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NSC

Eight bridges for Aberdeen bypass

April 2017
Vol 25 No 4

Steel tops Coal Drops

Steel solution at Old Street

New home for nuclear police

Regeneration checks in at Redhill

Cover Image
Coal Drops Yard, London
Main client: Argent
Architect: Heatherwick Studio
Main contractor: BAM Design
Structural engineer: Arup
Steelwork contractor: Severfield
Steel tonnage: 1,350t

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These and other steelwork articles can be downloaded from the New Steel Construction Website at *www.newsteelconstruction.com*

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Important Safety Information

Voluntary safety-related measure for angle grinders – affects:

- **Series GWS 20 and GWS 22** from the production period June through to August 2016

- **Effective immediately, products may no longer be used or provided to others.**

You can find out whether your product is affected

- **online at: www.anglegrindercare.com or**
- **using the free hotline: 00800 83 64 67 04.**

Naturally, affected products will be repaired or exchanged **free of charge.**

Robert Bosch Ltd
Broadwater Park, Denham, Uxbridge, Middlesex, UB9 5HJ

Sustainability still topping agendas

Nick Barrett - Editor

Fears that sustainability would be demoted from corporate driver to the back seat during the last recession and the credit crisis that preceded it appear to have been unrealised.

In a recent survey from Tata Steel into sustainability attitudes and practices in the construction industry (see News) over 80% of respondents confirmed that their companies are either investing, or planning to invest, in sustainability strategies. The survey asked a wide range of people and companies along the construction supply chain why they considered sustainability to be important, and what barriers they saw to improved sustainability performance.

The report establishes that there is a positive approach to sustainability across the construction industry, and this is also evident in the steel construction sector. It is widely appreciated among clients and designers that steel enjoys a greater ability to be recycled or reused than any other construction material, a major sustainability benefit.

One key theme to emerge from the survey is responsible sourcing, which the supply chain as well as clients are increasingly realising the importance of. The UK steel construction sector is leading the way here with several major suppliers including Tata Steel along with British Steel and ArcelorMittal investing in BES 6001 responsible sourcing certification to demonstrate that their steel construction products meet the responsible sourcing standard.

The report also highlights areas of opportunity for businesses within the construction industry to grow and improve their sustainability performance, by placing more emphasis on recyclability, rather than recycled content for example, and focusing on the environmental impact of the whole life cycle of buildings.

One of the best ways of ensuring that sustainability opportunities are maximised from the start of a project all the way through to the end of a building or other structure's useful working life is of course to select a steel solution. This is evident throughout the pages of this month's issue.

In News we have stories about steel extending the life of, or giving new life to, buildings that have outlasted or outgrown their original purpose; one concerns a steel frame erected inside a historic chapel to give it a new lease of life as a six-storey apartment block, and another steel frame within a retained façade that is helping to rejuvenate Guilford's town centre with a stylish shopping and dining quarter.

At Kings Cross a dramatic new steel-framed roof is providing two restored Victorian structures with a new crowning glory as well as a new column-free upper level for a world-class retail destination.

Steel is good for sustainability, there is no doubt. As the Tata Steel report demonstrates, sustainability has been embraced by the construction industry, acknowledged as too important to be regarded as just a fad to be financed out of profits when times are good. But as many sustainability benefits can be harvested at no extra cost when steel solutions are selected, sustainability will be good for steel.

82% of construction industry investing in sustainability strategies

A new report from Tata Steel has revealed the importance of sustainability within the construction industry.

The report, entitled '*Sourcing responsibly: A market insight into sustainability attitudes and practices*', reveals key findings from a survey commissioned in March 2016. Over 80% of those who responded to the survey confirmed that their companies are investing, or planning to invest, in a sustainability strategy.

The survey, aimed to gain a greater understanding of current sustainability attitudes and practices across the construction industry, highlights why sustainability is critical and what makes it so important to companies.

Respondents were supply chain leaders, and included architects, consultants, developers, engineers, planners and installers.

Barry Rust, Energy & Sustainability Manager at Tata Steel said: "Sustainability is becoming a critical issue in the construction industry, as shown by the results detailed in our report. Responsible sourcing emerged as a particularly important theme, with the industry clearly prioritising a need to understand the provenance and impact of the materials used in construction.

As a manufacturer of construction products, we are pleased to see such a positive response to responsible sourcing and plan to use the findings from the report to encourage greater adoption of sustainable materials in the construction industry."

To find out more, download the full report at *www.tatasteelconstruction.com/responsiblesourcing*

Historic chapel given new lease of life

Built in the 1830s but derelict for a number of years, the Grade II listed Welsh Baptist Chapel in Upper Brook Street, Manchester is being converted into a residential scheme with the addition of a new steel interior.

A structurally independent steel composite frame has been erected inside the chapel to form a new six-storey apartment block.

The current work will also help remove the building from Historic England's At Risk register, while restoration work will repair and revive the existing fabric. This includes retention and repair of the distinctive rose window, corbels and vaulted springers along with the reconstruction of the Chapel roof.

The scheme will provide high quality, private residential apartments within the Chapel and the adjacent Sunday school building. It will also incorporate a contemporary new build element providing facilities including a fitness room, cinema room and residents' lounge.

Working on behalf of main contractor H.H. Smith, EvadX has fabricated, supplied and erected the project's structural steelwork.

Ground broken for Oxford speculative office scheme

Developer MEPC and contractor Buckingham Group have commenced construction work of the speculative Park Drive East development at Milton Park in Oxfordshire.

Park Drive East will comprise three separate steel-framed buildings (141, 142 and 143 Park Drive), totaling 10,200m^2 of floorspace, including a 3,900m^2 Grade-A office building, as well as two hi-tech laboratory facilities.

The Grade A office building is expected to complete by the end of the year, which will quickly accommodate the ongoing demand for high-quality office and laboratory space in Oxfordshire. The two remaining buildings are expected to complete in spring 2018.

The development is situated on a 7.6-acre site located towards the eastern end of the leading science and business park. It also falls within the Science Value UK Enterprise Zone, which offers businesses taking space in the new scheme business rates discounts of up to £275,000.

All three buildings have been designed and specified with a high level of flexibility in mind, which is said to appeal to science and technology companies embarking on research and development activities.

CEO at MEPC James Dipple said: "The development will be the largest ever speculative build of its kind at Milton Park and in Oxfordshire, with the acute lack of commercial space in the area, coupled with our exceptionally low void levels at Milton Park, we are confident that it will be well received.

"The accommodation will provide the opportunity for new businesses to join the Milton Park community, help satisfy requirements from within our existing customer base and maintain Milton Park's position as the premier business location and destination of choice for science and technology businesses within the region. We look forward to announcing new lettings at Park Drive East in the near future."

Steel link bridge for Heathrow Airport hotel

Weighing 100t and measuring 170m-long, a new Heathrow Passenger Air Bridge has been successfully installed by Apex Steel Structures.

The steel bridge links a new Premier Inn hotel to the existing bridge network and on to Heathrow Terminal 4.

The entire bridge structure was fabricated in 16 individual truss sections, of varying length, but all measuring 3.1m-wide and 2.95m-high.

The sections were fabricated from 120mm × 120mm box sections, with CHS and RHS cross bracing members. A series of 6m-high, 407mm-diameter CHS columns support the bridge.

Prior to being delivered to site, all of the bridge truss sections were transported to a holding depot where the cladding and flooring were installed and the steelwork painted.

"The installation of the trusses required a lot of planning and close liason with Heathrow Airport to deal with the various crane configurations we needed. The largest was a 220t-capacity mobile unit, needed to lift in a 25m long section spanning one of the Airport's main roads," said Apex Steel Structures Director Dean Jarvis.

Prestigious West End mixed-use development completed

Providing 4,500m² of office accommodation and 1,400m² of retail space, the eight-storey 11-12 Hanover Square project in London's West End has been completed.

Working on behalf of McLaren Construction, BHC erected 950t of structural steelwork for the prestigious job that has façades along Oxford Street as well as Hanover Square (see *NSC Feb 2016)*.

The building's basement, ground and first floor levels are split in half, with the area nearest Oxford Street dedicated to retail, with the other half of these floors, facing Hanover Square, occupied by a plant room (basement) and a ground floor entrance lobby for the offices.

From second floor up to seventh floor level, the building is solely commercial office space with the sixth floor benefiting from having a roof garden overlooking Oxford Street offering breakout space for tenants.

McLaren began work on the site during November 2014 with the demolition of the existing buildings. The basement was then deepened and a retaining wall installed along with piled foundations.

The new building has been constructed with a structural steel frame and composite concrete floors. Steelwork predominantly begins at ground floor,

supported by the retaining wall and on concrete piers that extend upwards from the basement slab.

Festive retail boost for Highlands tourist resort

Developers plan to fast track construction work on a new £10M retail park in Aviemore to ensure the first tenants, supermarket chain Aldi and Home Bargains, have their new stores up and running for the Christmas season.

Aldi and Home Bargains have taken two of three steel-framed retail units to be constructed on the Aviemore Retail Park site, which will bring over 100 long-term retail jobs to the town.

Bryan Wilson, Development Director with London & Scottish Investments (L&SI) who are developing the former Tesco site said: "We always aim to ensure our tenants can open their doors as quickly as possible.

"But obviously, Christmas is a key trading period for any retailer and their customers, so we are pulling out all the stops to ensure Aviemore Retail Park is open for business in time for the festive rush.

"We will fast track work on the units themselves, so we can give our tenants time to fit out their premises, while we finish off some of the external parts of the development like the 333 parking spaces and the landscaping."

L&SI are currently marketing the third large retail unit on the site throughout the UK on the strength of Aviemore's prime tourism location in the Cairngorms National Park, and the fact that during the peak winter sports season it can attract thousands of visitors a day.

Mr Wilson added: "The combination of Aviemore's tourist trade, and the opportunity to be located beside Aldi and Home Bargains, with all the footfall they generate, makes our remaining unit a very marketable proposition".

NEWS IN BRIEF

Billington Holdings has reported strong profit and revenue growth in its full year results to 31 December 2016. Revenue increased from £56.7M in December 2015 to £63.3M, an increase of 11.6%. Profit before tax was up from £3.1M in the previous year to £3.8M.

The **University of Glasgow** has been given the green light by the City Council for a £1bn expansion to be built on the site of a former hospital. The expansion project will see a new business school, learning hub and research facility built over the next decade.

The Mayor of London, Sadiq Khan, has approved **Chelsea Football Club**'s plans for a state-of-the-art £500M stadium on the site of their existing Stamford Bridge ground. Plans for the new stadium will see Chelsea's match-day capacity increase from 41,600 to 60,000 and will include the construction of an elevated walkway over the nearby District Line, linking the stadium to Fulham Broadway station.

Essex County councillors have backed plans to create a new 1,200-place secondary school as part of the development of the county's first ever all-through school. The new school at Beaulieu in Chelmsford would provide an initial 900 secondary school places from September 2019, growing to 1,200 in future years.

A new **Liverpool business district** development, providing up to 37,000m² of Grade A office space over three buildings, has been given the go-ahead. Liverpool City Council has appointed Kier Construction and CTP to begin work on the site, which was formerly occupied by the Exchange Railway Station.

Structural Metal Decks has asked us to point out that since achieving the £1 million turnover figure in the late 1980's that was mentioned in last month's issue of *NSC* the company has grown to a turnover of £20 million.

AROUND THE PRESS

New Civil Engineer
April 2017
Steadying influence
[Kolkata skyscraper bridge] – The basis of the bridge's design is two longitudinal trusses, enhanced with an arch structure and stiffened with a diagonal grid system spanning from one tower to the other. The decks are then supported on transverse steel trusses. Together, these take all of the dead and live loads back to the bearings.

Construction Enquirer
21 March 2017
£1.3bn deal to spark Swansea Bay construction boom
The Steel Science Centre project, based in Neath Port Talbot, will provide a Centre focusing on providing commercial R&D to address the current and future challenges of sustaining steel-making capacity in the region and the UK.

Construction Enquirer
21 March 2017
Steelwork contractor Billington gears up for expansion
Shafton Steel Services provide steel profiling and processing services with new capacity expected to come on line in the summer. [Billington CEO Mark Smith] added that Billington intended to further increase its 360 strong workforce with the planned employment of additional labour at the Shafton site and the expansion of the technical and professional teams at the Bristol office.

Construction Manager
February 2017
Grand Central
[Tottenham Court Road Crossrail station] – Striking twisted glass-and-steel canopy entrances form part of an area of urban realm, designed to create a new pedestrian connection to Covent Garden, where the Underground station is close to capacity and unable to expand due to its Grade II-listed status.

British Steel welcomes its next generation of steelworkers

The latest generation of Teesside steelworkers have started their careers in a partnership between British Steel and Middlesbrough College.

The 12 manufacturing and technical apprentices, who are employed by the college, are being sponsored by British Steel and it is hoped they will join the steelmaker when they have completed their training.

The apprentices' training takes place at the college's STEM (Science, Technology, Engineering and Maths) Centre and British Steel's Teesside Beam Mill.

They are learning how to operate a comprehensive range of mill equipment associated with the rolling and finishing of steel sections used in the construction industry. This includes techniques to ensure that products are rolled within specification ready for release to customers.

British Steel's Managing Director for Construction Richard Farnsworth said: "We're delighted to welcome 12 new people to British Steel. This is a fantastic opportunity for them and they are promised the very best training from ourselves and the college.

"The steel industry is in Teesside's blood and this move not only demonstrates our commitment to apprenticeships and training, but to the region as a whole.

"We employ more than 430 people at our Teesside Beam Mill and the neighbouring Service Centre at Lackenby, and they are building a bright future for themselves, our business and our customers."

The new starters have been enrolled on Middlesbrough College's apprentice programme and they will receive six weeks of intensive training at the college before training and working at British Steel.

Middlesbrough College's STEM Director Ian Smith said: "We are delighted to be working in partnership with British Steel to deliver an innovative apprenticeship programme that ensures manufacturing skills are developed in young people.

"The Stem Centre has been specifically designed to provide industrial standard training as part of the solution to industry skills gaps and we are thrilled to support British Steel's ambitions during an exciting stage of their development."

Steel frame up for designer retail and leisure centre

Working on behalf of main contractor ISG, Gorge Fabrications has completed the steel frame for the Tunsgate Quarter project in Guildford, Surrey.

The majority of the existing Tunsgate shopping centre has been demolished, with the exception of the main façades and basement.

Approximately 280t of structural steelwork has been installed to form three new retail and restaurant levels within the retained structure.

