

# Case Study:

## Sustainable construction of the Western Approach viaduct

***How best practice and a sustainable approach during construction benefitted the Thameslink Programme.***

### **Key challenges**

A major component the Thameslink Programme involved the redevelopment and reconfiguration of London Bridge station with significant changes to the western and eastern approaches to London Bridge station. This case study deals with the Western Approach structures.

The redevelopment of London Bridge Station comprises a comprehensive upgrade of station facilities in conjunction with increased capacity via more frequent and longer 12 car trains. These upgrades required provision of additional 'through lines' by means of continuing tracks which originally terminated at the station and the complete replacement of the station superstructure.

When travelling west out of London Bridge station, the new continuing tracks traverse three key structures, Station Approach Viaduct Extension (SAVEx West), Western Approach Viaduct (WAV Spans 3 to 5) and Railway Approach Viaduct (RAV) and collectively are known as the 'Western Structures'.

The 'Western Structures' were cast in-situ and are designed to link the existing network with the new. This was probably the most challenging aspect of the London Bridge project, - partly because it impacted on London Underground, the bus station and the railway activities, but also because of the restricted site access, loading restrictions and adjacent structures.

### **A sustainable approach**

Sustainability was right at the heart of the Thameslink Programme and the vision was to deliver transport benefits to budget that represented value for money and created an overall positive impact on the community and the environment. To do this the project upheld the highest standards in sustainable principles on all fronts. As part of this vision, CEEQUAL helped to strike a balance of high standards of environmental and social benefits whilst achieving value for money.

Two CEEQUAL assessments were thus applied as part of the London Bridge Station Redevelopment Project to drive sustainable choices in design and construction and both saw resounding success. The value of CEEQUAL was recognised in improving sustainability performance by supporting both our sustainable development policy and Network Rail's wider sustainability commitments.

At the start of the design stage, CEEQUAL workshops were held with the project teams, designers and suppliers to challenge the design and construction process and to identify sustainable design and construction solutions. At the workshops, sustainability objectives and targets were agreed, and sustainability champions identified to review progress of targets through the design process. Cost consultants explored in more detail the whole life cost impacts of any sustainable design decisions.

CEEQUAL helped to improve sustainability performance and provided a wide range of benefits including;

- Significant improvements through adoption of best practice including whole-life costing, waste minimisation, resource efficiency (materials, water, energy), responses to predicted climate change effects, as well as project management and reduction of complaints and environmental incidents.
- Reputation-building and good public relations including verified demonstration of delivery of environmental, sustainability and corporate social responsibility policies.
- Cost savings through CEEQUAL's influencing role.

- Demonstrating commitment to the sustainability agenda, and providing public recognition of our work to clients, to the industry, and/or to stakeholders and the general public.
- Enhanced team spirit through CEEQUAL's recognition of teams and, because using CEEQUAL provides encouragement and a target for your project and contract team to deliver high performance, it helps to develop a positive performance attitude.
- Award presentations celebrating high performance and reinforcing team spirit.

## **Outcomes and achievements**

The success of the ambitious redevelopment programme, which ran to schedule, was down to a complex staging process. This involved demolishing the old platforms and the arches below and then progressively reconfiguring the tracks to construct the new station in nine stages, each stage having to come into service before the next stage could commence.

Testament to the project's success was the successful integration of another major piece of work on the three, usually separate project areas, around London Bridge station.

These were the packages of work that were led by Network Rail, mainly the station development itself (with Costain), associated track work (Balfour Beatty) and signalling and telecommunications (Siemens Rail Automation).

There were no direct contractual links between the three parties, but the London Bridge Area Partnership (LBAP), a collaborative relationship established using BS11000, was established in 2012 between them. The intent of the LBAP arrangement from the outset was to ensure that interfaces between the parties were effective.

These were the technical interfaces through the design development and approval process, programme interfaces so that 'give/get' dates could be devised, agreed and achieved, and the coordination and control of safety, health and the environment. In addition, the relationship supported the sharing of best practice and innovation and risk mitigation.

In total more than 200 suppliers were involved in this venture and the relationship and interface management was critical in ensuring that the project's success. We applied programme wide sustainability standards across our suppliers and achieved a high level of buy-in from them.

The new London Bridge station provides a truly legible single station layout for the first time. The rippling, reflective canopy ribbons give a clear identity to the station form. The design is an appropriately bold response to the Shard, creating an ambitious and dynamic piece of twenty-first century architecture, but one which respects the scale and grain of its context.

