
hewson
consulting engineers
creative engineering solutions for transportation infrastructure

ABOUT US

Hewson Consulting provides specialist civil, structural and geotechnical engineering and design services. We combine our design expertise with detailed knowledge of the construction process to create design solutions that are practical, efficient and economic.

We are passionate about what we do believing that good design is a creative process that requires innovative thinking coupled with technical skill and experience to deliver the best solutions. We are also very good at listening to our clients, establishing their specific requirements and then tailoring our designs to suit.

We have extensive experience working with contractors as well as owners and operators, thus providing a strong foundation from which to support projects at all stages of the design and construction process.

HISTORY

When we started out in 2005 we had no preconceptions of where the work would lead, just a desire to be involved with exciting and challenging engineering projects by providing efficient, construction-led design services. Since then we have grown and matured to become an established specialist civil, structural and geotechnical engineering consultancy with an international reputation. Our experience includes an impressively large and diverse range of projects undertaken in many regions of the world. Our involvement has resulted in the delivery of practical solutions for some very complex engineering challenges. A flair for ingenuity on one hand balanced with buildability on the other underpins our reputation for delivering truly creative engineering solutions.

WORKING COLLABORATIVELY

Our guiding philosophy has always been to collaborate closely with clients right from the start of a project to understand their needs and priorities. We know that every client and project team we work with has a slightly different take on what is important to them at a given time. We have learnt to listen carefully to their thoughts and priorities and then use our experience to develop bespoke designs that are tailored to these requirements.

Our clients value the creativity that we bring to solving complex engineering challenges. We have consistently demonstrated our commitment to collaborate closely with clients and other stakeholders to deliver a responsive service that positively contributes to making their projects successful.

OUR APPROACH

The construction requirements and planning are an integral part of the design process for all forms of civil engineering. We therefore develop our designs with buildability foremost in mind. By considering the way a structure will be built, the design can incorporate appropriate details and structural arrangements to ensure that an efficient overall outcome is achieved. A design that is easy to build will invariably result in better quality, durability and whole life cost.

We fully embrace the philosophy behind partnering and seek to work closely with all parties involved with a project to deliver a design that all can take pride in. Where required and working with our strategic partners we are able to offer clients experienced teams that are able to deliver the full scope of services for most infrastructure projects.

AWARDS

Our international reputation for providing creative design has been recognised through a number of awards for our designs, our BIM modelling, and with respect to the business overall.

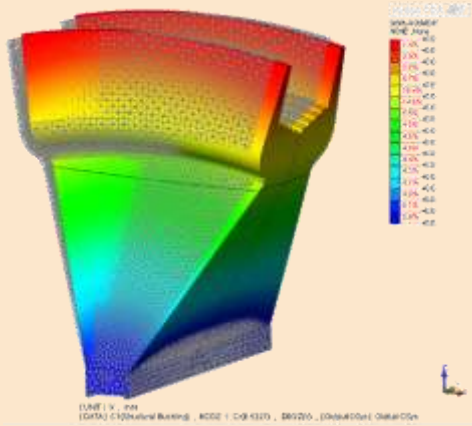
Selected examples include:

- 2013 Queens' Award
- 2016 ICE Wales Innovation Award (Pont Briwet)
- 2017 Saltire Award winner (Edinburgh Gateway)
- 2019 NCE100 Trending20 (SME of the year) winner
- 2023 UK Tekla Awards winner (Tideway)

ADVANCED ANALYSIS

Our design philosophy involves combining our experiences from successful projects from the past, with new and emerging techniques for the future. We are continually seeking ways to improve the efficiency of the design and construction process, and surpass our clients' expectations. We have a broad capability for advanced numerical analysis covering both structural and geotechnical design. This includes:

- dynamic/seismic analysis
- energy dissipative structures
- track-structure interaction
- non-linear materials including cracked concrete
- 3D soil-structure interaction



NET ZERO

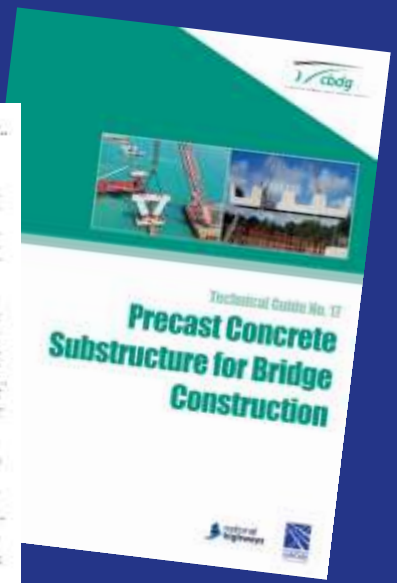
As signatories to UK Structural Engineers Declare and members of the Net Zero Bridges Group we are committed to identifying strategies and innovations to reduce embodied carbon within the projects that we design. We assist our clients to assess and benchmark their projects for life–cycle embodied carbon in accordance with PAS 2080. promoting reuse and rehabilitation where possible or reduction and efficient design where not.

We believe we have a moral and professional responsibility to play our part in responding to the climate emergency.

DESIGN for MANUFACTURE AND ASSEMBLY (DfMA)

Since our inception we have pioneered and championed the use of DfMA in our projects, including numerous major infrastructure works. This includes off-site construction of large structural elements and standardising complex geometry into modular units produced under factory-conditions.

This approach, as part of the wider value engineering services we offer to optimise the design and construction, regularly achieves substantial savings in construction costs. The benefits reach far beyond this however, as our DfMA designs can simplify on-site activities, accelerate construction, de-risk the critical path, enhance efficiency and enable safer working methods. Furthermore, it brings extra benefits to society by minimising the adverse impact to the environment and public.