Developer Queensberry's vision is to create a thriving and stylish 7,500m^2 shopping and dining quarter in the heart of Guildford's historic town centre.

Topping the main retail zone will be a new glazed roof designed to allow natural light into the centre of the mall. Also at rooftop level, the scheme includes 12 apartments.

The Tunsgate Quarter is scheduled to open in October.

Funding secured for Barnsley town centre revamp

The face of Barnsley town centre is set to be radically changed thanks to a new multi-million pound leisure complex, which will be fully funded by the local council.

Having already committed £50M to fund the first phase of the scheme, Barnsley Council has now committed to fund the remainder of the scheme, bringing its total investment to deliver this transformational development to £120M.

Leisure giants Cineworld and Superbowl have both been confirmed as anchor tenants with the scheme expected to be completed by May 2020. It is expected that most of the new buildings will be steel-framed.

Known as The Glass Works, the 3.8 hectare development will provide a 54,500m^2 family-led offering, comprising a range of new shops, restaurants, multiplex cinema and bowling, alongside a brand-new home for the town's historic markets, a central library and a public realm.

Barnsley Council Leader Councillor Sir Stephen Houghton said: "We are delighted to announce that we will be funding the delivery of The Glass Works, the new and exciting leisure and retail scheme in Barnsley town centre.

"This has been a priority for the Council for many years now and we are finally moving forward and giving Barnsley what it deserves; a vibrant town centre."

Latest King's Cross scheme tops out

Working on behalf of BAM Construction, Severfield has completed the steel erection for the nine-storey Aga Khan Institute of Ismali Studies and Institute for the Study of Muslim Civilisations.

Providing 8,700m² of floorspace, the building is the latest scheme to top out in the King's Cross redevelopment programme, which is radically changing a former run-down industrial site in central London into a vibrant business neighborhood.

Described as one of the largest regeneration schemes in Europe, it will include 50 new buildings, 2,000 new homes, 20 new streets and 10 new public squares spread over 67 acres.

The Aga Khan Institute's building is opposite the Coal Drops Yard [see page 22 of this issue], a former Victorian railway coal depot that is being converted into a retail destination.

The Aga Khan represents the world's 15 million Ismaili Muslims and his Institute is developing five buildings in total at London's King's Cross as part of a new 4.5-acre campus.

The Institute's building is due to complete in 2018.

Works starts on automotive design centre

Jaguar Land Rover Automotive, the UK's largest car manufacturer, has announced it is beginning construction work on a £200M redevelopment of its design and engineering centre at Gaydon in Warwickshire.

The expansion represents the first major construction project at one of the company's non-manufacturing sites in over a decade.

"The new design and engineering centre is a testament both to Jaguar Land Rover's British heritage of innovation and its compelling vision for future vehicle technology," said Jaguar Land Rover Property Programmes Director Chris Elliott.

"The new space will centralise our design, product engineering and purchasing functions in an original and modern environment, as well as creating additional capacity for the future."

Jaguar Land Rover worked with leading architectural practice Bennetts Associates to design the scheme and has engaged Laing O'Rourke as its construction partner. Laing O'Rourke will develop the site to create a unique landscaped campus comprising new steel-framed offices combined with steel-framed Jaguar and Land Rover design centres.

In recent years Jaguar Land Rover has invested heavily in its UK vehicle manufacturing facilities at Castle Bromwich, Halewood and Solihull to support the introduction of all-new vehicles such as the Jaguar XE, XF and F-PACE, Range Rover Evoque Convertible and Land Rover Discovery Sport. A number of steel-framed facilities were constructed at these sites to aid increased production.

Tekla 2017 software release for the construction industry

Trimble has launched three new versions of its software for structural engineering, fabrication and construction teams: Tekla Structures 2017, Tekla Structural Designer 2017 and Tekla Tedds 2017.

The company said that the continuous development of Tekla Building Information Modelling (BIM) solutions demonstrates its commitment to innovation in structural engineering, offsite prefabrication and on-site efficiency.

"In these new Tekla versions, we focus on improving communication and modelling methods because these are directly tied to the productivity of core tasks within large workgroups and projects," said General Manager of Trimble's Structures Division Jari Heino.

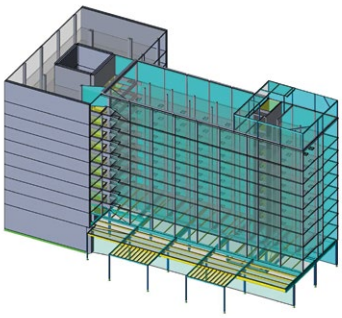
"The software provides a variety of completely new tools for users to expand their scope of work and collaborate with project stakeholders to ensure that the entire team is on the same page."

For steel detailing, the new version of Tekla Structures is said to improve modelling of steel bent plates with full support for direct modification.

It is claimed that editing and working with even the most complex bent plates is simple and intuitive. Users can create anything from simple bent gussets to folded profiles, spiral stringer plates, transitional duct sections and complex folded panels.

Tekla Structural Designer 2017 is said to deliver significant new features and enhancements focused on workflow productivity. Trimble claims it has improved numerous elements that combine to contribute significantly to the overall workflow for both steel and concrete code compliant structural design.

For more information visit: *www.tekla.com/2017*



Diary

For SCI events contact Jane Burrell, tel: 01344 636500 email: *education@steel-sci.com*

Tuesday 25 April 2017
Web Openings in Composite Beams
This webinar will cover the design methods for steel and composite beams with circular, rectangular and elongated web openings for services. Available to BCSA and SCI Members only.

Tuesday 23 & Wednesday 24 May 2017
Essential Steelwork Design - 2 days
This 2-day course introduces the concepts and principles of steel building design to EC3. Cardiff.

Tuesday 30 May 2017
VBA – the power behind Excel
This 1 hour webinar will explore the opportunities that VBA provides for Engineers. Available to BCSA and SCI Members only.

Wednesday 31 May 2017
VBA – the power behind Excel
This 1 hour webinar will explore the opportunities that VBA provides for Engineers. Available to BCSA and SCI Members only.

A world-class steel fabrication service

Responding positively to rapid technological advances and rising customer expectations ensured that Steel for Life Headline sponsor Jamestown thrived despite the challenging market conditions of recent years. Jamestown Managing Director Fiacre Creegan says the company now aims to build on these solid foundations.

The cellular plate girders produced cost savings in the region of 20 per cent

Jamestown is a leading manufacturer of plate girders, box girders, cellular beams, bridge beams and high quality heavy fabricated steel sections, also providing an industry-specific steel processing service to the engineering, manufacturing and steel fabrication sectors.

Despite some difficult industry-wide conditions in recent years, Jamestown remains at the forefront of companies offering design, fabrication and fully-automated welding of plain and cellular plate girders. The company also manufactures heavy components for sectors including highways, rail, construction, marine, port and crane, and machine building.

Commitment to steel construction

Jamestown Managing Director Fiacre Creegan says joining the British Constructional Steelwork Association, and becoming a Headline Sponsor of Steel for Life in 2016, demonstrate that the company is committed to the promotion and development of the steel construction industry. "We recognise the crucial role of standards, quality levels and accreditations to the industry," Mr Creegan says. "It was this recognition that led to Jamestown becoming an early adopter of CE Marking, achieving Execution Class 4, NHSS 20, and BS EN 3834 compliance."

Unlimited possibilities

Jamestown understands that it operates in an industry that must respond to constant technological advances and high customer expectations, which means making appropriate investments. "As part of our commitment to growth and development, we have installed automatic welding technology on all three of our automatic plate girder lines," says Mr Creegan. "In 2015 Jamestown moved to a large-scale 200,000 square feet production facility with 24, 15 and 20t overhead cranes on a 17-acre site, which allows erection or trial assembly of bridge structures of up to 200 tonnes weight and 150 metres in length."

Jamestown can now produce beams on single- or double-shifts across one, two or three machines. The company attributes its continuing success in this competitive sector to specialist knowledge in welding, welding processes, weld testing and weld design.

Client confidence

Mr Creegan says clients know that their requirements will be met with total commitment as well as the necessary flexibility to adapt to changing circumstances. He said: "Jamestown's specialist knowledge and experience give clients the absolute confidence that we can meet the most demanding of project programmes, and can manufacture a

Jamestown's extensive production facilities expand design possibilities

quality assured product on time, every time. We believe that our investment in manufacturing capability and design and management expertise mean we can offer an unrivalled degree of flexibility in design and manufacture. It is this flexibility which puts us in a unique position in meeting client needs."

Expansion into new sectors

Jamestown has expanded its activities in recent years into new markets including the rail industry, where it has produced individual components weighing up to 100 tonnes in finished single pieces.

A recent successful project involved three rail bridges in the Chester area, including two on the important Manchester Airport railway line. The bridges needed to be worked on simultaneously, and the project required successful collaboration with multiple partners (concrete, waterproofing, craneage, haulage, painting, machining and others) in order to meet very tight deadlines. Time was saved and accuracy assured by a trial erection at the Jamestown site. Very large (19 metre) plates needed to be delivered and assembled on site. The project was completed on schedule, within a five-month timescale.

Innovative construction techniques

In more conventional steel construction, Jamestown has recently played a major role in a prestigious office development project in Aberdeen's business district. The Silver Fin Building in Union Street is one of the the largest buildings of its kind in the city, rising to 13 storeys with a four-storey open atrium. The Jamestown contribution included 23 different beam types, with an average length of 9.7 metres. Advanced computer design techniques were employed to offer an alternative to the conventional ribbon cut beams which had been proposed; the cellular plate girders which were used instead produced significant cost savings, as well as a saving in construction time.

A different challenge was posed by a project in the East Village, the new London neighbourhood which was originally built as the Olympic Village of the 2012 London Games. The company was contracted to deliver large steel components manufactured to a very high degree of accuracy, and with a tight delivery schedule. Careful planning of fabrication and welding, in consultation with the designers, was required to allow for high level weld testing, intricate design and very tight tolerances. The innovative construction method on this site was being used for the first time in the UK.

Building a future together

In a mature market, Jamestown envisions a future in which expanding the range of client options, and collaborating with clients to save on costs and eliminate waste, will be two of the most important factors in ensuring the company's continuing success.

As construction projects increase in scale and complexity, Jamestown knows its ability to develop plate girders of virtually any length, height and width, will be crucial in confirming its position as a leader in this field. Mr Creegan said: "The complex projects of the future will require high levels of trust and confidence among a range of collaborators. Jamestown's reputation for customer service, attention to detail, skill and expertise, coupled with our ability to form effective working relationships, is our foundation for the future."

Jamestown Manufacturing Ltd is a headline sponsor of *Steel for Life*

STEEL for life

Jamestown trial erection

Photo courtesy of Barrett Steel Ltd

STEEL for life

Sponsors Steel Stockholders

Headline: Barrett Steel Limited
Gold: AJN Steelstock Ltd, National Tube Stockholders and Cleveland Steel & Tubes, ParkerSteel

An introduction to steel stockholders

Steel stockholders play a vital part in the steel construction supply chain, ensuring the market is supplied with what it needs when it is needed. From an extensive national network of depots and an efficient transportation network, they serve all parts of the UK construction supply chain.

How much structural steel is procured through a steel stockholder?

Over 65% of structural steel in UK construction projects is supplied via a steel stockholder. Steel stockholders supply a variety of products including heavy structural sections, plate, tubular sections, light sections, cladding materials, flats and angles.

A steel stockholder can supply any quantity and mix of steel required for a project. This means steelwork contractors do not have to incur the additional capital cost of purchasing more steel than required on the off chance that it may be required soon, coupled with the risk and costs associated with keeping that extra material in inventory.

The relationship between the steelmaker and stockholder

Steelmakers produce steel in accordance with pre-planned rolling cycles. While these rolling schedules can vary and are influenced by product and market requirements, they need to be planned in advance. When buying directly from a steelmaker, orders must be for minimum quantities of steel in terms of weight or bundles (number of pieces) rather than matching the specific and immediate requirements of a project.

"Steel stockholders play an absolute vital role in the supply chain, giving steel users the flexibility to plan their production to maximise efficiency." Barrett Steel Group Managing Director James Barrett

What are the other services stockholders offer?

Steel stockholders have invested heavily in productivity and service enhancing equipment. A number have invested in the latest laser cutting, sawing, shot blasting and priming equipment. Offering these additional services helps steelwork contractors that do not want to use their capital to invest directly in large plant and machinery.

'It is crucial to our customers that we continue to offer processing quickly and accurately. Today's modern fabrication processes have led to massive increases in demand to support the need for processes such as sawing, drilling and plasma cutting at very short notice," says AJN Steelstock Sales Executive Phil Cleaver.

Supporting the fabrication process

On an average contract, the lead-in time before the steel is required on site may be 10 working weeks. In these 10 weeks the steelwork contractor needs to resolve any design queries, model the steelwork, design and detail the connections, order and receive the steel, fabricate the steel and deliver the steel to the construction site.

The steel stockholder plays a significant part in ensuring these tight timescales are met and has processes in place to support this. For example the advancement of online services eases the process for steelwork contractors; simplifying the ordering process, providing quick and easy access to certification details and providing in time updates on deliveries.

