the British Library site at Boston Spa, West Yorkshire.

The 45-week PCSC (pre-construction services consultant) role will see Wates working alongside the client's design team up to RIBA Stage 4 with services engineer, Buro Happold and London-based architectural practice, Carmody Groarke.

The scheme involves the construction of a new 28m-high, 5,274m² fully automated net-zero carbon archive building, which will feature a public viewing gallery and 220km of extra shelf space. The project also includes an extensive renovation of the nearby 1970s Brutalist-style Urquhart Building for the library's 550 on-site staff, including a new reading room, restaurant and café for visitors.

Sustainability will be an integral feature of this ambitious programme, including the creation of new and improved green spaces to support biodiversity and enhance the natural environment surrounding the site.

The British Library aims to open its new spaces at Boston Spa by 2026.

Planning approved for £135M redevelopment of Wigan shopping centre

Cityheart has been granted planning permission for its £135M redevelopment of the Galleries Shopping Centre in Wigan town centre.

The plans include detailed and outline proposals covering an array of leisure facilities including a multimedia centre, which will be home to a multi-screen cinema, a ten-lane bowling alley, new food and drink outlets, multi-purpose venue and indoor mini golf.

A purpose-built pavilion off Market Street will provide new food and drink establishments and evening entertainment, while a market hall will be delivered, which will include traditional market stalls, new retail units, co-working spaces, small offices and a contemporary food hall.

The proposals also include a new hotel and 464 homes ranging from one-bedroom apartments to three-bedroom town houses and retirement living.

Work is due to start on site in January next year. Over 600 full time jobs will be created once the site is operational and further jobs and apprenticeships will be created during the construction stage.

Diary

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

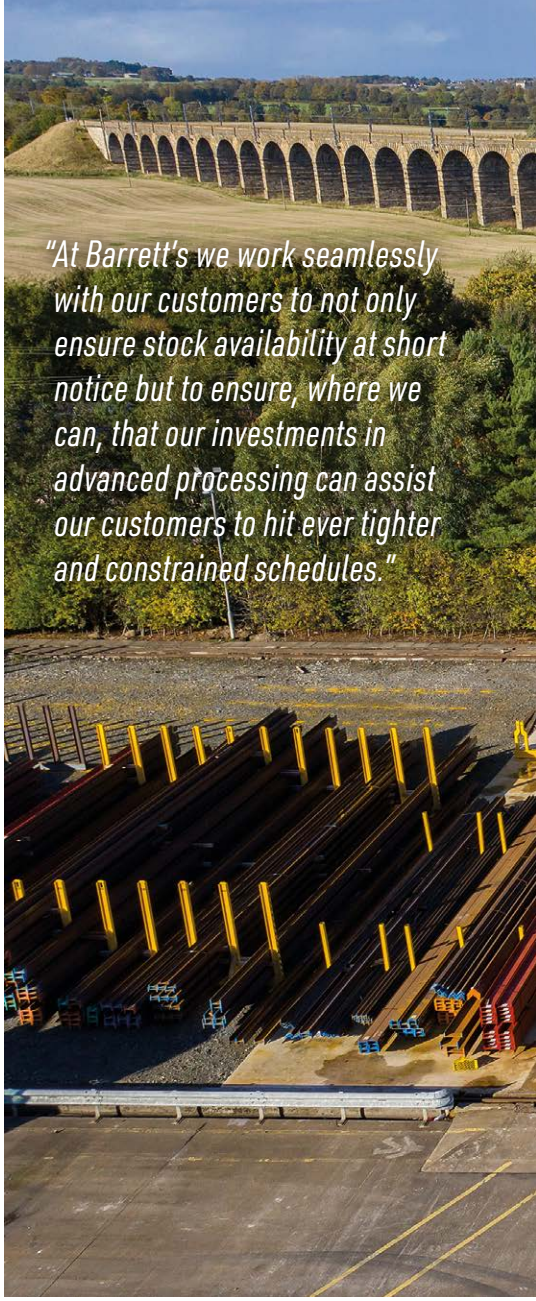
Tue 11 Jan 2022
Welding Technology Part 1 - What designers need to know
Webinar, SCI/BCSA members only
The webinar will cover basic welding technology and provide an overview of the techniques to minimise the risk of defects in the welds. Although this is the job of the Responsible Welding Coordinator (RWC), the webinar will cover the identification of higher risk situations and what to look for/expect when reviewing weld procedure specifications.

Tue 18, Thu 20, Mon 24 Jan, 2022
Light Gauge Steel Design Course
Online
This online course is delivered in three sessions. It introduces the uses and applications of light gauge steel in construction, before explaining in detail the methods employed by Eurocode 3 for designing light gauge steel members in bending and compression and calculation of section properties. Specific design issues related to the different uses of light gauge steel are addressed.

Wed 9, Thu 10, Wed 16, Thu 17 Feb, 2022
EC4 Composite Design Course
Online
This course will cover the design of composite beams and slabs with reference to Eurocode 4 for composite construction (BS EN 1994). Combining steel and concrete so that they act together structurally in composite elements can lead to very efficient frame solutions. Common problems and misunderstandings will also be highlighted during the course, as well as detailing recommendations. Please note that this course covers buildings but not bridges.

Supply chain leader

During a challenging period, Barrett Steel, the UK's largest steel stockholder, has continued to invest in supporting the steel construction sector.



"At Barrett's we work seamlessly with our customers to not only ensure stock availability at short notice but to ensure, where we can, that our investments in advanced processing can assist our customers to hit ever tighter and constrained schedules."

A skilled labour force is essential to the smooth running of any steel stockholder.

In a year where the UK's construction industry has faced several operational challenges, Barrett Steel says it is proud to support and continue its Headline sponsorship of Steel for Life.

Looking back, Barrett Steel says it had a markedly positive 2021. The business secured its position as the UK's largest steel stockholder (having over 120,000 tonnes of stock in situ) through new acquisition and continuous investment in the latest fleet and processing technologies.

Barrett Steel has for generations been openly proud of supplying the steel construction market and despite recent sector uncertainties in material supply chains and distribution shortages, has continued to invest in supporting the industry, while securing jobs for many in the sector.

Commenting on the challenges ahead, Daniel Redgwick, Commerical Director for Barrett Constructional Steel says: "At Barrett Steel we have supported our customers throughout these uncertain times. Guaranteeing steel price security by standing over contractually agreed prices when our customers have faced site delays has enabled them to navigate a turbulent period for the sector."

Long-established, as a key partner to construction businesses across the UK, the 6th generation family business prides itself being the most versatile of providers to the construction industry. An industry that has been imbedded right at the core of Barrett's success since the business began with Henry Barrett in Bradford back in 1866.

In more recent times, late 2021 saw the launch of its Barrett Steel Scotland businesses new 9,300m² stock and processing site in Newbridge. The investment by Barrett Steel in this new facility is £5.5M on capital expenditure and stock that provides a total stockholding of 5,000 to 6,000 tonnes of stock, based in Scotland for next day delivery. The site is said to be perfectly located to service construction customers across the entire breadth of Scotland as it is situated on the M8/9 interchange just outside of Edinburgh.

In addition to this, the Group has recently purchased additional land surrounding one of its key structural section processing hubs in North Lincolnshire. This expansion will enable the site to grow to meet the increasing demands for steel supply within the sector. Barrett Steel has navigated the recent driver shortages by having its own dedicated fleet of over 150 modern vehicles maintaining service standards to key construction projects across the UK and Ireland.

Continuous investment in state-of-the-art steel processing equipment continued for the group in 2021. Barrett Steel's key manufacturing hub and centre of excellence for section/hollow section processing in Dudley has recently seen extensive investment in three new tube lasers, including a jumbo tube laser, alongside a new structural saw line installation. This investment follows the recent arrival of two rapid angle processing lines for the businesses UK network as well as a new fully automated shotblast, paint and processing line at its HQ in Bradford.

There has also been substantial investment at the company's dedicated and expanding plate profiling centre based in Rotherham, which has seen the addition of a new plasma profiling machine with a second machine due to be installed in February. In addition, the site will also see a further two 10kw fibre lasers join the centre over the next 10 months.

Tom Barrett, Group Commercial Director says: "We've seen continued growth in our plate profiles team at Rotherham. The installation of a third plasma and an additional two laser machines will extend our plate profiling capacity and further complement our existing HD Plasma, laser, oxy and plate drilling facilities.

"Already with a strong reputation for customer service and quality, these machines will broaden our

Barrett Steel has expanded its Scottish operations with a new facility at Newbridge.

supply opportunities and reduce lead times."

On the topic of steel stockholders being able to offer an increasingly varied supply of processed material into the construction sector, Group Managing Director James Barrett says: "Over 150 years working hand-in-hand with the construction industry has enabled Barrett's to be in tune with the challenges our customers are facing daily. At Barrett's we work seamlessly with our customers to not only ensure stock availability at short notice but to ensure, where we can, that our investments in advanced processing can assist our customers to hit ever tightened and constrained schedules."

The experience entwined in the Barrett Steel operation means not only does the Group have the scope to supply a wide variety of stock and processed products, but additionally its long-established supply chain relationships pass on an enormous amount of benefits to the customer. Whether it is sourcing diverse types of stock, such as non-standard specification for the nuclear construction sector, or by reducing costs for end-users thanks to single-source operation, its supply chain allows reduction in costs and transport requirements across the board.

Barrett Steel were recently the first steel stockholder in the UK to join the Climate Groups SteelZero initiative, and by doing this it has joined key steel industry partners in a commitment to procure 100% net-zero steel by 2050. In addition to this the Group has also announced its strategy to be a net-zero carbon business by 2035.

The company says, what is certain in these challenging times, is that Barrett Steel's team of experts can boast significant levels of technical knowledge and in 2021 the Group has invested significantly in its people with over 30 employees undertaking Aspiring, Advancing and Ascending Leadership courses, with a further 45 joining their 2022 programmes.

This level of knowledge and understanding of the sectors they are servicing, allows them not only to create tailored solution-based offerings to assist customers with their ever-changing challenges, but also backs up the Group's investment in stock, transport and the processing capabilities required to cater perfectly to the construction industry for many generations to come. ■

Barrett Steel is a headline sponsor of Steel for Life

STEEL for life

Barrett Steel is a key partner to construction businesses across the UK.

Hollow sections processed in Dudley

Steel creates outstanding offices

A high-profile business quarter in Leeds city centre is continuing to expand with the construction of 11&12 Wellington Place, which will provide office, retail and leisure space.

Located a short walk to the west of Leeds city centre on a site once occupied by the main railway station, the Wellington Place development is said to be playing a pivotal role in the regeneration of the city's West End.

Developer MEPC is turning the site into a prestigious new multi-use quarter, and, so far, it has completed over half of the overall masterplan.

Currently on site, main contractor Wates Construction is building the steel-framed 11&12 Wellington Place, the seventh project the company has done for MEPC during the last eight years. The project consists of two blocks, 10 and 11-storeys high respectively, that both sit above a shared one-level basement and are joined by a link bridge.

Structural steelwork has played a leading role in the previous Wellington Place projects as *New Steel Construction* has previously reported (see *NSC* April 2015 and June 2017).

This latest project will provide the Leeds office market with a further 22,700m² of Grade A, BREEAM 'Outstanding' office, retail and leisure space. Once finished, 11&12 Wellington Place will bring a further 2,500 more people to the area, increasing the projected total working population of the estate to 12,500 people. The developer says, as a Net-Zero Carbon building (as defined by the World Green Building Council) it will set the benchmark for future-proofed, sustainable development - not just in the region, but nationally.