Our DfMA designs have featured in various industry, including the New Civil Engineers Magazine from the Institution of Civil Engineers and the Concrete Society Magazine. We have also recently authored the Concrete Bridge Development Group Technical Guide for use of precast substructure elements in bridge works

SELECTED EXAMPLES

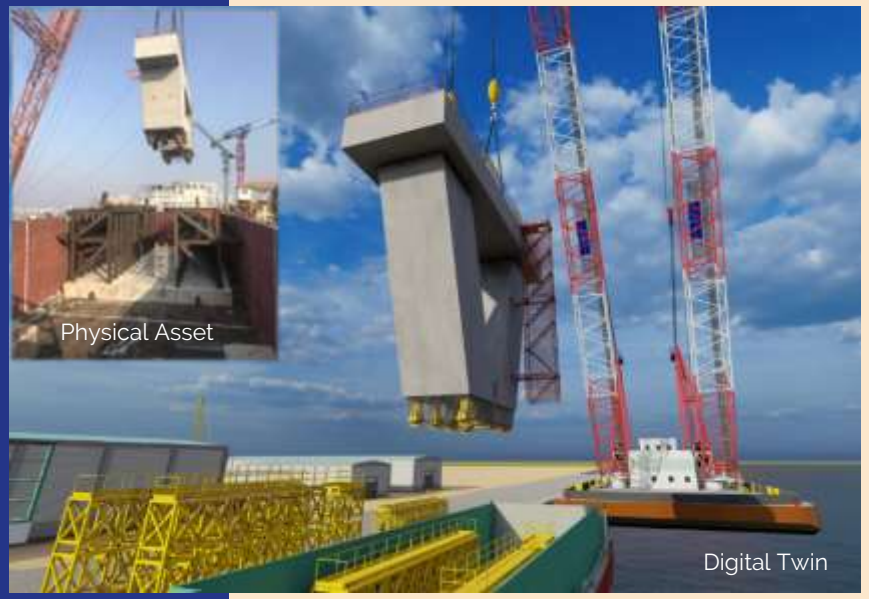
- Large V-piers fully precast on Cross Bay Link in Hong Kong.
- Modular steel propping system design in the UK for deep basement and excavations.
- Precast segmental method used for scores of km of viaducts in Malaysia, Indonesia, Dubai and elsewhere around the world.
- Precast bridge piers, crossheads and beams for multiple bridges in the UK.
- Prefabricated steel decks for bridges.
- Steel cantilevered piling platform for construction of marine piles over quay wall.
- Precast piles, beams and slabs for stations on Jakarta Metro.
- Tunnel design using precast units in UK and Hong Kong.
- Steel modular temporary works for heat-straightening works during bridge repairs.
- Precast shells for simple construction of marine pile caps in Brunei and Kuwait.
- Platforms constructed using modular precast units for an underground station in Luton, UK.

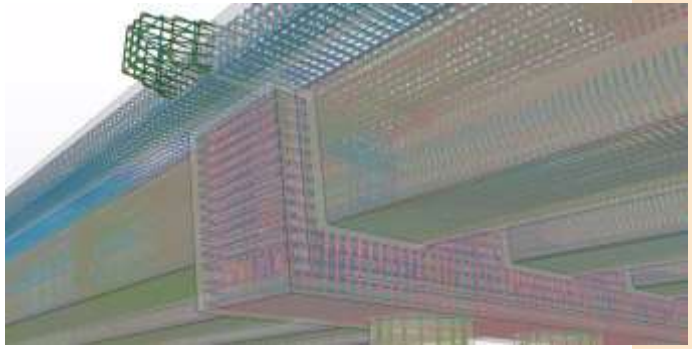
DIGITAL ENGINEERING AND BIM

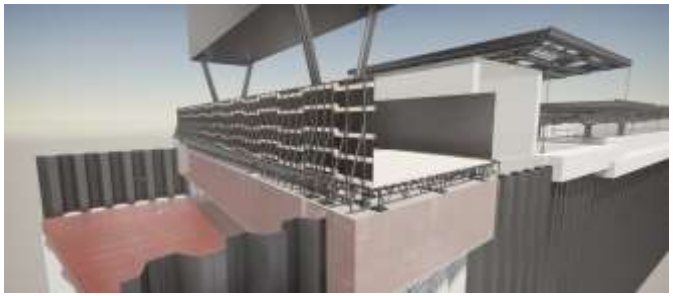
Over the past decade we have been proactively integrating digital engineering and BIM modelling into our standard processes and have established a successful track record of delivering permanent and temporary works using the latest modelling technology. We provide BIM services in accordance with ISO 19650, producing 3D models with associated metadata and interfacing across multiple disciplines with common data environments. Sharing models via the internationally-adopted Industry Foundation Class (ifc) enables us to interface effectively with models from all other disciplines regardless of specific software.

Development and sharing of these 'digital twins', accurately representing both geometric and non-geometric data of the built asset, fosters collaboration and leads to more effective communication, faster decision making, and better risk-management.

We use these models to evaluate buildability, inform programme planning and quantify material consumption during construction and in service. Where beneficial we generate 4D simulations, where the entire planned construction process is virtually represented in the digital environment. In this way all details can be reviewed in advance by stakeholders. This also enables proactive participation from the supply chain meaning potential issues can be identified and resolved early, leading to smoother operations during the site works.







