
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.

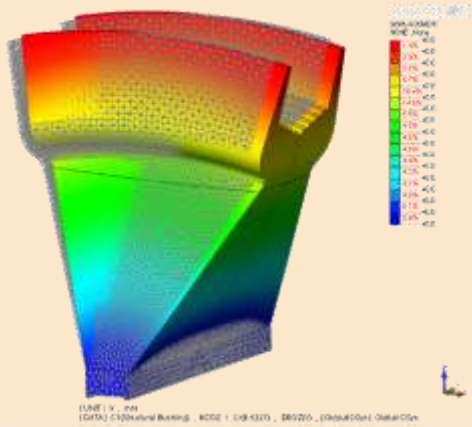
Selected examples include:

- 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)
- 2024 NCE Tunnelling Awards (Tideway)
- 2025 Bridges Awards (River Lea Crossing)

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

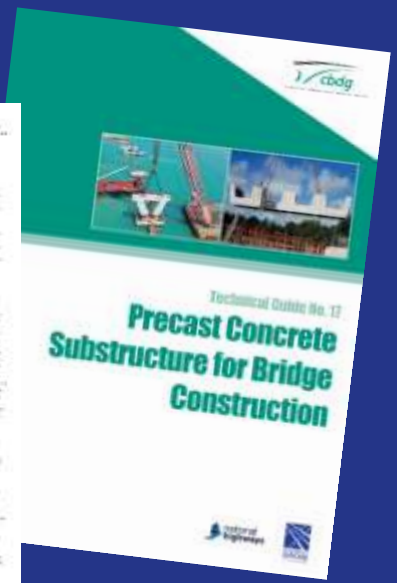
As signatories to UK Structural Engineers Declare and members of the Net Zero Bridges Group we are committed to identifying strategies and innovations to reduce embodied carbon within the projects that we design. We assist our clients to assess and benchmark their projects for life–cycle embodied carbon 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

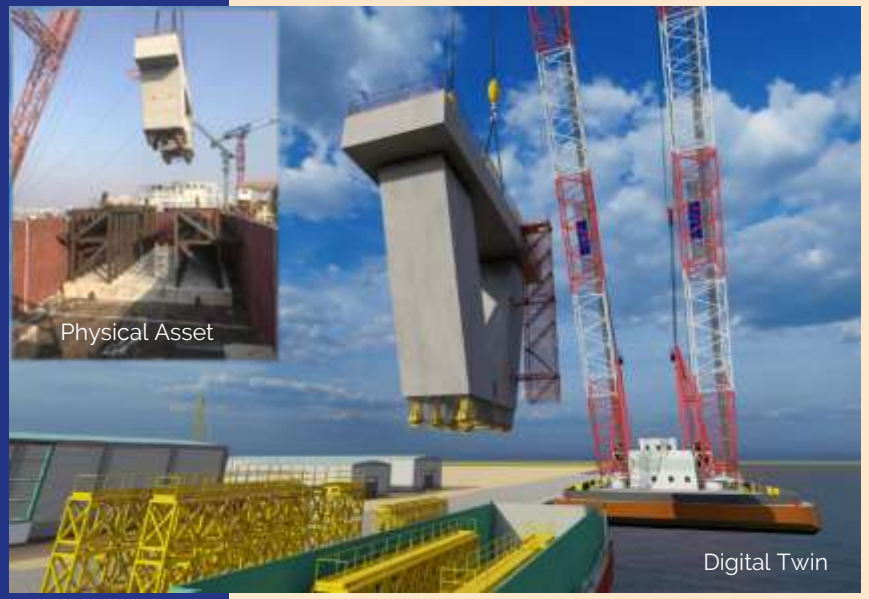
- Large V-piers fully precast on Cross Bay Link in Hong Kong.
- Modular steel propping system design in the UK for deep basement and excavations.
- Precast segmental method used for scores of km of viaducts in Malaysia, Indonesia, Dubai and elsewhere around the world.
- Precast bridge piers, crossheads 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.

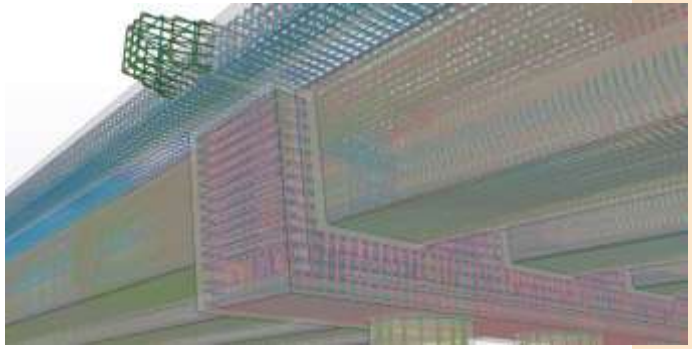
DIGITAL ENGINEERING AND BIM

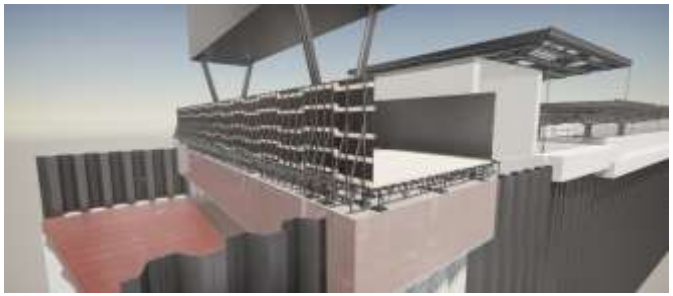
Over the past decade we have been proactively integrating digital engineering and BIM modelling into our standard processes and have established a successful track record of delivering permanent and temporary works using the latest modelling technology. We provide BIM services in accordance with ISO 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.







