

BRIDGING THE GAP

Members of the Paddington Bridge project team are meeting head-on the challenge of completing a long-term major bridge replacement programme whilst minimising disruption to the railway

On 11 January 2004, work began to replace a series of bridges across the Grand Union Canal, its towpaths, the Hammersmith and City lines and 14 Network Rail lines at the throat of Paddington station.

The replacement structure will have a two-span rail bridge and a two-span canal bridge, crossing development land and the canal to the north of the railway. The area has long been known for its traffic congestion, made worse by a 7.5 tonne weight restriction placed on one of the old bridges following a strength assessment.

Funded jointly by Westminster City Council (WCC), Network Rail and Heathrow Airport, the new bridge will provide up to six lanes for traffic, and will allow simple connections from future development of Paddington station.

During the advance works, a two-year bridge closure and main works construction programme (2004–2006), the demolition methods and new construction have to allow constant and safe operation, access and protection for:

1 the operational Grand Union

Canal, Paddington Basin branch;

1 14 operational Network Rail lines, eight of which are fitted with 25kV overhead electrification;

1 two surface LUL Hammersmith and City lines;

1 major pedestrian access routes to new developments from Paddington station;

1 the twin bore Bakerloo line tunnels which run under the north abutment of the bridge;

1 a large Thames Water sewer which runs down the centreline of the old bridge;

1 the future route of the Crossrail tunnels; and

1 new and existing office and residential buildings which are in close proximity to the site and limit the size of cranes able to access the works.

Early on in the process, it was determined that the potential effects on signal sighting and limited headroom on some lines would preclude extensive temporary works supports in the railway corridor to allow in-situ demolition of the main 62m span steel bow girder section of the bridge. The contractor, Hochtief (UK), came up with an innovative solution of lifting the existing 62m span some 10m into the air before launching the new bridge beneath it and then lowering the old bridge onto the new deck for removal. The launch platform for the new rail bridge will be the new canal



Paddington Bridge Project

bridge on the north eastern side of the site, the superstructure of which is now largely complete. As they are outside the rail corridor, the canal bridge and major elements of the main span can be constructed in a conventional manner without requiring possessions. A two-stage launch of the main rail bridge will be undertaken during 2005. Following completion of the launch of the new rail bridge, the old bowstring bridge will then be lowered onto a multi-wheeled transporter positioned on the deck of the new bridge and rolled onto the new canal bridge for final demolition.

The programme was developed to minimise the number of possessions and any risk to the railway. The works involve modifications to the Grade I listed Macmillan House and railings on the Eastbourne Terrace side of the site. The lucky discovery of Brunel's notes and drawings for the original canal bridge by Dr Steven Brindle of English Heritage during planning, gave a positive link to the original canal bridge and modified the method of removal. This historic 1838 cast iron and masonry structure, which had been disguised

by the brick parapets built in the 1900s, was carefully dismantled and stored with a view to being re-erected in the Paddington area as a heritage feature.

Project design started in 1998, with preparatory construction works beginning in 2001, about 18 months before the bridge closure. Advance works, including the construction of a services tunnel beneath the railway and canals and wholesale diversion of the major services that were located on the original bridges, were let as separate contracts prior to the main works by Hochtief. The final structural design of the main bridge started in 2002 to ensure that appropriate time was available for detailed planning and obtaining consents for the major operations.

Diverting communication services was achieved using a 900mm diameter under-track-tunnel, thrust-bored under all 16 rail and LUL lines and fitted out with ducts. Following completion of the main thrust bore and headings to connect to the existing telecom chambers a 12-month programme to sequentially divert the various communication lines was undertaken to completely free the

This article was compiled with the help of members of the Paddington Bridge Project Team, including: Tony Parasram, Bal Chana, Jo Kenward and Philip Tindall, of Hyder Consulting. Further information on the project can be found on www.paddingtonbridge.com

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existing structure in readiness for the main contractor's works to demolish the bridges. Monitoring of the rail lines was carried out throughout the shaft construction and tunnelling works to ensure there were no adverse effects on the operational railway. Strict limits of twist and settlement affecting the track above were imposed and the works achieved compliance throughout construction, with no impact on operation. In parallel with the removal of statutory undertakers services above the bridge, a programme of works was implemented to transfer the support of the OLE lines onto purpose built gantries and registration structures, thus removing any reliance on the old bridge for catenary support.

Before the bridge closed, 20m deep, 4.3m diameter caissons were installed adjacent between platforms 10 and 11. These foundation structures not only form

part of the bases for the temporary steel towers employed to lift the main truss, but will also be part of the permanent foundations. These works were undertaken in a safe working zone established between live railway lines. The works were started in August 2003 and completed in 2004 with no interruption to operational services. To achieve a safe working environment, a full height hoarding was erected enclosing the area of the pier foundations within which the men and plant could work without requiring possessions. A rigorous monitoring regime was established for the surrounding tracks, with an action plan to ensure that no adverse effects occurred as a result of the digging works. The actual movements of the rails were maintained within the agreed limits at all times.