Paul Pavia, Head of Development at Wellington Place for MEPC, explains: "The construction of this building takes us beyond the halfway mark of the Wellington Place masterplan and will offer Leeds far more than just office space. It will play a big part in attracting major players to the city and continue to cement our position in the Northern Powerhouse.

Work on the project began in January 2021 when main contractor Wates installed piled foundations to a depth of 20m, cast the basement and podium slab, and slip-formed the two cores (both 11&12 have their own centrally-positioned cores).

All of this preliminary work prepared the site for Elland Steel Structures (ESS) to erect the project's two steel frames, that both begin at basement level.

Commenting on the use of steelwork, tp bennett Architect Jason Turner says: "The steel frame design offers large spans thus contributing to a column-free space with maximum flexibility.

"The other important consideration for this project was the low carbon design. The large spanning frame limits the number of columns and ultimately the number of piles, which helps to limit the embodied carbon of the building.

"The offsite fabrication provides a safe and efficient build which supports an efficient construction programme, therefore getting our

Structural steelwork is said to have limited the project's embodied carbon.

FACT FILE
11&12 Wellington Place, Leeds
Main client: **MEPC**
Architect: **tp bennett**
Main contractor: **Wates**
Structural engineer: **Curtins**
Steelwork contractor: **Elland Steel Structures**
Steel tonnage: **1,800t**

"The steel frame design offers large spans thus contributing to a column-free space with maximum flexibility."

client's product to market quicker than other structural alternatives."

The steelwork from ground floor upwards is based around a regular 6m × 14m grid, with the perimeter columns carefully coordinated with the cladding and glazing details.

The grid pattern allows the office floorplates to have minimal internal columns, creating the desired open-plan design.

"The only internal columns are located close to the cores and are consequently hidden in corridor and toilet walls," explains ESS Design & Build Manager Chris Heptonstall.

Westok cellular beams, up to 14m-long, form the internal spans and accommodate building services within their depth. They also support metal decking and a concrete topping to form a composite flooring solution. The use of cellular beams has also made the building lighter and more cost-effective, as a lighter frame requires shallower foundations, which also creates a quicker programme.

"We were delighted to provide design guidance to Curtins and ESS on the value engineered design of the clear-span floor beams on this project," says Kloeckner Metals UK Westok Technical Advisory Engineer Tom Elliott.

"The ribbon-cut low-carbon Westok floor beam delivers a structurally efficient design solution, and the provision of cells across the full beam affords the M&E team considerable flexibility for the building service routes."

Taking into account the differing uses, between the upper floors and the basement, the ground floor of each building incorporates two transfer structures, as the basement columns are slightly offset. This is because a bigger grid was required for the car parking that will be accommodated within the basement of block 12 and under the podium that separates the two structures. The same larger column spacing is continued under 11 Wellington Place, where a gym and back-of-house facilities will be housed in the basement.

Meanwhile, spanning the central podium, the two blocks are linked by a 5-storey high steel footbridge measuring 14m-long × 20m-wide, which connects the buildings from fourth floor up to level eight.

"The steel-framed structures at Wellington Place have become increasingly more efficient as we incorporate learnings from each building we work on. Early engagement with ESS and other key supply chain partners has been crucial in enabling us to continue to push for improvement in design and operations," says Wates Construction Project Director Dan Miller.

The steel erection programme for each block consisted of four phases, with each phase comprising up to 600 individual steel pieces. The heaviest steel elements were some of the main column sections, which weigh up 4.8t each.

Each phase, up to level eight, was completed using a combination of the site's two tower cranes and MEWPs positioned on the basement slab.

However, for the two uppermost floors, the MEWPs had to be moved to the eighth floor completed slab, as a machine with a working reach for this height would have been too heavy for the basement slab.

The top two floors of 11 and 12 Wellington Place are different. In no.12 they comprise offices, while its neighbour (no.11) has some offices at level nine and a large outdoor terrace that covers about two-thirds of the footprint and extends onto the link bridge's roof. Above the offices on 11 Wellington Place, there is a plant deck at level 10.

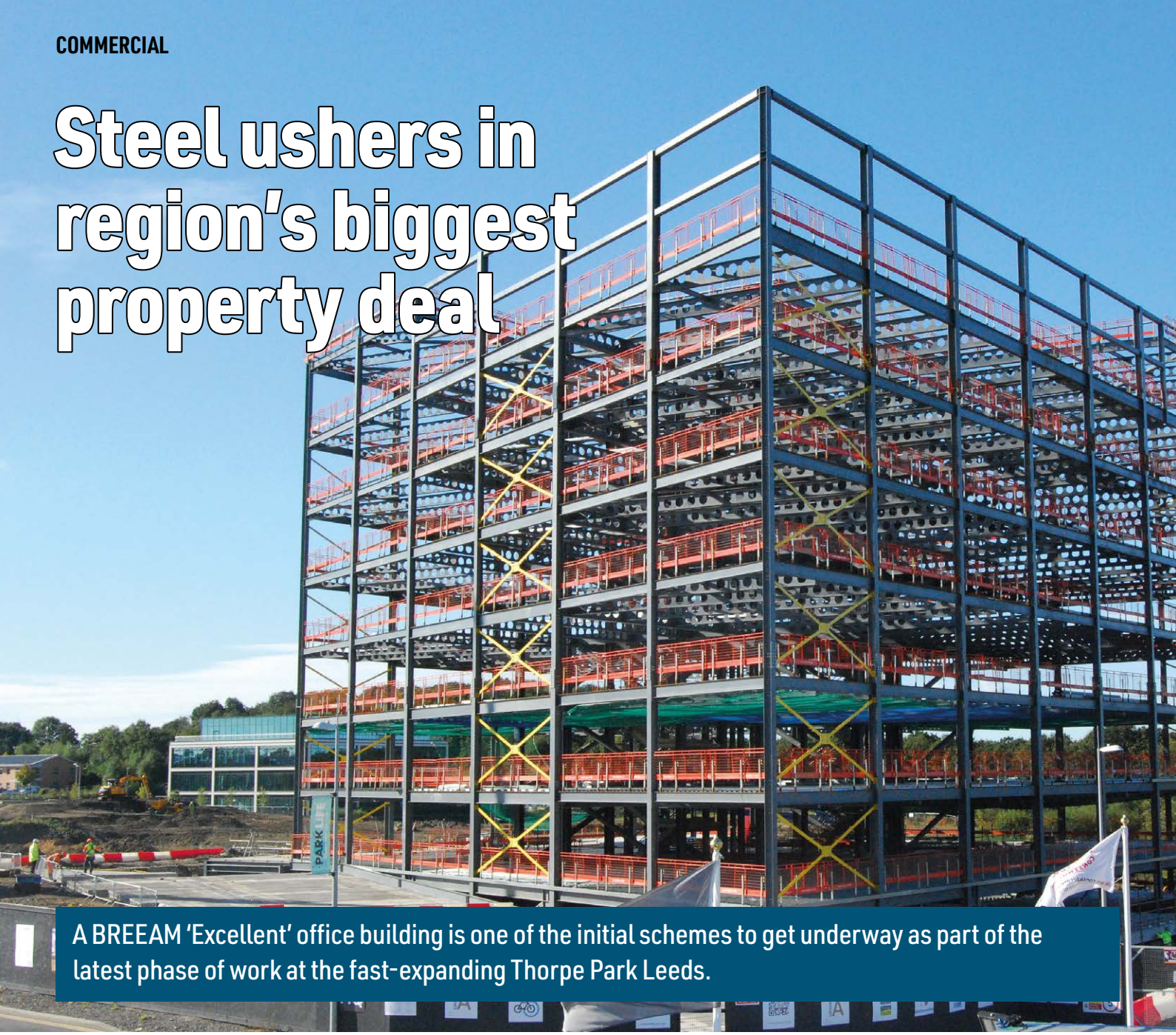
11&12 Wellington Place is due to be complete in December 2022. ■

How the completed project will look.

Westok cellular beams have been used throughout for services integration.

Each of the two buildings is stabilised by a concrete core.

Steel ushers in region's biggest property deal



A BREEAM 'Excellent' office building is one of the initial schemes to get underway as part of the latest phase of work at the fast-expanding Thorpe Park Leeds.

The post-pandemic recovery is being led by the commercial sector in Leeds, as a number of high-profile office projects are currently underway and transforming the city centre and its environs.

Structural steelwork is playing an integral role as the majority of these projects are steel-framed buildings. The material is chosen for its speed of construction as well as its ability to create the long span column-free spaces modern offices require.

Highlighting the strength of the sector in Leeds, the largest single out-of-town office deal ever recorded in West Yorkshire, and the biggest property transaction in the Northern Powerhouse region over the last twelve months, has recently been signed for a new commercial scheme at Thorpe Park Leeds.

Lowell, a leading credit management company, has agreed a 15-year lease to occupy this new, state-of-the art 12,300m² office building. It is relocating its UK headquarters from two buildings in Leeds Valley Park to one smaller, modern and more environmentally-friendly purpose-designed building.

Designed by award-winning architects, Carey Jones Chapman Tolcher, the steel-framed building is said to represent a new benchmark for future development at Thorpe Park Leeds, with an environmental performance target of BREEAM 'Excellent' and principles set out in the WELL Standard to provide an exemplar environment for users.

The new steel-framed building will provide seven floors of office accommodation with two levels of podium parking and amenity below.

Constructed on a sloping site, early works included the excavation of some 55,000m³ of earth in order to create a level plateau for the new structure.

"None of the overburden left the development as it was all distributed to other parts of the scheme, to form embankments and landscaped areas around the new housing zones," explains GMI Construction Senior Project Manager Leigh Bennett.

After the earthworks programme, GMI installed a series of piled foundations, to a depth of 20m and completed the majority of the concreting work, which included the basement slab and retaining walls.

Based around a regular column grid pattern of 7.5m × 12m, B3's steel frame is formed with a series of cellular beams, up to 15m-long that support metal decking and a concrete topping to create a composite flooring solution.

Centralised braced steel cores, along with discrete low-level steel bracing to the perimeter, provide the steel-framed structure with its stability. The positioning of the cores allows for minimal internal columns within the floorplate, creating an open-plan office environment.

The majority of the structure's columns have been supplied in two sections: A 15.4m-high column founded at basement level, spliced at the fourth steelwork level to another 20.1m column that extends up to the roof.

The building's main entrance lobby is a double-height space and located on the south elevation, facing the new landscaped realm to be created by the scheme's steel-framed podium.

Structurally-independent to the main B3 structure, the steel podium is a two-storey braced structure, constructed around a similar grid pattern to the office.

The podium extends the project's car parking

Steelwork has provided the office spaces with the desired open-plan design.

FACT FILE
B3 Thorpe Park Leeds
Main client: **Scarborough Group International**
Architect: **Carey Jones Chapman Tolcher**
Main contractor: **GMI Construction**
Structural engineer: **Buro Happold**
Steelwork contractor: **Billington Structures**
Steel tonnage: **1,740t**

from the building's basement in two directions. Along the western elevation, the podium is 1,000m² and contains the car park entrance and exit.

To the south of the building, the second and largest part of podium is approximately 2,862m².

