



creative engineering  
solutions for  
transportation  
infrastructure

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## WORKING COLLABORATIVELY

Our guiding philosophy from the outset has 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.

## ABOUT US

Hewson Consulting provides specialist structural, bridge 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, it was 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 structural 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.





## OUR APPROACH

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.

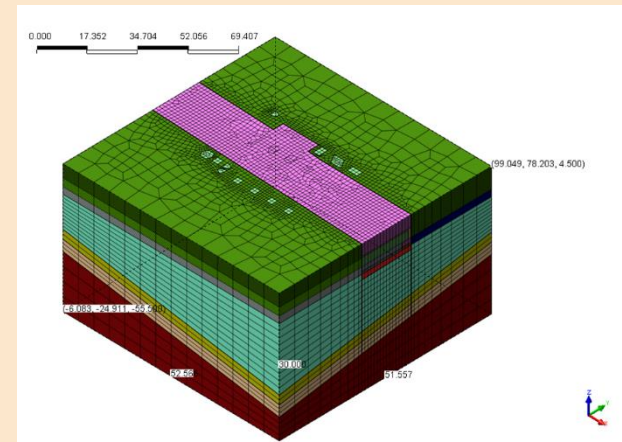
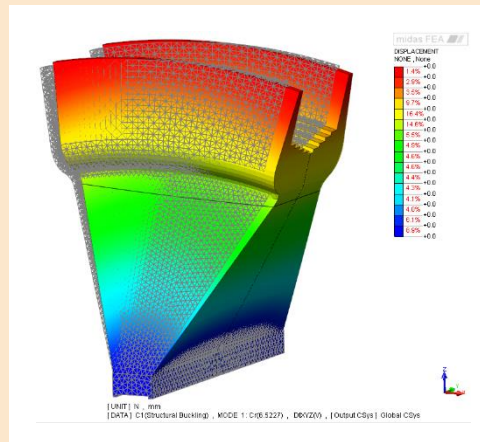
Selected examples include:

- 2013 Queens' Award
- 2016 ICE Wales Innovation Award (Pont Briwet)
- 2017 Saltire Award winner (Edinburgh Gateway)
- 2019 NCE100 Trending20 (SME of the year) winner
- 2020 UK Tekla Awards winner (Luton DART)

## 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:

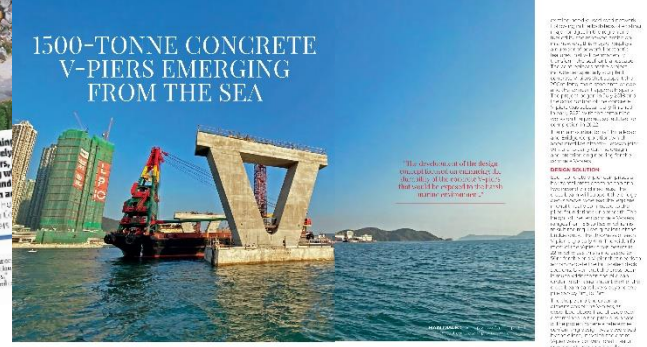
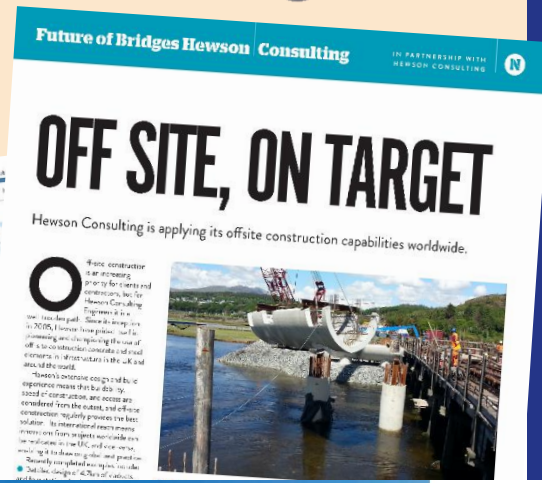
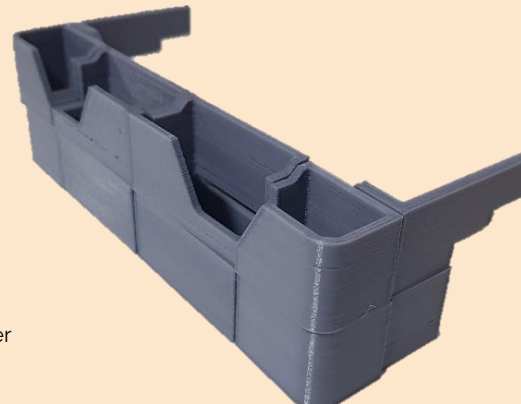
- dynamic/seismic analysis
- energy dissipative structures
- track-structure interaction
- non-linear materials including cracked concrete
- 3D soil-structure interaction