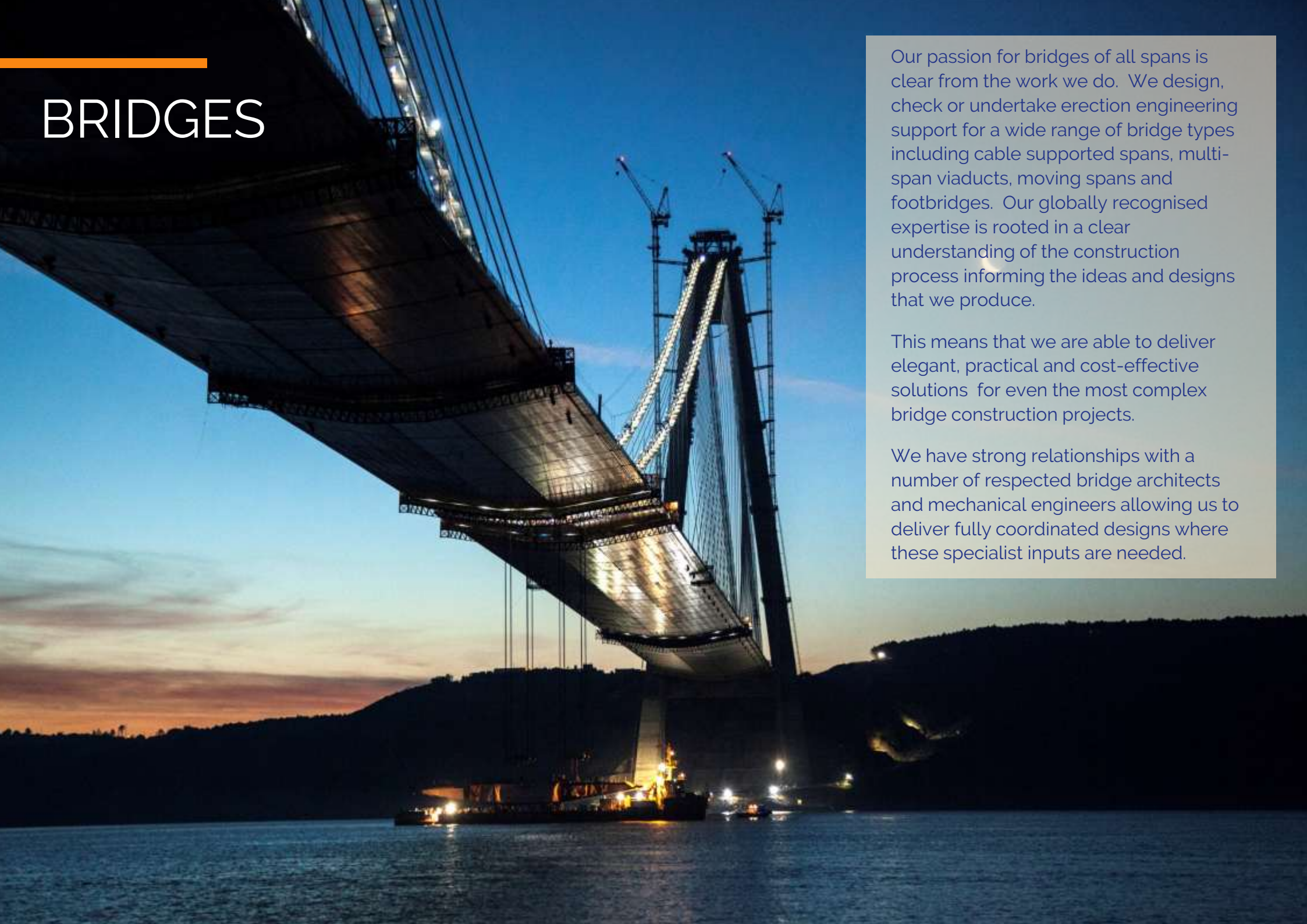
TAILORED SOLUTIONS

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



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.

Al Maqta Bridge Widening

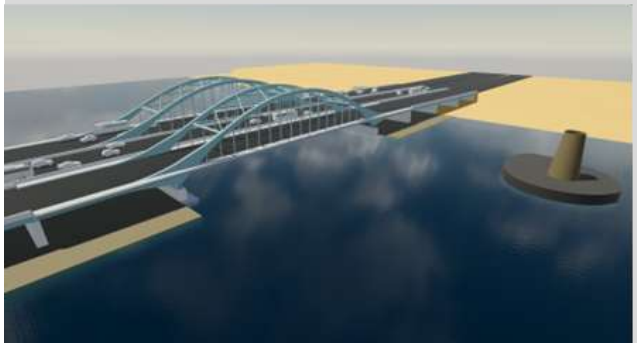
CLIENT: Meinhardt Ltd. **LOCATION:** Abu Dhabi **YEAR OF COMPLETION:** Ongoing

The goal of the Abu Dhabi South Island Connectivity Plan is to upgrade six consecutive intersections and structures to create a free-flowing corridor that distributes traffic across the four main arterial streets that continue to the downtown core of the city.

As part of this masterplan, the existing Al Maqta arch bridges are required to be widened, to accommodate an additional two lanes of traffic in each direction. Existing traffic capacity must be maintained throughout construction.

We are providing bridge design services for this project to Meinhardt. This includes reviewing existing information for these iconic structures, developing options and recommending preferred solutions. Considerations include options to retain and refurbish existing steelwork, particularly including the existing arches which are culturally significant for the city.

Our scope includes concept, preliminary and detailed design of the bridgeworks, working within the wider multi-disciplinary team.



KEY FACTS:

- Concept through detailed design
- Highway bridge
- Optioneering and constructability

Santubong Bridge

CLIENT: Jurutera Bintang Senari **LOCATION:** Malaysia **YEAR OF COMPLETION:** Ongoing

The new Santubong Bridge is a key element of the Jalan Sultan Tengah Road Upgrade, designed to increase capacity and support future transport needs.

Located adjacent to the existing bridge, it mirrors the structural form to maintain visual continuity. The 335m-long, three-span structure features an in-situ post-tensioned twin-cell concrete box girder, with a 145m main span and 95m end spans. Constructed using the balanced cantilever method, the deck varies in depth from 8m at the piers to 3m at midspan, carrying three lanes of road traffic and two dedicated ART lanes across a 24.2m-wide deck.

The main span is integral with the river piers, which sit on 4m-deep pile caps supported by 2.5m diameter bored piles driven 50m to rock through 25m of river water and very soft marine clay.

We undertook both the preliminary and detailed design, addressing complex ground conditions and vessel impact on both superstructure and substructure.

KEY FACTS:

- Balanced cantilever construction method
- Post-tensioned twin cell box
- Complex ground conditions
- Designed for vessel & Log Impact

Malaysia – Batang Rambungan Bridge, Sarawak

CLIENT: Jurutera Minsar Consult Sdn Bhd **LOCATION:** Sarawak, Malaysia **YEAR OF COMPLETION:** 2024

The Batang Rambungan Bridge enhances the connectivity of the existing coastal trunk road network in Southern Sarawak, replacing an existing ferry service and connecting Kuching to Lundu.

We worked with H&T Consulting providing the detailed design of the cable stayed bridge, with a configuration of 80m-160m-80m.

