

# **DESIGNING THE RAILWAY FROM SURREY QUAYS TO OLD KENT ROAD JUNCTION**

**by Gary Stevens (Project Manager) and Stuart Brunton  
(Engineering Manager), Parsons Brinckerhoff**

With construction all but complete on East London Line Phase 1, detailed planning is now focused on the completion of the inner London Orbital railway. This will be accomplished by linking the East London Line to the South London Line via a new 1.3km track from Silwood Junction to Old Kent Road Junction. A railway existed along this route from the 1870s, but fell into disuse almost a century ago. The restored link will provide the means to run 4 Overground trains per hour from Clapham Junction into the core East London route towards Dalston when construction is completed in 2012. Trains will be 4-car Class 378 EMUs (with passive provision for 5-car trains incorporated into the Preliminary Design). The double-track line will be rated for 40 mph running and will be electrified on the third-rail system used on ELL Phase 1. At the time of the meeting, passive provision only was made for one intermediate station at Surrey Canal Road – the decision regarding funding for provision of the station is awaited.

Phase 2 was a late inclusion to the ELL project with the passing of the relevant Transport Works Act Order in 2001. The cost of the Silwood link is £75 million, funded by the Department for Transport, Transport for London and the London Borough of Lewisham. Since May 2009, Parsons Brinckerhoff have been working on the Preliminary Design to match the requirements of rail infrastructure, rail systems and civil and structural engineering with the concerns of the client (TfL) and local stakeholders such as Lewisham Council. Over 150 drawings have been produced as well as over 70 detailed reports to assist the approvals process. To demonstrate the detail that the Preliminary Design must provide, Gary Stevens compared the process to constructing a Haynes car mechanic's manual: "you have to provide an exploded view of the end result". Despite its short length and the reuse of a former railway right-of-way, Phase 2 faces a number of civil and structural challenges in meeting TfL's functional specification while protecting the amenity of the residents and businesses of this part of New Cross.

The route leaves the main ELL route south of Surrey Quays. Silwood Junction has been provided with a flyover for New Cross Gate-bound trains as part of the Phase 1 works. 300 metres from the junction, and close to residences, the route encounters three Network Rail viaducts carrying the Kent Lines and Thameslink into London Bridge. Closely abutting the route's limit of deviation here is the SELCHP waste incinerator. Passing under the viaducts, the line rises at a 1 in 29 gradient past the Millwall Football Club to span Surrey Canal Road at where a station site will be provided on the south side of the road. If constructed, platforms are envisaged to be around 80 metres long. The bridge is approximately halfway along the route which then travels on a curving route atop a 5 metre embankment close to blocks of flats on the western side of Bridge House Meadows. The route has a pedestrian underpass at Hornshay Street before crossing into Network Rail territory 30 metres short of a flat double junction at Old Kent Road. Currently occupying the route is a shared-use path (footway and cycle way) that crosses Surrey Canal Road on its own bridge. There are also retaining structures from the 1870s railway and the whole route is traversed by gas mains, high voltage cabling, as well as other utility infrastructure.

There are clearly many risks to a project that involves threading a double track railway under viaducts, over bridges, through open space and within metres of residences. Consultations are ongoing with London Fire & Emergency Planning, British Transport Police, utilities, Environment Agency, Network Rail as well as the residents and businesses in the area that will be affected by the construction and operation of the railway. Although the project has 'Powers' to build, there are potential issues that will require amicable resolve with London Borough of Lewisham Council. These challenges have centred on protecting the amenity of residents living close to the tracks and ensuring that open space loss at Bridge House Meadows is as sensitively dealt with as possible. As mentioned above, the railway will be on an embankment within 15 metres of housing, and so much work in the Preliminary Design has gone into noise abatement. Ambient

noise levels have been taken for the affected dwellings and these cannot increase by more than 5dB when a train is passing. A 1½-metre noise barrier will be placed at rail level along the affected areas of track. This barrier (in the main) will be constructed of absorptive material (e.g. timber) so that it has minimal visual impact than materials such as steel. Although this protects against excessive noise, there are potential sunlight/daylight issues that arise from an earthwork and barrier with a combined height of almost 7 metres in close proximity to residences. New planning regulations also mandate that this be taken into account. Modelling occurred to ensure that these problems have been demonstrably dealt with before detailed design of the track can proceed. Added to these considerations, the new infrastructure will remove many trees and a well-used footpath from the former railway formation – new planting, fence lines and the reinstated shared footway must balance the needs of maintaining the operational railway and the aesthetics and ecology of the area.