The landscaped car park podium is constructed with large precast planks supported by a steel frame to cater for the associated heavy loads.

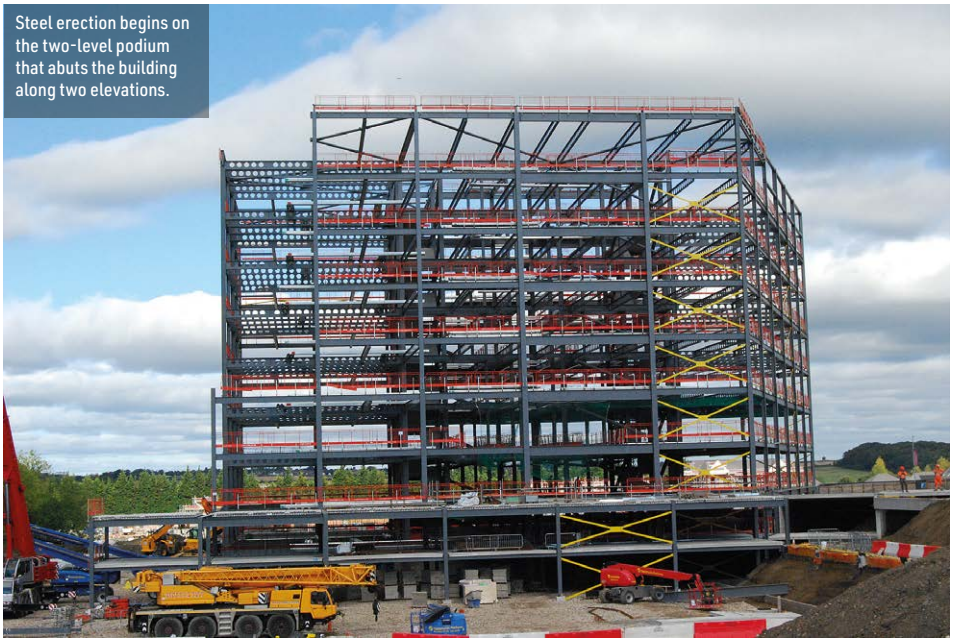
As well as erecting the steelwork, Billington Structures has also installed the precast planks, which weigh up to 4.6t each.

Erection and installation coordination has been a key part of the project for Billington Structures especially when it came to the podium.

As the precast planks are so heavy and in order to avoid bringing a very large crane to site, each bay of steelwork had to be followed immediately by the installation of its precast planks.

This sequence of work allowed Billington to place each bay of planks using a smaller crane positioned adjacent to the erected steel, without the need to lift over any of the completed frame.

B3 is scheduled to be completed in September 2022. ■



Steel erection begins on the two-level podium that abuts the building along two elevations.

Thorpe Park Leeds, the story so far

Thorpe Park Leeds is a well-established business location, strategically located with its own dedicated access at Junction 46 of the M1.

More than 74,000m² of office space is already built supporting over 5,500 jobs and The Springs retail and leisure park sits at the core of the mixed-use business community with a line-up of major high street brands including Next, M&S, ODEON Luxe, Pure Gym, Boots, H&M and TK Maxx along with a growing range of smaller, independent, niche retail and leisure businesses.

Plans are also in place for a new dedicated railway station to be built, which will provide a direct line into Leeds main railway station.

Commenting on B3, Kevin McCabe, Chairman at developer SGI says: "This is a game-changing deal, not just for Thorpe Park Leeds, but also for the Leeds City Region as a location for world-leading enterprise.

Over 20 years ago we set out to create the largest and most attractive out-of-town mixed-use destination in the North. With over £160M investment from our joint venture partners, Legal & General Capital we have been able to deliver critical new infrastructure."

As well as B3, the latest phase of work will include more than 130,000m² of mixed-use accommodation, 300 new homes, and 140 acres of parkland and public realm. Having built much of the Thorpe Park Leeds development, GMI Construction is about to start work on a six-level multi-storey car park, located opposite B3. Billington Structures will also be fabricating, supplying and erecting the steelwork for this project. ■

Visualisation of B3 and its podium after completion.

Trusses frame waste solution

Structural steelwork is taking a central role in the development of Edmonton EcoPark, a £1.2bn sustainable waste management hub in north London.

With the advent of the climate emergency, encouraging households and businesses to do more recycling in order to divert waste away from landfill sites is of upmost importance, not just in the UK but globally.

An example of how one authority is tackling this issue can be found in Edmonton, where the North London Waste Authority (NLWA) is striving to achieve 50% household recycling rates by diverting up to 700,000 tonnes of non-recyclable waste from landfill.

To achieve these aims, the NLWA is currently constructing the first phase of a £1.2bn sustainable waste management hub, known as the North London Heat and Power Project at Edmonton EcoPark.

The wider scheme will eventually see the site's current energy-from-waste facility, which dates from the early 1970s, demolished and replaced with a new and more efficient plant.

The initial and current phase of works includes the construction of a Resource Recovery Facility (RRF), which will be one of the largest publicly owned facilities of its kind in London, with the capacity to manage 135,000 tonnes of recyclable material every year, as well as the first ever public Reuse and Recycling Centre (RRC) at the site. These large steel-framed buildings will receive waste, segregate it and prepare it into fuel for the waste-to-energy plant. Initially, this will mean feeding the existing facility, until the new plant comes online later in the decade.

Phase one of the works also includes a third steel-framed building known as EcoPark House. With a footprint of 40m × 20m, this two-storey structure will house a visitor and education centre, where the local community can learn about waste reduction and recycling, as well as a new home for the Edmonton Sea Cadets.

Caunton Engineering commenced the steelwork erection programme for this flagship scheme during the summer, but prior to this a major groundworks scheme had to be undertaken.

Steve Pate, Project Director of EcoPark South for Taylor Woodrow explains: "The site, which was previously a laydown area for trucks, had to be levelled with 30,000m³ of earth removed and reused elsewhere. We then installed over 500 piles, to a depth of 20m, 1,200 controlled modulus columns (CMCs) to a depth of 10m and commenced reinforced concrete works in preparation of the steelwork starting."

Accounting for nearly three-quarters of the project's overall steel tonnage, the RRF building is 160m-long and formed with a series of seven long-span trusses, that primarily create the column-free processing area of the building and support a saw-tooth roof.

One of the initial long-span trusses is erected for the construction of the RRF building.

EcoPark House will house a visitor and education centre.

"Using structural steelwork for the project's buildings was the only practical solution, primarily because of the required internal spans and the size of the trusses," explains Waterman's Regional Director Edwin Bergbaum.

"The initial design had trusses at 8m centres, but after a value engineering exercise this was rationalised to fewer trusses, which are spaced at 24m centres.

"As well as cost and programme benefits, this design enhancement contributed to towards a carbon reduction of approximately 720 tonnes in the frame."

The structure's perimeter columns are however still arranged at 8m bays, but as there are, no internal columns allowed in the majority of the building, the 76m-long × 6m-deep trusses are connected by cambered 686 UBs spanning perpendicular to the trusses and providing support to the saw tooth roof steelwork.

The exception to the 24m truss spacing is the northern end of the building where a double truss and column arrangement forms an expansion joint.

The most northerly of these two trusses is substantially heavier than all of the others as it not only supports the roof steelwork, but also picks up the beams forming one of the building's two plant decks.

This truss weighs 159t and its top boom is formed with European wide flange sections (HD

"Using structural steelwork for the project's buildings was the only practical solution, primarily because of the required internal spans and the size of the trusses."

FACT FILE
Edmonton EcoPark
Main client: **North London Waste Authority**
Architect: **Grimshaw**
Main contractor: **Taylor Woodrow**
Structural engineer: **Waterman Group**
Steelwork contractor: **Caunton Engineering**
Steel tonnage: **1,963t**

400 × 990) that have 115mm-thick flanges, 72mm-thick webs and a weight of 990kg per metre.

The connecting beams that create the 1,800m² plant level, are European I beams (HL 920 × 725) that are up to 20m-long and weigh up to 15t each.

"Forces in the booms are up to 22,000kN and there was a camber of 300mm over the length of the truss to account for deflection," explains Caunton Engineering Structural Engineer Chris Martin.

The beams support precast floor planks, chosen as this was deemed the best solution for the corrosive environment the building will contain. However, above the first floor, there is another smaller mezzanine level, accommodating a control room and this floor is formed with a composite metal decked solution.

A smaller first floor element is also located at the southern end of the RRF, also formed with steel beams supporting precast floor planks.

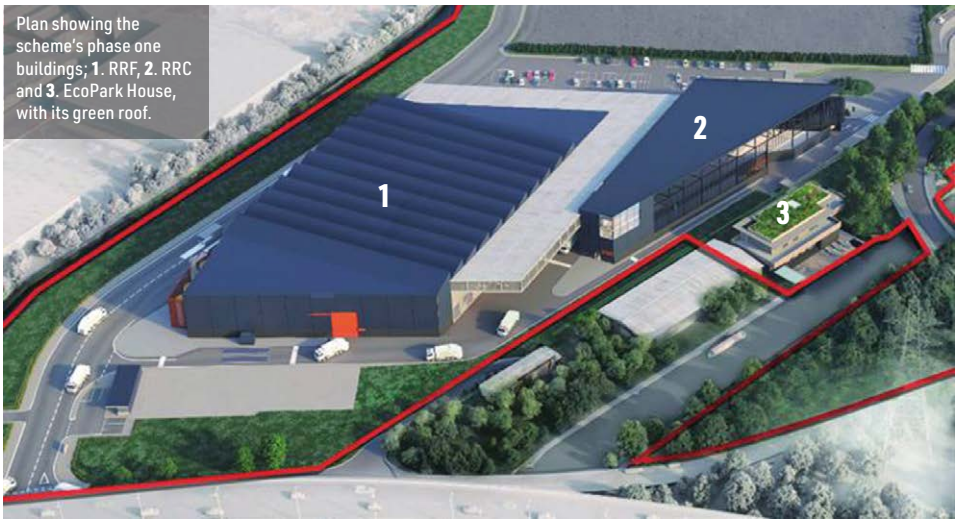
In order to install the trusses, they were all brought to site piece-small and assembled on the ground, before being lifted into place by two mobile cranes. Apart from the aforementioned plant room-supporting truss, the other six of the trusses weigh up to 69t.

Sat adjacent to the RRF, the RRC is a wedge-shaped structure with an office block located at its narrowest southern end. Sat atop of a concrete basement structure, that contains water sprinkler tanks and a rainwater harvesting vessel, the majority of the building is formed by a series of 3m-deep trusses that up are to 30m-long and fabricated from 203 UC booms with SHS internal members.

A further set of trusses, up to 20m-long, cantilever off of the RRF along its eastern elevation to form a canopy. Along part of the eastern elevation, the canopy infills the gap between the RRF and RRC and in this area, it is propped by the latter structure on a sliding bearing that requires +/-100mm of movement. The canopy continues along the RRF's northern elevation and here it 6.5m wide and formed with a series of 457 UB sections.

Environmental considerations are at the heart of this project; they include a rainwater collection system, and a clean energy system powered by photovoltaic panels and geothermal energy. The team is also investigating an opportunity to harness the energy from the adjacent River Lee Navigation using hydro turbines.

Phase one at the EcoPark is due to complete by the end of 2022. ■



Plan showing the scheme's phase one buildings; **1**. RRF, **2**. RRC and **3**. EcoPark House, with its green roof.