As the bridge deck is relatively narrow, the inclined H-shape pylon gives the bridge an open appearance, as well as improved torsional stiffness.

The deck is a cast in-situ edge-beam and slab arrangement over the whole length of cable-stayed bridge and was cast using the balanced cantilever construction method.

KEY FACTS:

- Detailed design
- 3-span Cable-Stayed bridge

Narrow Water Bridge

CLIENT: Louth County Council **LOCATION:** Ireland **YEAR OF COMPLETION:** 2013 + 2023

We undertook a full independent design check of Narrow water Bridge; a double cable-stayed and a moving bridge. With spans of 138m and 57m, the bridge carries a two-lane carriageway and pedestrian traffic over the river. The shorter moving span consists of a rolling bascule. We undertook independent checking of both the structural design and the performance specification for the M&E elements of the bridge.

A steel orthotropic box girder deck is supported by stays anchored to the slender composite pylons. A massive reinforced concrete abutment was required on the north side of the river to house the opening counterweight mechanism and hydraulic operating rams.

The design check was completed in 2013, while the project was put on hold in late 2013 due to funding issues, The project was resurrected in 2022 at which time we were again engaged for Cat 3 checking.

KEY FACTS:

- Independent Cat. 3 design check
- Steel orthotropic box girder
- Lift bridge

Cable stayed bridge at Sejingkat, Sarawak

CLIENT: JKR Sarawak **LOCATION:** Sarawak, Malaysia **YEAR OF COMPLETION:** 2023

We are working with H&T Consulting Engineers to provide detailed design of this proposed cable-stayed bridge spanning the Sg. Sarawak at Sejingkat.

The three-span structure is fully integral across all four piers, with a 400m main span providing clearance to the 200m wide, 28m high navigation channel below. The pylons have a diamond configuration in elevation, with the split piers tied together using steel bracing members.

Our input includes advice on design and detailing of the steelwork and concrete for the deck, pylons, and substructure in accordance with the Eurocodes.

A detailed finite element analysis model has been constructed for this task, and to assist with dynamic assessment, with modal shapes and frequencies assessed using linear eigenvalue analysis. These have informed studies into aerodynamic stability of the structure under wind, in both the permanent and construction conditions.

KEY FACTS:

- Cable-stayed bridge
- 400m main span
- Detailed design
- Modal analysis for wind assessment

Batang Lupar Bridge No2

CLIENT: Naim Gamuda Joint Venture **LOCATION:** Sarawak, Malaysia **YEAR OF COMPLETION:** Ongoing

Batang Lupar Bridge No. 2 is a cable-stayed bridge with 450m main span and 210m side spans. It is being constructed as part of the Sarawak second trunk road.

The towers and deck are constructed from concrete, with longitudinal prestress in the deck supplementing support from the stay cables. The deck structure, utilising a ladder deck arrangement with concrete top slab, will be constructed in-situ by cantilevering out from the tower locations using form travellers.

We are working with H&T Consulting Engineers Sdn Bhd, to provide construction engineering services to the contractor for all stages of bridge erection. This includes structural checks at every stage of the construction, deflection predictions to facilitate geometry control, and form-setting information for in-situ concreting works.

In addition, we have undertaken eigenvalue analysis to determine modal shapes and frequencies during construction and in-service, to facilitate wind assessment and testing for aerodynamic stability.

KEY FACTS:

- Cable Stayed Bridge
- 450m main span
- Construction engineering
- Dynamic analysis for wind assessment

Bintulu-Jepak Bridge

CLIENT: Opus **LOCATION:** Sarawak, Malaysia **YEAR OF COMPLETION:** 2022

The Bintulu-Jepak Bridge, with a total length of 3.6km will be a crucial connection on the Sarawak Coastal Road, linking Bintulu with the airport. The bridge supports a new highway crossing Sungai Sarawak towards the north of Bintulu centre, near the mouth of the river. It will link up with the existing highway network on either side of the river, including the upgrading of Jalan Matang / Kpg Paroh. As part of the crossing there will be a three-span cable-stayed bridge at the river location, with approach viaducts extending over 400m on the west side and 368m on the east

The 609m crossing has a main span of 330m with stay cables supporting the insitu concrete beam+slab deck. The main pylons and tie-down piers of the back span are all supported off large diameter bored piles

We were appointed by Opus to carry out an Independent Category 3 Design Check of the cable-stayed bridge crossing.

KEY FACTS:

- Independent Cat 3 Design check
- 330m span stay cable bridge
- Concrete beam+slab deck
- Bored piled foundations

Lupar 1 Bridge

CLIENT: Opus **LOCATION:** Brunei **YEAR OF COMPLETION:** 2024

The Coastal Road Network and the Second Trunk Road is set to provide the Sarawak state's coastal areas better access as it offers seamless connectivity between towns like Kota Samarahan, Sadong Jaya, Sebuyau, Kabong, Tanjong Manis, Daro, Matu, Balingian and Bintulu to the Pan Borneo Highway.

Jabatan Kerja Raya Sarawak (JKRS) are constructing a two-lane cable stayed bridge across Batang Lupar connecting Sebuyau ,Samarahan and Triso, Betong as one of the important links for the coastal road network

We were appointed by Opus, on behalf of JKRS, to carryout an Independent Design Check of the bridge crossing, including the 3-span cable stayed bridge with a main span of 324m. The check extended from the pylons, stay cables, deck, sub-structure and bored piled foundations.

KEY FACTS:

- Independent Cat 3 design check
- 324m span cable-stayed bridge
- Concrete beam+slab deck
- Piled foundations

Jurong Region Line Contract J109 – Viaduct Design

CLIENT: Aurecon **LOCATION:** Singapore **YEAR OF COMPLETION:** 2022

The Jurong Region Line (JRL) is a new 24km MRT line planned to extend the existing rail transport network in Singapore.

Contract J109 of the Jurong Region Line consists of the design of four stations and the associated elevated rail viaduct. We were appointed by Aurecon to assist their design by completing the detailed design of four packages of these viaducts.

The viaducts are precast segmental box girders, with both double cell and single cell boxes designed. The deck is integral with its intermediate supports, which are either RC piers or portals, and on bearings at its end supports. All foundations are bored pile groups.

All of the viaducts that we design are constructed using the balanced cantilever method, with central spans of up to 83m.