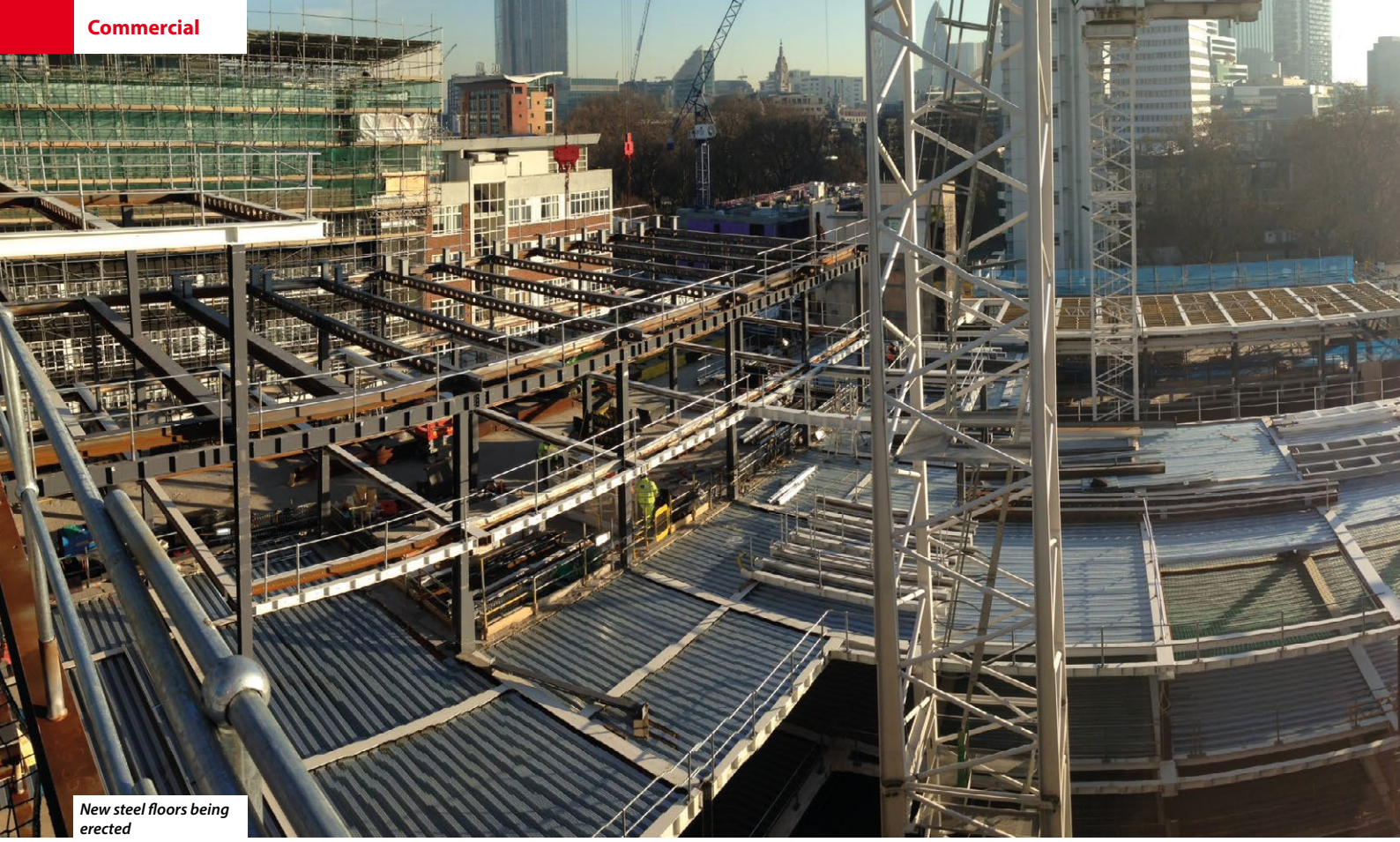
Stockholders also provide a just-in-time service to steelwork contractors, specifically daily steel deliveries to increase their production efficiency, which in turn allows for last minute design changes and reduces the handling of steel in their own yard. A number of stockholders will have sites across the UK and Ireland which supports ease of transportation and stock availability.

"The key tenet of stockholding is service and the main element is delivery. Short notice, difficult lengths, coatings and load sequences are all part of the challenge we face and solution that we offer," explains Cleveland Steel & Tubes Managing Director Roy Fishwick.

Knowledge of steel stockholders

Due to their integral role within the supply chain, steel stockholders can provide up-to-the-minute insight on the steel construction industry and have access to a wide range of information, such as pricing trends, availability issues, backlogs and activity levels.

"A reliable and sustainable supply chain is critical to success; with volatile prices and rapidly changing market conditions it's essential to form a close relationship with steelmakers whilst building a pipeline of orders to understand future product demand," says ParkerSteel Senior Commercial Manager, James Harding.



New steel floors being erected

Marrying old and new

New steelwork additions are helping to convert a 1970s-built office building into a modern commercial scheme fit for the 21st Century. Martin Cooper reports.

FACT FILE
160 Old Street, London
Main client: Great Portland Estates
Architect: Orms Architects
Main contractor: Wates
Structural engineer: Heyne Tillett Steel
Steelwork contractor: Bourne Steel
Steel tonnage: 900t

Dramatic changes are under way at 160 Old Street, a former Post Office administrative building located just outside of the north-western edge of the City of London.

The 1970s-built six-storey concrete-framed building is getting a complete makeover, with an extensive refurbishment that will deliver 157,000ft² of open-plan office space within a new expanded structural envelope.

The area around Old Street is becoming renowned as a location for media and digital companies, and in keeping with the new building's expected tenants' preference, exposed soffits as well as limited internal finishes throughout will create a modern industrial warehouse environment.

Although the original structure is concrete, it is a steel solution which is playing the leading role in the refurbishment to minimise weight and loads. Extra steel-framed floors have been added to the Old Street elevation, increasing this side of the building to nine floors. Meanwhile two floors have also been added along the Bunhill Row elevation, increasing this part of the scheme to seven floors.

Another steel floor has also been added to the Banner Street elevation, while internally, a new four-storey steel element takes up approximately one-third of the inner space by replacing a 1980s concrete addition that has been demolished.

"Using a lightweight composite solution of structural steelwork supporting metal decking to form the new upper floors, and the new internal zone, has meant there has been little or no strengthening works necessary to the foundations or existing concrete columns," says Heyne Tillett Steel (HTS) Project Engineer Krzysztof Marcinkiewicz.

Wates started its programme last February, while the main demolition was still ongoing. As well as dismantling internal areas of the existing structure, the demolition also included stripping back all of the elevations to reveal the original frame.

"One of the first steelwork erection parts of the job was the new floor added to the top of the Banner Street elevation," says Wates Project Manager Mark Tulk. "Logistically it was fairly easy as it was just a single floor, however there were quite a few steel-to-concrete connections and these were a challenge."

As the majority of the new steelwork is connected to the original concrete frame, HTS had to investigate the project's original designs to find out where rebar was located, so the appropriate connection brackets could be designed.

"We designed brackets that had a number of spare holes, so when it came to Bourne Steel connecting them to the concrete they had enough options for their bolts to avoid hitting rebar," says Mr Marcinkiewicz.

Bourne Steel had to design the numerous steel-to-steel connections, as well as fabricate, supply and importantly erect the steelwork.

The rooftop extensions, as well as the internal steel additions, are all erected around a 5m × 7.5m grid pattern. This mostly corresponds with the existing frame and so one new column sits atop a concrete column, taking the loads directly down to an individual pile.

The exception to the column-on-column design is the new 20m × 15m four-storey internal addition. This steel frame sits on a retained podium slab which spans the building's former basement car park.

"The podium has transfer beams within its structure and these support the desired

Steelwork is providing the building with new internal floors

steelwork grid we wanted," adds Mr Marcinkiewicz.

Elsewhere some of this podium has been demolished to open up the basement to create two internal courtyards. They will allow natural light to penetrate two new lower office levels created by adding a mezzanine in the basement.

Much of Bourne Steel's erection programme has been done using the site's two tower cranes. However, there are some areas within the project where the cranes cannot deliver materials due to the existing structure being in the way.

One such area is on the western end of the Old Street elevation and involves the new three-storey extension. As the existing stability system, which is based around cores, was deemed to be insufficient for this steel extension, a new series of cross bracings has been added in one bay per floor to the full height of the building.

"The bracing is formed by two columns and two beams bolted into the existing concrete bay, and then strengthened by a cross bracing in the middle," says Bourne Steel Site Manager Steve Condon.

"However, there was no way they could be erected with the tower crane because of obstructions, so they were placed into a central area within the building and then manoeuvred and erected using a telehandler and manual hoists."

One of the client's desires for the new scheme was to increase the available office floorspace. This has been achieved with the new steel floors, basement mezzanines and internal additions.

However, to further increase the floorspace, a series of steel Vierendeel trusses, bolted to the existing concrete-framed elevations has allowed these floors to be extended by 400mm.

The trusses, which are 5m long and 1m-high, formed by 150mm × 150mm box sections, fit into individual bays. The internal void is in-filled with plywood decking to form the floor extension, while externally the trusses support the building's cladding.

"For the areas built with new steelwork we were able to form cantilevers to create the exact same elevation profile," says Mr Marcinkiewicz.

Elsewhere the steel programme has included Bourne installing new lift shafts and risers, and internal supporting beams for the existing frame where areas have been demolished.

"Logistics have been a challenge on this project as with most city centre jobs that involve a tight and confined site with little or no room to store materials," sums up Mr Tulk.

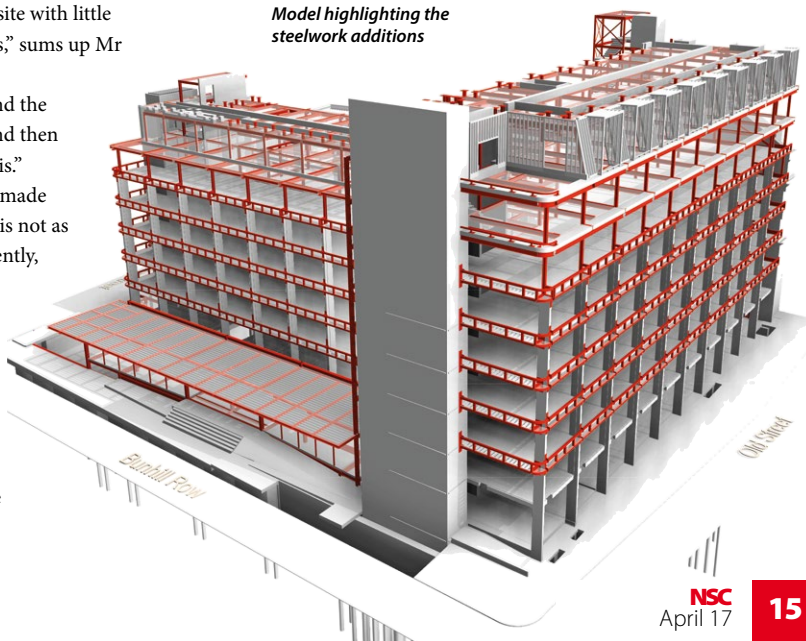
"This job is no different and the steelwork had to delivered and then erected on a just-in-time basis."

Most steel deliveries were made via Bunhill Row as this road is not as busy as Old Street. Consequently, the last steel pieces to be erected were a two-storey (basement and first floor) pavilion that will house the main entrance and a coffee shop.

160 Old Street is due to be completed in early 2018.

How the completed scheme will look

Model highlighting the steelwork additions



Nuclear patrols with steel

A bespoke steel-framed training complex is being built for the Civil Nuclear Constabulary near Sellafield. Martin Cooper reports.

FACT FILE
Civil Nuclear Constabulary training facility, Sellafield, Cumbria
Main Client: Nuclear Decommissioning Authority
Architect: Capra Architects
Main contractor: Morgan Sindall
Structural engineer: WML Consulting
Steelwork contractor: Border Steelwork Structures
Steel tonnage: 950t

Charged with protecting the UK's civil nuclear sites and materials, the Civil Nuclear Constabulary (CNC) employs more than 1,500 armed police officers and members of staff whose primary task is to deter any attack or sabotage on these important assets.

To help better train its officers, a new CNC training facility is under construction near Sellafield in Cumbria, which consists of a series of inter-connected steel-framed structures.

They include a three-storey hub with classrooms, operational stores, gym and offices, alongside communal use areas. Further connected steel-framed structures house two live fire training ranges – 50m and 100m long respectively, and a live fire skills area where various training scenarios can be played out within a three-storey building.

The facility will be owned and developed by the Nuclear Decommissioning Authority (NDA) and leased to the CNC. Morgan Sindall has been appointed to construct the facility with Deloitte Real Estate providing project management and cost consultancy support.

Commenting on the project that began last May, CNC Assistant Chief Constable Chris Armitt, says: "The new training facilities represent an important and necessary step forward for the CNC, ensuring we continue to effectively deliver our mission of maintaining public safety and protecting civil nuclear sites.

"It will allow us to continue to meet the most stringent armed policing standards set by the College of Policing and UK Government regulatory standards for the protection of nuclear sites such as Sellafield."

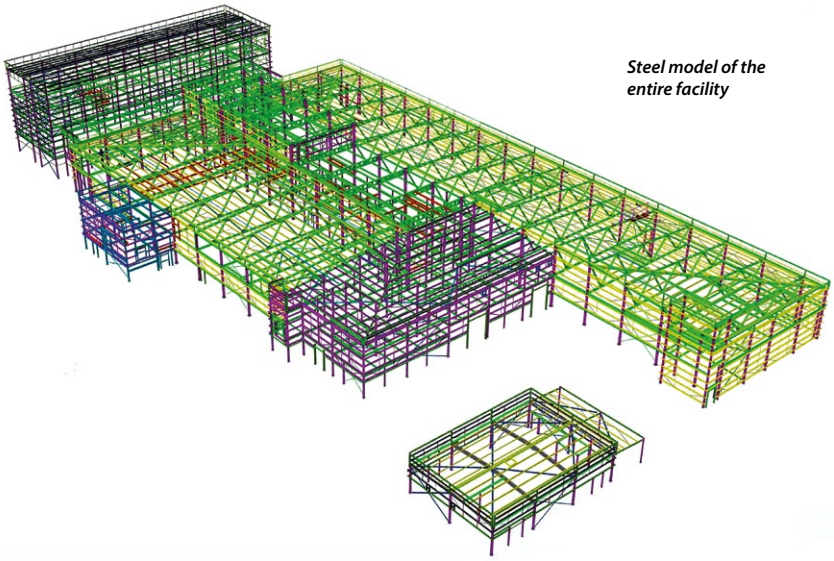
Work on the project started in May 2016 with the previously greenfield site, which is adjacent to the main Sellafield nuclear plant, undergoing a cut and fill operation. This work was undertaken to form a level footprint for the buildings on the sloping site.

Once the pad foundations were installed, the steelwork erection progamme kicked off in July, with all of the main structures erected by November.

"A steel-framed solution was chosen because of the long spans required for the ranges, while cost and speed of construction also played a big part in the decision," says Morgan Sindall Project Director Paul Limb.

"Configuring the steel frames so they best fitted the site, especially as one of the ranges is 100m-long, was one of our initial challenges," says WML Project Engineer Emma Hackney.

The biggest building is the hub that will accommodate the main entrance and it sits at the western portion of the site. Behind this structure are the two steel frames housing the ranges, sitting either side of the



Steel model of the entire facility

View of the office block and the 50m-long range

Ballistic steel walls

"This is a bespoke building as it is the only one of its kind in the UK to have all of the training facilities within one large building," says Morgan Sindall Project Director Paul Limb.

As the name suggests, live ammunition will be fired in the live fire skills area as well as within the two ranges. Consequently, these areas have some special cladding to prevent bullets from leaving each of the three isolated zones, and to prevent dangerous ricochets.

The steel frames support concrete wall panels that have a series of hardened bullet-proof steel (also known as ballistic steel) plates bolted to them. Timber batons placed onto the plates then support a further layer of rubber matting that creates a 500mm void.

