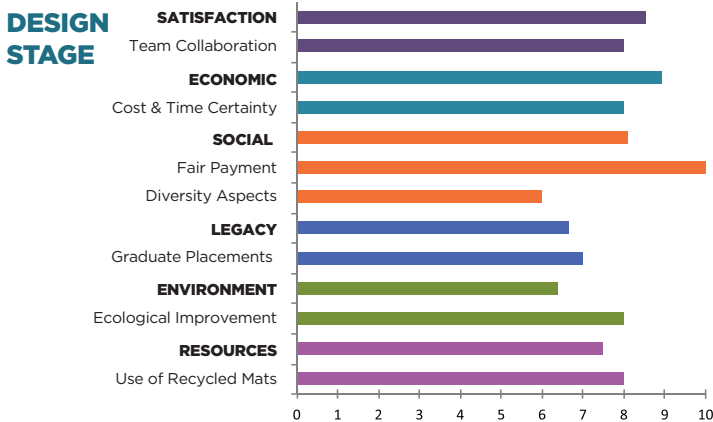


A4232 Cardiff Eastern Bay Link

Photo Courtesy - Global Drone Surveys



The Eastern Bay Link (EBL) scheme extends the A4232 link road around the southern perimeter of Cardiff from Queensgate Roundabout to Ocean Way Roundabout through Cardiff docks. The EBL provides the next section of the link and removes the need for traffic to negotiate the current 3½ km route via Central Link, East Tyndall Street and Ocean Way.

The strategic link road is a 1.2km long elevated dual carriageway and the conceptual design was based on the provision of two approach embankments and a viaduct of composite construction approximately 180m long. Due to the poor ground conditions it was envisaged that the embankments would need to be piled. Site constraints required a large part of the approach works to be contained by retaining walls. Alteration works including additional signalisation were required to both roundabouts together with diversion of the main dock road.

The main risks were considered to be acquiring the required land, poor ground conditions including areas of contamination, site restraints due to the immediately adjacent CELSA live railway and working dock roads, and phasing of major service diversions. An ECI contract for the design and construction of the road was let to the DFA Joint Venture in January 2015.

PROJECT DETAILS

Client: Welsh Government
Employers' Agent: WSP Parsons Brinckerhoff
EA Cost Advisor: Corderoy
Environmental Consultant: TACP
Contractor: Dawnus Ferrovial Agroman (DFA) Joint Venture
Designer: Capita and Cass Hayward
Total Project Value: £57.3m
Project Size: 1.2Km of Dual Carriageway and 1.5km of community route
Contract: NEC Target Cost Option C - ECI
Duration: ECI Award: January 2015; Advance Works Start Date: July 2015; **Construction Start Date:** February 2016
Completion Date: Early Summer 2017



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What is an Exemplar project?

An Exemplar is defined as **‘something worthy of being copied’**. The Exemplar programme has been developed to help identify the reasons why certain projects are successful in a standardised, quantifiable way and to share with the industry what enabled these successes.

An Exemplar considers all aspects of sustainability, including economic, social and environmental, demonstrating that the

scheme is well rounded and has incorporated best practice and collaboration.

Case studies are prepared at 3 Key Stages Design Stage; Construction Phase; Post Occupation

This ensures that lessons learnt can be demonstrated throughout the development of the project.

What will make this project Exemplar?

1 Collaboration. The project is being delivered using Ministerial powers to construct a new highway under Section 24 of the Highways Act. The reliance on land acquisition by negotiation was essential to a successful outcome. The DFA JV worked collaboratively with the client; agents; its designers; key stakeholders and statutory bodies with great success. This has resulted in neighbouring land issues being quickly resolved to everyone’s satisfaction and delivering other benefits including improving the local surface water drainage capacity by working closely with DCWW and European Metals Recycling Ltd (EMR).

Collaboration was also key in managing the risks associated with the fundamental design change required to resolve issues with the existing utilities on site. The team worked flexibly to agree and commence delivery of advance works in parallel with the on-going preliminary design, and commence detailed design of the viaduct prior to the completion and acceptance of the preliminary design, all of which were carried out to safeguard the overall project programme.

2 Utilities Incentivisation Contract Clause. The land corridor available for the EBL contained a significant amount of utilities apparatus. The diversions identified in the scheme outline design had been quoted for by the utility companies and these amounted to potential costs of circa £6.5m. Costs and risk associated with these diversions are usually borne by the Employer. A utilities incentivisation clause was the contractual mechanism designed to try and achieve an optimum solution. The forecast cost of each utility diversion associated with the outline design was set out in the works information. A new Z Clause was introduced that allowed a proportion of the utility savings arising from an alternative design to be added to the contractors target cost.

Major difficulties were identified early in the preliminary design process in relation to the Victorian Sewer, which on detailed investigation could not be diverted within the site boundaries. In order to resolve these difficulties the

conceptual design was changed to lengthen the proposed viaduct from 180m to 660m. This meant that the length of the sewer diversion could be reduced and major diversions of electricity and communication cables, and a medium pressure gas main could be avoided altogether. This provided a direct saving to the employer and removed significant risks associated with phasing and cost increases, thereby adding real value to the project.