FACT FILE
V&A East, Stratford, London
Main client: **V&A**
Architect: **O'Donnell + Tuomey**
Main contractor: **Mace**
Structural engineer: **Buro Happold**
Steelwork contractor: **Bourne Steel**
Steel tonnage: **1,500t**

Steelwork has provided the solution to form the building's complex facade design.

Museum displays steel frame

Described as one of the world's most significant cultural projects, the Victoria and Albert Museum is currently constructing two new sites in east London as part of V&A East.

"Steel lends itself to this job, as we need to form an articulated façade, which would be difficult to create in another framing material"

The building's shape takes its inspiration from an X-Ray of evening dress in the V&A's collection.

Founded in 1852 and renowned as the world's leading museum of art, design and performance, the Victoria and Albert Museum (V&A) has a collection of over 2.3 million objects that span more than 5,000 years of human creativity at its South Kensington premises.

Building on the success of its original facility in South Kensington, Young V&A in Bethnal Green, and the recently opened V&A Dundee, two new sites known as V&A East are now under construction in Stratford, east London.

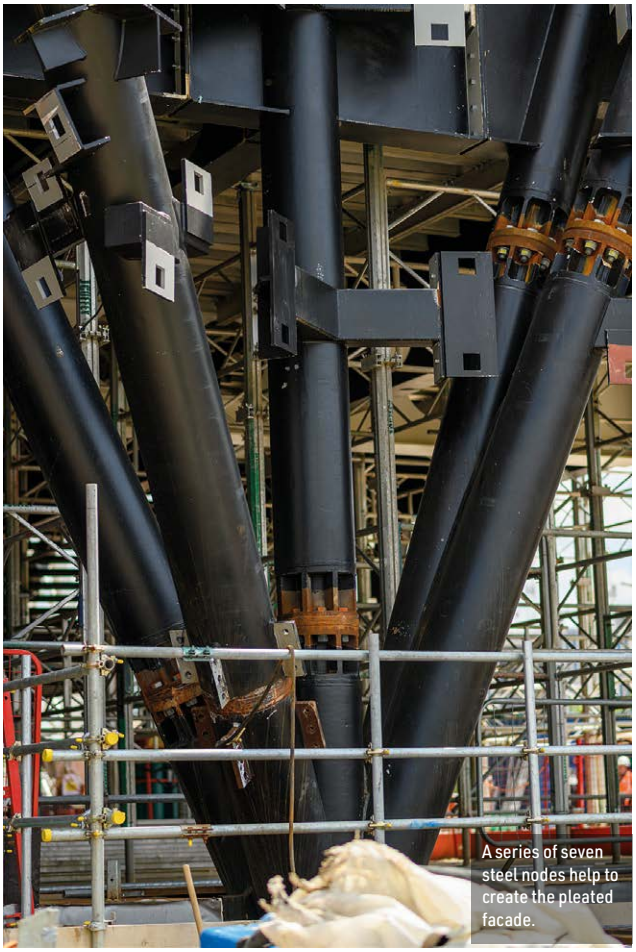
Opening in an area called Here East in 2024, V&A Storehouse will offer a new immersive visitor experience taking people behind the scenes and offering public access to the museum's collections, while V&A East Museum will open in 2025, celebrating global creativity and making. It forms part of the East Bank development, which is a £1.1bn scheme of culture, education, innovation and growth being built on the Queen Elizabeth Olympic Park.

Overall, East Bank will be spread across three sites – Stratford Waterfront (containing the new V&A East Museum, along with Sadler's Wells, BBC, and UAL's London College of Fashion), UCL East (University College London's new campus) and Here East.

Working on behalf of main contractor Mace, Bourne Steel is fabricating, supplying and erecting 1,500t of steelwork for the V&A East Museum project.

Founded on a series of piled foundations, the steel frame is stabilised by three concrete cores and the diaphragm action from the composite flooring.

The completed V&A will form a central element of the East Bank development in Stratford.


A series of seven steel nodes help to create the pleated facade.

It is also integral in creating the project's intricate geometric design.

"Steel lends itself to this job, as we need to form an articulated façade, which would be difficult to create in another framing material," says Buro Happold Project Engineer Matthew Duckett.

"The museum also needs flexible internal spaces, with long spans that are able to take high loads from various exhibits that could be hung from above; a steel solution worked for all of these criteria."

The structure's façade is the most striking element of the project, and one that will ultimately make the V&A East Museum stand out in an area that is already home to many impressive buildings.

The architects, O'Donnell + Tuomey's façade is inspired by Nick Veasey's X-ray of a 1955 silk taffeta evening dress by Cristóbal Balenciaga, which is in the V&A's collection. The pleated façade accommodates the vertical circulation between floors, reminiscent of the boning which supports the sculptural dress.

A series of seven steel nodes, weighing up to 12t each were erected to support the unique exterior precast and glazed cladding.

A series of bespoke brackets, each set at different angles to accept the cladding, were welded to the CHS columns at the fabrication yard by Bourne Steel.

"Each node is founded directly on a pile cap, and they are all unique, due to the complex geometry of the frame," explains Bourne Steel Project Director Russell Thomson.

"They have either four or five CHS columns connecting to them and each is concrete-filled to make them blast-resistant."

The nodes were delivered to site in complete pieces. Their connecting circular columns, up to 7m-tall, were connected in the fabrication yard via welded connections, again to aid their blast resistance.

Once the nodes were in place, further additional CHS sections are added, via bolted connections to complete the façade to its full-height. The circular columns are 457mm-diameter, with the heaviest weighing 5t.

The façade erection is being undertaken at the same time as the internal steelwork, as floor beams connect to the façade at each level and stabilise the CHS sections.

Including ground, the V&A East Museum has five floors, two mezzanines and a sixth level plant deck. As the cores are slightly offset towards the eastern elevation, there is one row of internal columns ▸20


Two trusses, at the underside of level two, create the desired column-free spaces.


Bespoke girders with cellular openings for building services have been used on all floors.

▸19

towards the western side of the building, allowing each floorplate to have clear spans of up to 16m.

Forming the internal floor areas are a series of plate girders, up to 500mm deep, that support metal decking and in some areas precast flooring. The girders are designed to take substantial loadings, while bespoke cells will allow them to accept services within their depth.

Adding some more complexity to the steel frame design, along the eastern elevation, where the elevation changes to a sloping façade, there is a requirement at level one to have fewer perimeter columns.

To achieve this, Bourne Steel had to install a two truss arrangement to the underside of level two along the eastern side of the structure. A vertical truss measuring 14m long × 2.6m high, weighing 5.1t, connects to a horizontal truss that measures 13.4m-long × 2.5m-deep and weighs 2.6t.

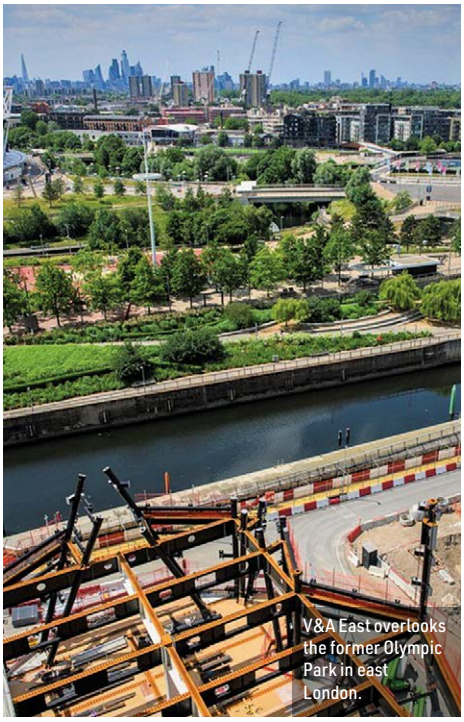
Much of the internal steelwork will be left exposed in the completed scheme and so decorative paint finishes have been applied to the steelwork as well as intumescent fire protection.

Summing up, Bourne Steel Managing Director Nick Hatton says: "We are delighted with the progress of this complex steel construction and associated works on site at V&A East Museum, despite the challenges of the COVID-19 pandemic.

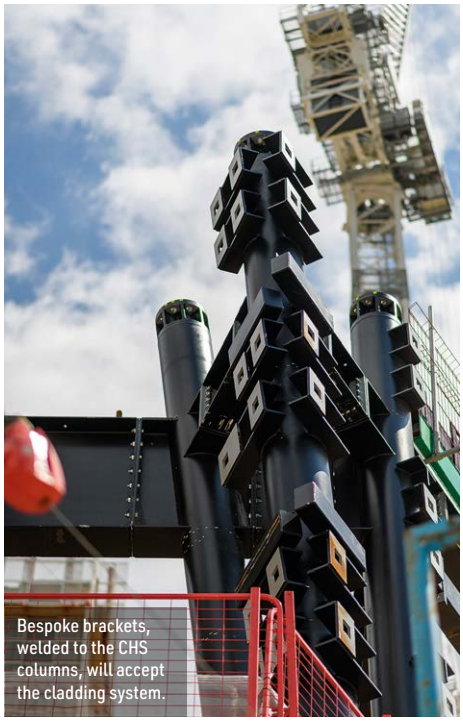
"The Bourne Group are proud to be involved with this world-leading museum project which is part of the large investment in the future of London's culture at the Queen Elizabeth Olympic Park. This is the second Bourne Group V&A project, previously we installed an underground exhibition gallery, courtyard and improved entrance at the V&A, South Kensington."

The V&A East Museum is scheduled to open in 2025. ■

As much of the steelwork will be left exposed, a decorative paint finish has been applied.



V&A East overlooks the former Olympic Park in east London.



Bespoke brackets, welded to the CHS columns, will accept the cladding system.

V&A East's façade

The façade of V&A East stands out – both literally and as an architectural feature. David Brown of the SCI comments on some of the challenges.

The façade at V&A East has circular hollow sections inclined in multiple directions – and an "intricate geometrical design". Intricate generally means complicated, especially where the members intersect. It is not a surprise that the nodes at base level were prefabricated and delivered in complete pieces. The nodes at the bases (which were featured in NSC in May) are fantastic pieces of engineering, demanding really clever surveying in the workshop to ensure that the complicated geometry of the intersecting columns was correctly fabricated. The proof of that is demonstrated in the largely completed façade steelwork, where the whole framework is seen to connect together correctly. The splices are aligned, neatly completed within the profile of the column section and intermediate beams between columns fit snugly. A small angular departure would have caused significant problems on site.

It is interesting to reflect on modern computer aided drafting, compared to previous practice (not so many decades ago) when the geometry of V&A East would have been a real challenge. With manual drafting, the position in space and orientation of all the irregular connections for secondary elements would have caused some significant head-scratching.

Inclined columns always have a horizontal component which must not be forgotten. Horizontal forces need to be carried back to the stability systems generally by steel members acting as ties, or by carefully detailed floor diaphragms – the local transfer of force is important.

The concrete filling to enhance blast resistance is an interesting feature. The usual reason for filling hollow sections with concrete is to enhance their fire resistance. Design guidance is available with respect to fire resistance, but SCI is only aware of relatively recent research on the blast resistance of concrete-filled steel sections. Researchers have modelled concrete-filled steel hollow sections and conducted physical tests under close range blast loading – which must have been interesting! The conclusions were that concrete-filled columns were still able to retain a large proportion of their axial resistance, even after a close blast event. Perhaps design guidance for this form of construction will be developed and published to bring this solution more widely to the attention of designers. ■

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Steel leads Baltic revival

Liverpool's Baltic Triangle is continuing to expand with the construction of a prestigious residential scheme consisting of five steel-framed buildings.