Bullets penetrating the rubber will hit the steel plates and then drop down through the void into collecting trays placed on the floor.

live fire skills zone. At the end of 50m-long range and the live fire zone, two smaller connected frames house soft skills, which means training without live ammunition.

Beyond these structures there are two further small, and completely independent, steel structures accommodating a workshop and a store.

As well as fabricating, supplying and erecting the project's structural steelwork, Border Steelwork Structures (BSS) has a large remit on this project as it also installed precast floor planks, windows, cladding and roofing louvres.

"We had to sequence our programme to allow access for our floor installation which had to follow on behind the steel erection," explains BSS Senior Contracts Manager Stuart Airey.

The sequencing meant the two parallel ranges were erected first, followed by the connected three-storey hub building. Finally, BSS erected the live fire skills area which sits between the ranges. This area contains precast flooring units and in order to gain access for the crane it had to be built last," adds Mr Airey.

"We were able to position a mobile crane in the gap between the two ranges, installing steel and planks, working its way out sequentially."

For its entire programme, BSS used four 80t-capacity mobile cranes for the steel and flooring programmes, and two self-erecting tower cranes for cladding and roof installation.

Erecting the two ranges required BSS to assemble on site a series of 24m-long trusses that form the two column-free spaces. These were brought to site in two sections that were then spliced together and lifted into place as one large piece.

Supported on perimeter columns set at 7m spacings the trusses, which have a maximum depth of 4.5m, taper to form the sloping profile of the roofs.

The two ranges are independent structures that gain their stability from bracing positioned within their perimeter walls. The live fire skills area gains its stability from the ranges on either side.

A series of 14m-long Westok cellular beams, supporting precast planks, form the live fire skills areas floors.

Structurally the ranges are separated from the hub building by a double column movement joint. The hub is a braced frame with cross bracing located in perimeter walls. One row of internal columns creates two internal spans measuring 7.5m-wide.

A steel bridge connects the hub building's main entrance at first floor level directly to a car park.

Construction and fit-out is due to be completed by the end of the year and the facility will be operational by January 2018.

The main entrance and the completed offices

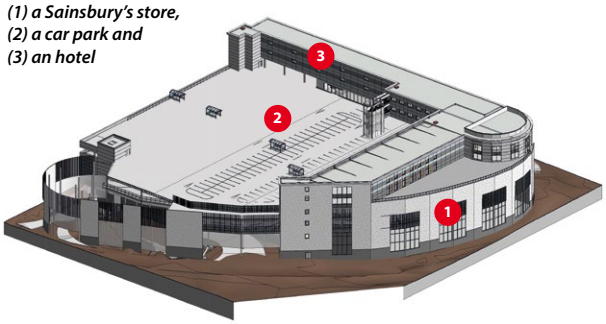
One of the ballistically-clad firing ranges

FACT FILE
Warwick Quadrant, Redhill, Surrey
Main client: Sainsbury's, Aviva Investors
Architect: CHQ
Main contractor: RG Group
Structural engineer: GD Partnership
Steelwork contractor: Billington Structures
Steel tonnage: 3,000t

Retail buys into town centre revival

A steel-framed Sainsbury's store and car park form an initial phase in Redhill's ambitious redevelopment plans.

The scheme includes (1) a Sainsbury's store, (2) a car park and (3) an hotel



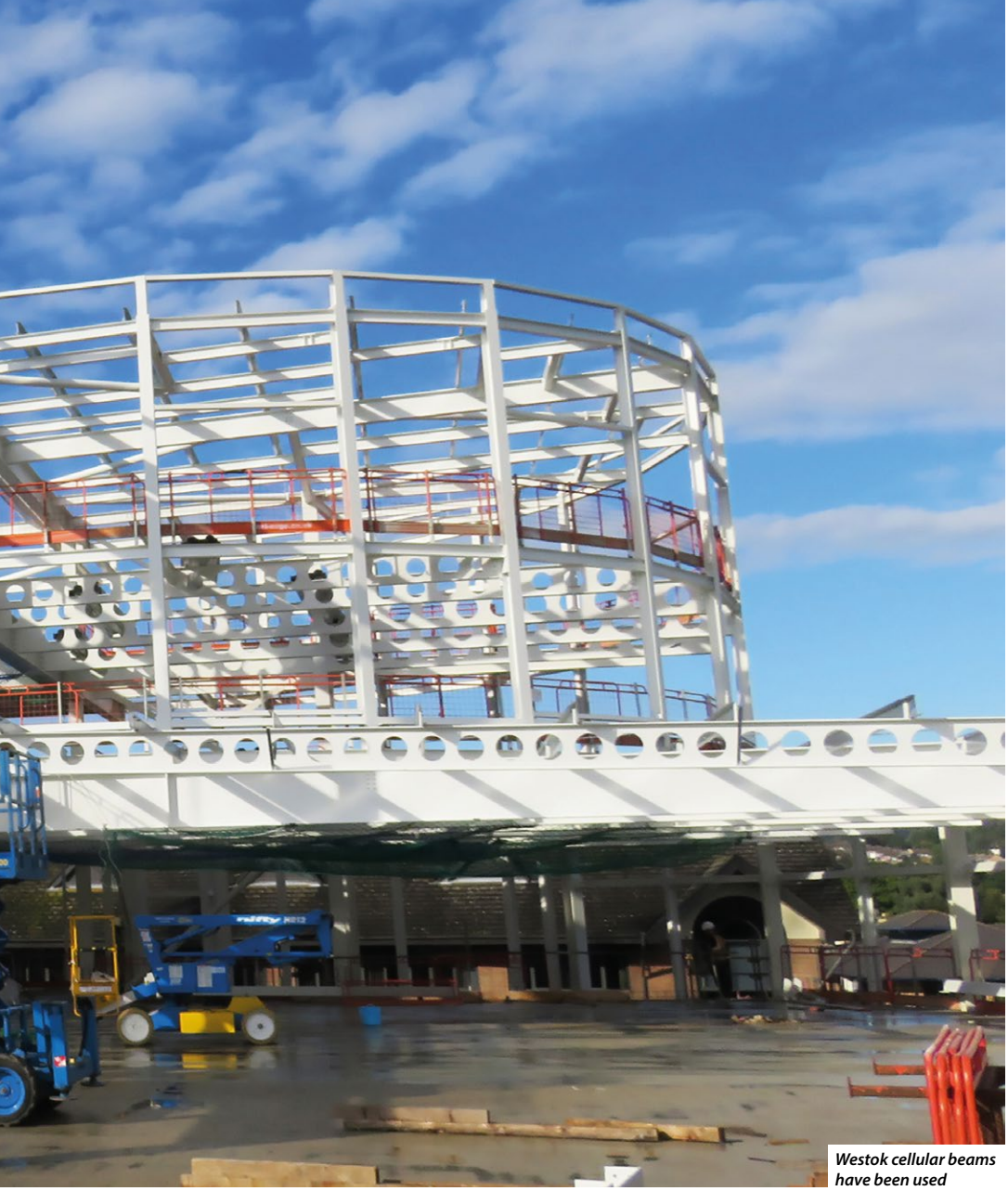
The Surrey town of Redhill is getting a much-needed makeover as the Warwick Quadrant scheme, one of the first stages of a town centre regeneration programme, takes shape.

Reinvigorating a large centrally-located plot, the scheme consists of a new Sainsbury's store with a two-level car park above, a gym and a 68-bed Travelodge hotel, all housed in one large interconnected steel braced frame.

Sainsbury's is playing an integral role in the project as the retailer is more than just the client. It has occupied part of the site for many years, albeit in a smaller store than the one being built, and importantly it is maintaining a presence throughout the construction programme.

In order to keep the Sainsbury's store open, the construction and demolition programmes have been phased. The initial stage, which was completed last year, involved the demolition of an office block known as Lombard House, which occupied approximately half of the site.

RG Group Retail Manager Mark Smith explains: "Once this building was demolished we had room to start building



Westok cellular beams have been used throughout to create long spans

part of the new steel frame, which consisted of the front portion of the new Sainsbury's store, a gym and parts of the new two-level car park."

Sainsbury's decamped into this portion of its new store last August, which then allowed phase two of the scheme to kick-off.

A temporary wall separates the open store from the ongoing works, while temporary bracing has also been added to this frame as it will not be entirely self-sufficiently stable until the entire scheme is built and the larger phase two has been connected up.

Once complete both parts of the new store will form one large new retail zone, incorporating a mezzanine level for a café.

"After they had moved into the front portion of their new premises we were able to begin demolishing the old store and then start erecting the rest of the new steel frame," adds Mr Smith.

The phase two steelwork programme consists of the remainder of the new store at ground floor level, the mezzanine deck restaurant level, the rest of the car park and the hotel.

A third phase of steelwork erection involves the construction of the car ramp.

Keeping Sainsbury's open on the site is not the only logistical challenge the project team has on this scheme. Below most of the plot's footprint is an underground car park, an important town centre asset which is being kept open throughout the construction works.

During the demolition phase this concrete basement car park and its roof – the ground floor slab – was retained and these elements are being incorporated into the new scheme.

All of the demolished structures on the site were concrete-framed, while the entire new build is steel-framed. The choice of steel was made primarily because a lightweight solution was required so that the existing substructure and foundations could be reused.

"We are constructing more floors than the original structures so some strengthening works have been undertaken to the original reinforced concrete structures, such as columns and foundations. This work has meant a phased closure of some parts of the car park," explains GD Partnership Director Rudy Djajasaputra.

While this work has been carried out the project team has had to maintain a minimum of 155 parking spaces in the basement car park at all times.

Steel was also chosen because it is quick to erect and creates flexibility within the building. Within the phase one area, the Sainsbury's store has a 9m floor-to-ceiling height, high enough to allow another floor ▶20

Sainsbury's was partially opened last year, while construction continued above and adjacent to the store

▶19 to be added if the tenant so wished.

Once phase two is complete the new Sainsbury's store will have approximately 6,000m² of retail space, up from 2,300m² in the old premises. The store has been built using a series of 16m-long Westok cellular beams, supported on columns spaced at 8m centres.

The store's grid pattern corresponds to the existing basement car park grid and for ease of design and continuity, the same column spacings have been maintained for much of scheme.

Above the Sainsbury's store the two-level car park has the same steel 16m × 8m grid pattern as does the gym, which is positioned above the front (phase one) part of the store.

The highest part of the scheme is the two-storey Travelodge hotel which sits above the car park along the western elevation. In order to avoid columns clashing with window and door openings, this part of the scheme is erected around a smaller 8m × 5.2m grid.

As well as the new build elements of the scheme, another key benefit of the redevelopment are the public space improvements that will be introduced to the pedestrianised area of London Road, which runs along the western side of the site.

The project has provided a new steel canopy entrance to the adjacent Harlequin Theatre and Library, as well as new seating, planting and paving.

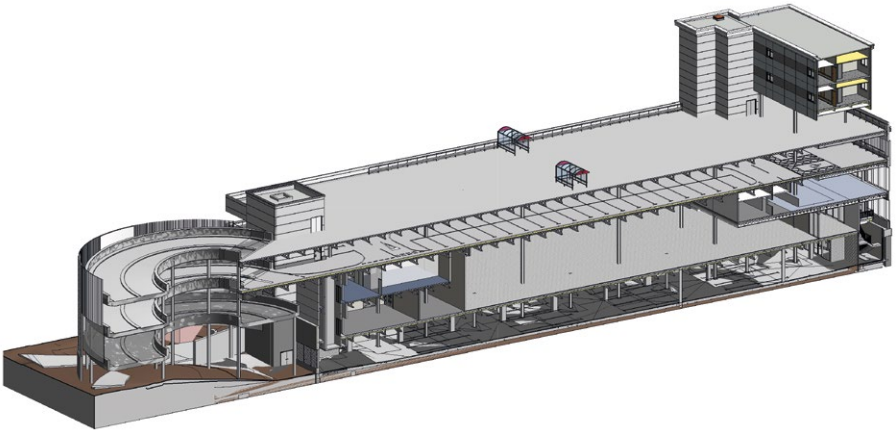
The entire Sainsbury's store is set to open this summer, with the Warwick Quadrant redevelopment completing later in the year.

Steel car park design

David Brown of the SCI discusses some aspects of steel car park design.

Car parking is an important feature of the Warwick Quadrant scheme; the existing car park dictates the primary structural grid and the new scheme incorporates a car park above the retail outlet. Even without the constraints of the existing structure at Redhill, long spans are a preferred solution for car parking. Long spans allow a degree of flexibility with the circulation within the facility but, more importantly for the user, result in a light, airy environment with minimal internal structure, which serves to enhance a feeling of security.

For car parks not constrained by existing structure, there is plenty of design guidance on optimum layouts. These include split level and flat deck solutions with different circulation patterns possible, which may be selected to suit the intended use characteristics. Ideally, inward traffic covers as many parking bays ('stalls') as possible, and is separated from outward traffic. This means that empty stalls can be found rapidly and users can exit with minimum frustration. Clear spans are generally around 16m (as at Warwick Quadrant), being based on two parking stalls 5m long and a 6m aisle for passage of cars. Intermediate columns at the edges of the aisle are generally unwelcome, as they can impede parking manoeuvres. Stall widths are generally based on multiples of 2.4m, with some allowance for the structure.



Typical floor solutions are available to the designer (see steelconstruction.info), including primary beams, secondary beams and columns, leading to an approximate weight of steel per space for use at initial estimate stage. The construction depth varies with the solution, but based on a 16m × 7.2m grid and an imposed load of 2.5kN/m², the typical construction depth ranges from 575mm to 950mm. Floors may be precast units or composite slabs constructed from profiled steel decking. Generally, beams will be designed as composite members, and longer spans will be precambered.

Corrosion protection will be an important consideration, since a car park environment is particularly hostile. In addition to appropriate protection of the steelwork, careful attention must be paid to the drainage arrangements, crack control and the application of protection to the top surface of the slab. Dynamic performance is generally not a critical design consideration, as studies of existing car parks have shown that ensuring the natural frequency is greater than 3Hz is appropriate.

Resources:

http://www.steelconstruction.info/Car_parks

Design recommendations for multi-storey and underground car parks, ISE, 2011

Roofing a new retail destination

In the midst of a high-profile renovation project, a highly bespoke steel-framed roof structure will provide two restored buildings with a new crowning glory.

FACT FILE
Coal Drops Yard, London
Main client: Argent
Architect: Heatherwick Studio
Delivery architect: BAM Design
Main contractor: BAM Construction
Structural engineer: Arup
Steelwork contractor: Severfield
Steel tonnage: 1,350t

The King's Cross redevelopment programme is radically changing a former run-down industrial site in central London into a vibrant business neighborhood.