3 Innovation Another good example of collaboration and flexible working was resolving issues with the Victorian sewer which was found to be silted up in many places. As part of the advance works the DFA JV constructed additional access chambers and worked closely with specialist sub-contractor Celvac to design and commission a remotely controlled vehicle cleaning system. Jeff Davies of DCWW commented “the JV team were extremely helpful and pro-active in dealing with the issues surrounding the Victorian sewer and performed well in delivering the new diversion to the standards required”

4 Project Bank Account (PBA). The Eastern Bay Link will be the first infrastructure scheme to trial PBA with a view to develop a consistent approach to their implementation, to ensure that they are set up and used effectively and correctly. Process has been set up and agreed at the design stage ready for use in Key Stage 6, to facilitate prompt payments to sub-contractors directly from the client.

The overall aim of the adoption of PBAs within public procurement is to improve payment practices throughout Wales and thereby facilitate faster payment to sub-contracting suppliers. PBAs are ring-fenced bank accounts with trust status which act solely as a receptacle for transferring funds from the client to the lead contractor and supply-chain. The Welsh Government is committed to ensuring that sub-contractors involved in the delivery of public sector contracts in Wales are treated fairly and with respect. Utilising Project Bank Account (PBA) arrangements within publicly funded construction /infrastructure projects would facilitate quick payment through the supply chain.

5 Community Benefits. A key Welsh Government objective stated in the contract was that the contractor would have due regard for its policies in delivering the project. This policy dictates a sustainable development approach to deliver social, economic and environmental benefits.

An extensive consultation exercise has been carried out with The City of Cardiff Council, local businesses, help groups, employment agencies, charities and other organisations. This identified the most worthwhile community projects in the area, that will provide local benefits as well as learning and training experiences for young persons with a view to enhancing their employment prospects.

The JV has embarked on a partnership with the Princes Trust to develop their “Get into Construction Programme” in the local area and formed links with Willows High School located in Splott, with which it has agreed and embarked upon a range of activities.

Notable Achievements

The team have dealt with many key issues facing the project and industry as a whole linking with local academic institutions and expertise. The DFA JV has identified two beneficial areas for links with Cardiff University

- BIM The DFA JV has sponsored a PhD student from Cardiff University to study how BIM can best be applied on the project and similar highway projects in the future, and how this can help the asset manager to better manage his assets in the future. A student, employed for three and a half years will be working with the design team and The City of Cardiff Council, with the intention of creating a process in which the information is collected and handed over following construction.
- Ecology Site clearance and ecological investigation and monitoring has been carefully planned in the SINC (Site of Importance for Nature Conservation) area of the site, in order to protect native species. There is an opportunity through careful management of site won materials to significantly enhance the landscape and biodiversity in the SINC and surrounding land, and the Environmental Master Plan is being developed to achieve this. In order to support this, the DFA JV plan to engage a locally based student to closely monitor the habitat and how it is being utilized over a period of five years post-construction, in order to provide useful data to Welsh Government when planning future projects.

Improving The Process

The process used for delivering the scheme most effectively and for achieving the JV’s objectives is set out in the Project Management Plan (PMP) and associated documents. In addition to the working groups required to be set up by the client such as the Environmental Liaison Group and the Technical Working Group, the DFA JV has, for the design stage set up a series of focus groups to more effectively “focus” on particular aspects of the project.

These groups include:

- Statutory undertakers focus group (utilities)
- Programme Focus Group
- Stakeholders Management Focus Group

Each group has a leader chosen for their expertise and experience. Other members of the team have then been selected for their strengths and expertise as appropriate, whilst at the same time ensuring that they commit the required time to the workings of the group.

Innovation

Adoption of Design for Manufacture and Assembly (DfMA) Principles

The new road is carried on viaduct for most of its length and the project team has exploited many opportunities for the design to include components of the viaduct which are manufactured in steel or concrete off-site. In a highly constrained site, delivery and erection of large prefabricated components significantly reduces the interface issues with neighbours and the railway in particular. The viaduct design has adopted composite construction with permanent formwork throughout, using prestressed precast concrete beams for the primary members of approach spans and steel plate girders for the longer more complex spans required for the heavily skewed crossing of the railway. In addition to these more usual arrangements a number of bespoke details are notable examples of innovation:

- Two of the intermediate supports to the railway viaduct have been designed as long span portals to avoid interference of foundations with the railway and underground services and to avoid closures of the CELSA railway during construction. Pier 1219 Utilising a heavy steel box girder for the overhead element where as pier 1183 utilises and precast concrete
- At the viaducts’ edges deck slab cantilevers and parapet support beams are being designed as precast concrete units, 3m long, to avoid formwork and falsework and to achieve factory quality finish.

Strategy

The DFA JV has installed a strong and committed leadership team using the expertise and experience available in the two contracting organisations that make up the joint venture. They also appointed Capita as their lead designer and Cass Hayward as specialist designers for the composite (central section) of the viaduct.