Erection underway on blocks B (left) and C (right).

"Steel was chosen as the preferential structural framing solution for this project due to its flexibility, lower overall weight and its ability to accommodate complex transfer arrangements"

Each block is sat atop a podium.

Since the demise of its once busy port, Liverpool has had to reinvent itself and today it is once again viewed as one of the North West's most important economic centres.

This transformation is due, in no small part, to numerous regeneration schemes that have brought new life to the city. One area that has benefited from redevelopment is the Baltic Triangle, which occupies a pivotal location just south of the city centre and is positioned between a number of Liverpool's other strategic regeneration investments.

Historically, the area was used to handle goods being transported via the docks, as well as being a thriving industrial area. By the 1970s, with much of the port in decline, many of its former warehouses had become derelict, with some of them being demolished and replaced with small-scale industrial units.

The area now accommodates an eclectic mix of indigenous businesses such as car repair workshops, mechanics, welders and tradespeople. These sit alongside the newer creative businesses such as digital media agencies, PR companies, architects, designers and musicians, which have arrived over the last decade.

Major residential regeneration investments are also now emerging due to the area's high-profile location, distinctive rich heritage and historic character.

One of the more high-profile residential schemes is One Baltic Square, which is being developed by Legacie Developments – with its construction business, Legacie Contracts acting as main contractor – on behalf of Nexus Residential.

On completion, the scheme will consist of five steel-framed buildings up to seven-storeys high. Overall, it will provide 296 one and two-bedroom apartments, with each of the blocks set around a landscaped public realm.

EvadX has fabricated, supplied and erected the steelwork for the scheme's first four buildings (approximately 900t), with the fifth (270t) due to start on site during February. Steelwork also forms

FACT FILE
One Baltic Square, Liverpool
Main client: **Nexus Residential**
Architect: **YPG**
Main contractor: **Legacie Contracts**
Structural engineer: **Clancy Consulting**
Steelwork contractor: **EvadX**
Steel tonnage: **1,170t**

a podium that covers the entire site's footprint measuring 80m × 70m. It forms the project's lower ground floor and accommodates a car park, while also supporting each individual block and a landscaped public realm at upper ground level.

The site's topography, whereby it slopes down towards the River Mersey, means the car park lower ground level is a basement at the eastern end of the plot, but accessed at street level at the Grafton Street western end.

Commenting on the choice of steelwork as the framing solution for the entire project, Legacie Contracts Senior Site Manager Peter Dulson says the decision was made because the material offered the most cost-effective solution as well as a quick construction programme.

Speed is of the essence for all construction projects and this scheme is no exception. Since starting on site last year, Legacie Contracts has excavated the lower ground floor, installed mass pad foundations and overseen the steel erection.

Clancy Consulting Structural Engineer Anthony McManus adds: "Steel was chosen as the preferential structural framing solution for this project due to its flexibility, lower overall weight and its ability to accommodate complex transfer arrangements at ground level where the residential building column grid sits over the basement car park.

"The shallow metal deck floors and long span composite beams accommodate services efficiently, while composite edge beams support the masonry façade using soldier plates for support brackets to fix to."

Block A is six-storey building with a resident's terrace positioned at first floor level. Blocks B, C and D are similar buildings with the first two rising to seven-storeys and the latter topping out at five-storeys.

Giving the uppermost apartments some added quality, blocks B, C and D each have private roof terraces positioned on levels six, five and four respectively, formed by a step in the building's design.

The yet to be erected Block E will also have a similar design. This long rectangular five-storey structure will feature a terrace at level four, positioned in the middle of the structure.

Each of the buildings has a similar braced frame design with beams supporting metal decking and concrete topping to form a composite floor solution.

Each block is structurally-independent and only linked via the lower ground level. Stability is derived from strategically-placed cross bracing in the stairs and lift areas, that create braced steel cores.

"In all other areas, the bracing generally has had to be placed to suit car park spaces in the lower ground level, so transfer beams and diaphragm floors are required to transmit both gravity and lateral loadings," explains Mr McManus.

The lower ground car park is set-out with a 12m × 6m column grid pattern, but a smaller 6m × 6m column grid has been used for the upper residential areas. Consequently, a series of transfer beams, up to 1m-deep, are positioned at upper ground floor level to support the different column positions above.

The completion date for the entire One Baltic Square development is early 2023. ■

The completed scheme will transform a large former industrial site in the Baltic Triangle.

Steelwork erection was initially undertaken on Block A.

Wind actions on single storey buildings

David Brown of the SCI comments on some of the issues frequently raised when determining the loading on this common form of construction.

Single storey buildings

Portal frame buildings and other single storey structures are said to account for around 45% of the structural steel used in the UK. Considering the steel tonnage used in a single multi-storey building, there is obviously considerable demand for industrial, retail, storage and distribution buildings. "Single storey" may be an inappropriate description as some storage and distribution structures are equivalent in height to three or four-storey offices. This article covers some of the questions on BS EN 1991-1-4 which arrive at the SCI's Advisory Desk.

First, the pressure

Who would ever want to undertake calculating this by hand? Many companies who manufacture purlins and side rails provide software to assist in the design and selection of appropriate members. This software will always need to calculate the peak velocity pressure q_p and will usually present the information for each 30° segment around the site. At a stroke, the heartache of working through the standard and the UK National Annex has been bypassed.

Some warnings are however necessary. Several programs use "BREVe" to determine the wind pressure, a component which has been around for some time, leading to some compatibility issues with operating systems. Users will generally be presented with a table of intermediate results, inviting the user to modify the assumed values. Although it may be tempting to simply accept the table, users really should ensure they are content with the presented values. The important values to check and adjust if necessary are:

- Site altitude
- Distance from the sea (or significant inland water)
- Distance from edge of town
- If in town, the average obstruction height and spacing (h_{ave} and x respectively, from A.5 of BS EN 1991-1-4)

Since the underlying data has a certain granularity (for example, altitude might be anywhere within the surrounding 2 km) users should expect some odd values if comparing with OS maps. As the database reflects a point in time, subsequent urbanisation may have an impact on the assumed values.

The default values for h_{ave} and x may be 6 m and 20 m respectively. The value of 20 m was suggested in BRE Digest 436, Part 1, from 1999, which gave guidance on BS 6399-2. The 1999 version of the digest is not readily available, having been completely updated to reflect the Eurocode. The value of 6 m may reflect an assumed two-storey shelter height. Local knowledge is essential to determine the correct values. It is assumed that "irreversible urbanisation" will mean that shelter only increases, which seems optimistic in reality.

Peak velocity pressure without software

Manual calculation is of course possible, though for the author, not desirable. Calculations could consider the same 12 segments as software. The SCI recommendation is to consider four 90° quadrants and determine the most onerous values of the various factors in each quadrant. The peak velocity pressure would then be the most onerous of the four. This "by quadrants" method generally gives reasonable results compared with considering twelve segments, and avoids the significant conservatism of taking the most onerous value from anywhere around the site and assuming these most onerous values all apply to wind blowing from one direction.

Whichever approach is followed, the assessment to this stage has only considered the site – the orientation of the building is not yet relevant. In most cases it is not necessary to know the building orientation, unless there is particular benefit in calculating a different pressure for each face. It would be unusual to have different side rails on different faces of the structure (for example). Pressures on individual faces may be important if the building is not symmetric, there is some ground feature affecting one side only or there are openings on one face only. If pressure on an individual face is important, the pressure on a face must be determined considering a range of directions ±45° from the normal to each face as shown in Figure 1, not just the direction perpendicular to each face – the full 360° around the site must be included.

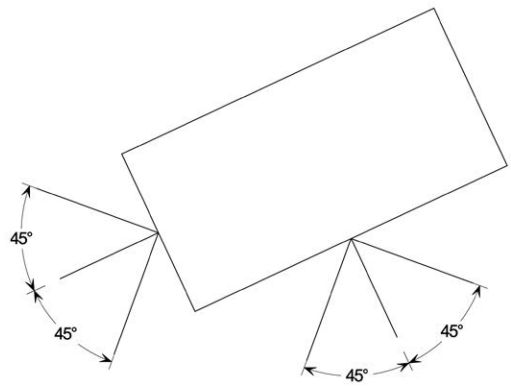

Figure 1: Wind pressure on individual faces

Designers undertaking manual calculations will need to interrogate figures NA.7 (reproduced below) and (if in Town) NA.8. SCI is not aware of any expressions which define the curves in these figures. Some time ago, csv files were available via IStructE, which could, with some thoughtful interpolation, be used to determine a value, but these are no longer available.

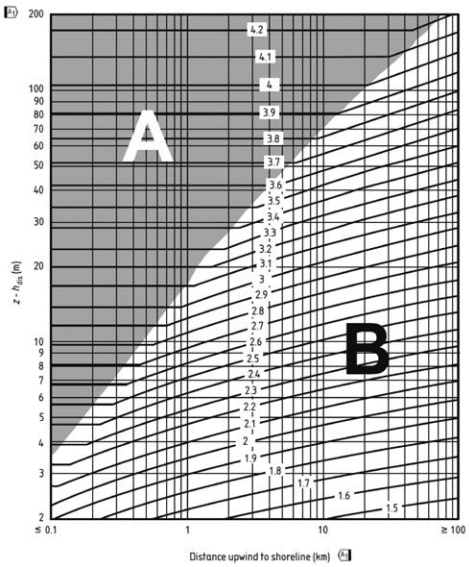

Figure 2; Figure NA.7 (from the UK NA to BS EN 1991-1-4)

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A helpful free tool is available to download from *www.rwdimedia.com/encalculator_program.html* which will enable precise values to be determined.

Internal pressure coefficients

Mature designers will immediately recognise two values, of +0.2 or -0.3. These values appeared in Appendix E of CP3:Chapter V from 1972 and Table 16 of BS 6399-2 from 1997. The same values appear in Note 2 to clause 7.2.9(6) of BS EN 1991-1-4, presented as an option if the designer is unable to, or does not wish to, calculate the precise value based on building geometry and opening ratio.

BRE Digest 436 Part 1 from 1999 offered further guidance that "the positive value C_{pi} = +0.2 is now less likely to be a critical design case. The positive value can only occur when the side walls are impermeable and the front face is permeable". The Digest also advised that "The internal pressure coefficient for completely clad enclosed warehouse-type buildings without opening windows, may be taken as C_{pi} = -0.3."

The reference to opening windows relates to a dominant opening, discussed later. After BRE Digest 436 was published, many designers of "warehouse-type" buildings changed their practice to only consider a coefficient of -0.3, though some considered an additional coefficient of zero as a replacement to the +0.2.

Generally, it is advantageous to calculate the actual internal pressure coefficient, using Figure 7.13 and expression 7.3 from the Eurocode. If it is reasonable to assume that the roof is impermeable and the elevations equally permeable, the calculation is simply based on area.

With a 15 m tall portal frame building, 36 m span and 90 m length (Figure 3), the wind may blow parallel to the ridge, or perpendicular to the ridge.