KEY FACTS:

- Detailed Design
- Post tensioned precast concrete box girder
- Balanced cantilever method

Cross Bay Link

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

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 12 No iconic V-piers which support both the main bridge and approach viaducts. Our design adopts an innovative precasting solution which enables the majority of the works to be completed off site. It also features 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

Nawaseeb Road Upgrade, Kuwait

CLIENT: SMEC (Kuwait) **LOCATION:** Kuwait **YEAR OF COMPLETION:** 2022

The Nawaseeb Road in Kuwait forms an important part of the country's national infrastructure, providing a strategic, logistical corridor to neighbouring Saudi Arabia.

It has been upgraded to include grade-separated junctions and widening of the highway. The works include 9 interchanges, 8 of which consist of a flyover carrying the dual carriageway highway over the at-grade road network. Interchange #5 includes a 1,040m long flyover above the at-grade roads along with a 1,590m elevated ramp structure. In addition, there are 4 Camel Crossings over the new widened Nawaseeb Road.

We were appointed to undertake the detailed design of the bridge structures on the project, including a series of precast concrete beam and slab decks as well as prestressed insitu concrete box girder decks and associated substructure and foundations. The precast beam decks have spans up to 45m, while the concrete box girders have spans up to 110m.

KEY FACTS:

- Detailed Design
- Multi-span precast beam bridges
- Multi-span in-situ box girder bridges

Richards Bay Power Island Project

CLIENT: Anchor Energy **LOCATION:** South Africa **YEAR OF COMPLETION:** 2021

Anchor Energy intends to develop a Liquified Natural Gas (LNG) Power Facility located in the Port of Richards Bay, South Africa. The facility will support LNG supply vessels, LNG Floating Storage Units, Power Barges and associated infrastructure.

We were appointed to develop a preliminary design for the bridge structures required to carry the pipes and cabling to the new Power Island. A detailed optioneering processes was undertaken to develop and evaluate solutions which met the requirements of the Power Island and minimized environmental impact in the highly sensitive surrounding area.

Numerous alignments were considered, each with different combinations of bridge structures including long span suspension and cable stayed solutions, steel truss viaducts which could be launched in place, and lightweight repeated spans for more accessible areas. The final arrangement had a total length of 2.4km

KEY FACTS:

- Feasibility/concept design
- Suspension bridges
- Cable stayed bridges
- Launched bridge construction

Gewan Island Entrance Bridge

CLIENT: Midmac-Porr JV

LOCATION: Doha, Qatar

YEAR OF COMPLETION: 2021

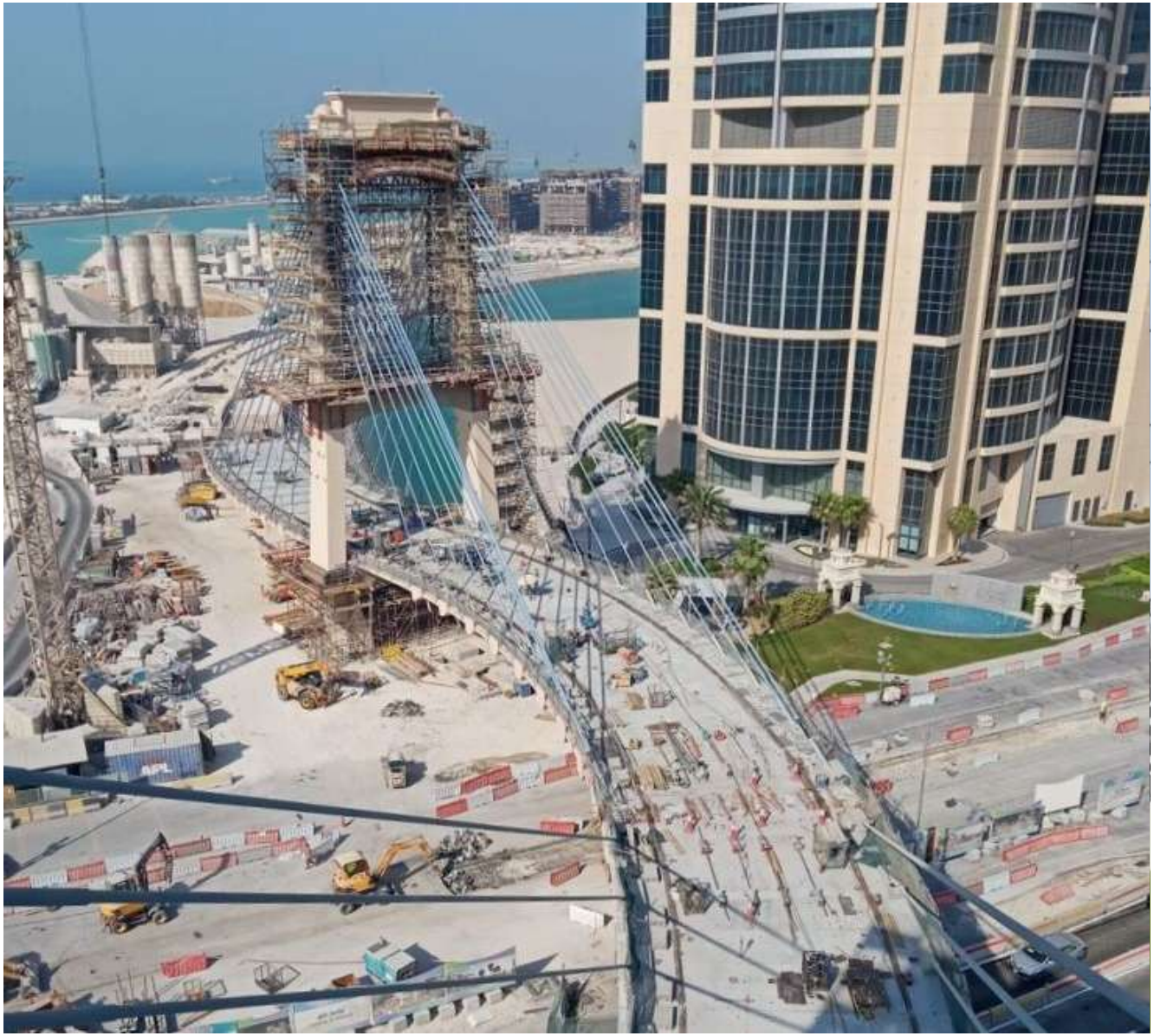
Connecting Lusail Expressway and The Pearl-Qatar Boulevard to Gewan Island, this 250m long structure is Qatar's first curved cable-stayed bridge. It will form an iconic entrance structure as well as providing transit to and from the new development of Gewan Island.

We provided construction engineering review and advice service to the contractor Midmac-Porr JV during erection of the bridge works. The deck is formed of post-tensioned precast segments and was erected via the balanced cantilever method.