## **Community relations and engagement challenges**

Being on site for several years gave the project a wonderful opportunity to develop long term meaningful relationships with the local community to leave a real legacy. To do this, the project identified and understood the community's needs from the very outset. The redevelopment took place in a busy urban environment with many neighbours and in an area of high unemployment. It was also a place that lacked green spaces, so this gave the project clear needs to focus on and these were then structured around three distinct programmes;

- 1) Community engagement
- 2) School and college outreach
- 3) Local supply chain opportunities.

To demonstrate commitment to these, the project employed a full-time dedicated Community Relations Manager and a Projects Skills Coordinator to lead these and to provide a dedicated interface. Our community engagement agenda was also supported from the very top of the organisation, which set social responsibility as a core value. This always led to a project team who actively sought and engaged with the community at all levels.

Thanks to a well-structured programme and top-level commitment and support, the project was proud to report that it:

- Delivered over 150 community engagements, including 29 events with an educational focus and eight events in the local neighbourhood;
- Provided 48 students the opportunity to gain experience in the reality of working life with some very positive feedback, delivering exposure about career opportunities within construction and the rail industry;
- Provided training to over 200 unemployed residents of which 62 went on to be employed by the project;
- Provided 61 apprenticeships;
- Donated nearly £90,000 to a variety of charitable causes;
- Awarded work to 11 SME's to provide tools, materials and office fit-outs for the project for contracts in excess of £6million; and
- Developed a long-term relationship with a local school, which provided many opportunities to provide a positive impact via health, safety and environment engagement programmes, reading and maths mentoring, STEM activities, parent workshops and donations of office furniture and gardening equipment.

Having strong and consistent leadership around social value, advocating its value and requiring participation, particularly from the Programme Directors, was the key to success in delivering a positive social impact to leave a social legacy beyond project completion.

Internally, work around social value developed the skills of the project's employees and made them feel more engaged. The project attracted and retained a greater diversity of talent than most rail projects, which is good for the industry. It indicates that people are being drawn from the full pool of talent and helps to bridge the talent and skills gap facing the sector.

## **Waste Challenges**

Network Rail were (and still are) delivering the biggest investment in the railway since the Victorian era. All work from designing and building iconic new stations, signalling upgrades, electrification, track renewals and bridges produces waste. This waste can have a significant impact on both the environment, costs to the business and thus value for the tax payer.

A construction and demolition project of this size and scale inevitably presented a range of challenges and opportunities with regards to waste and material management. As part of the sustainability vision, the Thameslink Programme committed to "reduce waste generated and disposed of" through "reducing waste during the design process" and "diverting at least 90% of our waste from landfill using the waste hierarchy".

To this end, at design state, a series of 'Designing Out Waste' workshops were held using the WRAP (Waste and Resources Action Programme) Designing out Waste toolkit. The objective of these workshops was to collaboratively challenge the design and construction process to identify where waste could be reduced during design and construction

This was done through:

### **Offsite construction and the use of prefabrication.**

Modular and pre-fabricated components were used for bridge decks, platforms units, lifts, escalators and station furniture and standardised components were used for station glazing. Modular and pre-fabrication reduced material use and waste, reduced risk of pollution, minimised impacts on our neighbours through quieter construction and removed road congestion through fewer deliveries. It also provided several economic benefits such as improved product quality, reduced installation programme, reduced materials double-handling and improved site logistics.

### **Reuse and recovery of demolition materials**

Inert waste arising throughout the demolition works was crushed for re-use within the station

### **Recycling hazardous waste**

At London Bridge we recycled aerosols through a specialist aerosol piercing unit enabling aerosol cans to be recycled like any other metal, thus diverting waste from landfill.

### **Recycling plasterboard**

At London Bridge plasterboard was used to fit out the station accommodation. It is a difficult material to dispose of as all gypsum-based wastes must be disposed of to landfill thus increasing impacts and costs. By working with suppliers, the team was able to return plasterboard waste products for recycling and reuse into a variety of other products that were sold again to construction projects.

### **Segregating waste**

Waste segregation was a standard activity. However, as the worksite reduced in size and space became constrained, off-site segregation and recycling was maximised. The project used dedicated off-site storage areas for storage of construction materials supported by just in time deliveries to reduce the volume of materials held on site. This was supported by returning surplus materials to the storage area for reuse during construction.

### **Recycling soils**

200,000 tonnes of excavated soils at London Bridge were tested and segregated on site into inert, hazardous, non-hazardous and special non-hazardous waste to prevent mixing of waste and costly waste disposal to landfill.

All soils were treated at a soil treatment facility according to their type, for example through soil stabilisation or bioremediation. Treated soils were then transported along the River Thames by barge and incorporated into other land reclamation projects. Each barge carrying 1000 tonnes removed 50 lorries from congested London roads and reduced carbon emissions by 60%.

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#### **Further information**

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