Much work has gone into protecting the open space of Bridge House Meadows. This area was the site of New Cross Greyhound and Speedway Stadium until 1963 – the contours of the former track can be seen clearly on satellite views. Some of this land will be lost when Phase 2 is built, with a significant amount of land required for the construction of Surrey Canal Road station. Existing terracing in the park will be retained and an extensive programme of tree-planting and re-vegetation will happen once building works are complete. Protection of these vital inner-city assets is the main concern of Lewisham Council and approval of the plans for the Meadows is a critical approval that needed to be gained prior to meaningful construction activity commencing. Incidentally, a works 'site' already exists at Bridge House Meadow. A Portakabin was erected by TfL in November 2006 to ensure that construction powers granted by the 2001 Transport Works Act Order did not lapse. Access to the Meadows across the railway will need to be maintained, which can lead to programme risks. For example at Hornshay Street, an underpass will be created to preserve existing access – this will require the diversion of gas mains to create the crossing. Much design work has been done to ensure this can be done within budget and with minimal disruption, and that final design work is straightforward.

Crossing Surrey Canal Road is the major engineering undertaking on the Silwood line and providing a cost-effective solution for this is one of the major risks to the design programme. The original railway crossed the Grand Surrey Canal when built in the 1870s; the canal was drained in 1974 and Surrey Canal Road built on the alignment in the late 1970s. The original railway bridge span has long gone, and a steel footbridge now exists at this point providing a pedestrian and cyclist link across what has become a busy local traffic artery. The 1870s bridge abutments and retaining structures are still very much in evidence however and form an integral part of the Preliminary Design.

It is in this design that the ability of good engineering to save money and reduce disruption has been demonstrated. The reference designs for the 2001 Order provided for the lowering of Surrey Canal Road by 2½ metres at the point where the Overground crosses. This would have required around 18 months' disruption to traffic in the area, and would have taken at least £5 million from the total budget of £75 million. There are a great number of cables and utilities that would have required diversion had the road been lowered; a number of these also run along what would have once been the canal towpath – very close to the original bridge abutments. Taking all these risks to the project together, the Preliminary Design engineers have concluded that rather than lowering the road, the bridge should be made higher. The railway will still cross Surrey Canal Road at a height of 5.3 metres, which the minimum clearance mandated by the Highways Agency but without the massive disruption and cost caused by road lowering. Remembering that 280 metres north of Surrey Canal Road the railway passes *under* Network Rail viaducts means that the gradient to the bridge is now a steep 1 in 29. Modelling has demonstrated that Class 378 rolling stock should take this incline in its stride and that there will be no undue burden on the power supply for this section of track.

Stuart Brunton and his team have also carried out investigative work on the existing bridge abutments and believe they can be 'recycled' to carry the new span across Surrey Canal Road. Again, this is a departure from the reference design which called for new bridge supports to be built and demolition of the existing structures. Given the number of utilities that run alongside the

140 year old abutments, demolition and excavation for new foundations would have meant expensive diversionary work. TfL are still to be completely convinced of this course of action – however, Stuart pointed to successful refurbishments on bridges in the area as part of ELL Phase 1 – for TfL of course! The bridge itself is a plate girder structure with a span of 26 metres. The original reference plans sited Surrey Canal Road Station on part of the bridge itself, but the station will now be wholly on the south side of the road atop an embankment. As the bridge now only has to support concrete deck and rails it is now much simpler to build and will for the most part be fabricated on the station site with much of the concrete decking precast. The span can then be 'launched' across the road during a night-time closure. While there will still be works that require blocking the pavements, this approach should minimise occupation of the highway itself and further reduce risks to the project. An estimated £2 million could be saved with this revised bridge plan. It has been suggested that this saving combined with £5 million saved from not lowering the road in the first place could help pay for the construction of Surrey Canal Road Station itself.

The East London Line Phase 2 project clearly shows the consultative and consent-driven process for large scale engineering projects in the UK. With construction to commence in 2011 and operations to start in 2012, this line will ease the pressure on London Bridge station during the major Thameslink upgrade works. Although not an Olympic deliverable, the completion of the last part of the 'M25 of London Overground' will assist in moving people around the capital during this busy time and for many years to come.

**Dan Scott**