Described as one of the largest regeneration schemes in Europe, it will include 50 new buildings, 2,000 new homes, 20 new streets and 10 new public squares spread over 67 acres.

Located in the middle of this development is the Coal Drops Yard, which was built in the 1850s for receiving and sorting coal as it arrived from the north of England by train.

Consisting of two long brick and cast iron buildings, they each originally carried four high-level railway tracks from which wagons dropped coal into storage hoppers below. Horse drawn delivery carts, positioned at ground level, would then load up with the coal.

The Victorian structures were used as warehouses for most of the last century before being turned into workshops, studios and night clubs during the 1990s.

In the latest twist in the building's story, the Coal Drops Yard is now being converted into what has been described as a world-class retail destination. The renovated brick arches will house a collection of shops, with a focus on fashion, craft and culture.

There will also be places to eat and drink, while the wide open cobbled forecourt between the two buildings will be used as an outdoor performance space. Something akin to London's Covent Garden is to be expected of the completed scheme.

Main contractor BAM is employing an array of different skills for this conversion project, from specialist restoration work of the brickwork and ironwork, to repairing the original timber roofs.

However, possibly the most challenging aspect of the project is the construction of a steel sculptured roof, which will straddle some of the area between the two original coal drop buildings.

The buildings, known as East Coal Drops and West Coal Drops, are approximately 150m and 120m-long respectively, and sit side-by-side while splaying outwards in a southerly direction. The roof structure is positioned towards the northern end, creating a feature element, where the gap between the structures narrows to about 30m-wide.

The roof structure is approximately 75m-long on one side and 65m-long on the other. It curves inwards, from the south and north ends, and then rises up in the middle to a maximum height of 25m.

Two 'ribbon' trusses, sat atop of each building, help form the undulating shape of the roof structure.

"So as not to overload the existing Coal Drops buildings, new independent steel frames have been erected carefully within the existing brickwork structures to support the roof steelwork," explains BAM Construction Manager Ewen Hunter.

The trusses are fabricated from 610mm CHS members with 508mm CHS verticals and bracings made from 219mm CHS sections.

Tubular sections were used as the geometry of the trusses is so complex no other steelwork sections would have worked without a considerable amount of extra fabrication.

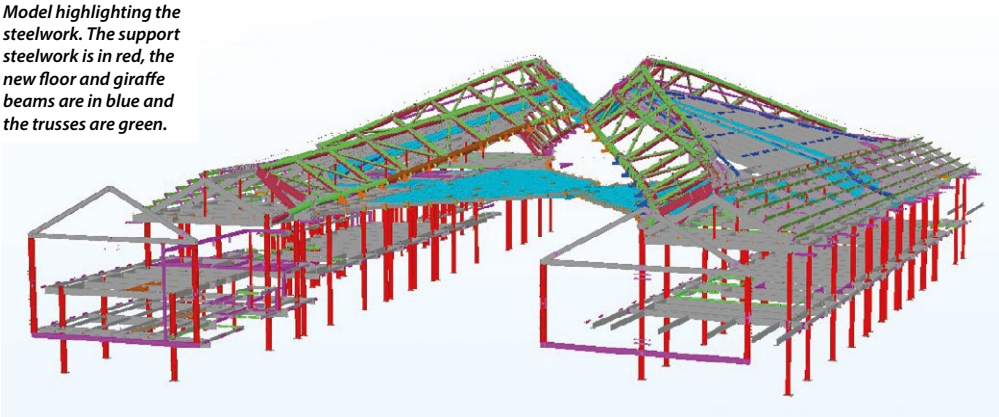
"The truss depths are maximised to be as deep as possible within the available roof void, and so range from about 7m in the middle to 5m close to the ends," says Arup Engineer Stuart Chambers.

According to the design team, the curve of the ribbon trusses was heavily influenced by the architectural form of the roof, although it was rationalised where possible.

For example, each chord was rationalised onto a flat plane to make bending of chords easier, and there is a constant offset from the upper cladding surface to standardise, as much as possible, the cladding bracketry.

The trusses are both created from four individual segments [eight in total], each one bespoke, due to the curvature of the roof and the splay of the buildings.

Model highlighting the steelwork. The support steelwork is in red, the new floor and giraffe beams are in blue and the trusses are green.



Eight individual and bespoke truss sections are lifted into place

To form the segments, 20 individual components were brought to site by steelwork contractor Severfield, and then bolted together before being lifted into place by a 500t-capacity mobile crane.

In order to minimise the amount of working at height, Severfield also carried out paint touch-up and purlin installation on the ground.

A series of temporary trestles was installed to support the truss segments during the erection sequence. The trestles will remain in place until the roof structure and its supporting steelwork is complete.

Above the trusses the new roof is primarily supported by a compression-tension system, spanning the distance between the Coal Drops buildings.

This is supported on new steelwork at each end within the east and west buildings. The compression aspect of the system is made up of four fabricated box 'giraffe girders' (they look like giraffe necks in 2D elevation).

The 'giraffe' box girders, which span 50m from building to building, are 1,000mm deep × 600mm wide with 40mm flanges.

The tension is taken through a single tie (made of a series of plated steel elements), that is connected to the bases of the giraffe girders.

At the middle point of the roof, there is a large kink where the two sides nearly meet. This area has been dubbed the 'kissing point.'

"As you can imagine, huge bending moments are generated in the steelwork here as the compression finds its way through. As such, there is a correspondingly huge, almost 100t, steel node positioned at this point," adds Mr Chambers.

The 'kissing point' node, that resolves force through the kink at the centre of the roof is tapered from 900mm to 1,300mm deep at the centre, and has 80mm flanges.

"It may seem oversized, but its stiffness had a significant effect on overall roof deflections as it transfers the majority of roof load across the zone where the two halves of roof meet, and hence it had to be so big," says Mr Chambers.

Meanwhile, the roof steelwork is doing two jobs, as well as spanning the void between the existing buildings, it also supports a new column-free upper level of the development.

As Severfield Project Manager Dominic Charlton explains: "A new suspended floor is hung from the bottom chord of the ribbon trusses. It is constructed from tapered composite beams, with a 150mm slab over the top. At one end the floor beams are supported on new structure within the footprint of the existing Coal Drops buildings.

Each truss section is supported on temporary trestles

"At the other end, it is supported by solid steel hangers."

The steelwork programme for the Coal Drops Yard scheme is expected to be completed by August, and the new King's Cross retail destination will open in October 2018.

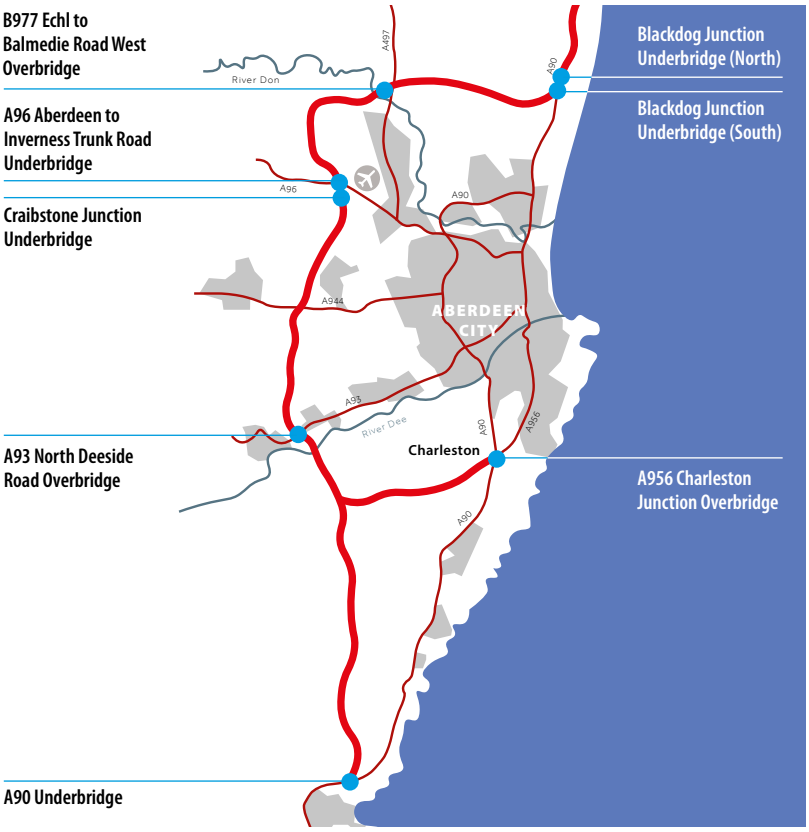
Fabrication of the trusses

Girders are lifted in for the A93 North Deeside Overbridge

Bridging the granite city's bypass

A total of eight steel composite bridges are being constructed as a vital component of the Aberdeen Western Peripheral Route.

FACT FILE
Aberdeen Western Peripheral Route/ Balmedie to Tipperty bridges
Main client: Transport Scotland, Aberdeen City Council, Aberdeenshire Council
Main contractor: AWPR Construction Joint Venture
Steelwork contractor: Cleveland Bridge
Steel tonnage: 1,350t



Covering a distance of 58km, the Aberdeen Western Peripheral Route/Balmedie to Tipperty (AWPR/B-T) is the longest road building project currently under way in the UK.

Designed to significantly improve travel in and around Aberdeen and the north east of Scotland, the scheme is being delivered by a joint venture that includes Balfour Beatty, Morrison Construction and Carillion.

One of main reasons for the project is the fact that Aberdeen lies at the intersection of several major roads, including the A90 and A96 trunk roads. Currently traffic has to travel through the city, making journeys difficult and time-consuming.

Meanwhile, the existing Balmedie to Tipperty road is recognised as a bottleneck. The single carriageway, which carries some 22,000 vehicles per day, is heavily affected by peak traffic flow during the morning commute.

Alleviating these problems, the new AWPR/B-T will consist mainly of a new dual two-lane carriageway. However, the carriageway will be dual three-lane for a short section between the North Kingswells and Craibstone Junctions and between Charleston and the next junction to the south at Findon on the existing A90.

The project provides a bypass for long-distance traffic while facilitating peripheral movement for shorter journeys, therefore removing traffic from both the city areas and unsuitable rural and urban local roads.

Constructing such a long highway around a major conurbation brings with it the need for bridges - 75 to be exact on this scheme. Many of these structures are minor, but eight major bridges are steel composite structures fabricated, supplied and erected by Cleveland Bridge.

The bridges vary in length but all have a similar steel composite design. They are constructed with pairs of steel braced girders supporting a concrete deck slab. All of them are single-span bridges with the exception of the two-span A93 North Deeside Road Overbridge.

According to a Transport Scotland spokesperson: "Steel was selected for the structures where the bridge geometry was too long a span or at too high a skew for

One of the 46m-long girders for the North Deeside Overbridge is delivered

concrete, or where steel provided a greater space for fitting major utilities below the bridge deck."

In order to fit in with the overall construction programme, bridge construction has been sequenced with Cleveland Bridge erecting four structures last year and then completing its work this Spring.

During 2016, Cleveland Bridge delivered and installed the steelwork for four bridges, the A93 North Deeside Road Overbridge, the Craibstone Junction Underbridge, the A96 Aberdeen-Inverness Trunk Road Underbridge and the B977 Echt-Balmedie Road West Overbridge.

Commenting on the work, Cleveland Bridge Head of Projects Dan Banks says: "The delivery of the first four bridges, which had components that were up to 43.5m-long and needed to be transported more than 300 miles, is a demonstration of our manufacturing and logistical capabilities."

Two of the initial bridge structures to be installed, the B977 Echt-Balmedie Overbridge and the A96 Aberdeen-Inverness Underbridge, both required assembly of girders adjacent to their final position.

For the former bridge, the steel was brought to site in four braced pairs of plate girders, each pair being 3.2m wide. They were joined on site, using a 250t-capacity mobile crane to form two 57m-long braced pairs of girders. These were then installed over days using a 500t telescopic crane.

The A96 bridge is a single span structure requiring five pairs of plate girders. The steelwork was taken to site in lengths of 36m and 12m, which were spliced together on two plots adjacent to the bridge's final position. Installation of this bridge required the use of a 800t-capacity lattice boom crane.

The bridges that are yet to be installed this year are: the A956 Charleston Overbridge, and the Blackdog Junction North Underbridge and South Underbridge, structures that form both parts of a roundabout junction.

The final bridge structure in Cleveland Bridge's programme is the A90 Aberdeen-Dundee Trunk Road Underbridge at Stonehaven, which is due to be completed this Spring.

Steel Bridges - Vital Statistics

A93 North Deeside Road Overbridge – Steel tonnage of 300t and consists of three pairs of two-span plate girders that were installed using a 500t-capacity crane. The fully painted pairs of girders measure 4.8m wide and were delivered to site in 46m and 29m lengths.

Craibstone Junction Underbridge – Steel tonnage of 301t and consists of five pairs of weathering steel plate girders that were taken to site as braced pairs measuring 3.25m wide and 42m long.

A96 Aberdeen-Inverness Trunk Road Underbridge (above) – This is the heaviest structure with a steel tonnage of 811t. It consists of five pairs of weathering steel plate girders 3.2m wide and 48m long.

B977 Echt-Balmedie Road West Overbridge (below)– A fully painted structure with a tonnage of 210t. Consists of two pairs of plate girders measuring 3.2m wide and 57m long.

The A90 Aberdeen-Dundee Trunk Road Underbridge at Stonehaven – Steel tonnage of 312t, this structure consists of five pairs of fully painted plate girders that were brought to site in 3.8m wide × 40m lengths.

The A956 Charleston Junction Overbridge – The second heaviest structure with a 518t tonnage. Consists of seven pairs of weathering steel plate girders brought to site in 3.8m wide × 50m lengths.

The Blackdog Junction Underbridge (North)– Weighing 197t, this structure consists of three pairs of weathering steel plate girders brought to site as 3.8m wide × 44m lengths.

The Blackdog Junction Underbridge (South) – Consists of three pairs of weathering steel plate girders brought to site in 3.8m wide × 46m lengths. Tonnage of 215t.

Structural steel reuse

Following on from last month's *NSC* article on *Steel and the circular economy*, Michael Sansom of the SCI focuses on structural steel reuse and in particular, the work of SCI to explore the viability of more mainstream steel reuse.

Structural steel sections are inherently reusable. Reuse, as opposed to the current, common practice of recycling steel by remelting, makes good environmental sense; saving both resources and carbon emissions. It also retains more economic activity within the UK since currently around 70% of steel scrap is exported for recycling.