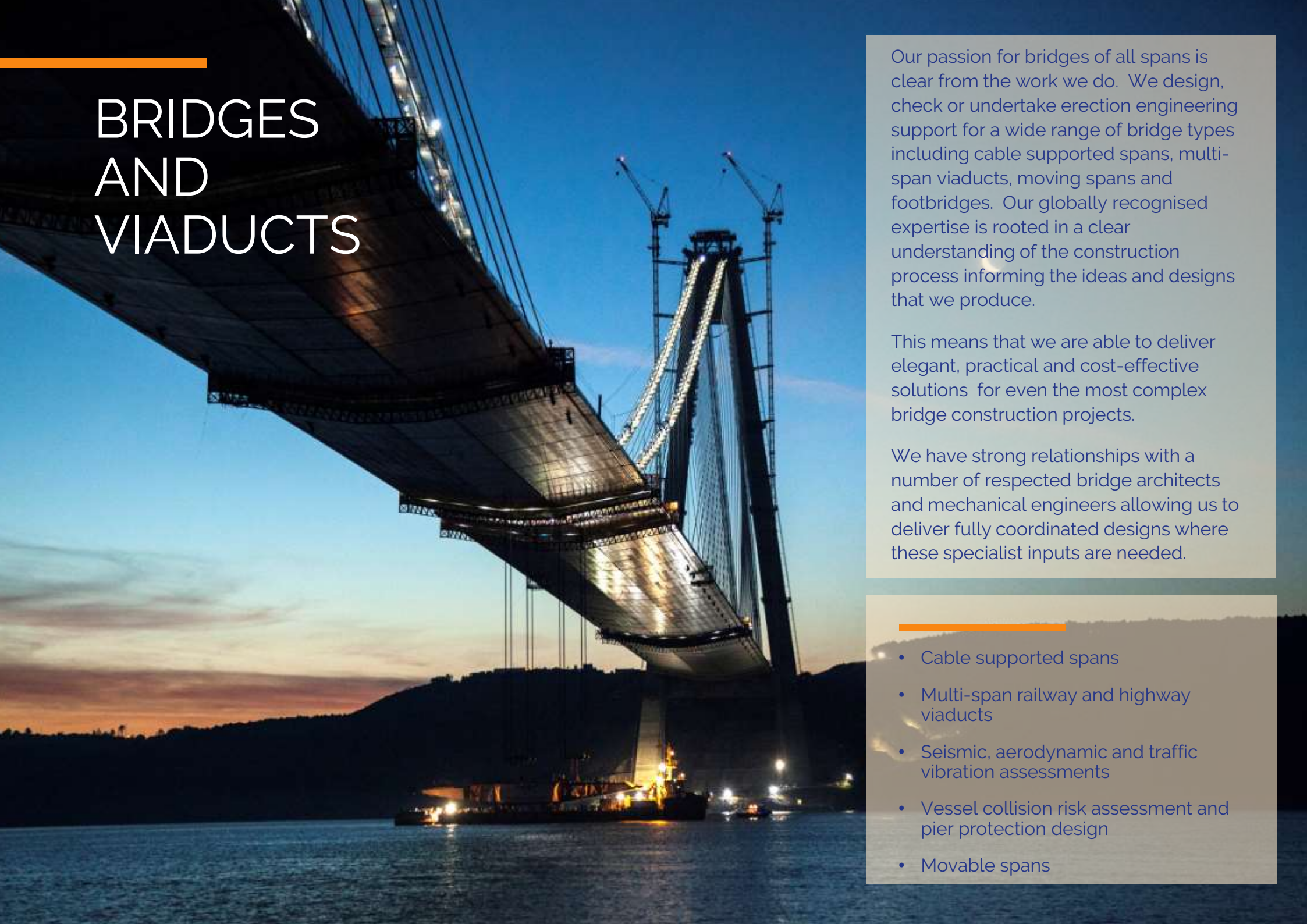
TAILORED SOLUTIONS

We are firm believers that the benefits of BIM and digital engineering extend far beyond the bare minimum of the contract requirements. We work proactively with the wider team from the earliest possible opportunity to identify the benefits of digital engineering on each project.

This includes:

- BIM modelling in accordance with ISO 19650 for design, construction and operation.
- 3D reinforcement detailing with automated scheduling.
- Digital twin production.
- 4d construction simulation.
- Clash detection.
- Integration of permanent and temporary works models for construction planning.

BRIDGES AND VIADUCTS



Our passion for bridges of all spans is clear from the work we do. We design, check or undertake erection engineering support for a wide range of bridge types including cable supported spans, multi-span viaducts, moving spans and footbridges. Our globally recognised expertise is rooted in a clear understanding of the construction process informing the ideas and designs that we produce.

This means that we are able to deliver elegant, practical and cost-effective solutions for even the most complex bridge construction projects.

We have strong relationships with a number of respected bridge architects and mechanical engineers allowing us to deliver fully coordinated designs where these specialist inputs are needed.

- Cable supported spans
- Multi-span railway and highway viaducts
- Seismic, aerodynamic and traffic vibration assessments
- Vessel collision risk assessment and pier protection design
- Movable spans

Brentford Lock West Active Travel Bridge

CLIENT: Waterside Places **LOCATION:** London **YEAR OF COMPLETION:** 2023

Brentford Lock West is a residential development in West London forming part of the overall rejuvenation of the area. The development includes an 80m long footbridge crossing the existing River Brent to maintain the waterfront as a focus of the scheme and improve access to Brentford Railway Station.

We were engaged as the bridge engineering consultant to develop the new footway/cycle bridge. A number of concept designs were developed and a preferred option taken through the planning and approval in principle stages. After receipt of planning consent we undertook the detailed design.

The preferred option is a sleek, low height, steel, vierendeel truss superstructure, supported on slender, V shaped concrete substructures. Both the top and bottom chords of the superstructure curve in elevation, with the top chord additionally curved transversely, forming a complex and visually attractive arrangement.

Construction of the bridge was completed in 2023.

KEY FACTS:

- Concept, preliminary & detailed design
- Slender form steel superstructure
- Dynamic analysis

Singapore High Speed Rail Crossing

CLIENT: AECOM **LOCATION:** Singapore **YEAR OF COMPLETION:** 2017

We carried out the preliminary and reference design for this 550m long extradosed bridge for the HSR crossing the PIE highway, with main spans of 175m.