The bridge horizontal alignment features a double-curve which results in eccentric loading from dead load, the cable-stay forces and post-tensioning. Careful consideration was required at each stage to maintain stresses within design limits across the full extent of the cross section, along the full length of the bridge.

KEY FACTS:

- Cable-stayed bridge
- Construction engineering
- Complex geometry
- Precast segmental erection



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

Temburong Crossing Contract CC2

CLIENT: Daelim- SWEE JV **LOCATION:** Brunei **YEAR OF COMPLETION:** 2019

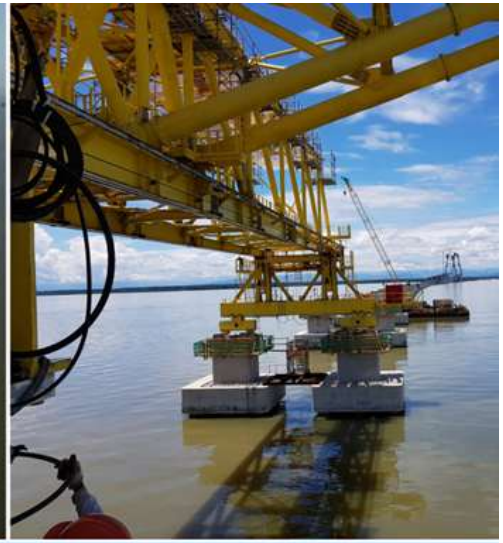
Temburong Crossing is a 30km link between the Brunei–Muara District and Temburong District across the Brunei Bay.

Temburong Bridge carries a dual two-lane highway over the Brunei Bay, with the CC2 package consisting of the main viaducts that connect between the cable-stayed bridges, included in package CC3, and link in with the Land Viaducts of package CC4. The viaducts consisted of full span precast concrete box girders on insitu concrete piers and pile caps with large diameter bored piles.

Our role on the project was as the Independent Design Checker for the Contractor designed elements of the permanent works and the temporary works for the superstructure and substructure construction.

The independent design check of the temporary works included the bespoke erection gantry used for superstructure erection, access and working platforms, falsework and formwork for superstructures and substruction casting, precast pile cap shells with associated steel cofferdam units, marine jetty and temporary bund for reclamation,

The independent check for the contractor designed elements included the alternative design for the post-tensioned concrete box girder deck,



KEY FACTS:

- Major marine crossing
- Multi-span box girder viaduct
- Independent Design Check
- Alternative box girder deck
- Temporary works

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 supported and advised Hyundai on the design and construction of the bridge and of the temporary works used during its construction.

Our work included:- design of the cofferdams in the sea supported off the piles for the pile cap construction; temporary facilities for the lifting and placing of the precast concrete pile cap shells; temporary supports in the sea for bridge deck erection; full shipping impact assessment and derivation of ship impact loading to be applied to the permanent works and temporary works in the sea.

KEY FACTS:

- Marine temporary works design
- Shipping impact assessment
- Design and buildability advice

Temburong CC3

CLIENT: Daelim **LOCATION:** Brunei **YEAR OF COMPLETION:** 2019

This sea crossing in Brunei includes two cable-stayed bridges with associated connecting viaducts and ramps for the 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.

We were appointed as Independent Checker for the contractor's designed element of the permanent works, temporary works and erection engineering of the bridges and post-tensioned concrete box girder viaduct of the connection bridge and access ramp structures.

The independent checks included a range of major and minor temporary works required for the bridge construction, including for the pile installation, pile cap construction, piers and pylons, and the deck construction. This including the pile cap precast shells, cofferdams, reclamation, excavations, support platforms, working platforms, formwork, segment moulds, jump forms, falsework, temporary struts, lifting beams, temporary jetty, form travellers and segment erection gantry.

The independent check of the contractors designs for the permanent works included the bearings, expansion joints and access ladders and platforms

KEY FACTS:

- Independent design checks for temporary works and construction engineering
- Cable-stayed Bridge
- Marine crossing
- Detailed analysis

Malaysia – Singapore Highspeed Rail (Reference Design)

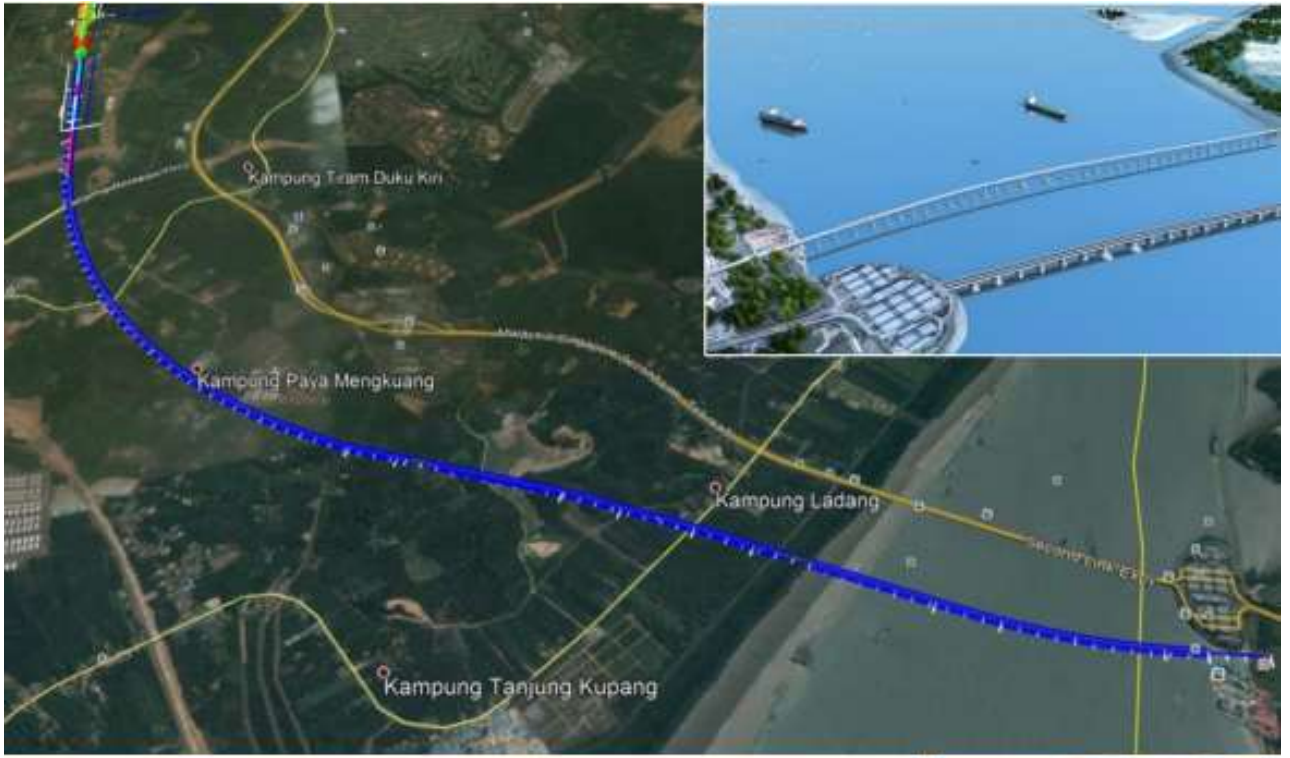
CLIENT: AECOM **LOCATION:** Malaysia **YEAR OF COMPLETION:** 2016