Wind parallel to the ridge

Area of elevations with suction = 2 × (90 × 15) + (36 × 15) = 3240 m²

Area of all elevations = 3240 + (36 × 15) = 3780 m²

$$\mu = \frac{3240}{3780} = 0.86$$

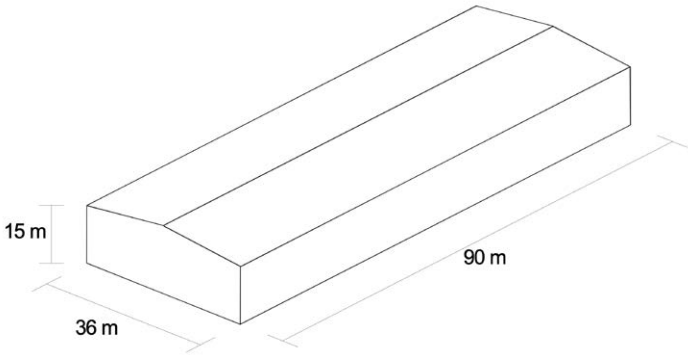

Figure 3: Example building

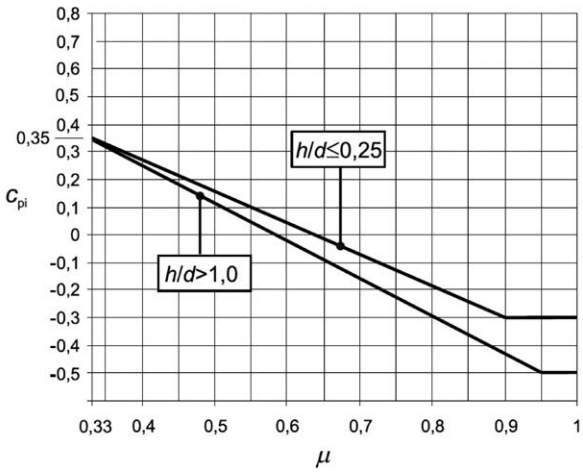

Figure 4: Figure 7.13 from BS EN 1991-1-4

For Figure 7.13 (reproduced as Figure 4), h/d = 15/90 = 0.17

From Figure 7.13, C_{pi} = -0.25

Wind perpendicular to the ridge

Area of elevations with suction = (90 × 15) + 2 × (36 × 15) = 2430 m²
Area of all elevations = 3780 m²

$$\mu = \frac{2430}{3780} = 0.64$$

For Figure 7.13 (reproduced as Figure 4), h/d = 15/36 = 0.42
From Figure 7.13, with interpolation, C_{pi} = -0.02

Particularly for wind blowing perpendicular to the ridge, this is a considerable improvement from the use of C_{pi} = -0.3. Only unusual geometry will result in a positive internal pressure, supporting the advice in the BRE Digest.

Dominant openings

CP3:Chapter V has the guidance that C_{pi} should be taken as the more onerous of +0.2 and -0.3 "when there is only a negligible probability of a dominant opening occurring during a severe storm". It is not clear how this should be assessed. It would be expected that certain structures, such as fire stations or lifeboat buildings might well have open doors in a severe storm. Perhaps a 24-hour distribution warehouse might also need to continue operations. Allowing for a dominant opening will serve to inflate or deflate the building and will probably increase the required member sizes since C_{pi} is up to 90 % of C_{pe} at the location of the opening. In the author's experience from previous decades, tenders might be qualified in small text that "it has been assumed that in the event of a severe storm, all openings will be shut", which was code for "we have not allowed for dominant openings".

The Eurocode does not allow this practice – clause 7.2.9(3) insists that if openings that would be dominant are assumed to be shut, the condition with the door or window open should be considered. Fortunately, the Eurocode also specifies this as an accidental combination of actions, meaning that equation 6.11b from EN 1990 should be used to verify this case. The actions are unfactored in the accidental combination, which may mean that the original member sizes remain satisfactory. An opening does not need to be large to be dominant – advice is given in clause 7.2.9(4) of BS EN 1991-1-4.

Note that zone A (just around the corner from the windward face) has a more onerous coefficient than zone E, the leeward face, as shown in Figure 5. A dominant opening in zone A could be particularly onerous.

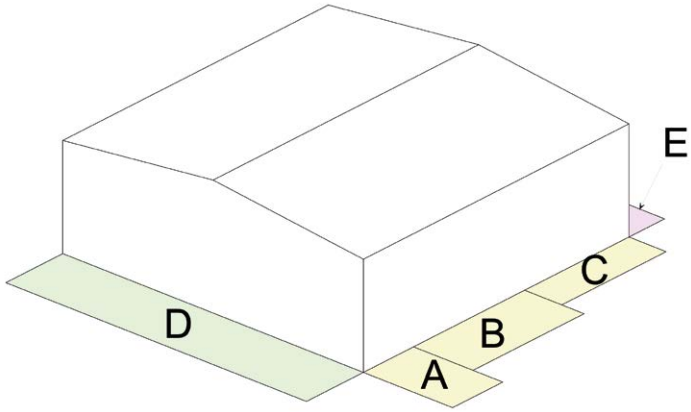

Figure 5: Wall coefficients

Local external pressure coefficients

Where wind flows around a corner, or over the eaves, or over the ridge, increased turbulence leads to higher local suctions. CP3: Chapter V presented coefficients for these zones, but noted in clause 7.2 that "they should not be used for calculating the load on entire structural elements such as roof walls or the structure as a whole". This gave rise to the widespread practice (at that time) of neglecting the local zones for the design of the structure. There is no permission to ignore the local zones in BS 6399-2 or BS EN 1991-1-4.

Further resources

SCI publication P394 contains comprehensive advice on the application of BS EN 1991-1-4 and a worked example. The three parts of both the 1999 and 2015 versions of BRE Digest 436 contain helpful guidance and are recommended reading. ■

New and revised codes and standards

From BSI Updates November and December 2021

BS EN PUBLICATIONS

BS EN 508-1:2021
Roofing and cladding products from metal sheet. Specification for self-supporting products of steel, aluminium or stainless steel sheet. Steel
supersedes BS EN 508-1:2014

BS EN ISO 3834-1:2021
Quality requirements for fusion welding of metallic materials. Criteria for the selection of the appropriate level of quality requirements
supersedes BS EN ISO 3834-1:2005

BS EN ISO 3834-5:2021
Quality requirements for fusion welding of metallic materials. Documents with which it is necessary to conform to claim conformity to the quality requirements of ISO 3834-2, ISO 3834-3 or ISO 3834-4
supersedes BS EN ISO 3834-5:2015

BS EN 15339-2:2021
Thermal spraying. Safety requirements for thermal spraying equipment. Gas control units
supersedes BS EN 15339-2:2007

UPDATED BRITISH STANDARDS

BS EN ISO 13918:2018+A1:2021
Welding. Studs and ceramic ferrules for arc stud welding
Amendment, September 2021;
Corrigendum, August 2018

DESIGNATED STANDARDS

BS EN ISO 21904-1:2020
Health and safety in welding and allied processes. Equipment for capture and separation of welding fume. General requirements

BRITISH STANDARDS REVIEWED AND CONFIRMED

BS EN ISO 9015-2:2016
Destructive tests on welds in metallic materials. Hardness testing. Microhardness testing of welded joints

NEW WORK STARTED

EN WI 00250223
Eurocode 3. Design of steel structures. Towers, masts and chimneys
will supersede None

EN 1993-1-6
Eurocode 3. Design of steel structures. Strength and Stability of Shell Structures
will supersede None

EN 1993-1-7
Eurocode 3. Design of steel structures. Plated structures subject to out of plane loading
will supersede None

EN 1993-4-1
Eurocode 3. Design of steel structures. Silos
will supersede None

EN 1993-4-2
Eurocode 3. Design of steel structures. Tanks
will supersede None

EN 1993-6
Eurocode 3. Design of steel structures. Crane supporting structures
will supersede None

DRAFT BRITISH STANDARDS FOR PUBLIC COMMENT – ADOPTIONS

21/30423661 DC
BS EN ISO 1461 Hot dip galvanized coatings on fabricated iron and steel articles. Specifications and test methods
Comments for the above document were required by 21 November 2021

21/30436636 DC
BS ISO 6707-3 Buildings and civil engineering works. Vocabulary. Sustainability terms
Comments for the above document were required by 13 November 2021

21/30442309 DC
BS EN ISO 7817 Building information modelling. Level of information need. Concepts and principles.
Comments for the above document were required by 20 December, 2021

21/30430940 DC
BS EN ISO 11127-6 Preparation of steel substrates before application of paints and related products. Test methods for non-metallic blast-cleaning abrasives. Determination of water-soluble contaminants by conductivity measurement
Comments for the above document were required by 13 December 2021

21/30435806 DC
BS EN ISO 11127-7 Preparation of steel substrates before application of paints and related products. Test methods for non-metallic blast-cleaning abrasives. Determination of water-soluble chlorides
Comments for the above document are required by 8 January 2022

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AD 475: Buckling of cruciform columns

The SCI's Advisory Desk has been asked about the design of cruciform columns to Eurocode 3. This structural shape is sometimes adopted for architectural reasons. Its behaviour is unusual when the section is made of plates without flanges and has rotational symmetry of four, in the respect that the likely critical buckling mode is torsional, not flexural.

Unusually, the formula for the elastic critical torsional buckling force for an I section is given in BS EN 1993-1-1 and appears in para BB.3.3.1:

$$N_{crT} = \frac{1}{i_s^2}\left(\frac{\pi^2 EI_z a^2}{L_t^2} + \frac{\pi^2 EI_w}{L_t^2} + GI_T\right)$$

In this formula, $i_s^2 = i_y^2 + i_z^2 + a^2 =$ and a is the distance between the axis of rotation and the shear centre of the section. L_t is the length between torsional restraints. The intersection of the rectangular elements that form the cross section is its shear centre and when rotation occurs about this axis, the value of a is zero. As the section is bi-symmetric, the shear centre coincides with the geometric centroid of the cross section.

The absence of flanges at the ends of the plates remote from the shear centre results in a zero value for the warping constant I_w.

