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SIR PETER HENDY SPEAKS OUT

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At rest: 2009 stock in the Victoria Line depot at Northumberland Park. Keith Fender
Inset: **Cab screens: the top display shows nine seconds to go to departure, with the speedo at zero. The CCTV images show the platform.** Keith Fender

NOTES FROM THE UNDERGROUND

By default, it seems, the journeys described on this 'Welcome' page will, at some point, include a meal. But on 16 February London Underground, clearly unaware of this tradition, had unaccountably failed to marshal the restaurant car in the Victoria Line train taking our party of journalists from Siemens' offices at Euston to Northumberland Park, where we would be shown the Line's control centre.

In truth, we had been amply fed and watered by Siemens during the preceding presentation on the resignalling of the world's first automatically driven metro. That pioneering signalling and control scheme has been the responsibility of Westinghouse, which through various changes of ownership became Invensys and is now Siemens' UK arm.

When the Line upgrade was completed in 2012, the combination of new Bombardier rolling stock running under Siemens' radio Distance-to-Go signalling was providing 30 trains per hour (tph). Frequency has been ramped up progressively and from this month will provide 34tph across the whole length of the Line.

I regularly make the interchange from the Great Northern at Finsbury Park and two things are noticeable. First, you can sometimes see the tail light of a departing train as the headlight of the next approaching train blooms in the tunnel. Second, commuters' trust in the high frequency service has modified behaviour at peak times. If a coach is full and standing, passengers no longer join the scrum, they just stand back and wait for the next train – due in 105 seconds.

At the presentation, as well as paying glowing tributes to Siemens' contribution to this success story, London Underground's Capital Programmes Director David Waboso told us that his organisation was 'well on the way' to the next planned increase to 36tph from spring 2017.

There was also the interesting observation that the current service requires 39 of the 47 trains in the fleet in service. The Victoria Line has 33 platforms, so that means any disruption results in six trains stopped in tunnel.

Then we made our way to the end of the northbound Victoria Line platform at Euston for a novel experience – my first automated Underground footplate. Seated on the left hand side of the cab, I had a duplicated 'driving' panel with screen displaying a set of closed circuit television (CCTV) camera images looking along the train. A smaller digital display screen showed linespeed plus actual speed.

With the doors closed and checked on the display, simultaneously pressing two buttons was all that was needed to accelerate off into the tunnel. As the tail end cleared the platform, the CCTV screens went blank.

Despite the confined space, the maximum 60mph didn't seem fast as we rolled through the noticeably clean tunnel. Coming into King's Cross station, the CCTV screens came to life. A clever bit of automation selects the appropriate number of images to display (more for curved platforms, obviously).

Something I am researching at the moment is the impact of automation on driving skills. Human factors could be an important issue when Thameslink and Crossrail are open and drivers are switching from automatic train operation to manual driving.

While manual driving would be impractical at Victoria Line frequencies, the trains are driven manually between Seven Sisters station and the depot. In addition, drivers can maintain their skills, if they wish, between Seven Sisters and Walthamstow on Sundays, running in restricted manual mode.

All in all, a fascinating look behind the scenes of the tube line that features in many of my business and leisure trips to London, bringing most destinations within comfortably less than an hour from home.

Roger Ford, Industry & Technology Editor

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Cover: **unit No 360204 on Stockley flyover in west London.** Antony Guppy

RED IN TOOTH AN

It must be infuriating for the theoreticians at the Competition & Markets Authority (CMA) that real people in the real world don't behave as theory predicts. In March they were on about competition in the energy markets, where the wrong type of consumers are not busily switching between gas and electricity suppliers in search of the cheapest price.

According to the CMA, around 70% of the domestic customers of the six largest energy firms are still on the more expensive 'default' standard variable tariff. The CMA's latest analysis reveals that the average customer could save over £300 by switching to a cheaper deal. Even worse, customers could have been paying about £1.7 billion a year more than they would in a competitive market.

So it is all our fault. And we must be made to align with economic theory. The CMA's solution is a range of measures, aimed directly at customers, 'to help and encourage a greater number to benefit from switching to more competitively priced deals'.

One measure is the creation of a database, controlled by the energy regulator, of 'disengaged customers' who have been on a standard tariff for more than three years. This will allow rival suppliers to target their marketing at these saboteurs of market theory.

Obviously, it never occurs to the CMA that consumers may have seen through the faux market that is the privatised power network. Nor are they likely to welcome a blizzard of direct mail shots and cold marketing calls.

If you sign up for home food delivery, the quality of service and the quality of food is obvious. If the van driver is always late and the bananas black, then you can switch to another supermarket.

But the electricity you buy comes from a common pool. Competition is purely on price. Service is centred on billing, where if administrative incompetence annoys customers they certainly will switch.