The Malaysia – Singapore Highspeed Rail was a proposed major cross-boundary transportation project with the objective to connect Kuala Lumpur and Singapore with by a 350km long high-speed railway link.

Before the cancellation of the project, reference designs were already completed for the civil structures on the proposed routes, including the bridges and viaducts. Reference Design Package RD06 covers the section of the proposed highspeed railway line at the south end of Malaysia, including the strait crossing connecting to the Singapore section.

This section is approximately 10km long and includes land viaducts and marine bridges across the Johor Strait. Various options were studied for the bridge and viaduct superstructure, and eventually prestressed precast segmental deck was chosen as the main solution. The typical span length is 30m for the land viaduct, 50m for the approach viaduct near the marine crossing, and 100m for the main bridges of marine crossing over the Johor Strait.

Hewson Consulting was appointed as the specialist bridge consultant by the Lead Consultant (i.e. AECOM) for this Reference Design Package RD06.



KEY FACTS

- Highspeed Rail Viaducts
- Precast Segmental Bridge Deck
- Land Viaducts and Marine Crossings

RTS Singapore Cable-Stayed Extrados Bridge

CLIENT: AECOM **LOCATION:** Singapore **YEAR OF COMPLETION:** 2017 (design)

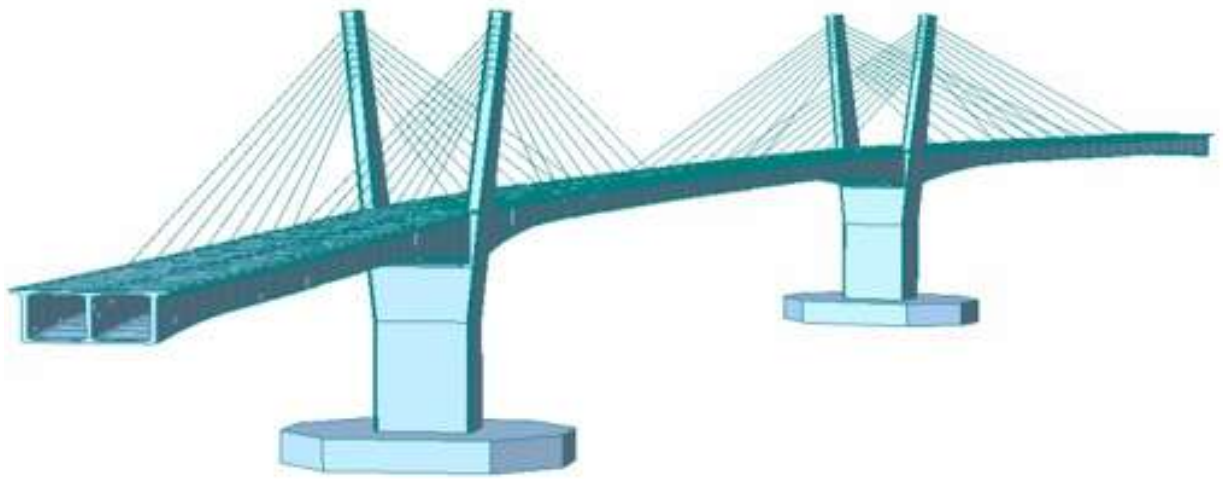
We carried out the detailed design of this 445m long extrados bridge with a 205m main span, forming part of the Rapid Transport System Link between Singapore and Johor Bahru, Malaysia – the second rail link between the two countries.

The RTS link will carry two tracks of Light Rail 4km over the Straits of Johor, and the extrados bridge was one of two major structures spanning the main navigation channels.

The deck comprised of a precast segmental twin-cell concrete box girder with a combination of internal and external prestressing tendons. The 52m high pylons are reinforced concrete and support parallel wire multi-strand cables through saddles to reduce the number of stay anchorages.

All piers are supported on large diameter bored piles and the pylon pile caps are protected from ship impact by piled dolphins.

The design was carried out using the specialist MIDAS software and included the stage-by-stage construction with time dependent effects as well as the dynamic behaviour and rail-structure interaction analysis.



KEY FACTS:

- Extrados Bridge
- Precast segmental twin-cell box girder deck
- Detailed Design

Tatau Bridge

CLIENT: Jurutera Bintang Senari **LOCATION:** Sarawak, Malaysia **YEAR OF COMPLETION:** 2016

The Tatau Bridge forms part of the Pan Borneo Highway network, spanning the Tatau River in Sarawak, Malaysia. The bridge was designed to alleviate congestion on the existing crossing and improve traffic flow along this critical transport corridor.

Positioned parallel to the existing bridge, the new structure carries two additional highway lanes, effectively increasing capacity and enhancing connectivity in the region.

The bridge is a prestressed, post-tensioned balanced cantilever design, featuring a main span of 150 metres and back spans of 91 metres. The superstructure was constructed in situ using form travellers and internal post-tensioning tendons, facilitating the balanced cantilever method without the need for extensive temporary works in the river below. The deck is supported by reinforced concrete piers founded on deep piled foundations, designed to accommodate local geotechnical conditions and hydraulic demands.

We were responsible for delivering the complete detailed design of the structure, encompassing structural analysis, post-tensioning design and detailing in accordance with relevant international and local standards.

KEY FACTS:

- Detailed design
- Prestressed, post-tensioned balanced cantilever design

Pont Briwet Bridge Detailed Design

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 Hewson winning the ICE Wales Award for Innovation.