# 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 achieve 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.

## 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.

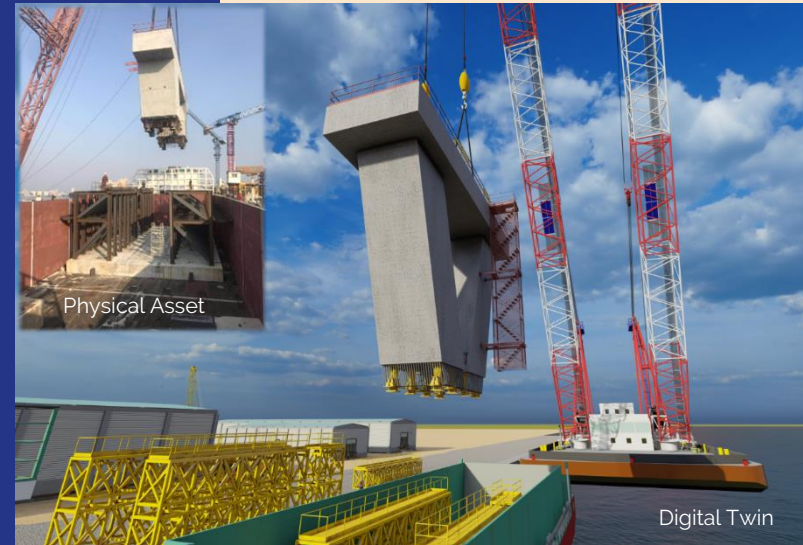


## DIGITAL ENGINEERING AND BIM

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 the models to evaluate the buildability, schedule the programme planning and quantify the material consumption during the construction stage. 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 all relevant parties. This also helps to encourage more proactive participation from the supply chain meaning potential issues can be identified and resolved early, leading to smoother operations during the site works.

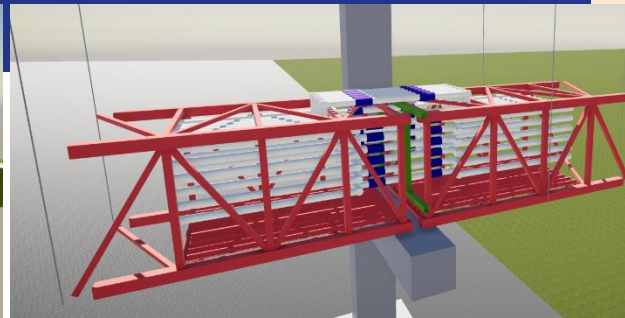


## TAILORED SOLUTIONS

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



# Yavuz Sultan Selim Bridge (3<sup>rd</sup> Bosphorus Bridge)

**CLIENT:** Hyundai/ SK Joint Venture

**LOCATION:** Turkey

**YEAR OF COMPLETION:** 2013

The Yavuz Sultan Selim Bridge (3rd Bosphorus Bridge) is the widest hybrid suspension bridge in the world with a width of 59m, where the longest span which is 1,408m has a rail system on it. The bridge has an usual 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 advise on the buildability of the bridge structure and to assist in the value engineering of the design alongside the permanent works designers.

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

## KEY FACTS:

- Buildability advice and design
- Value engineering
- Complex support system for box girder viaduct
- Erection engineering