But viewed from the consumer's side of the energy bill, those 70% could represent the wisdom of crowds rather than the apathy of the lumpen proletariat. All we want is 240 Volts when we flick the switch, preferably generated and distributed reliably and at the lowest cost.

BLOCKBUSTER

Another measure is the decision to rescind the energy regulator's imposition of a maximum of four energy tariffs. This move will allow the energy suppliers to market tariffs targeted at particular groups.

Which, of course, via Transport Secretary Patrick McLoughlin's comment that 'the ticketing system in our country is complicated and we need to see improvements being made in it. I'm the first to accept that', brings us to railways where, two days before its report on the energy market, the CMA published a 237-page blockbuster report singing the praises of competition on the tracks.

Remember how we laughed when dear old Roger Freeman, public transport minister back in the early 1990s, proposed that competition in the privatised railway might see separate trains for secretaries and their bosses coming into work later? And operators would be bidding for paths every eight weeks under the 'Peterborough' process?

Experience has taught us that, in the majority of cases, the

ND CLAW

realities of railway operation make competition on the rails impractical and even 80 weeks would be a quick turnround for a timetable recast today. The CMA concurs that opportunities are limited to the three main lines – East Coast, Great Western and West Coast.

Replacement of the Inter-city East Coast franchise in 2023 would, the CMA recommends, provide the first opportunity for 'significantly greater on-rail competition'. Further opportunities would follow with Inter-city West Coast in 2025 and Inter-city Great Western after that. Oddly, no mention is made of open access on HS2.

CMA lists four desiderata for increased competition on these lines. The first is reform of the structure of track access charges to create a level playing field between open access operators (OAO) and franchised train operating companies.

Next comes an abbreviation that took us straight back to the nationalised railway. Competition will need the introduction of a PSO, or Public Service Obligation levy, to cover the franchised operator's loss of revenue, the consequent reduced premium payments to the Department for Transport and thus cross-subsidy for 'public passenger transport services in the general interest that an operator, if it were considering its own commercial interests, would not assume or would not assume to the same extent or under the same conditions without reward', as the relevant EU legislation puts it.

Another sine qua non, according to the CMA, is the provision of capacity for OAOs on the relevant routes (amazing, Holmes!). Here, of course, the Digital Railway is the all purpose deus ex machina, magicking the extra paths into existence.

Open access: a Grand Central HST (left) makes its first call after leaving London on the 08.02 King's Cross to Sunderland service, while at right an HST operated by franchisee Virgin Trains East Coast waits to depart on the 07.30 Edinburgh to London service on 5 June 2015. Tony Miles

PATHS

A new system for allocating paths to OAOs would also be needed. Given the glacial progress with the current East Coast open access applications, this could be an understatement. Legislation to allow path trading is also suggested, but hastily parenthesised as 'desirable but not strictly necessary'.

And then we come to the matter of choice. As we are seeing from the current attempts to create an East Coast main line timetable, even something ostensibly simple, such as allocating eight inter-city paths an hour, is not easy. This is because all the other services that have to be accommodated keep getting in the way.

This affects choice. If you flight train departures around the hour, say, the putative open access operator can compete only on service and price, since, unless you can overtake, journey time will be the same.

If, in the future, both franchised and open access operators are paying much the same for access and rolling stock leasing charges, then the scope for price cutting is limited. And if a price war develops, with even more pricing offers to confuse the customer, the incumbent franchisee is likely to have deeper pockets.

And there is also the influence of journey time on preference. If you need to be somewhere at a certain time, then you catch the appropriate train. A rival service leaving 20 minutes later, even though it offers a welcome glass of champagne in all classes, isn't an option.

If we are going to take the need for competition seriously then this should be reflected in franchising. As we are seeing on the ECML, the franchise agreement expects that Virgin will provide a high frequency service when the Inter-city Express Programme (IEP) fleet arrives.

If Virgin has to share a finite number of paths with one or more OAOs, then the ridership and revenue assumptions on which the franchise was let are shattered.

So, when it comes to letting the new Inter-city East Coast franchise in 2023, should the state provide the bare minimum service, the equivalent of supermarket 'basics' or 'essentials' baked beans? Should the state operate, say, a one train an hour London-Leeds service, with the other two paths available for open access offerings?

Well, perhaps no, because we know passengers value frequency. Having to wait an hour for the next People's train would not go down well. But then again, would this matter if the prohibitive cost of walk-on fares and operator-specific tickets made frequency irrelevant?

And think of the hours of fun downloading tickets from multiple operators onto your personal chip-implant or whatever is the ticketing medium of choice in 2023.

FREQUENT

Which brings us back to the reactionary energy users. What long distance rail travellers want is a fast and frequent walk-up-and-go service at an affordable price. And that is what the franchised railway ought to try and provide.