SCI, working together with the University of Cambridge, has recently completed two national, (Innovate UK) projects exploring the barriers to more mainstream reuse, the economics of reuse and assessing the feasibility of developing a website for trading and sharing information about reclaimed structural steel. SCI is also working on two large European projects REDUCE and PROGRESS. This article describes these projects.

Reusing reclaimed steel is not a new idea; in fact, the practice was more prevalent in the past but has declined over the last few decades. The main reasons being new development programme constraints and tougher health and safety requirements in relation to demolition activities, in particular, working at height.

There are many steel-based temporary work systems which are highly reused; the challenge is to develop permanent work systems that are similarly reusable.

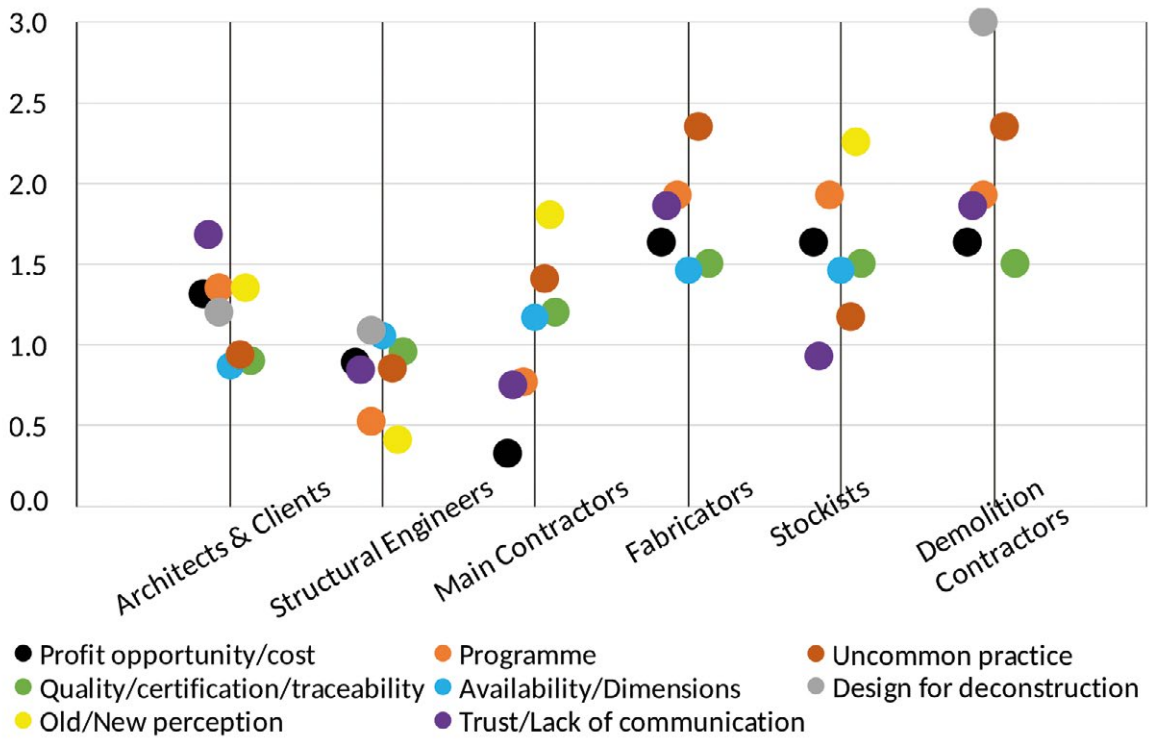
Reuse is commercially and technically viable, as demonstrated by isolated projects and in certain niche markets. Reusing simple structures, such as portal frames, is relatively common particularly in the agricultural and industrial building sectors. The SEGRO case study is a good recent example.

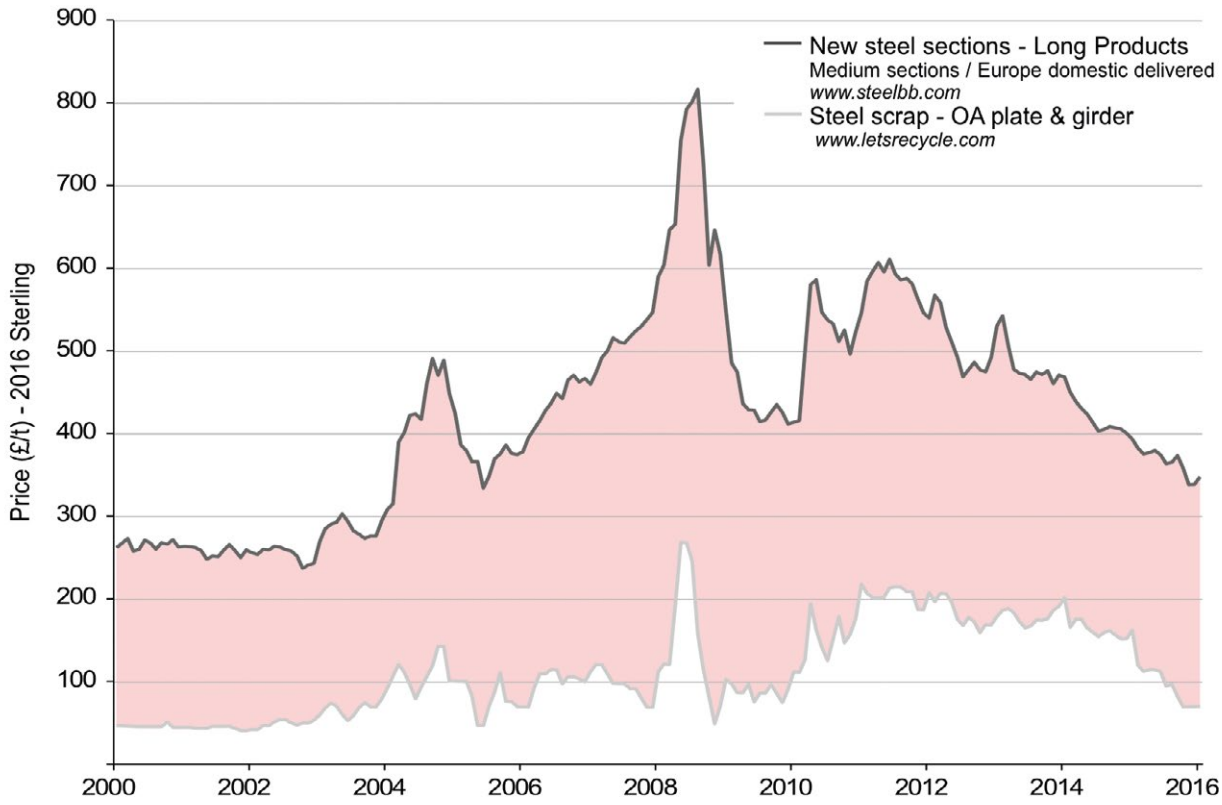
Consultations with the steel construction supply chain, confirm the technical viability but also identify the many, real and perceived, barriers to reuse. These include barriers across the supply chain, notably the additional cost and longer procurement and construction programmes involved.

Based on consultations (interviews and on-line survey) with the supply chain, the overall ranking of barriers in descending order of importance, is:

1. Availability of reclaimed sections; particularly of the desired size, volume and in the right location
2. Issues relating to the quality, traceability and certification of reclaimed sections
3. Additional cost associated with using reclaimed sections
4. (Lack of) supply chain integration; particularly communication and sharing information through the supply chain and trust (and risk sharing) between companies
5. Additional time required within construction programmes to allow for using reclaimed steel; in general, additional time incurs addition cost
6. Reclaiming and reusing structural steel is a relatively uncommon practice and many organisations simply do not have the skills or experience to do it
7. The perception that reclaimed steel is somehow inferior to new steel sections.

Barrier ranking by actor – the higher the score the higher the perceived importance[1]





Price differential between new steel sections and scrap grade OA (2000-16)[2]

The historical (2000-16) price range between new steel sections and scrap sections (grade OA scrap) reveals an average price difference of £313 per tonne over this timeframe. This differential represents the profit opportunity for reuse before the additional deconstruction costs (testing and certification, storage and refabrication costs) are taken into account.

The economic case for widespread reuse today is marginal. Under current UK economic and legislative conditions, the conclusion is that, other than some small-scale and niche markets and under certain project specific circumstances, mainstream structural steel reuse is not viable today. The lack of economic incentive is compounded by the lack of any legislative drivers. We conclude that, in the short-term, this situation in the UK is unlikely to change dramatically.

Although more mainstream structural steel reuse is unlikely under current UK economic and legislative conditions, BIM technologies overcome several of the barriers to steel reuse by providing certainty about material properties, traceability and provenance and eliminating the need for testing. Looking ahead therefore, structural steel (BIM) models offer a cost-effective means of enabling future reuse.

Steelwork contractors have been using BIM models for years and routinely offer their clients as-built structural models on building handover. By storing such models in a secure database, this will future-proof UK steel structures by enabling:

- efficient refurbishment and structural extension of existing structures
- safe deconstruction
- a detailed inventory of reclaimed steel sections for future use (with full traceability and all relevant material properties)
- optimising the recycling process through knowledge of the metallurgy of the steel.

SCI has developed a prototype website and database to facilitate trading of reclaimed steel sections and for securely storing structural steel information to enable future deconstruction and reuse.

Design for deconstruction

Design for deconstruction (and reuse) is central to the circular economy. Current practice, is generally to demolish buildings with little thought about preserving the integrity and value of components for reuse. Only by designing buildings for deconstruction can we make reuse of buildings and building components more commonplace and commercially viable.

The ability to reuse building components is, to a large extent, dependent on how buildings have been constructed in the first place. Although designers routinely consider the constructability of buildings, generally little thought is given to their deconstruction and how elements and components could be reclaimed and reused. At its simplest level, there are two main considerations:

1. The types of materials and components used; some products, like structural steel, are inherently more reusable than other structural materials and systems
2. The way the materials and components are put together (thus able to be taken apart) and deconstructed.

Key principles to follow in design for deconstruction are:

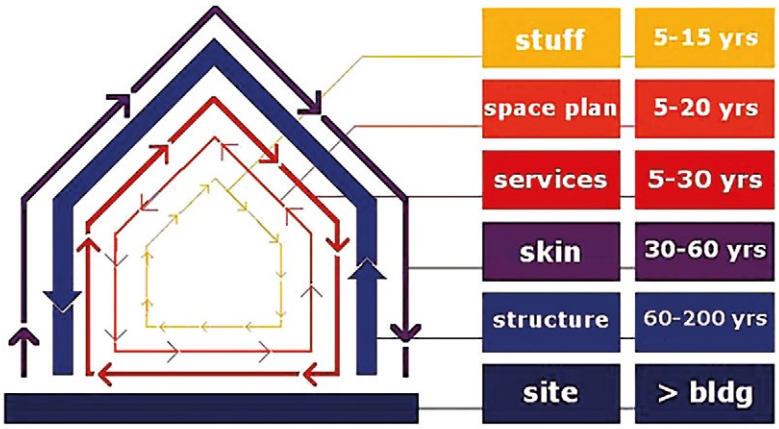
- Simplicity – design building systems and interfaces that are simple to understand, with a limited number of different ▶28

SEGRO warehouse and office building deconstructed and relocated on the Slough Trading estate in 2015

▶27

material types and component sizes

- Standardisation and regularity – design building systems and materials that are similar throughout the building and laid out in regular, repeating patterns. Where possible, standardise elements
- Simplify and separate building systems – use a 'layering approach' to keep elements of the building (with different anticipated lifetimes) separate
- Minimise the number of different types of materials and components; fewer larger elements which are more durable and easier and quicker to remove are more likely to be reused
- Use lightweight materials and components
- Use reusable materials: chose materials that are inherently durable and reusable and retain their value through reuse
- Identify points of disassembly/connections and ensure they remain accessible
- Simplify and standardise connection details: This allows for efficient construction and deconstruction and facilitates reuse without modification after deconstruction
- Use mechanical fasteners in preference to chemicals such as sealants and adhesives
- Record as-built conditions, i.e. what was built not just what was designed



Left: Layering approach to design for deconstruction in which different layers (with different lifetimes) are separated to facilitate deconstruction and minimise waste © SEDA Right: The Circular Building, London 2016

- Provide a deconstruction plan outlining general concepts where the load path for the self-weight of structure and deconstruction loads follow conventional paths. Provide specific detailed plans where load paths are not conventional. All load transfer systems should be identified
- Record adaptations to the building over its life
- Ensure information is securely stored and remains accessible.

Specifically in relation to structural steel:

- Provide clear documentation of all steel members used in the structure including, size, grade, length, and connection details
- Keep records of the steel supplied, specifically mill test certificates including manufacturer, production date and standard
- Ideally steel members should have a permanent marking or tagging to assist in traceability and to identify their chemical and mechanical properties.

SCI is coordinating a collaborative EU-funded project called REDUCE (Reuse and Demountability using Steel Structures and the Circular Economy).

The overall objective of this three-year project is to provide practical tools and steel-based technologies to be able to design steel and composite structures for deconstruction and reuse. A specific objective is to develop and test composite, steel-based flooring systems which are demountable and the components reusable.

The project will investigate applications of the developed systems in commercial and residential buildings and will explore options for greater standardisation. In the context of demountable composite construction systems, the shear connector systems with the greatest potential will be tested and analysed using numerical modelling so that design guidance can be developed following the principles of Eurocode 4.

In addition, REDUCE will review methodologies to quantify the benefits of demountable buildings and reuse including life cycle assessment methodologies, e.g. CEN TC350 standards and developing metrics for quantifying circularity, e.g. those developed by the Ellen MacArthur Foundation. The project will also explore how BIM can be used to provide information to enable the building to be easily adapted during use, and/or deconstructed and the components reused at end-of-life.

SCI is also a partner in a new EU project (PROGRESS). The focus of PROGRESS is the deconstruction and reuse of elements of single-storey buildings. The project will address both the structural and envelope elements and their interfaces, and will also consider both the reuse of existing buildings and how new single-storey buildings can be designed and constructed to facilitate future reuse.

Structural steel is uniquely placed to deliver buildings that are flexible, adaptable and ultimately reusable. Although current UK commercial and legislative conditions are not conducive to more widespread reuse, the realisation that current, global consumption patterns are unsustainable leads to the conclusion that it is only a matter of time before reuse of buildings is mandatory. SCI is leading the UK steel construction sector to ensure that it is able to capitalise on these opportunities.