The twin cell concrete box deck was supported by two planes of extradosed cables arranged in a parallel layout down both sides of the deck and supported on concrete pylons and piers, on bored pile foundations.

The HSR interaction with the structure was a critical aspect of the design, requiring a stiff structural arrangement to satisfy the deflection and vibration requirements for HSR operation.

The bridge layout and construction sequence were dictated by the existing dual carriageway expressway over which the HSR passes.

KEY FACTS:

- High speed rail
- Extradosed bridge
- Insitu segmental box girder deck

Pont Briwet Viaduct

CLIENT: Hochtief (UK) Construction **LOCATION:** Wales **YEAR OF COMPLETION:** 2015

We led a team in providing the detailed design for a 1.5km road and 800m rail improvement scheme which included a seven span viaduct using precast beams and crossheads, separate decks for the highway and railway. The 134m long fully integral viaduct does not have bearings or formal movement joints and is the longest structure of its type in the UK. In addition, specialist track/structure interaction design avoided the use of expensive and difficult to maintain breather switches at either end of the rail bridge. The new track alignment also involved a rock armoured embankment and a replacement precast concrete station at Llandecwyn.

The bridge has separate decks supported on combined crossheads. The crossheads were designed with a precast external shell to act as a permanent shutter. The bridge was constructed in two stages with the rail first to allow the bridge to remain open to traffic. The deck construction stages allowed for the support of a temporary deck to carry road traffic during the works. This was to avoid construction of a separate temporary bridge.

All the designs had to meet the highest environmental requirements of the Snowdonia National Park and resulted in us winning the ICE Wales Award for Innovation.

KEY FACTS:

- Detailed design of road/rail viaduct
- Innovative tender solution
- Hydraulic modelling

Cross Bay Link

CLIENT: China Road and Bridge Corporation **LOCATION:** Hong Kong **YEAR OF COMPLETION:** 2021

Cross Bay Link is a 1km sea crossing, the centrepiece of the new East-West Express Highway link in the Tseung Kwan O area of Hong Kong. We were appointed by the Main Contractor as their Designer to provide various design and erection engineering services on this project.

We undertook detailed design for 12No iconic V-piers which support both the main bridge and approach viaducts. Our design adopted an innovative precasting solution which enabled the majority of the works to be completed off site. It also featured the use of hollow sections for the concrete structure in order to reduce the self weight and achieve a more efficient structural arrangement.

We carried out the erection engineering analysis for all the steel bridges, comprising a 200m long tied arch main span and two 100m long side spans This included full stage-by-stage analysis, evaluation of deflection and precamber, development of erection method, cable stressing analysis, and assessment of bridge's capacity during erection stages.

KEY FACTS:

- Detailed design of permanent works featuring the precast concrete V piers located in a marine environment
- Erection engineering for the long span arch bridge
- Temporary works design enabling efficient and safe bridge erection

Izmit Bay Ozman Gazi Bridge

CLIENT: Capita Symonds on behalf of the Lenders **LOCATION:** Turkey **YEAR OF COMPLETION:** 2011

We provided specialist advice on the approximately 400km long Gebza-Orhangazi-Izmir Motorway BOT Project. The project consisted of suspension bridge with a main span of approximately 1,500m, an overall length of approximately 3,000m and a major approach viaduct, the southern approach viaduct, approximately 1,400m in length. The southern approach viaduct alignment crosses several strands of the North Anatolian fault.

We advised on the review of the design, construction methodology, and on the operational and maintenance aspects of the suspension bridge and the southern approach viaduct. As part of Lenders' Technical Advisory team, we worked closely with Lenders, the sponsors, their advisors and contractors to assist a financial close on the project.

KEY FACTS:

- Steel box deck
- Steel towers
- Construction methodology
- Reinforced concrete substructure

Yavuz Sultan Selim Bridge (3rd Bosporus Bridge)

CLIENT: Hyundai/ SK Joint Venture **LOCATION:** Turkey **YEAR OF COMPLETION:** 2013

The Yavuz Sultan Selim Bridge (3rd Bosporus Bridge) is the widest hybrid suspension/cable-stayed bridge in the world with a width of 59m, while the longest span which is 1,408m has a rail system on it between the highway carriageways. The towers at 322m are amongst the tallest in the world.

The bridge has an unusual hybrid suspension system having both cable stays that support the outer thirds of the main span on either side and a suspension cable which supports the central third.

We were appointed to assist the contractor with the design development and advise on the buildability of the bridge structure. We assisted in the value engineering as part of the design development, working alongside the permanent works designers.

We were able to deliver changes to the design which improved buildability and reduced construction costs.

KEY FACTS:

- Long span hybrid cable supported bridge
- Buildability and design advice
- Value engineering
- Steel box deck and concrete towers

Tsueng Kwan O Southern Footbridge

CLIENT: China Road & Bridge Corporation
LOCATION: Hong Kong
YEAR OF COMPLETION: 2022

Tsueng Kwan O Southern Footbridge features a 100m main span arch with asymmetrical hanger configuration and double-curved deck.

We undertook the detailed design for the foundations of the arch bridge and the associated access ramps which are connected to the coastal footpath. We also provided the full erection engineering services for the steel arch bridge and side spans, covering their entire off-site assembly, marine transportation and on-site lift-in erection process.

We created a 'Digital Twin' to simulate the construction method and sequence as well as carrying out clash analysis.

River Suck Bridge Rehabilitation

CLIENT: Galway County Council
LOCATION: Ireland
YEAR OF COMPLETION: 2023

We were appointed to assist in developing maintenance and rehabilitation works for the River Suck Bridge, a five-span masonry arch bridge located in Co. Galway. The bridge is a National Monument, originally constructed in 1575 and widened using similar materials in 1745.