# Gewan Island Entrance Bridge

**CLIENT:** Midmac-Porr JV

**LOCATION:** Doha, Qatar

**YEAR OF COMPLETION:** 2021

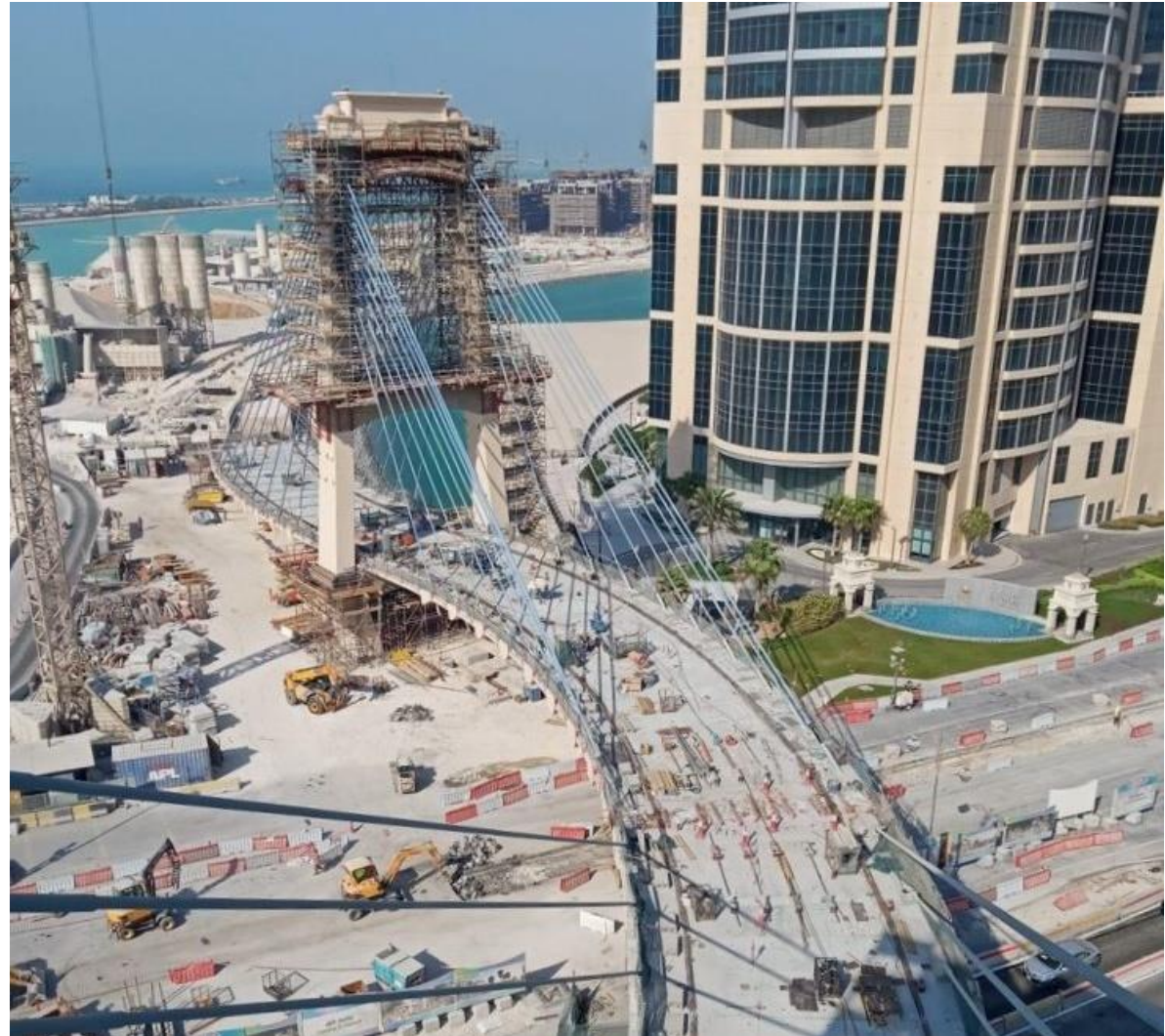
Connecting Lusail Expressway and The Pearl-Qatar Boulevard to Gewan Island, this 250m long structure is Qatar's first curved cable-stayed bridge. It will form an iconic entrance structure as well as providing transit to and from the new development of Gewan Island.

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





# HS2 Phase 1 – Mainline and Birmingham Spur Viaducts

**CLIENT:** Arcadis for BBV Joint Venture

**LOCATION:** Warwickshire, UK

**YEAR OF COMPLETION:** Ongoing

We have been appointed to undertake the Category 3 independent checks of the permanent works design for a number of the key viaducts on the northern section of HS2 Phase 1. These viaducts all carry the HS2 mainline or Birmingham Spur and are thus subject to rigorous dynamic and rail-structure interaction performance criteria. The viaducts that we have checked include:

- M42/M6 Motorway Link Viaducts; and
- River Cole Viaducts (pictured)  
*Twin 160m long 4-span (max. 45m span)  
composite trapezoidal steel box girder decks with bored pile foundations.*
- M6 Motorway South Viaducts  
*Twin 314m long 5-span (max. 84.5m span)  
orthotropic steel box girder decks with bored pile foundations.*

In addition to checking the in-service condition we have also checked the permanent works for incremental launching of the motorway viaducts.

We have worked proactively with the designers to resolve our comments to achieve certification.

## KEY FACTS:

- High speed railway viaducts
- Steel composite and orthotropic box deck construction
- Dynamic and rail-structure checks
- Incremental launch condition checks





## East London Foot/Cycle Bridge

**CLIENT:** Withheld

**LOCATION:** East London

**YEAR OF COMPLETION:** Ongoing

A new combined pedestrian and cycle bridge is proposed to span an existing river in East London to improve access between two London Boroughs, as part of the wider development and regeneration of the area. Working with a specialist bridge architect, we are currently engaged in the preliminary design of the foot/cycle bridge to support pre-application consultations.

The proposed bridge is an elegant steel tied arch structure with a span of 66 metres; the slender structure is efficient while minimising the visual impact on the surrounding area. Navigation clearance above the river is maintained, and a riverside path is accommodated at the western end of the bridge. The eastern landing is severely constrained due to the presence of existing services, ground contamination mitigation measures, the existing river wall and a nearby nature reserve. A tied arch was selected to resist the arch thrust forces, allowing the abutments to be minimal in size which allowed the constraints to be managed.