On the East Coast, Hull Trains and Grand Central have shown that boutique operators can grow ridership by offering high levels of customer satisfaction and serving niche markets ignored by franchising. But to paraphrase Marshal Pierre Bosquet, 'C'est magnifique, mais ce n'est pas le chemin de fer'.

CMA's preferred option only offers more of the same, but with the OAOs paying their way, plus a PSO. If you really believe in competition, then 2023 should see all the long distance high speed paths put out to competitive tender, as has been suggested by a number of experienced railwaymen.

For both the East Coast and Great Western, this would be feasible. The state owns the track (Network Rail) and the trains (IEP), meaning the cost of running a service would be the same for each OAO. So a large transport group might bid for the lot, or two or three OAOs might turn Great Western into Julius Caesar's Gaul, with separate operators, quality of service and price for Anglo-Welsh services, London-Bristol and the far South West. But since the state would own the assets, wouldn't these be concessions, or even franchises?

The CMA does not have a distinguished track record when it comes to railways. When Virgin Trains East Coast, majority owned by Stagecoach, took over the services out of King's Cross, the Authority was too busy crouched in a corner inspecting local services from Peterborough through a magnifying glass to notice the elephant of Stagecoach-run services to London from the East Midlands standing just behind it.

The moral is clear: rather than burying its nose in 19th century economics text books, the CMA would be better occupied finding out what passengers want from the railway. We suspect a competitive free-for-all is not high on their list of priorities. mr

FUNDING FOR HS3 DEVELOPMENT

CHANCELLOR BACKS IMPROVED LEEDS - MANCHESTER LINK

THE GOVERNMENT has backed the development of an enhanced rail network connecting the major cities of the north of England. The move follows a recommendation from the National Infrastructure Commission (NIC), chaired by Lord Adonis, and development work by Transport for the North (TfN).

In his budget, Chancellor George Osborne provided funding of £60 million to develop detailed plans for a high speed link between Leeds and Manchester, as well as plans for improving links between the North's other major cities. Whether the Leeds-Manchester link will be an all-new line or an upgrade of existing routes is unclear at present.

The scheme, originally labelled HS3, was set out as a more comprehensive 'TransNorth' network in TfN's March 2015 strategy (p16, May 2015 issue), with TfN now dubbing it 'Northern Powerhouse Rail' (NPR). TfN's aim is to deliver a 'world-class network', based on the belief that 'there is substantial untapped potential for increased rail demand in the north, which [the] new network will address'.

TfN concludes that upgrades would need to 'go further than committed investments in the existing railway', and options being developed include new lines or 'very significant sections of new line'. A new high-speed line from Manchester linking with HS2 between Leeds and Sheffield is shown as being part of TfN's 'emerging view' of the options.

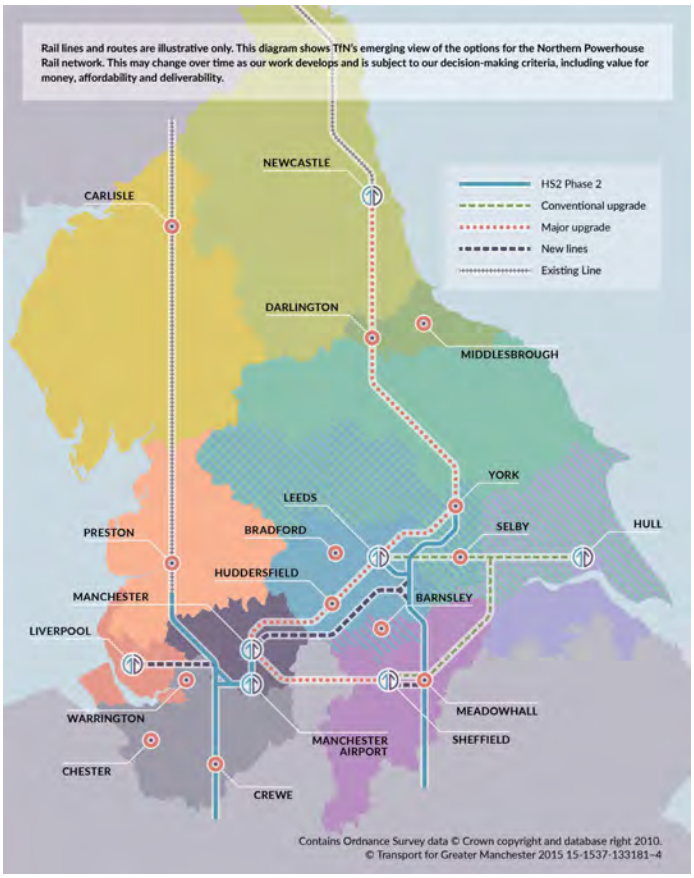
The NIC report, however, seems to back wholesale improvements to existing rail alignments rather than major new schemes. It suggests that a staged approach to upgrades should begin with the route between Manchester and Leeds. Building on Network Rail's plans to deliver a 40-minute journey time in 2022, the eventual aim would be for a further 10-minute cut, in line with TfN's ambitions. It is suggested that this 'may not require a completely new line but will require sections of major new infrastructure'.