Our remedial works included strengthening of the arches where separation was observed, redesigning surface water drainage to prevent water ingress into the masonry, repair of the deteriorated masonry and breakwaters.

All works were carried out using traditional methods in keeping with the structure.

Temburong Crossing CC2 and CC3

CLIENT: Daelim
LOCATION: Brunei
YEAR OF COMPLETION: 2021

We were the Contractors Independent Checking Engineer for the designed elements, including both temporary works and permanent works items, for two cable-stayed bridges, connecting viaducts and ramps of adjacent interchange. The cable-stayed bridges are a 3-span arrangement with a 260m main span and a 2-span arrangement with spans of 145m.

The decks are prestressed concrete edge beams with a concrete slab. The viaducts and ramps are precast concrete segmental box girders erected as balanced cantilevers.

RAIL

We have delivered designs and construction engineering solutions for a wide range of railway structures across the world. These include new build high speed, mainline and rapid transit projects as well as enhancement schemes within existing live rail environments where clear thinking over safety and construction scheduling are critical.

We have proven expertise in the design of bridges, stations, underpasses, retaining walls and slopes. Where a broader spectrum of services is needed, we work with established partners who can provide permanent way, signalling, power and telecommunications designs that are fully integrated with the structural elements.

- High speed, MRT and LRT structures
- Rail bridge replacement schemes
- Station structural design
- Integrated railway structures

HS2 Phase 1 N1 & N2: Independent design checks

CLIENT: Arcadis for BBV JV **LOCATION:** UK **YEAR OF COMPLETION:** In progress

Phase one of HS2 comprises 140 miles of high-speed railway extending from London to the West midlands. Packages N1 and N2 form the northern section of phase one and contain hundreds of assets including bridges works, embankments, tunnels and minor structures.

We are providing independent check services for bridges and embankments on N1 and N2, in conjunction with Arcadis. Working directly for contractor BBV JV, the check team undertake fully independent geotechnical interpretation and assessment, and structural design verification.

Structures are assessed in accordance with the Eurocodes and HS2 project standards. This includes dynamic assessment of bridges and earthworks in accordance with the latest standards, using both theoretical high speed load models (HSLM) and real train data.

KEY FACTS:

- High Speed Rail
- Dynamic Analysis
- Design to Eurocodes
- Bridges and embankments
- Independent design verification

Luton DART Gateway Bridge, Independent Design Check

CLIENT: Volker Fitzpatrick – Kier Joint Venture **LOCATION:** Luton, UK **YEAR OF COMPLETION:** 2021

The new Direct Air Rail Transit runs from the existing Network Rail Luton Mainline Station to the new Central Terminal underground station which is adjacent to the Airport South Apron area. The Gateway Bridge has a 72m span and carries the twin track light rail system at 200m plan radius curve over the A1081 Airport Way as the main access to the airport.

We were appointed by the JV contractor to undertake the independent Category 3 design check of the 72m single span steel composite box girder gateway bridge. The design incorporates an architecturally driven tapered truss as a feature of the bridge that carries some load but has limited restraint. We therefore undertook non-linear buckling analysis of the bridge to confirm the design resistance of the truss top chord in accordance with the Eurocodes. The large bridge abutments have piled foundations into the chalk.

In addition to checking the bridge for the in-service condition we were also commissioned to check the design of the permanent works during assembly, transport and installation for the bridge move in November 2019.

KEY FACTS:

- Independent detailed check
- Steel composite curved box girder deck
- Complex buckling analysis
- Complex 1km bridge move

Jakarta Mass Rapid Transit CP103

CLIENT: Obayashi Corporation **LOCATION:** Indonesia **YEAR OF COMPLETION:** 2020

The new MRT system in Jakarta is Indonesia's first, providing much-needed relief to the existing road network by offering an alternative transport mode through the city.

The project includes 4.7km of viaduct, 4 new overhead stations as part of Package CP103. We were appointed the structural designers for the bridgeworks, and all four stations, working directly for the contractor.

The viaduct deck was formed using precast segmental construction, erected span by span using an overhead gantry. The post-tensioned concrete box girders were delivered on site along the completed deck in the congested urban areas.

The stations are generally reinforced concrete beam, slab construction on reinforced concrete columns, with steel beam composite platform level and steel truss roof structure. At one feature station, the roof utilises a tension membrane on a truss frame to give a shaped fabric construction.

All structures were designed for high seismic loading at both serviceability and ultimate limit states, using the latest international codes of practice combined with site-specific design spectra.

KEY FACTS:

- Erection engineering
- Precast segmental construction
- Viaducts and Stations
- Earthquake Engineering

Klang Valley MRT- Sungai Buloh- Kajang (SBK) Line

CLIENT: MMC Gamuda KVMRT Sdn Bhd **LOCATION:** Malaysia **YEAR OF COMPLETION:** 2016

The MRT SBK is a 43km mass transit line which links the densely populated areas of Damansara in the northwest and Cheras in the southeast, through the central business district of Kuala Lumpur city.

We undertook the preliminary and detailed design of over 20km of concrete box girder deck and associated substructure for the new MRT system. The viaduct standard spans consist of simply supported decks with spans up to 39.8m utilising dry jointed precast segments and external tendons. Long spans up to 110m are continuous hunched boxed girder decks built using the balanced cantilever technique with either precast or in situ construction and utilising internal tendons. The piers and portals are in situ concrete, either simply reinforced or prestressed.

KEY FACTS:

- Preliminary and detailed design of precast segmental concrete box girder
- Dry jointed precast segments
- Balanced cantilever technique

Dubai LRT- Red Line

CLIENT: Atkins
LOCATION: Dubai
YEAR OF COMPLETION: 2006

For the LRT system in the state of Dubai, we provided detailed design and erection engineering of a 42km post tensioned viaduct deck. The decks were mainly simple supported girders erected using a number of gantries on a span by span basis. In addition to the simple supported spans, a number of two span continuous deck structures were designed for the station and the crossover areas.