Making these simplifications means that the formula for N_{crT} reduces to:

$$N_{crT} = \frac{A}{I_y + I_z} GI_T$$

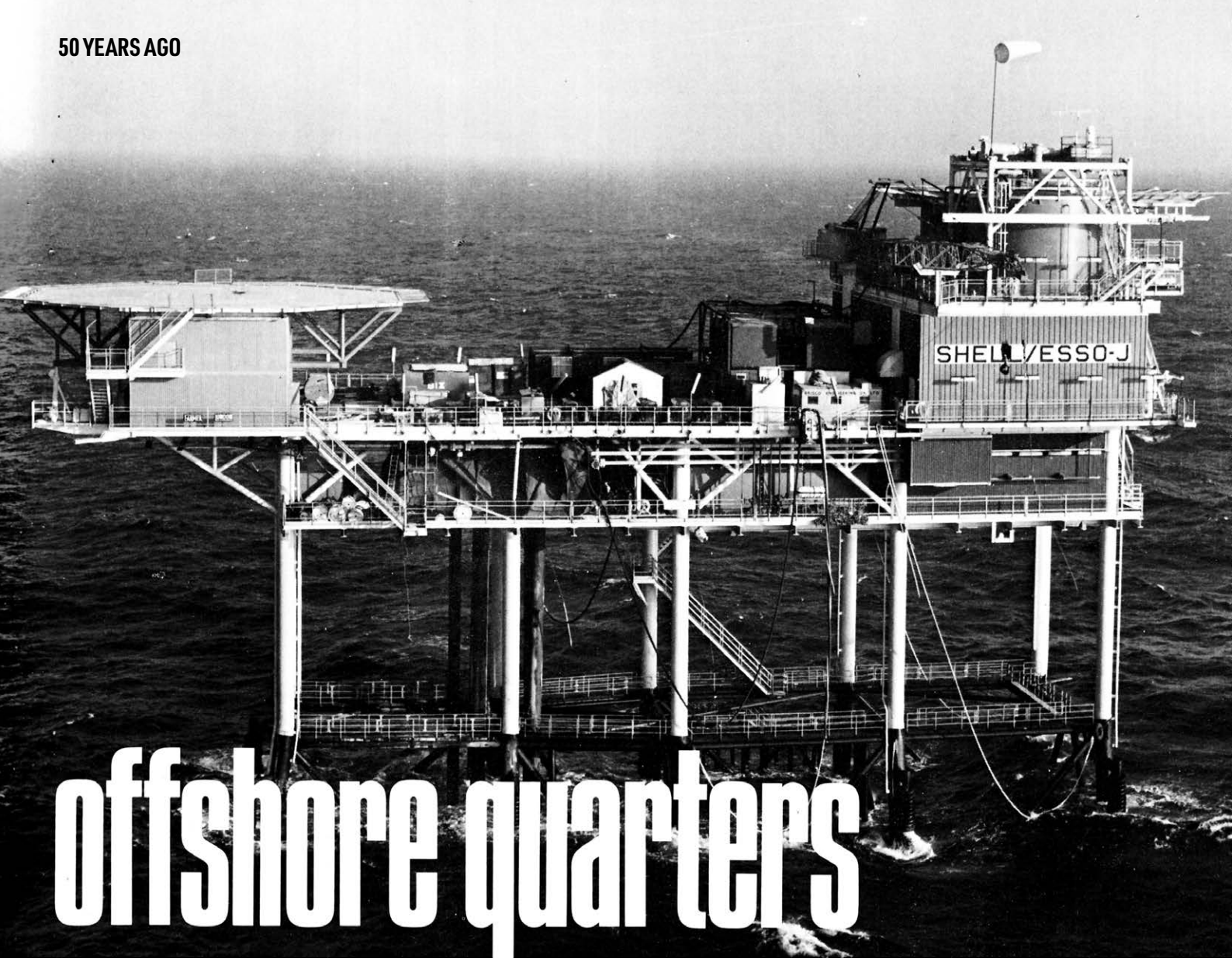
For a cruciform column with end moments, a lateral torsional buckling check can be carried out using the general formula for lateral torsional buckling in BS EN 1993-1-1. The value of M_{cr} can be determined using the same formula as that for a flat plate:

$$M_{cr} = \frac{\pi}{L}\sqrt{EI_z GI_T}$$

This formula is relevant to a uniform moment. Useful references are Design of cruciform sections using BS 5950-1:2000[1], AD391[2] and Timoshenko and Gere[3].

Contact: **Richard Henderson**
Tel: **01344 636555**
Email: **advisory@steel-sci.com**

1. Charles King, *Design of cruciform sections using BS 5950-1:2000*, NSC, April 2006
2. AD391: *Lateral torsional buckling of rectangular plates in accordance with BS EN 1993-1-1*, SCI
3. Timoshenko, SP and Gere, JM, *Theory of elastic stability, 2nd Edition*, Dover Publications Inc, 2009.



offshore quarters

The 'Mammoth' crane of the PLA lifting the structure

Conditions are tough on an oil-drilling rig. The work is arduous and the weather can be foul. Off-duty the crew therefore need comfortable quarters. That these are now being provided can be seen from this new development from Farmer Offshore Ltd which is described by Mr H. Snaith of CONSTRADO

Already internationally known for their work in furnaces, structural steel, and in the oil and petrochemical plant field, S. W. Farmer & Son Ltd, structural and mechanical engineers, of Courthill Road, Lewisham, London SE13, recently formed a new company - Farmer Offshore Ltd - to exploit the new, expanding market of producing equipment for offshore oil-rig platforms.

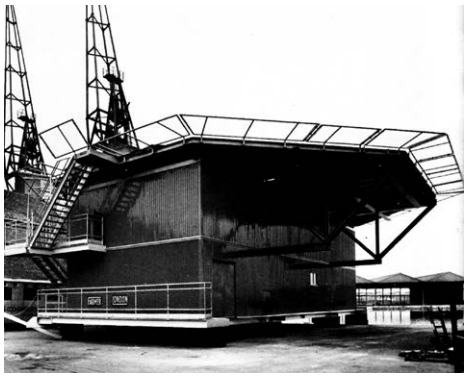
Offshore building work is carried out at the Farmer assembly centre at London Docks where they have extensive storage facilities coupled with waterside access with a quayside water depth of 9m (adequate for oceangoing barges). Each building, whether a generator building, service building, or crew quarters, is designed to integrate into the individual rig services system and connects direct to plumbing, piping, power, etc, with minimal external routing. All buildings are supplied pre-wired and complete with all internal fittings and equipment.

General construction

The main structural work is carried out by Farmer staff, but fitting out is carried out by sub-contractors experienced in oil-rig work. Equipment and accommodation buildings incorporate steel skid bases and all structures are supplied with single-point crane lift slings or frames. Walls and roofs are of sandwich construction steel or aluminium cladding with a U-value of 0.1. Doors and flashings are system built to high standards. Structures are heated and ventilated by independent automatic ventilating louvre systems so that they may integrate into the existing platform air-pressure system. Dehumidifiers, gas detectors, and fire extinguishers are also incorporated into the design.

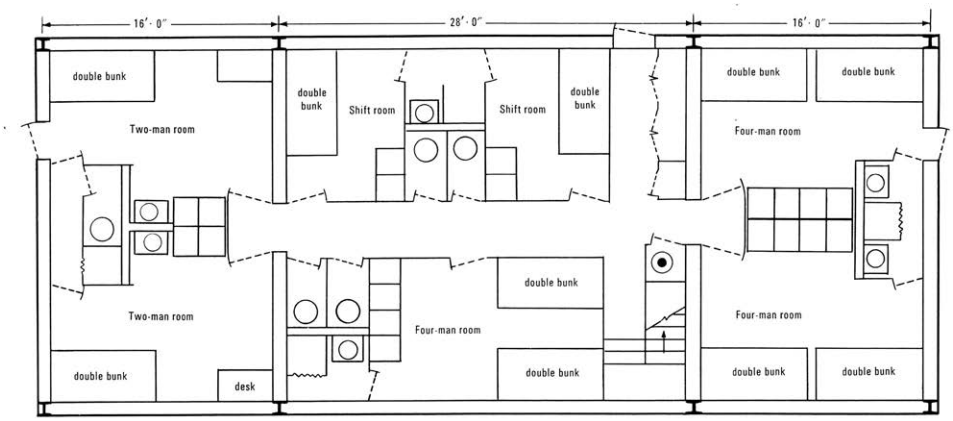
Turbo-generators, insulated exhaust systems, stand-by diesel generators are installed and tested by Farmer. The generator buildings contain motor control panels and station batteries. Switchgear buildings have relay panels, navigation aids, radio rooms, telemetry measuring panels and rig-savers, all pre-wired. Auxiliary buildings are supplied to provide storage, workshop and general service areas, or to house battery racks or emergency power generation plant. The framework is, of course, steel. It is totally welded, which is 60 per cent weld tested.

FROM
Building with Steel
November 1971

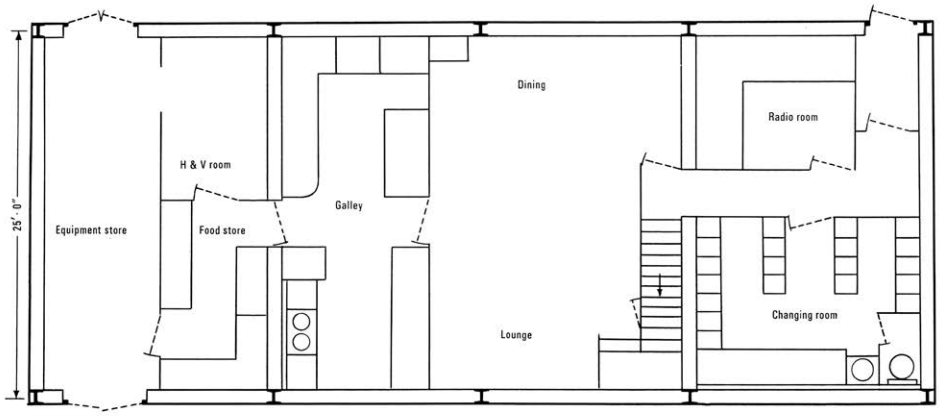


Quarters on the dockside ready for lifting

The quarters about to be positioned on the oil-rig



FIRST FLOOR PLAN



GROUND FLOOR PLAN

Living-quarters
It will be appreciated how extreme are the climatic and meteorological conditions experienced in the North Sea. Living-quarters must be properly insulated and completely sea-proof, and capable of standing up to high wind pressures and varying temperatures. Particular attention must be paid to sealing of doors and openings and the fastening of claddings.

Living-quarters of varying weights up to 300 tonnes with provision for living accommodation for 16 to 40 men, according to rig platform requirements, are supplied in single or multi-storey designs, the roofs of which form helidecks.

Typical of Farmer construction and design was the recent completion of an order for a helicopter-decked crew accommodation building. The order for this was placed in the middle of December 1970, and dispatch date programmed was for the end of May 1971. This was a very tight schedule indeed.

The structure provides living accommodation for 20 men and enables them to live in a safe atmosphere away from the hazards of the production platform. The building has its own emergency lighting system as well as gas and fire detectors, and thus provides an intrinsically safe environment.

The building is air-conditioned and fitted with a kitchen, lounge and dining-room, utility-rooms, equipment stores, etc. The upper storey (the building is of two-storey construction) has bedrooms fitted with individual shower and toilet units and has sound-proofed shift-rooms.

The total structure weighed 160 tons when shipped by sea barge for direct installation on to the offshore platform and a complete service of offshore commissioning and testing was supplied. The structure, which is virtually a miniature hotel and airport, was loaded out on to an ocean-going barge by the 'Mammoth' crane of the PLA, towed out to the North Sea on May 28, and landed in position on May 30.

Specification
The frame was constructed of steel. It was a totally welded fabrication, 60 per cent weld tested, and prefabricated in large sections at Farmer workshops and assembled at the dockside.

Cladding was purpose made from 1in Styroform, backed internally with galvanized sheet and faced with a profiled marine aluminium to specification colour, in 24g. Cladding was fastened by stainless-steel rivets and cladding laps were a minimum of 6in. Main fixing bolts at 2ft 6in centres were connected to the structural rails.

Internal partitions were in 2in and 3in thick Styroform backed both sides with Formica in grey ground colour, but yellow in the bedrooms.

Stainless steel was used extensively. The complete galley was fitted in stainless steel incorporating cabinets, worktops, deep fry, and cooker.

All stairways and walkways were galvanized after manufacture with non-slip open-type grating and treads. Navigational light supports, walkways light supports, and safety capsule supports were all built into the walkway steelwork.

Dimensions
Height of complete structure was 22ft. The living quarters on plan were 25ft wide x 60ft long. The helideck area was 65ft overall the helideck, and 72ft overall the safety-nets.