Over the August Bank Holiday weekend in 2004, an 833 tonne steel

truss was carefully lifted in place using four 418 tonne strand jacks each located on purpose built temporary steel towers to the four corners of the bridge. These hydraulic jacks incrementally raised the old bridge 10m into the air in a single possession. Using this system, the whole operation could also be safely halted and maintained at any point in the lift, thus avoiding the risk of possession overruns. If necessary the works could then be restarted on the following possession until completion. In the event the lift operation went totally to plan and was completed well within a single possession.

Work now concentrates on the construction of the abutments, piers and Canal Bridge, which will form the platform for the construction and eventual launch of the main rail bridge. It is due to be completed in early 2007.

EDUCATION PROGRAMME NEWS

We are now accepting applications for enrolment on both our Associate Course and Member Course. For course information and application forms, please contact Mike Hill on 01344 875328 or email education@railwayoperators.org. Employees of corporate member companies receive a 30 per cent discount on course fees, whether the fee is paid by the employer or the individual.

MEMBERS' NEWS

The following employers operate a Corporate Membership scheme, by paying a one-off annual fee, which covers all their employees' Affiliate or Associate membership subscriptions. Network Rail Eurostar UK Ltd, ScotRail, First Great Western, First Great Western Link, One, Central Trains, EWS Railway, Northern Ireland Railways, Freightliner, Virgin Trains, Northern Rail (FNW part only), Thameslink, GB Railfreight, Hull Trains, South Eastern Trains, Corus Rail Consultancy, Iarnród Éireann, Arriva Trains Wales, Southern, London Lines, Transport for London/London Underground Ltd/Docklands Light Railway, Stagecoach Rail (South West Trains, Island Line, Sheffield Supertram).

Those with full Membership will continue to pay their subscription personally, irrespective of whether they can subsequently claim it back. Please note that, as subscriptions are tax-deductible, a receipt will be issued for all payments.

PROFESSIONAL QUALIFICATIONS FOR RAILWAY OPERATORS

Have you got experience of operating the railway? Would you like professional recognition, development and qualifications? The Institution of Railway Operators has been established to provide a professional structure and qualifications for people with knowledge and experience of operating the railway, at all levels. An information pack is available for anyone interested in finding out more. Contact Claire Wickes at the above address to get a pack for yourself or colleagues.

DIARY OF EVENTS

NORTH WEST AREA

Wednesday 16 March Manchester. Chris Leah, chairman of the IRO and the North West Area AGM. To contact the North West area on any matter, please contact Clive Evans on 01270-629009 or e-mail us at: Northwest@railwayoperators.org

MIDLANDS AREA

Monday 21 February Visit to Serco Railtest. Further dates for your diaries:
Monday 21 March
Monday 25 April
Monday 23 May
Saturday 18 June
To contact the Midlands Area on any subject, please contact Julia Stanyard on 0121 345 5030 (NEW NUMBER) or e-mail: Midlands@railwayoperators.org

SOUTH EAST AREA

Monday 21 March London. Ian Coucher, Deputy Chief Executive, Network Rail
Monday 23 May London.

'Operations for Dummies – Traincrew Management' (Details to follow)
All South East Area meetings take place at the Union Jack Club, Sandell Street, Waterloo. Doors open at 1800 and the talks commence at 1830. To contact the South East area on any subject, please e-mail: Southeast@railwayoperators.org

NORTH EAST AREA

Tuesday 8 March York. 'White Rose - A Blooming Miracle' – Robin Davis from GNER will talk about the project management of the introduction of a new train service, White Rose (Eurostar). Everything from satisfying the UK rail safety acceptance regime, dealing with route clearance, teaching drivers French, difficulties of the Yorkshire alphabet, being able to make a proper cup of tea on a French train and washing up on a train with no water. Venue: GNER Studio 1 accessed from platform 9 on York station. All North East Area meetings normally take place at 1730 for 1800, at York.

For further news on the IRO in the North East contact us by e-mail at: Northeast@railwayoperators.org

SCOTTISH AND IRISH AREA

IRO members are assured of a warm welcome at the following Scottish CILT meeting:
Tuesday 15 February – 1730 for 1800, Glasgow. Bill Burns, MD of the Hunterston Container Terminal, on 'Clydeport and the Development of Hunterston', 16 Robertson Street, Glasgow G2 8DS.
For information on all Scottish events and matters, please contact Scottish@railwayoperators.org or phone Jim Summers, Acting Chairman on 01324 625284.

SOUTH WEST AREA

For information on all South West events and matters, contact Lawrie Hall on 01453 822150 or e-mail us at Southwest@railwayoperators.org