References

1 Cyrille F. Dunant, Michał P. Drewniok, Michael Sansom, Simon Corbey, Julian M. Allwood, Jonathan M. Cullen (2017) Real and perceived barriers to steel reuse across the UK construction value chain, *Resources, Conservation & Recycling*, under review.

2 Cyrille F. Dunant, Michał P. Drewniok, Michael Sansom, Simon Corbey, Jonathan M. Cullen, Julian M. Allwood (2017) Cost and Risk Distribution Across the Value Chain: Why Steel Reuse Is Not Profitable, *Construction & Building Materials*, under review.

AD 406: Transient response factors in vibration analysis of staircases

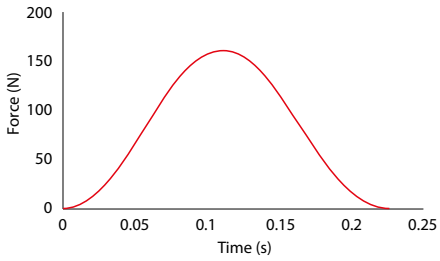
SCI recommends that for most orthodox designs the **transient** response of a staircase should not be considered in design, as first implied by AD330[1]. The purpose of this advisory desk note is to clarify the reasoning behind this advice.

The SCI's key publication on design for vibration is P354[2]. This publication describes an acceleration-based checking methodology (response factor), suitable for both floors and staircases, that supersedes traditional checking of the natural frequency of the structure. The publication describes two checks that must be performed; steady-state and transient analysis. While both checks must be carried out, steady-state response tends to be critical for lower natural frequency structures, while the transient response tends to be critical for structures with higher natural frequency.

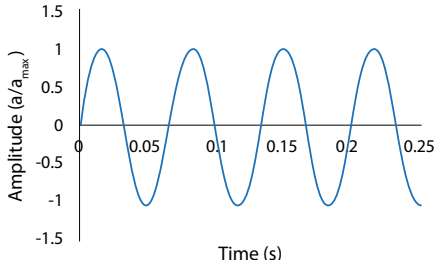
Several differences exist between design of staircases and floors for vibration. Staircases tend to have low mass and a low damping ratio. Staircases are also subject to a different force profile, since users tend to travel faster and step harder when ascending or descending a staircase than they would on a flat surface. The force functions provided by Bishop et al.[3] are recommend for use in steady-state analysis.

Conversely, the acceptable response factor for a staircase is higher (less onerous) than for a floor, as the audio and visual stimuli that accompany vibration of a floor, such as monitors and shelves shaking, are not present on a staircase. SCI currently recommends limiting response factors of 32 for light use (such as stairs in offices) or 24 for heavy use (such as stairs in public buildings and stadia)[1,2].

Even with the less onerous acceptance criteria, it is very difficult to design a staircase with a low frequency that would pass the steady state criteria. In SCI's experience, staircases with natural frequencies, *f*, less than 15 Hz will struggle to pass. Designers may increase either the mass or stiffness to decrease the response factor, which is usually achieved by increasing member sizes.



Force of a footstep (Input)



Response of structure (Output)

The calculation of the transient response assumes instantaneous impulsive loading. For most structures, the response time of the structure is much larger than the contact time of a footstep so this assumption is valid. However, for structures with frequencies over about 15 Hz, this assumption begins to break down.

In reality, a footstep delivers most of its energy to the structure over a contact time of about 0.2 seconds[3]. A typical staircase might have a natural frequency of 15 Hz or greater, which gives a natural period of about 0.066 seconds. The response time of the structure is therefore less than the contact time of a footstep.

The figure shows the force function from Bishop et al. for a fast ascent (4.5 Hz) compared to the normalised response of a 15 Hz mode (left and right respectively). The x-axis, showing time, is consistent in both plots. This figure highlights the higher natural frequency of the structure compared to the frequency of the forcing function.

The assumption of instantaneous impulsive loading is therefore invalid in this case. The increased contact time between the person and the structure will result in destructive interference in the oscillation, which the analysis method does not take into account.

For the reasons presented, SCI considers that the transient response prediction is not applicable to typical staircases, and therefore should not be used in design.

References

1. AD 330: Vibration of steel staircases, Steel Construction Institute
2. SCI P354 Design of Floors for Vibration: A New Approach, Revised Edition 2009
3. N.W.M. Bishop, M. Willford, R. Pumphrey, Human induced loading of flexible staircases, Safety Science, Volume 18, Issue 4, February 1995, Pages 261-276, ISSN 0925-7535, http://dx.doi.org/10.1016/0925-7535(94)00035-2.

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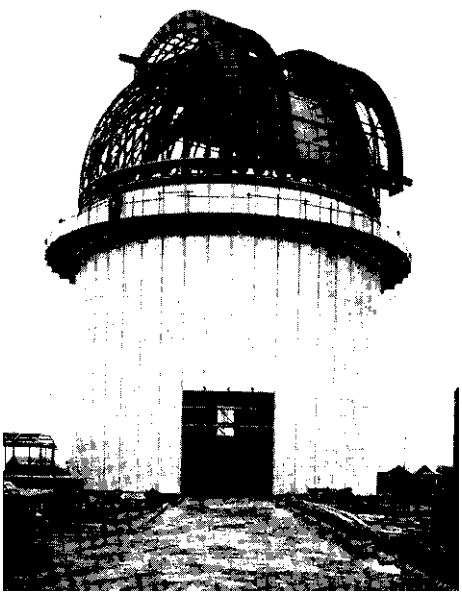
Email: **advisory@steel-sci.com**



BUILDINGWITHSTEEL

The largest telescope in Europe

The Isaac Newton astronomical telescope at the Royal Greenwich Observatory, Herstmonceaux Castle, Sussex, is the largest in Europe. The main mirror is 98 in (2.5 m) in diameter and 16 in (41 cm) thick. Designed by Grubb Parsons, the telescope - weighing 100 tons - is housed within a dome which is accurately balanced and levelled on a track 56 ft above ground level.

The building housing the telescope is of steel-framed construction, circular in plan of 60 ft diameter and 60 ft high. Steelwork comprises sixteen 18 in by 7½ in by 66lb universal beam stanchions 55 ft high. Steelwork is grit blasted, zinc sprayed and painted with one coat of calcium plumbate.

Floor beams are at 36 ft 6 in and 48 ft levels with a cantilever balcony at 48 ft. This balcony is for the use of

New and revised codes & standards

From BSI Updates March 2017

BRITISH STANDARDS

BS 8548:2017
Guidance for arc welding of reinforcing steel
No current standard is superseded

BS EN PUBLICATIONS

BS EN ISO 8502-2:2017
Preparation of steel substrates before application of paints and related products. Tests for the assessment of surface cleanliness. Laboratory determination of chloride on cleaned surfaces
Supersedes BS EN ISO 8502-2:2005

BS EN ISO 8502-3:2017
Preparation of steel substrates before application of paints and related products. Tests for the assessment of surface cleanliness. Assessment of dust on steel surfaces prepared for painting (pressure-sensitive tape method)
Supersedes BS EN ISO 8502-3:2000

BS EN 10056-1:2017
Structural steel equal and unequal leg angles. Dimensions
Supersedes BS EN 10056-1:1999

BS EN 10152:2017
Electrolytically zinc coated cold rolled steel flat products for cold forming. Technical delivery conditions
Supersedes BS EN 10152:2009

BS EN 10365:2017
Hot rolled steel channels, I and H sections. Dimensions and masses
Supersedes BS 4-1:2005

CORRIGENDA TO BRITISH STANDARDS

BS EN 10365:2017
Hot rolled steel channels, I and H sections. Dimensions and masses
CORRIGENDUM 1

BRITISH STANDARDS PROPOSED FOR WITHDRAWAL

BS 6779-1:1998
Highway parapets for bridges and other structures. Specification for vehicle containment parapets of metal construction
This standard is proposed for withdrawal. This series has been retained for some years as current, partially superseded as the European Standards series EN 1317 were implemented as British Standards. Whilst some clauses of BS 6779 may not be in conflict with the European Standard, the series is being withdrawn as it does have conflicting clauses and this could cause confusion to users. Although withdrawn the series will continue to be available

BS 6779-3:1994
Highway parapets for bridges and other structures. Specification for vehicle containment parapets of combined metal and concrete construction
This standard is proposed for withdrawal. This series has been retained for some years as current, partially superseded as the European Standards series EN 1317 were implemented as British Standards. Whilst some clauses of BS 6779 may not be in conflict with the European Standard, the series is being withdrawn as it does have conflicting clauses and this could cause confusion to users. Although withdrawn the series will continue to be available

BRITISH STANDARDS WITHDRAWN

BS 4-1:2005
Structural steel sections. Specification for hot-rolled sections
Superseded by BS EN 10365:2017

BRITISH STANDARDS UNDER REVIEW

BS EN ISO 4759-1:2001
Tolerances for fasteners. Bolts, screws, studs and nuts. Product grades A, B and C

BS EN ISO 7093-2:2000
Plain washers. Large series. Product grade C

BS EN ISO 18286:2010
Hot-rolled stainless steel plates. Tolerances on dimensions and shape

BS ISO 888:2012
Fasteners. Bolts, screws and studs. Nominal lengths and thread lengths

NEW WORK STARTED

EN 1011-3
Welding. Recommendations for welding of metallic materials. Arc welding of stainless steels
Will supersede BS EN 1011-3:2000

DRAFT BRITISH STANDARDS FOR PUBLIC COMMENT – ADOPTIONS

17/30335249 DC
BS EN ISO 898-3 Mechanical properties of fasteners made of carbon steel and alloy steel. Part 3. Flat washers with specified property classes
Comments for the above document were required by 19 March, 2017

17/30347067 DC
BS EN 10340-1 Steel castings for structural uses. Part 1. General
Comments for the above document were required by 4 April, 2017

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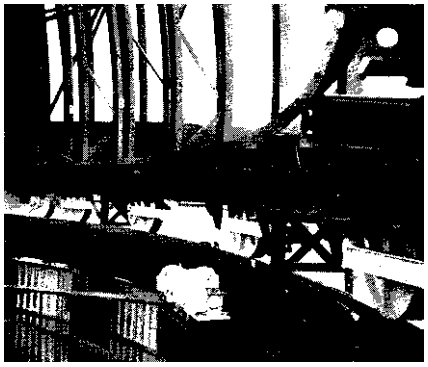
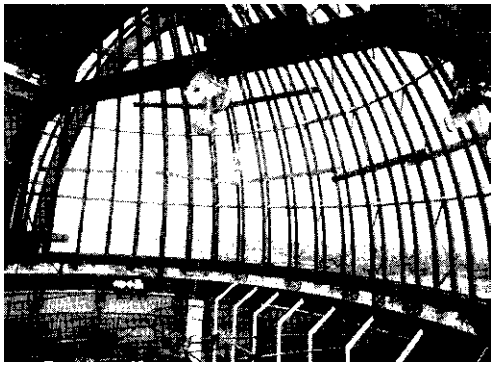
May 1967

observers. The main staircase is of all-welded mild steel construction. The building is clad with aluminium sheet. Heavy steel reinforcing rods contributed to the great strength needed in the concrete foundation to support the weight of the telescope and its ancillary equipment.

Superintending civil engineer: D H Little, OBE BSc MICE Ministry of Public Building and Works.





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

Gillian Mitchell MBE, Deputy Director General, BCSA, 4 Whitehall Court, London SW1A 2ES
Tel: 020 7747 8121 Email: *gillian.mitchell@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, ● = Member)