We also undertook a value engineering exercise to optimise the quantities and buildability of the deck units giving high repeatability over the project.

Wessex capacity Upgrade

CLIENT: Skanska UK Civil Engineering
LOCATION: UK
YEAR OF COMPLETION: 2018

We carried out temporary works design and checking at the former Waterloo International Terminal, including outline layouts for a temporary roof covering, and complex temporary works design and construction sequence to form new pedestrian openings in the historic masonry walls under the tracks and through the platforms. We also carried out a Category 3 check on a temporary tie to the 3 pin arch which was required to allow part removal of the concrete track slab structure. We designed a prop system to support a Kirow crane on a masonry rail bridge widened in steel. We used 3D modelling to understand the layout of the existing structure and to present our proposals.

Luton DART Parkway Station

CLIENT: Volker Fitzpatrick / Kier JV
LOCATION: Luton
YEAR OF COMPLETION: 2023

We were appointed structural designer for Luton DART Parkway Station, The primary station structure is reinforced concrete from foundation to first floor level, which is where the platforms and tracks are located. Steel columns support parasol roof structures spanning to the station edges. Lightweight steel framing supports glazed walling around the station perimeter, and a steel link bridge provides connectivity to the Network Rail station at first floor level. The station was delivered to BIM Level 2 in accordance with PAS 1192-2, and all reinforcement was detailed in the 3D model.

ROADS

From complex multi-level grade separated interchanges to simple single span bridges, we have a wealth of experience in helping clients identify, plan and then implement cost effective and practical highway structures.

We are familiar with all construction types and materials allowing us to genuinely provide the best solution for any particular project taking into account the specific geographical, environmental, cultural and commercial constraints.

- Value engineered structures for complex interchanges
- Experts at delivering practical solutions for projects in live traffic environments

M3 Junction 9 Improvement Scheme

CLIENT: VolkerFitzpatrick Ltd **LOCATION:** Winchester, UK **YEAR OF COMPLETION:** Ongoing

Highways England are upgrading junction 9 of the M3 motorway, to alleviate traffic congestion at this busy interchange with the A34, A33, and local services into Winchester.

This improvement scheme includes replacement of existing structures, erection of new bridge works, and construction of two underpasses to accommodate a highly complex arrangement of proposed slip roads and reprofiled access routes. The motorway and associated connections must remain fully-operational throughout the works.

We were appointed by contractor Volker Fitzpatrick at the Early Contractor Involvement stage, to provide temporary works designs, constructability advice, and demolition planning services for key existing and proposed structures along the route.

This includes analysis and optioneering of excavation methods and sequencing for underpass structures, and consideration of the integration between permanent and temporary works to deliver an efficient and buildable scheme.

KEY FACTS:

- Early Contractor Involvement
- Temporary works designs
- Constructability advice
- Bridges and underpasses

Dengkil Interchange

CLIENT: Gamuda **LOCATION:** Malaysia **YEAR OF COMPLETION:** 2019

We were appointed by Gamuda to provide detailed design services for the bridgeworks in the Dengkil Interchange project.

This comprised two packages. Package 1 was the North Bridge, which is approximately 815m long and spans across the Elite Expressway. It consists of RC spine beam deck except for the section of the expressway, where prestressed concrete box-girder deck was used to enable balanced cantilever construction and minimise disruption to the existing road network underneath. Package 2 included two ramps with a total length of 1km that form spur roads connecting the Toll Plaza of the new development with the Elite Expressway. The deck arrangement is similar to Package 1.

Cast in-situ spine beams were adopted as part of our alternative design for precast beams in order to simplify construction and reduce overall project cost.

KEY FACTS:

- Detailed bridge design
- RC spine beams
- Box-girder deck
- Balanced cantilever method

A13 River Lea Crossing Refurbishment Detailed Design

CLIENT: Road Management Services (A13) Plc **LOCATION:** London **YEAR OF COMPLETION:** Ongoing

We are undertaking detailed design of the refurbishment of the River Lea Crossing in East London. The bridge is a two-pinned arch structure comprising 16 riveted steel arch ribs.

Having previously undertaken a comprehensive programme of surveys, inspection and assessment we were able to demonstrate that refurbishment was a feasible option instead of replacement, drawing on the 'build less' approach in PAS 2080. The refurbishment scheme offers embodied carbon savings in the order of 50%.

The assessment included the mass concrete abutments to demonstrate their continued function and safety.

The design was managed in two phases: an ECI phase in which the refurbishment proposals were developed with the input of a specialist steelwork contractor, to ensure the proposals were buildable and to identify specific risks to the project; the second phase comprised the detailed design.

Our appointment includes fulfilment of the Principal Designer role and supervision throughout the construction phase.

KEY FACTS:

- Refurbishment solutions
- Steel two-pinned arch
- Surveys, inspection and assessment
- Significant embodied carbon savings

Glasgow Airport Improvement Area (GAIA) – Wright Street Link Bridge

CLIENT: Wills Bros / RPS **LOCATION:** Glasgow **YEAR OF COMPLETION:** 2022

The GAIA scheme is a series of highway improvements, with the aim of promoting development to the west of Glasgow Airport. The design and build contract was awarded to Wills Bros. Civil Engineering by Renfrewshire Council. We were appointed for the design of the two bridges on the scheme, a 98 metre span footbridge over the Black Cart Water and a highway bridge over White Cart Water.

