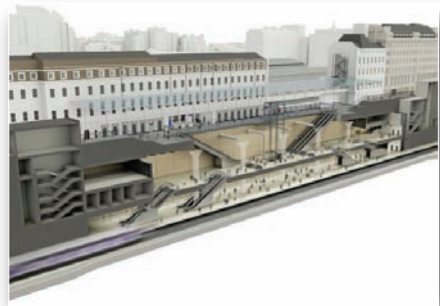
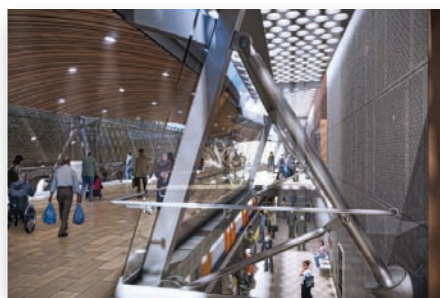


CASE study

Tracking changes

Crossrail is a hugely complex project where the most important factor is the ability to find the right information, at the right time, to support the decision making process, achieved by using solutions like Bentley's latest configuration management tool, eB Insight, from Enterprise Informatics



I thought Crossrail had come to town when I saw the new bus station being erected opposite the mainline station at Slough. It's remarkably similar to the style Crossrail is using for some of its overground stations. I had the chance to compare them shortly afterwards because, as luck would have it, the keynote session at this year's Bentley BE Inspired event in Amsterdam was given by Malcolm Taylor, Head of Technical Support Services at Crossrail. A happy coincidence, as BE Inspired always produces some of the most enlightening and interesting case studies for this magazine, and I was already thinking about taking a closer look at Crossrail itself.

If you live in London you can hardly have escaped the fact that the next couple of years are going to see some massive developments, right through the heart of the City and beyond the suburbs, as the urban metro service - a high frequency link between Maidenhead and Heathrow in the West - links up with Shenfield and Abbey Wood in the East.

Using main line sized trains, it is expected to carry up to 1500 passengers a train during peak periods, reducing crowding on London's congested transport network, increasing public transport by 10% at a stroke, and taking an estimated 30,000 cars a day off the streets. Starting above ground, it will dive under Central London in twin tunnels, linking Heathrow Airport, The West End, The City of London and Canary Wharf.

The project is hugely complex, not just in the way it is being delivered, with a programme that involves many partners, but in the challenges that lie with driving five tunnels and 21km of twin bore tunnels, 8 new underground stations and 4 overground spurs, including one to Heathrow Airport - all in, around and

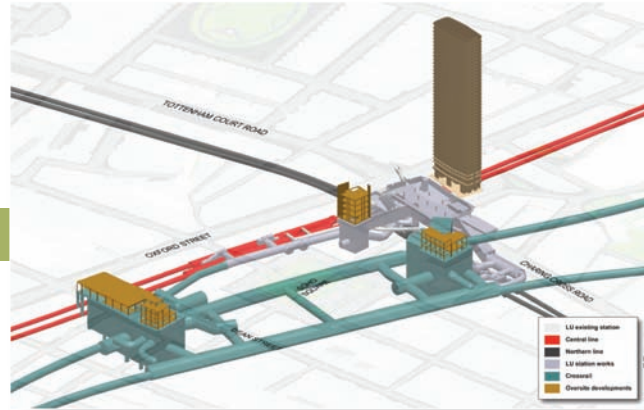
through one of the most highly developed and valuable pieces of real estate in the World. That's valuable in the sense that the inhabitants of London are not too keen on anything or anyone upsetting the historical ambience of the City. The estimated cost of £42 billion (TfL, August 2010) is highly controversial as well, especially given the current climate of austerity.

Royal Assent was given in July 2008, and Crossrail, previously publicists for the project, were then given the task of delivering the railway. The team they have assembled includes world class delivery partners, including London Underground, Network Rail, DLR, Canary Wharf Group and Berkeley Homes. In fact there are 32 different companies that have been involved throughout the Design Stage of the project, with 88 construction teams expected to be in place when the project is in full flow. Management and Control of the whole operation is, therefore, vitally important.