### KEY FACTS:

- Elegant tied arch steel foot/cycle bridge
- Top arch connection for improved dynamic performance
- Single 66m span





# Bonny River Suspension Bridge

**CLIENT:** Niger Delta Development Commission

**LOCATION:** Nigeria

**YEAR OF COMPLETION:** 2009

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
- Highway





# Brentford Lock West Cycle and Foot Bridge

**CLIENT:** Waterside Places

**LOCATION:** United Kingdom

**YEAR OF COMPLETION:** Ongoing

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 approval 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.

Because of the slender form the dynamic performance was a key consideration in the detailed design. From the outset the use of lock up devices was incorporated to control vibrations under pedestrian excitation but still permit long term temperature effects.

Detailed design has been completed and construction is anticipated in 2020.

## KEY FACTS:

- Concept, preliminary & detailed design
- Visually attractive, steel, curved form superstructure
- Dynamic performance and lockup devices



# Luton DART Gateway Bridge, Independent Design Check

**CLIENT:** Volker Fitzpatrick – Kier Joint Venture

**LOCATION:** England

**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





# Thames Ditton Island Footbridge- Cable Replacement

**CLIENT:** Thames Ditton Island(M&S) Ltd.

**LOCATION:** United Kingdom

**YEAR OF COMPLETION:** 2016

Thames Ditton Island Footbridge spans between the village of Thames Ditton and Thames Ditton Island on the River Thames. The bridge was fabricated and installed in 1939 by David Rowell & Co. Ltd. and is characteristic of their designs. It is a steel suspension bridge with lattice truss deck and tower members, which provided pedestrian and utility transit over the river to the private island.

We were appointed to undertake an initial study after corrosion was discovered on the main suspension cables. This included a visual inspection of the bridge and high-level analysis to estimate utilisation in the short term, and evaluate the need for remediation.

Additionally, we were commissioned to provide concept designs for possible methods for cable replacement along with recommendations for regular maintenance in the future.

## KEY FACTS:

- Historic suspension bridge
- Bridge assessment
- 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
- Complex temporary works designs for the Crossrail underground railway project in London.
- Extensive expertise in developing efficient temporary works solutions.



# Huntingdon Road Viaduct Check Assessment

**CLIENT:** A14 Integrated Delivery Team

**LOCATION:** United Kingdom

**YEAR OF COMPLETION:** On-going

We were appointed by the A14 Integrated Delivery Team to carry out a check assessment of the removal sequence of the existing Huntingdon Road Viaduct. With the opening of the new A14 the viaduct was no longer required and programmed for demolition.

The viaduct was a six-span structure with a total length of 226m. In the middle a 32m long suspended span of pre-tensioned concrete beams across the East Coast Main Line, was supported at each end on 16m post-tensioned concrete cantilever sections via half joints.

Our check assessment involved building up detailed analysis model of the existing structure, to allow the stage-by-stage demolition sequence to be assessed. This included the stage-by-stage imposition of loads from a bespoke lifting gantry designed to remove the suspended spans beams and move them transversely and longitudinally to awaiting SPMT transporters.

Removal of the beams commenced in March 2020 and the final beam was successfully removed in August 2020.

## KEY FACTS:

- Category III Check Assessment for end customer Highways England
- Bridge Demolition Sequence Assessment
- Safety critical removal sequence over ECML



## 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





# Sheikh Jaber Al-Ahmed Al-Sabah Causeway Project

**CLIENT:** Hyundai Engineering & Construction Co.

**LOCATION:** Kuwait

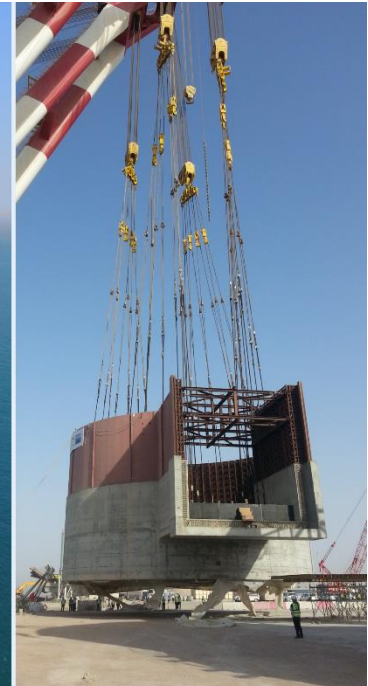
**YEAR OF COMPLETION:** 2019

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



## 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 the students receiving top-quality professional experience in a leading design consultancy with 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
- Independent checking
- Inspection and assessment
- Strengthening schemes
- Forensic investigation
- Technical advisor
- Contract administration
- BIM

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