The Wright Street link highway bridge is key to the scheme connecting existing industrial development with the new improvement area nearer the airport. The bridge is 70 metres long over three spans and is fully integral with a prestressed concrete beam and slab deck. To avoid complex river temporary works at the piers we designed precast shell crossheads installed over a single rows of piles. The crossheads were completed with an in-situ concrete pour, with reinforcement detailed to accommodate the significant number of services that had to be accommodated. We undertook a numerical soil-structure interaction analysis to properly account for the locked in cyclic thermal effects associated with an integral bridge of this length.

KEY FACTS:

- 70m long, fully integral bridge
- Precast concrete shell crosshead and precast beams
- Large diameter critical services

Rosie Hackett Bridge

CLIENT: Roughan O'Donovan
LOCATION: Ireland
YEAR OF COMPLETION: 2012

We completed the Independent Design Check for this slender post-tensioned concrete integral bridge with an architecturally inspired curved soffit. The structure spans 47m with a span to depth ratio 1:100. Designed to carry a combination of light rail and traffic, the bridge also provides designated cycle and pedestrian paths on either side resulting in an overall width of 26m.

In order to achieve the structural depth which was determined by navigation and vertical constraints, ultra high strength concrete of compressive strength 105 N/mm2 was adopted.

The bridge is flanked by historic quay walls, additional loading to which was avoided through the use of integral abutments.

Hong Kong Link Road

CLIENT: Mott MacDonald
LOCATION: Hong Kong
YEAR OF COMPLETION: 2013

The proposed 12km long Hong Kong Link Road connects the Zhuhai-Macao Main Bridge at the HKSAR boundary with the Hong Kong Boundary Crossing Facilities (HKBCF) situated at the north eastern waster of the Hong Kong International Airport. Opening a new and direct connection route between Hong Kong, Macao and the Western Pearl River Delta.

We undertook the detailed design of the 356m long seven span section of twin box precast segmental viaduct between HKSAR Boundary and Scenic Hill. The twin post tensioned box girders had a maximum 55m span and were built into concrete portals constructed integrally with the piers or supported on bearings.

Chelsea Bridge

CLIENT: Hyder Consulting
LOCATION: United Kingdom
YEAR OF COMPLETION: 2015

Chelsea Bridge is an historic self-anchored suspension bridge, the first of its type built in Britain completed in 1937 and is a Grade II listed structure. It crosses the River Thames in West London connecting Chelsea and Battersea with a main span of 101m.

We undertook an independent check of the bridge assessment on behalf of the Royal Borough of Kensington and Chelsea to ensure the capacity of the carriageway and walkway met the current restrictions of 40 and 7.5 tonnes respectively. The check included consideration of the bridge's unusual and complex construction sequence relating to the deck and hanger installation method

TEMPORARY WORKS AND ERECTION ENGINEERING

We understand construction and have extensive experience supporting contractors in the process. We design efficient temporary works ranging from the simplest propping systems to complex bridge erection equipment. Wherever possible we also work closely with our clients to integrate their construction requirements with the permanent works design. We've undertaken erection analysis and engineering for a number of major international bridge projects where our support has been instrumental to a safe and economic outcome.

- Major temporary works design and erection analysis for the 36km Subiyah Causeway Bridge in Kuwait
- Extensive expertise in developing efficient temporary works solutions.

Mesaimeer Road Upgrade Project

CLIENT: Consolidated Contractors Company **LOCATION:** Qatar **YEAR OF COMPLETION:** 2021

As part of a wider scheme to upgrade 4km of existing dual carriageways on Mesaimeer Road, Consolidated Contractors Company (CCC) constructed six bridges for Asghal, totalling 2,700m in length. All bridges were constructed using the balanced cantilever method, with post-tensioned precast segments. The longest spans, where the alignment crosses Salwa Road, are supported by extradosed cables. These are the first cable-supported bridges constructed in Qatar,

We undertook erection engineering for CCC, deriving precambers cast into the segments and predicting deflections at each stage to be used in alignment and geometry control throughout the works. Segment erection used a combination of lifting frames and cranes. Our analysis took into account the method chosen for each cantilever.

We also undertook structural checks at each stage of the construction process, and advised on phasing of temporary works including prestressing bars,

We further provided design services relating to the permanent bearings and shear keys, as well as design and checks for a number of temporary works items.

KEY FACTS:

- Erection engineering
- Precast segmental
- Balanced cantilever
- Extradosed cable-supported

Sheikh Jaber Al-Ahmed Al-Sabah Causeway Project

CLIENT: Hyundai Engineering & Construction Co. **LOCATION:** Kuwait **YEAR OF COMPLETION:** 2019

The Sheikh Jaber Al-Ahmed Al-Sabah Causeway Project (main link) is a 36km causeway crossing Kuwait Bay between Kuwait City and the Subiyah area.

The causeway consists of low-level bridges, embankments and transition islands. A cable-stayed bridge spans the navigation channel and a free-flow interchange at the Shuwaikh Port connects the causeway to the main road network at Kuwait City.

We provided support to contractor Hyundai on the design and construction of the bridge and of the temporary works. These including temporary bents, cofferdams and lifting frames, and local strengthening to permanent works for lifting and placement of steel and precast concrete items weighing up to 1800t.

We have also completed a shipping impact assessment and provided geometry control and erection engineering for the central cable-stayed bridge, which has a main span of 177m.

KEY FACTS:

- Construction support including temporary works designs.
- Geometry control for main bridge
- Ship impact risk assessment

Queensferry Crossing- Northern Launch Pit Foundations

CLIENT: Forth Crossing Bridge Constructors **LOCATION:** Scotland **YEAR OF COMPLETION:** 2015

Working for the Queensferry Crossing Bridge Constructors, a joint venture of Hochtief, American Bridge International, Dragados and Morrison Construction, we provided the concept design and CAT II checks for the Northern Launch Pit Foundations. We also undertook Category III independent design checks for all the temporary works associated with the Northern Viaduct Launch.