Accommodation
These comprised one equipment-store, one food-store, one heat- and ventilating-room, a galley, radio-room, one changing-room, one dining-room/lounge, two 2-man rooms, three 4-man rooms, two shift-rooms.

Services and fittings
The comfort of the crew is well cared for. Services and equipment include a washing-machine with matching dryer, refrigerator, range-oven, deep fry, Bain Marie, griller, deep freeze, ten double bunks, twenty wardrobes and twenty lockers.

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, Marketing and Membership Administrator,
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		●	Up to £3,000,000
Adstone Construction Ltd	01905 794561			●	●	●	●							●		✔	2	✔	●	Up to £3,000,000
AJ Engineering & Construction Services Ltd	01309 671919			●	●		●		●	●	●			●	●	✔	4		●	Up to £3,000,000
Angle Ring Company Ltd	0121 557 7241												●			✔	4			Up to £1,400,000*
Arminhall Engineering Ltd	01799 524510	●			●	●		●		●	●			●	●	✔	2			Up to £800,000
Arromax Structures Ltd	01623 747466	●		●	●	●	●	●	●	●	●				●		2			Up to £800,000
ASME Engineering Ltd	020 8966 7150			●	●	●		●		●	●			●	●	✔	4		●	Up to £4,000,000
Atlasco Constructional Engineers Ltd	01782 564711			●	●	●	●			●	●			●	●	✔	2			Up to £1,400,000
B D Structures Ltd	01942 817770			●	●	●	●				●	●		●	●	✔	2	✔	●	Up to £1,400,000
Ballykine Structural Engineers Ltd	028 9756 2560			●	●	●	●	●				●			●	✔	4		●	Up to £1,400,000
Barnshaw Section Benders Ltd	0121 557 8261												●			✔	4			Up to £1,400,000
BHC Ltd	01555 840006	●	●	●	●	●	●	●		●	●	●		●	●	✔	4	✔	●	Above £6,000,000
Billington Structures Ltd	01226 340666		●	●	●	●	●	●	●	●	●	●	●	●	●	✔	4	✔	●	Above £6,000,000
Border Steelwork Structures Ltd	01228 548744			●	●	●	●			●	●				●		4			Up to £3,000,000
Bourne Group Ltd	01202 746666		●	●	●	●	●	●	●	●	●	●	●	●	●	✔	4	✔	●	Above £6,000,000
Briton Fabricators Ltd	0115 963 2901	●		●	●	●	●	●	●	●	●		●	●	●	✔	4		●	Up to £6,000,000
Cairnhill Structures Ltd	01236 449393	●			●	●	●	●	●						●	✔	4		●	Up to £6,000,000
Caunton Engineering Ltd	01773 531111	●	●	●	●	●	●	●		●	●	●		●	●	✔	4	✔	●	Above £6,000,000
Cementation Fabrications	0300 105 0135	●			●		●	●	●	●	●		●	●	●	✔	3		●	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 £40,000
D Hughes Welding & Fabrication Ltd	01248 421104				●	●	●	●	●	●	●		●	●	●	✔	4			Up to £400,000
Duggan Steel	00 353 29 70072	●	●	●	●	●	●	●	●		●				●	✔	4			Up to £6,000,000
ECS Engineering Services Ltd	01773 860001	●		●	●	●	●	●	●	●	●			●	●	✔	4		●	Up to £3,000,000
Elland Steel Structures Ltd	01422 380262		●	●	●	●	●	●	●	●	●	●		●	●	✔	4	✔	●	Up to £6,000,000
EvadX Ltd	01745 336413		●	●	●	●	●	●		●	●	●			●	✔	3		●	Up to £4,000,000
Four Bay Structures Ltd	01603 758141			●	●	●	●	●		●	●			●	●		2			Up to £1,400,000
Four-Tees Engineers Ltd	01489 885899	●			●		●	●	●	●	●		●	●	●	✔	3		●	Up to £2,000,000
Fox Bros Engineering Ltd	00 353 53 942 1677			●	●	●	●	●		●	●				●		2			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				●	●	●	●		●				●	●	✔	2			Up to £1,400,000
G.R. Carr (Essex) Ltd	01286 535501	●		●	●			●			●			●	●	✔	4			Up to £800,000
H Young Structures Ltd	01953 601881			●	●	●	●	●			●			●	●	✔	4	✔	●	Up to £3,000,000
Had Fab Ltd	01875 611711				●				●	●	●				●	✔	4			Up to £3,000,000
Harry Peers Steelwork Ltd	01204 528393	●		●	●	●	●	●	●		●					✔	4			Above £6,000,000
Hescott Engineering Company Ltd	01324 556610			●	●	●	●			●				●	●	✔	2			Up to £3,000,000
Hillcrest Structural Steel Ltd	023 8064 1373			●	●	●	●	●		●	●			●	●	✔	3		●	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	✔	●	Above £6,000,000
Kloeckner Metals UK Westok	0113 205 5270												●			✔	4		●	Up to £6,000,000
LA Metalworks Ltd	01707 256290				●	●				●	●			●	●	✔	2			Up to £2,000,000
Leach Structural Steelwork Ltd	01995 642000			●	●	●	●	●			●					✔	2		●	Up to £6,000,000
Legge Steel (Fabrications) Ltd	01592 205320			●	●		●		●	●	●			●	●		3			Up to £800,000
Littleton Steel Ltd	01275 333431				●					●	●			●	●	✔	3			Up to £1,400,000
M Hasson & Sons Ltd	028 2957 1281			●	●	●	●	●	●	●	●			●	●	✔	4		●	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		●	Up to £2,000,000
North Lincs Structures	01724 855512			●	●					●	●				●		2			Up to £800,000
Nusteel Structures Ltd	01303 268112						●	●	●	●				●		✔	4		●	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		●	Up to £6,000,000
S H Structures Ltd	01977 681931	●		●	●	●	●	●	●	●	●	●	●		●	✔	4	✔	●	Up to £3,000,000
SDM Fabrication Ltd	01354 660895	●	●	●	●	●	●			●	●			●	●	✔	4			Up to £2,000,000
Severfield plc	01845 577896	●	●	●	●	●	●	●	●	●	●	●	●	●	●	✔	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		●	Above £6,000,000
Traditional Structures Ltd	01922 414172			●	●	●	●	●	●		●			●	●	✔	3	✔	●	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			Up to £400,000
Walter Watson Ltd	028 4377 8711			●	●	●	●	●				●				✔	4			Above £6,000,000
Westbury Park Engineering Ltd	01373 825500	●		●	●	●	●	●	●	●	●				●	✔	4		●	Up to £800,000
William Hare Ltd	0161 609 0000	●	●	●	●	●	●	●	●	●	●	●	●	●	●	✔	4	✔	●	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)

RQSC
The Register of Qualified Steelwork Contractors Scheme

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.

BCSA

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			✓	●	Up to £3,000,000
AJ Engineering & Construction Services Ltd	01309 671919	●			●	●	●	●	●			●	✓	4				●	Up to £3,000,000
Billington Structures Ltd	01226 340666	●		●	●	●	●					●	✓	4	✓	✓	✓	●	Above £6,000,000
Bourne Group Ltd	01202 746666	●			●	●				●		●	✓	4	✓		✓	●	Above £6,000,000
Briton Fabricators Ltd	0115 963 2901	●	●	●	●	●	●	●	●	●	●	●	✓	4			✓	●	Up to £6,000,000
Cairnhill Structures Ltd	01236 449393	●	●	●	●	●	●	●		●	●	●	✓	4			✓	●	Up to £6,000,000
Cementation Fabrications	0300 105 0135	●		●	●	●	●					●	✓	3			✓	●	Up to £6,000,000
D Hughes Welding & Fabrication Ltd	01248 421104	●		●		●			●	●	●	●	✓	4			✓		Up to £400,000
Donyal Engineering Ltd	01207 270909	●		●						●	●	●	✓	3		✓	✓	●	Up to £1,400,000
ECS Engineering Services Ltd	01773 860001	●			●	●	●		●			●	✓	4				●	Up to £3,000,000
Four-Tees Engineers Ltd	01489 885899	●	●	●	●	●	●		●	●	●	●	✓	3			✓	●	Up to £2,000,000
Kiernan Structural Steel Ltd	00 353 43 334 1445	●			●	●				●	●	●	✓	4	✓		✓	●	Above £6,000,000
M Hasson & Sons Ltd	028 2957 1281	●	●	●	●	●	●	●	●	●	●	●	✓	4			✓	●	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		✓	✓	●	Up to £6,000,000
REIDsteel	01202 483333	●				●	●	●				●	✓	4				●	Up to £6,000,000
S H Structures Ltd	01977 681931	●	●	●	●	●	●	●	●	●	●	●	✓	4	✓		✓	●	Up to £3,000,000
Severfield (UK) Ltd	01204 699999	●	●	●	●	●	●	●	●	●	●	●	✓	4	✓	✓	✓	●	Above £6,000,000
Shaun Hodgson Engineering Ltd	01553 766499											●	✓	3					Up to £800,000
Taziker Industrial Ltd	01204 468080	●		●	●	●	●	●	●	●	●	●	✓	3		✓	✓	●	Above £6,000,000
Underhill Engineering Ltd	01752 752483	●	●	●	●	●				●	●	●	✓	4	✓		✓	●	Up to £3,000,000
William Hare Ltd	0161 609 0000	●	●	●	●	●	●	●	●	●		●	✓	4	✓	✓	✓	●	Above £6,000,000
Non-BCSA member																			
Allerton Steel Ltd	01609 774471	●		●	●	●	●	●			●	●	✓	4	✓		✓	●	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		✓	✓	●	Above £6,000,000
CTS Bridges Ltd	01484 606416	●	●	●	●	●	●	●	●		●	●	✓	4			✓	●	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
IHC Engineering (UK) Ltd	01773 861734											●	✓	3			✓		Up to £200,000
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		✓	✓	●	Up to £3,000,000
Lundy Projects Ltd	0161 476 2996	●		●	●	●	●			●	●	●		4			✓		Up to £4,000,000
North View Engineering Solutions Ltd	01325 464558											●							Up to £800,000
Total Steelwork & Fabrication Ltd	01925 234320	●		●		●				●	●	●	✓	3			✓		Up to £3,000,000
Victor Buyck Steel Construction	00 32 9 376 2211	●	●	●	●	●	●	●	●	●	●	●	✓	4		✓	✓	●	Above £6,000,000

BCSA

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 Ltd	0113 242 7380

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
● = Gold ● = Silver
● = Bronze ● = 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			
Fabsec Ltd	01937 840641		N/A				
Farrat Isolevel	0161 924 1600	✓	N/A				
FLI Structures	01452 722200	✓	M	4	20	●	
Hadley Industries Plc	0121 555 1342	✓	M	4		●	
Hi-Span Ltd	01953 603081	✓	M	4		●	
Jamestown Manufacturing Ltd	**00 353 45 434288**	✓	**M**	4	20		**Gold**
Kingspan Structural Products	01944 712000	✓	M	4		●	
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		●	**Gold**

Computer software

Company name	Tel	QM	CA	FPC	NHSS	SCM	SfL
Autodesk Ltd	01252456600		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			●	
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			●	
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		●	
Duggan Profiles & Steel Service Centre Ltd	00 353 567722485	✓	M	4			
Kloeckner Metals UK	0113 254 0711	✓	D/I	4	3B	●	
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		

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				