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 & J Stead Ltd	01653 693742			●	●					●	●			●	●		2			Up to £200,000
A C Bacon Engineering Ltd	01953 850611			●	●	●	●				●			●			2			Up to £3,000,000
A&J Fabtech Ltd	01924 439614	●					●		●	●	●		●	●		✔	3			Up to £400,000
Access Design & Engineering	01642 245151					●				●	●			●	●	✔	2			Up to £4,000,000
Adey Steel Ltd	01509 556677	●		●	●	●	●	●	●	●	●			●	●	✔	3		●	Up to £2,000,000
Adstone Construction Ltd	01905 794561			●	●	●	●									✔	2	✔	●	Up to £3,000,000
Advanced Fabrications Poyle Ltd	01753 653617				●	●	●	●		●	●			●	●	✔	2			Up to £800,000
AJ Engineering & Construction Services Ltd	01309 671919			●	●					●	●			●	●	✔	4			Up to £2,000,000
Angle Ring Company Ltd	0121 557 7241												●			✔	4			Up to £1,400,000
Apex Steel Structures Ltd	01268 660828			●	●	●	●			●	●			●			2			Up to £2,000,000
Arc Fabrication Services Ltd	01709 557654			●	●	●	●	●	●	●	●			●	●	✔	3			Up to £200,000
Arminhall Engineering Ltd	01799 524510	●			●	●		●		●	●			●	●	✔	2			Up to £400,000
Arromax Structures Ltd	01623 747466	●		●	●	●	●	●	●	●	●	●		●	●		2			Up to £800,000
ASA Steel Structures Ltd	01782 566366			●	●	●	●			●	●			●	●	✔	4			Up to £800,000
ASME Engineering Ltd	020 8966 7150				●	●				●	●			●	●	✔	4		●	Up to £2,000,000
Atlasco Constructional Engineers Ltd	01782 564711			●	●	●	●				●			●	●	✔	2			Up to £1,400,000
Austin-Divall Fabrications Ltd	01903 721950			●	●		●	●		●	●			●	●	✔	2			Up to £800,000
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 £2,000,000
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 Construction Engineering Ltd	01202 746666		●	●	●	●	●	●	●	●	●	●	●	●	●	✔	4	✔	●	Above £6,000,000
Briton Fabricators Ltd	0115 963 2901	●		●	●	●	●	●	●	●	●			●	●	✔	4			Up to £6,000,000
Builders Beams Ltd	01227 863770			●	●	●	●			●	●			●	●	✔	2	✔		Up to £3,000,000
Cairnhill Structures Ltd	01236 449393	●			●	●	●	●	●	●				●	●	✔	4		●	Up to £3,000,000
Caunton Engineering Ltd	01773 531111	●	●	●	●	●	●	●		●	●	●		●	●	✔	4	✔	●	Above £6,000,000
Cementation Fabrications	0300 105 0135	●			●			●			●		●		●	✔	3		●	Up to £6,000,000*
Cleveland Bridge UK Ltd	01325 381188	●	●	●	●	●	●	●	●	●	●	●		●		✔	4		●	Above £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 £800,000
D H Structures Ltd	01785 246269			●	●		●				●						2			Up to £100,000
D Hughes Welding & Fabrication Ltd	01248 421104				●	●	●	●		●	●		●	●	●	✔	4			Up to £800,000
Duggan Steel	00 353 29 70072		●	●	●	●	●	●	●		●	●			●	✔	4			Up to £6,000,000
ECS Engineering Services Ltd	01773 860001	●		●	●	●	●	●	●	●	●			●	●	✔	3			Up to £3,000,000
Elland Steel Structures Ltd	01422 380262		●	●	●	●	●	●	●	●	●	●		●		✔	4	✔	●	Up to £6,000,000
EvadX Ltd	01745 336413			●	●	●	●	●	●	●	●	●				✔	3		●	Up to £3,000,000
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
Gorge Fabrications Ltd	0121 522 5770				●	●	●	●		●				●	●	✔	2			Up to £1,400,000
Gregg & Patterson (Engineers) Ltd	028 9061 8131			●	●	●	●	●				●		●		✔	3			Up to £3,000,000
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)
H Young Structures Ltd	01953 601881			●	●	●	●	●		●	●			●	●	✔	2		●	Up to £2,000,000
Had Fab Ltd	01875 611711				●				●	●	●				●	✔	4			Up to £3,000,000
Hambleton Steel Ltd	01748 810598		●	●	●	●	●	●				●		●		✔	4		●	Up to £6,000,000
Harry Marsh (Engineers) Ltd	0191 510 9797			●	●	●	●			●	●				●	✔	2			Up to £1,400,000
Hescott Engineering Company Ltd	01324 556610			●	●	●	●			●				●	●	✔	2			Up to £3,000,000
Intersteels Ltd	01322 337766	●			●	●	●	●					●	●		✔	3			Up to £2,000,000
J & A Plant Ltd	01942 713511				●	●									●		4			Up to £40,000
James Killelea & Co Ltd	01706 229411		●	●	●	●	●				●	●		●			4			Up to £6,000,000*
John Reid & Sons (Strucsteel) Ltd	01202 483333		●	●	●	●	●	●	●	●	●	●		●	●	✔	4		●	Up to £6,000,000
Kiernan Structural Steel Ltd	00 353 43 334 1445			●	●	●	●	●	●	●	●	●		●	●	✔	4		●	Up to £6,000,000
Kloeckner Metals UK Westok	0113 205 5270												●			✔	4			Up to £6,000,000
Leach Structural Steelwork Ltd	01995 640133			●	●	●	●	●			●					✔	2		●	Up to £6,000,000
Legge Steel (Fabrications) Ltd	01592 205320			●	●		●		●	●	●			●	●		3			Up to £800,000
Luxtrade Ltd	01902 353182									●	●				●	✔	2			Up to £800,000
M Hasson & Sons Ltd	028 2957 1281			●	●	●	●	●	●	●	●				●	✔	4			Up to £2,000,000
M J Patch Structures Ltd	01275 333431				●					●	●			●	●	✔	2			Up to £1,400,000
M&S Engineering Ltd	01461 40111				●				●	●	●			●	●		3			Up to £1,400,000
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			●	●	●	●				●						2			Up to £3,000,000
Murphy International Ltd	00 353 45 431384	●			●		●	●	●		●				●	✔	4			Up to £1,400,000
Newbridge Engineering Ltd	01429 866722	●	●	●	●	●	●	●	●		●			●	●	✔	4		●	Up to £1,400,000
Nusteel Structures Ltd	01303 268112						●	●	●	●				●		✔	4		●	Up to £4,000,000
Overdale Construction Services Ltd	01656 729229			●	●		●	●			●				●		2			Up to £400,000
Painter Brothers Ltd	01432 374400								●		●			●	●	✔	3			Up to £6,000,000*
Pencro Structural Engineering Ltd	028 9335 2886			●	●	●	●	●	●		●			●	●	✔	2			Up to £2,000,000
Peter Marshall (Steel Stairs) Ltd	0113 307 6730									●					●	✔	2			Up to £800,000*
PMS Fabrications Ltd	01228 599090			●	●	●	●		●	●	●			●	●		2			Up to £1,400,000
Rippin Ltd	01383 518610			●	●	●	●	●						●	●		2			Up to £1,400,000
S H Structures Ltd	01977 681931	●			●		●	●	●	●	●	●				✔	4	✔	●	Up to £2,000,000
SAH Engineering Ltd	01582 584220			●	●	●				●	●			●	●		2			Up to £800,000
SDM Fabrication Ltd	01354 660895	●	●	●	●	●	●				●			●	●	✔	4			Up to £2,000,000
Sean Brady Construction Engineering Ltd	00 353 49 436 4144			●	●	●	●			●	●			●	●		2			Up to £800,000
Severfield plc	01845 577896	●	●	●	●	●	●	●	●	●	●	●	●	●	●	✔	4		●	Above £6,000,000
SGC Steel Fabrication	01704 531286				●					●				●	●	✔	2			Up to £800,000
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 £1,400,000
South Durham Structures Ltd	01388 777350			●	●	●				●	●	●			●		2			Up to £800,000
Southern Fabrications (Sussex) Ltd	01243 649000				●	●				●	●			●	●	✔	2			Up to £800,000
Taziker Industrial Ltd	01204 468080									●				●	●	✔	3			Above £6,000,000
Temple Mill Fabrications Ltd	01623 741720			●	●	●	●				●			●	●	✔	2			Up to £400,000
Traditional Structures Ltd	01922 414172			●	●	●	●	●	●		●			●	●	✔	3	✔	●	Up to £2,000,000
TSI Structures Ltd	01603 720031			●	●	●	●	●			●			●		✔	2	✔		Up to £1,400,000
Tubecon	01226 345261						●	●	●	●				●	●	✔	4		●	Above £6,000,000*
Underhill Engineering Ltd	01752 752483				●		●	●	●	●	●			●	●	✔	4			Up to £3,000,000
W & H Steel & Roofing Systems Ltd	00 353 56 444 1855			●	●	●	●	●						●	●		4			Up to £2,000,000
W I G Engineering Ltd	01869 320515				●					●					●	✔	2			Up to £200,000
Walter Watson Ltd	028 4377 8711			●	●	●	●	●				●				✔	4			Up to £6,000,000
Westbury Park Engineering Ltd	01373 825500	●		●	●		●	●	●	●	●				●	✔	4			Up to £800,000
William Haley Engineering Ltd	01278 760591			●	●	●			●	●	●			●		✔	4		●	Up to £4,000,000
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)

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
A Lamb Associates Ltd	01772 316278
Balfour Beatty Utility Solutions Ltd	01332 661491
Griffiths & Armour	0151 236 5656
Highways England Company Ltd	08457 504030
Kier Construction Ltd	01767 640111
PTS (TQM) Ltd	01785 250706
Sandberg LLP	020 7565 7000
Structural & Weld Testing Services Ltd	01795 420264
SUM Ltd	0113 242 7390

RQSC
The Register of Qualified Steelwork Contractors Scheme

Steelwork contractors for bridgeworks

BCSA

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

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

- **FG** Footbridge and 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
- **RF** 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, ● = Member)

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	FG	PG	TW	BA	CM	MB	RF	AS	QM	FPC	BIM	NHSS 19A	NHSS 20	SCM	Guide Contract Value (1)
A&J Fabtech Ltd	01924 439614	●	●	●	●				●	✓	3					Up to £400,000
Bourne Construction Engineering 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 £3,000,000
Cementation Fabrications	0300 105 0135	●	●						●	✓	3			✓	●	Up to £6,000,000*
Cleveland Bridge UK Ltd	01325 381188	●	●	●	●	●	●	●	●	✓	4		✓	✓	●	Above £6,000,000*
D Hughes Welding & Fabrication Ltd	01248 421104	●		●			●	●	●	✓	4			✓		Up to £800,000
Donyal Engineering Ltd	01207 270909	●						●	●	✓	3			✓	●	Up to £1,400,000
ECS Engineering Ltd	01773 860001	●	●	●	●		●		●	✓	3					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			✓	●	Up to £6,000,000
Millar Callaghan Engineering Services Ltd	01294 217711	●				●		●	●	✓	4			✓		Up to £1,400,000
Murphy International Ltd	00 353 45 431384	●	●	●	●				●	✓	4					Up to £1,400,000
Nusteel Structures Ltd	01303 268112	●	●	●	●	●		●	●	✓	4		✓	✓	●	Up to £4,000,000
S H Structures Ltd	01977 681931	●		●	●	●	●		●	✓	4	✓		✓	●	Up to £2,000,000
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
Non-BCSA member																
Allerton Steel Ltd	01609 774471	●	●	●	●	●		●	●	✓	4			✓		Up to £4,000,000
Centregreat Engineering Ltd	029 2046 5683	●	●	●	●	●	●	●	●	✓	4					Up to £1,400,000
Cimolai SpA	01223 836299	●	●	●	●	●	●	●	●	✓	4					Above £6,000,000
CTS Bridges Ltd	01484 606416	●	●	●	●	●	●		●	✓	4			✓	●	Up to £800,000
Francis & Lewis International Ltd	01452 722200							●	●	✓	4			✓	●	Up to £2,000,000
Harland & Wolff Heavy Industries Ltd	028 9045 8456	●	●	●	●	●		●	●	✓	3					Up to £2,000,000
Hollandia Infra BV	00 31 180 540 540	●	●	●	●	●	●	●	●	✓	4					Above £6,000,000*
HS Carlsteel Engineering Ltd	020 8312 1879	●	●					●	●	✓	3			✓		Up to £40,000
IHC Engineering (UK) Ltd	01773 861734	●							●	✓	3			✓		Up to £400,000
Interserve Construction Ltd	020 8311 5500							●	●	✓	N/A					Above £6,000,000*
Lanarkshire Welding Company Ltd	01698 264271	●	●	●	●	●	●	●	●	✓	4		✓	✓	●	Up to £2,000,000
P C Richardson & Co (Middlesbrough) Ltd	01642 714791	●						●	●	✓	N/A					Up to £3,000,000
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

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.

1 Structural components
2 Computer software
3 Design services
4 Steel producers
5 Manufacturing equipment
6 Protective systems
7 Safety systems
8 Steel stockholders
9 Structural fasteners

CE
CE Marking compliant, where relevant:
M manufacturer (products CE Marked)
D/I distributor/importer (systems comply with the CPR)
N/A CPR not applicable

SCM
Steel Construction Sustainability Charter
● = Gold,
● = Silver,
● = Member

Company name	Tel	1	2	3	4	5	6	7	8	9	CE	SCM	BIM
AJN Steelstock Ltd	01638 555500								●		M		
Albion Sections Ltd	0121 553 1877	●									M		
Arcelor Mittal Distribution - Scunthorpe	01724 810810								●		D/I		
Autodesk Ltd	01252 456893		●										
AVEVA Solutions Ltd	01223 556655		●								N/A		
Ayrshire Metals Ltd	01327 300990	●									M		✓
BAPP Group Ltd	01226 383824									●	M		
Barrett Steel Services Limited	01274 682281								●		M		
Behringer Ltd	01296 668259					●					N/A		
British Steel	01724 404040				●						M		
BW Industries Ltd	01262 400088	●									M		
Cellbeam Ltd	01937 840600	●									M		
Cleveland Steel & Tubes Ltd	01845 577789								●		M		
Composite Profiles UK Ltd	01202 659237	●									D/I		
Cooper & Turner Ltd	0114 256 0057									●	M		
Cutmaster Machines (UK) Ltd	01226 707865					●					N/A		
Daver Steels Ltd	0114 261 1999	●									M		
Daver Steels (Bar & Cable Systems) Ltd	01709 880550	●									M		
Dent Steel Services (Yorkshire) Ltd	01274 607070								●		M		
Duggan Profiles & Steel Service Centre Ltd	00 353 56 7722485	●							●		M		
easi-edge Ltd	01777 870901							●			N/A	●	
Fabsec Ltd	01937 840641	●									N/A		
Ficep (UK) Ltd	01924 223530					●					N/A		
FLI Structures	01452 722200	●									M	●	
Forward Protective Coatings Ltd	01623 748323						●				N/A		
Graitec UK Ltd	0844 543 8888		●								N/A		
Hadley Group Ltd	0121 555 1342	●									M	●	
Hempel UK Ltd	01633 874024						●				N/A		
Highland Metals Ltd	01343 548855						●				N/A		
Hilti (GB) Ltd	0800 886100									●	M		
Hi-Span Ltd	01953 603081	●									M	●	

Company name	Tel	1	2	3	4	5	6	7	8	9	CE	SCM	BIM
International Paint Ltd	0191 469 6111						●				N/A	●	
Jack Tighe Ltd	01302 880360						●				N/A		
Jamestown Manufacturing Ltd	00 353 45 434288	●									M		
John Parker & Sons Ltd	01227 783200								●	●	D/I		
Joseph Ash Galvanizing	01246 854650						●				N/A		
Jotun Paints (Europe) Ltd	01724 400000						●				N/A		
Kaltenbach Ltd	01234 213201					●					N/A		
Kingspan Structural Products	01944 712000	●									M	●	
Kloeckner Metals UK	0113 254 0711								●		D/I		
Lindapter International	01274 521444									●	M		
MSW UK Ltd	0115 946 2316	●									D/I		
Murray Plate Group Ltd	0161 866 0266								●		D/I		
National Tube Stockholders Ltd	01845 577440								●		D/I		
Peddinghaus Corporation UK Ltd	01952 200377					●					N/A		
Pipe and Piling Supplies Ltd	01592 770312	●									M		
PPG Performance Coatings UK Ltd	01773 814520						●				N/A		
Prodeck-Fixing Ltd	01278 780586	●									D/I		
Rainham Steel Co Ltd	01708 522311								●		D/I		
Sherwin-Williams Protective & Marine Coatings	01204 521771						●				M	●	
Structural Metal Decks Ltd	01202 718898	●									M	●	
StruMIS Ltd	01332 545800		●								N/A		
Tata Steel Distribution UK & Ireland	01902 484000								●		D/I		
Tata Steel Ireland Service Centre	028 9266 0747								●		D/I		
Tata Steel Service Centre Dublin	00 353 1 405 0300								●		D/I		
Tata Steel Tubes	01536 402121				●						M		
Tata Steel UK Panels & Profiles	0845 3088330	●									M		
Tension Control Bolts Ltd	01948 667700						●			●	M		
Trimble Solutions (UK) Ltd	0113 887 9790		●								N/A		
voestalpine Metsec plc	0121 601 6000	●									M	●	
Wedge Group Galvanizing Ltd	01909 486384						●				N/A		
Yamazaki Mazak UK Ltd	01905 755755					●					N/A