DESIGN AND CONSTRUCTION

It's a challenge all round. The tunnels being built are larger than any that the underground already has, with tunnel boring machines almost as big as those for the channel tunnel - and there will be two tunnels side by side along the underground route. A tunnelling strategy had to be devised, not just to contend with a subterranean vista as complex as anything above, but to handle any problems that might emerge.

And a station construction strategy had to be devised for both new and upgraded stations. The ones being upgraded cannot take years of disruption as the enhancements are developed, and new stations are being built at the expense of existing buildings. A typical example is Paddington Station, an important hub



which will see a huge trench being dug the length of the street on its Western perimeter!

Other problems abound. Ventilation shafts will need to be dug along the length of each of the tunnels. Where these emerge into buildings, there will be problems of access, ownership, and construction. Digging such huge holes and tunnels creates problems with waste disposal too - like 200,000 cubic metres per month at the peak of construction!

Crossrail reckons that 47% of the waste will be disposed of by road - that's a whole lot of large dumper trucks driving through the centre of London to you and me - 39% by water and 14% by rail. Two-thirds of it will be going to Wallasea island where Crossrail is creating a 1500 acre wetland reserve; an environmental initiative to counter the inevitable encroachment on other wildlife areas.

Further complexity lies in the multiplicity of partners and contractors involved, as all of these will have their own entrenched working styles, solutions and practices. Dealing with the public isn't going to be any easier either, especially when some prime parks in the centre of London are going to be construction sites for the next umpteen years, so getting the message across has to be accompanied by media campaigns using the latest visualisation techniques to show how it is all going to look when completed.

CONFIGURATION MANAGEMENT

The problem with all of this complexity is not just about being able to manage day to day construction events, scheduling deliveries of materials, optimising the use of resources, and so on - it is all about configuring the management of the solution. How can Crossrail control the

huge amount of valuable information that is being created every day, manage its distribution and use for the benefit of the project as a whole? It's not only about gathering information either - it is also about ensuring that you get the right information just when you need it, the right documents to support the decisions being made, and the ability to manage the change process.

Greg Bentley highlighted the same problem at BE Inspired when he spoke of the inability of the engineers working to stop the BP oil leak in the Gulf of Mexico to find the drawings they needed or the results of tests recently conducted that would have pointed to the cause of the blowout.

Crossrail uses Bentley's Projectwise for the management of the project as a whole, but eB Insight from Enterprise Informatics for configuration management. That's a new acquisition of Bentley's that, according to Greg Bentley, "brings configuration and change management capabilities for mission-critical infrastructure asset operations to Bentley. The eB Insight product will play a key part in accelerating Bentley's new "AssetWise" initiative for improving infrastructure asset operations." Along, of course, with many other Bentley products, ranging from the MX suite for railway development to civil engineering, geophysical, construction and visualisation tools across the board.

MEETING THE PUBLIC'S NEEDS

With a project that has such a high profile, and one that is going to unavoidably disrupt the lives of many people, it is vital that the public is going to be both fully informed of what is going on and brought into the project wherever possible. Two recent examples exemplify this.

Whitechapel Station is one of the stations that will be thoroughly redesigned, with an improved ticketing hall and integrated entrance and step-free access for all services at the station; London Underground, London Overground and Crossrail.

All of the proposals have been discussed with the London Borough of Tower Hamlets, local residents and businesses. Crossrail has also put on three exhibitions locally, with 3D models of the proposed changes and translators for local residents who don't speak English as their first language. Crossrail has also established a second Crossrail Visitor information Centre close to Whitechapel Station, with information panels and Crossrail staff available to answer questions.

The second example is the Tunnelling and Underground Construction Academy which will be built - pending approval from Redbridge and Newham Councils - to provide training opportunities for people in underground safety, tunnelling operations and sprayed concrete lining to help deliver the Crossrail programme and other underground construction projects, such as the national grid, EDF and Thames Water.

Funding is from Crossrail and through a grant from the Skills Funding Agency. It will include both classrooms and practical facilities, including a simulated tunnel boring machine environment, spray concrete lining chamber and general underground construction facilities. It is designed to be used beyond the completion of the Crossrail project and represents a splendid example for other construction projects. Crossrail is setting up a world class training centre for future projects, not only in the UK, but in the rest of the world.

www.crossrail.co.uk