KEY FACTS:

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

Yavuz Sultan Selim Bridge (3rd Bosporus Bridge)

CLIENT: Hyundai/ SK Joint Venture **LOCATION:** Turkey **YEAR OF COMPLETION:** 2015

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

Macau LRT Project- Sai Van Bridge Modifications

CLIENT: Mitsubishi Heavy Industries Ltd **LOCATION:** Macau **YEAR OF COMPLETION:** 2013

The government of Macau awarded Mitsubishi Heavy Industries Ltd. the construction of the new 20km Light Rail Transit through the city.

We were appointed as the Independent Bridge Consultant for Sai Van Bridge to review and check the structure design for the incorporation of a new LRT system running through the centre of the existing concrete box girder bridge crossing. The main spans consisted of a cable-stayed structure while the approach viaducts were continuous prestressed concrete construction.

The modifications required to the bridge crossing included installing of a guideway within the concrete box deck, with amendment to the emergency escape passages and to the train and road restraint systems within the box.

KEY FACTS:

- Independent design check
- Cable-stayed Bridge
- Concrete box girder deck
- Retrofitting rail facilities inside deck

Sultan Abdul Halim Muadzam Shah Bridge (2nd Penang Crossing)

CLIENT: Government of Malaysia **LOCATION:** Malaysia **YEAR OF COMPLETION:** 2012

The Penang Second Bridge Project in Malaysia consists of 24km total length of dual carriageway highway comprising a 16.5km bridge extending between Penang Island and the mainland plus interchanges connecting to the existing road networks at either end. The main element of the crossing is the 550m long main bridge and the 15km approach viaducts.

We were appointed on behalf of the Malaysian Government to undertake a review of the technical proposals for the bridgeworks submitted by the project contractor. We produced a number of preliminary analyses of the main and approach bridges in order to estimate the material quantities for costing by a local consultant. At the Government's request we also developed a number of conceptual designs for a cable stayed main bridge.

KEY FACTS:

- Detailed design
- Driven tubular steel piles
- Post-tensioned in situ concrete voided slab

Forcados Cable-Stayed Bridge

CLIENT: Niger Delta Development Commission **LOCATION:** Nigeria **YEAR OF COMPLETION:** 2012

Pearl Consultants appointed us to undertake the design of this major river crossing which carries a new highway across the mouth of the Forcados River.

The cable-stayed bridge has 160m high concrete pylons with a single plane of stays arranged in a semi-harp arrangement to support the 350m main span concrete box girder deck along the centre.

The approach viaducts on either side are of prestressed concrete box girder construction with 100m typical span lengths, and an overall length of 2.9km. All piers and pylons are supported on large diameter bored piled foundations, the deck for the main bridge is constructed integrally with the pylon and piers and is cast in situ. The approach viaducts deck is of precast segmental construction.

KEY FACTS:

- Initial studies
- Concept and detailed design
- Concrete pylons and concrete box deck
- Contract Documents

River Bonny Bridge

CLIENT: Niger Delta Development Commission **LOCATION:** Nigeria **YEAR OF COMPLETION:** 2010

The Government of Nigeria planned to construct a 600km highway along the coast of the Niger Delta and appointed Pearl Consultant as consultant for the scheme. Pearl Consultants appointed us to undertake the design of this major river crossing which carries the new highway across the mouth of the Bonny River.

We undertook the initial studies, concept and detailed design of this 1500m main span steel box girder suspension bridge and the approach viaducts, which carry the highway over the mangrove swamp areas, either side of the river.

The suspension bridge has 240m high concrete towers with two main suspension cables supporting hangers at 20m spacing arranged down each side of the steel box girder deck. The approach viaducts on either side are prestressed concrete box girder construction with 100m typical span lengths and an overall length of 4km.

KEY FACTS:

- Detailed and concept design
- Initial studies
- Span steel box girder

Escravos Cable-stayed Bridge

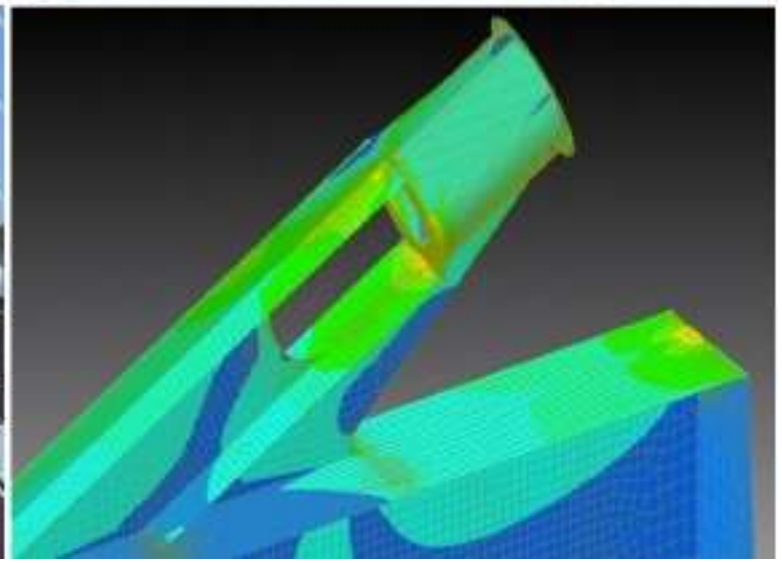
CLIENT: Niger Delta Development Commission **LOCATION:** Nigeria **YEAR OF COMPLETION:** 2010

The Government of Nigeria planned to construct a 600km highway along the coast of the Niger Delta, and have appointed Pearl Consultant as consultants for the scheme. Pearl Consultants appointed us to undertake the design of this major river crossing which carries the new highway across the mouth of the Escravos River.

We undertook the initial studies, concepts design and detailed design of this 700m main span steel cable-stayed bridge and the approach viaducts, which carries the highway over the mangrove swamp areas, either side of the river. We also put together the Contract Documents for the construction tender, including the BOQ, Specifications and Instruction to Tenderers.

The bridge has 240m high concrete pylons with two planes of stays arranged in a semi-harp arrangement to support the steel box girder deck along the outer edges. The approach viaducts on either side are prestressed concrete box girder construction with 100m typical span lengths, and a length of 3.5km.

All piers and pylons are supported on large diameter bored piled foundations. The internal piers for the main bridge are constructed integrally with the deck. End piers for the main bridge have been designed to accommodate the movements of the main bridge and approach viaducts.