The approach viaducts were constructed as a single unit incorporating a temporary king post structure, resting on temporary supports located on pad foundations built in the launch pit. When completed the viaducts were launched over the abutment structure, seen at the bottom of the picture, and on to the temporary & permanent piers located in the Forth. When finally positioned, all the temporary structures were removed.

The design of the foundations was complicated due to the chosen location as the gantry cranes ran the length of the pit encompassing the deck section and they needed to build up ground level in part of the pit. Several the pads had to be structurally linked to prevent overturning under transverse forces.

KEY FACTS:

- Bridge launch temporary works
- Assembly area foundations
- Launching checks

Old Street Station and Roundabout Upgrade

CLIENT: Morgan Sindall **LOCATION:** London **YEAR OF COMPLETION:** 2022

The transformation of Old Street in London is a major project. modernising the station entrances and an outdated 1960s roundabout to create a much safer, more welcoming environment for everyone.

The northwest arm of the roundabout has been permanently closed to all traffic to create a major new public space with better walking and cycling access to Old Street station. The new station entrance was the most complex part of the project with the sloping 4 arm canopy supported on a single precast column.

We undertook detailed design and checking of temporary works for the upgrade to the roundabout and access to the underground station. This included the temporary towers to support the tapered precast arms for the station canopy to allow them to be manoeuvred into place. The design was prepared in 3D to accurately represent the complex geometry. The four support towers accommodated jacks on sliding surfaces to allow fine adjustment of the position during installation of the arms and perimeter precast beams.

We also checked temporary crash and protection decks, formwork and falsework temporary precast stair supports.

KEY FACTS:

- Temporary Works
- Construction Engineering
- 3D modelling

River Exe Pipeline Launch

CLIENT: Expanded Ltd.
LOCATION: United Kingdom
YEAR OF COMPLETION: 2008

Energy infrastructure company National Grid needed to install to a gas pipe through a 1.8km long bored tunnel under the River Exe between Lympstone and Powderham as part of a major project to improve the region's gas supplies. In conjunction with specialist contractor Expanded,

We developed an installation method that involved strand jack pulling the gas pipe through the tunnel on roller supports. We designed the necessary temporary works for the jacking and supporting the pipe as it was pulled through the tunnel. This included the jacking frame, roller frame and pulling nose for the pipe.

Geodesign Barrier Dams

CLIENT: Robert Nicholas Ltd.
LOCATION: United Kingdom
YEAR OF COMPLETION: 2017

Geodesign barriers provide a temporary dam solution commonly used in emergency flood defence around the world. Typically the system is self-supporting and reliant on the frictional resistance at ground level to prevent sliding.

Robert Nicholas Ltd. who use the product regularly in the UK commissioned us to provide structural design for bespoke items enabling use of the barrier system where the 'typical' support arrangement was not possible, We designed the steel backstops to provide necessary resistance in areas of low friction such as smooth concrete.

Ordsall Chord

CLIENT: Skanska Northern Hub Alliance
LOCATION: United Kingdom
YEAR OF COMPLETION: 2017

The Ordsall Chord is a key link between two existing rail routes in Manchester vital to improving the Northern Hub rail network. The main feature of the design is a network arch crossing the River Irwell. The existing crossing in this location is the Princess Street Bridge comprising two large truss girder, cross girders, trimmer beams and steel deck plates.

We checked the capacity of the bridge for its new role as part of the temporary works for the new river crossing..

OUR GLOBAL FOOTPRINT

INVESTING IN PEOPLE

Our reputation and success heavily depends on the quality and enthusiasm of our staff. We have strong links with a number of leading universities and have for many years been involved in scholarship and industrial training schemes where we target the highest quality students. This approach delivers mutual benefit; with students receiving professional experience in a leading design consultancy and the company in return having the opportunity to invest early in training its future engineers and business leaders.

We are fully committed to investing in the development of our team of incredibly talented individuals. We do this by:

- Encouraging the next generation: providing work experience for senior school students who are considering a career in civil engineering.
- Hands-on experience: working closely with universities to provide scholarships, industrial placements and training opportunities to undergraduates studying civil engineering.
- Supporting development: mentoring and encouraging all graduates on their route to professional qualification with the Institution of Structural Engineers.
- Opportunities to progress: giving opportunities for talented and motivated engineers to progress quickly into responsible roles on projects and to undertake overseas assignments.
- Enhancing skills: delivering an active internal and external CPD training programme to ensure that we are aware of the latest innovations in engineering design and construction technology.

POLICIES AND ACCREDITATION

Our business operates in accordance with ethical principles and good business practice. Our current policies can be downloaded from our website.

Our business management system is independently accredited to ISO 9001:2015.

We are audited members of the Railway Industry Supplier Qualification Scheme (RISQS).

OUR SERVICES:

- Feasibility and concepts
- Permanent works design
- Temporary works design
- Erection engineering
- Value engineering
- Embodied carbon assessment
- Independent checking
- Inspection and assessment
- Strengthening schemes
- Forensic investigation
- Technical advisor
- Contract administration
- BIM

FOR MORE INFORMATION PLEASE CONTACT US

UK Office
First Floor
84 North Street
Guildford
Surrey GU1 4AU
+44 (0)1483 560700
info@hewson-consulting.com

Ireland Office
4 Church Street,
Newcastle West,
Co. Limerick V42 F982
Ireland
+353 (0)69 92508
info@hewson-consulting.com.ie

Hong Kong Office
Unit 2003-2004, 20th Floor
9 Chong Yip Street
Kwun Tong, Kowloon
Hong Kong SAR
+852 3468 6766
info@hewson-consulting.com.hk

UAE Office
Office 513, CEO Building
CEO Building
Dubai Investment Park 1
Dubai, UAE
+971 58 1062966
info@hewson-consulting.ae