The JV team has committed to integrating fully with the Client (Welsh Government) and the employer’s agents (WSP Parsons Brinkerhoff, TACP and Corderoy) and is working collaboratively with them and all other stakeholders including immediate neighbours; as well as statutory bodies. By working closely with ABP, CELSA, EMR, BOC and The City of Cardiff Council it was possible to alter the alignment of the new road in order to remove the need for a split level cycleway / footway shown in the conceptual design, originally required as a result of the severe space constraints present along the route. No complaints were received during the design and advanced works stages.

Following on from the tender stage, the contractor’s team continued to co-locate with Capita in their design office in Cardiff during Key Stage 3 (preliminary design stage) and maintained a presence during the detailed design in Key Stage 6. Cass Hayward have also been in regular attendance from their Cardiff base, and Welsh Government, and their agents continue to attend regular face to face meetings to discuss project issues and tackle particular problems together.

Focus on the client’s requirements will be maintained throughout and this has been extended to The City of Cardiff Council who will operate the road on completion, to ensure that the end user’s requirements are fully understood and met.

Impact

The Project Team is conscious that the project “is not just about building a road.” The DFA JV is committed to the basic delivery criteria of on time and within budget under the terms of the contract and in maximising the KPI scores achieved. It is the stated intention of the JV however to go well beyond this in delivering additional benefits to the local area and the region.

Dawnus as a local contractor based in Swansea is fully committed to the local area and reliant on the area for a large part of its workforce, whilst Ferrovial Agroman, as strategic partners bring their international experience and expertise gained from working on road schemes in similar localities in Northern Ireland and Scotland.

The JV is determined to protect all aspects of the environment from harm during construction as set out in the Construction Environmental Management Plan (CEMP) and wherever possible enhance the environment on completion, as set out in the Environmental Master Plan (EMP). This will include post project monitoring by a locally based student to closely monitor the habitat and how it is being utilized over a period of five years post-construction, in order to provide useful data to Welsh Government on the effectiveness of environmental mitigation when planning future projects.

Significant training opportunities for young people have already been delivered during the design and advance works stage including employment of seven JV staff on graduate training schemes and nine design apprentices.

Supply Chain Strategy

The principles and the values of the JV are being adopted by all supply chain partners employed on the scheme, including design partners and Grontmij who were originally employed by Dwr Cymru (DCWW) to design the proposed sewer diversion.

The JV appreciates that fair treatment of partners will result in a more successful project and as such work collaboratively with all partners to maximise benefits to all concerned, with the use of local partners, (such as B & W Tunnelling from Bridgend who installed the £1m DCWW Sewer diversion by pipe jacking), being maximised wherever possible, and where the appropriate expertise and capability is available.

Excellent health and safety performance is a key factor in any appointment and this aspect is the subject of close monitoring and collaboration to ensure joined up thinking and safe and effective working during construction, particularly at interfaces between different “trades”.

Partners are expected to support the JV’s approach to employment and training through offering new employment and work experience opportunities, and in providing training through people development. Training courses including behavioural safety and the provision of facilities to improve “well-being” are offered to all partners on site in order to promote a feeling of inclusivity throughout the whole team.



Continuous improvement

The JV is driving an agenda for continuous improvement which is linked to an effective performance measurement tool and objective peer review. The Welsh Government have pioneered a comprehensive key performance indicator measurement system which is scored quarterly on this project over the seven main headings.

The JV organisation has been set up to include a peer review team of experienced senior executives from the JV organisation and the lead designer as well as the Ferrovial Technical Office based in Madrid. The Technical Office was heavily involved in the analysis of the information from the ground investigation and the stability of the embankments. Other targeted areas included the piled embankments and viaduct deck design.

Sustainability

The scheme is targeting CEEQUAL Excellent. The Environmental Statement and the Construction Environmental Management Plan cover all aspects of effective environmental management both pre, during and post construction, and the operation of the CEEQUAL scheme will not only further raise awareness, but also significantly improve environmental performance leading to protection and where possible enhancement of the environment.

The Ocean Way Site of Interest for Nature Conservation (SINC) located on the site presents challenges but also opportunities, not only to maintain the calcareous grasslands but also to improve the local environment, particularly the scrubland situated to the north between the SINC and the northern boundary. The existing redundant overhead gas pipeline with its antiquated gantry support system running parallel with the proposed new road also presents challenges from an environmental perspective.

In addition, the DFA JV will minimize the use of primary aggregates by sourcing recycled aggregates from local sites. Real opportunities exist in terms of reducing transport for the delivery of key materials such as concrete and reinforcing steel which have been identified at the design stage and these are being followed up. The scheme will promote walking and cycling as much as possible and one of the key areas of the project will be to facilitate the link up of the Wales Coastal Path and local cycling routes. Preliminary plans have been drawn up to upgrade the crossing at Pierhead Street and in extending and improving the footway / cycleway on Rover Way and improving the Gateway to the off road section heading east.