KEY FACTS:

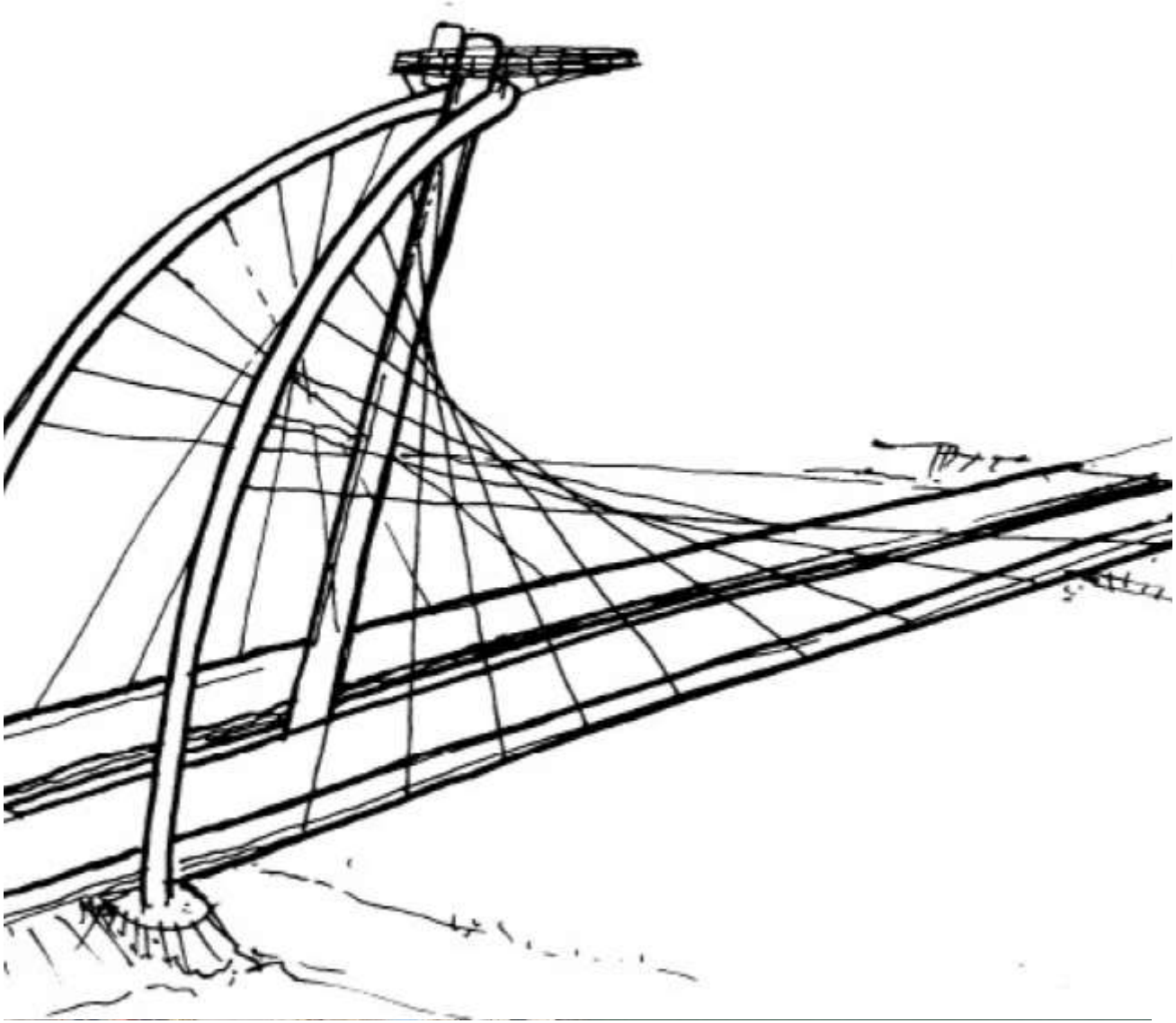
- Cable-stayed Bridge
- Initial studies
- Span steel box girder

Gongchon Landmark Bridges

CLIENT: Saman/ Hyundai JV **LOCATION:** South Korea **YEAR OF COMPLETION:** 2009

Two new iconic bridge structures were required as part of the infrastructure being constructed for a new city on the west coast of South Korea to carry dual three-lane carriageways over the river. The bridges are located on the outskirts of the new city linking a leisure area on the north bank of the river with a nature reserve on the south.

We prepared the concept design of the 1st and 3rd Gongchon Bridges for the tender competition along with the preliminary analysis of the first bridge. The first bridge is a cable-stayed iconic structure with a main span of 195m supported by stay cables from the curved back legs which are connected to the inclined pylon and adjacent abutment,.



KEY FACTS:

- Concept design
- Preliminary analysis
- Cable-stayed bridge

Sungai Prai Bridge

CLIENT: LLB **LOCATION:** Malaysia **YEAR OF COMPLETION:** 2008

This major river estuary crossing comprised of a 185m main span cable-stayed bridge with 1 km of approach viaducts, all constructed using precast segmental concrete box girders.

The single multi-cell box girder central spine was extended by the addition of precast concrete side frames giving a total deck width of 25m.

The stay cables were anchored down the centre of the box with a deviator saddle to guide the stays through the pylons. The foundations were large diameter bored piles, with the main pylon foundations consisting of large pile caps constructed within the tidal range

We advised the Client and Supervising Engineer on specific aspects of the bridge design and construction. These aspects included the deck, substructure and foundations elements of the bridge.

KEY FACTS:

- Advice on Client and Supervision engineering
- Multi-cell box girder
- Cable-stayed bridge

Stonecutters Bridge

CLIENT: Tony Gee and Partners LLP/ MHYH JV **LOCATION:** Hong Kong **YEAR OF COMPLETION:** 2006

Stonecutters bridge is a landmark cable stayed bridge that was constructed as part of the Route 8 project in Hong Kong. It has a main span of 1018m making it one of the longest cable stayed spans in the world. The construction of the steel twin-box deck and 300m high concrete towers presented significant engineering challenges during the construction of the bridge particularly given the exposed location and high likelihood of typhoon winds.

We led the design checks of the permanent works for the joint venture. As well as the contractor's erection engineering proposals which necessitated the creation of a stage-by-stage construction analysis of the bridge to check that the bridge was structurally adequate through all the stages of the construction. As part of this analysis we interpreted the wind tunnel testing data and determined a methodology for incorporating the buffeting response into the erection analysis.

KEY FACTS:

- One of the longest cable-stayed bridges in the world
- Design checks
- Structural analysis

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).

LRQA CERTIFIED ISO 9001 UKAS MANAGEMENT SYSTEMS 0001

Audited RISQS

Acclaim Accreditation

Constructionline Gold Member

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

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