Early work by Arup and Network Rail is highlighted, which has demonstrated that further journey time improvements between Manchester and Leeds may be possible without an entirely new alignment, with either the line via Huddersfield or the Calder Valley route possible candidates for such an upgrade, although it is acknowledged that these plans will require 'substantial investigation'. For the Sheffield to Manchester route, a transfer of tilting Pendolinos displaced from the West Coast main line after the opening of HS2 Phase One in 2026 is suggested as a way of reducing journey times between the cities to 40 minutes.

Elsewhere, TfN highlights that 'significant upgrade work' (electrification, quadruple tracking and grade separation of key junctions) between Leeds and Hull and Leeds and Newcastle looks 'likely to move significantly towards achieving our ambition'. Other routes could gain new lines – for example, between Liverpool and Manchester there is 'potential to integrate with the planned High Speed 2 infrastructure including the option of providing a new line'. The study also says that HS2 'could achieve the vision for access between Leeds and Sheffield with the right timetable and access to Sheffield city centre'. Under current plans HS2 is due to reach Crewe in 2027, before the complete network to Manchester and Leeds opens in 2033. Integration with HS2 is also a key recommendation of the Adonis Commission, which also champions a major redevelopment of Manchester Piccadilly station, enabling full integration of HS2 and HS3 services.

TfN's aim is to present a full analysis of options with relative costs and benefits by the autumn, with a single preferred option identified by the end of 2016/17. Scheme development would then continue, including analysis of which corridors to tackle first, enabling a plan for delivery to be formed, with implementation in the 2020s.

TransPennine Express: Unit No 185119 leaves Manchester Piccadilly for Scarborough on 16 June 2009. Tony Miles

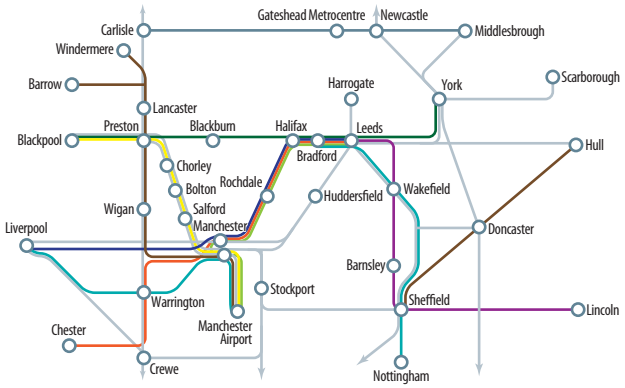


HS3 could join Manchester to the Yorkshire arm of HS2.

RAIL NORTH TAKES UP THE REINS

RAIL NORTH, the body that will be overseeing the new Northern and TransPennine Express franchises jointly with the Department for Transport from an office in Leeds, will become the rail arm of Transport for the North (TfN) when it is formally set up next year. Introducing the RN long term rail strategy at a stakeholder meeting in Leeds, director David Hoggarth emphasised that, with the north of England embracing 10 different franchises, two open access operators, over 500 stations and more than half of the freight carried, there was much to do beyond introducing the two new franchises. The strategy envisages the development of five service levels, each with specific and consistent rolling stock and service standards:

- between the five largest cities – Leeds, Manchester, Sheffield, Newcastle and Liverpool – there should be fast, high quality services providing high frequencies, better connectivity and at journey times significantly better than is achievable by road;
- between the other major cities and towns in the north, and between them and the five largest, the aim is to provide a consistent high standard of hourly express services;
- the third group covers services to London and other major cities elsewhere in the UK;
- the fourth is to major integrated gateways;
- finally, there are services to and from smaller towns, rural areas and tourist destinations.



Northern Connect services (heavy lines) will connect important towns with the metropolitan centres in the North.

The first level will mainly be the province of the new 125mph trains to be provided by the TransPennine franchise, while the second will be an entirely new level of services provided by the new Northern Connect network.

In the short term – to 2019 – the focus will be to maximise the value of agreed infrastructure investment, particularly the Northern Hub and the associated electrification schemes west of the Pennines. Thereafter, from 2019 to 2024, the emphasis will be on further electrification, particularly of the Manchester – Leeds – York route, and updating rolling stock by capitalising on the vehicle cascade from earlier electrifications to fulfil another RN objective, namely longer trains. RN wants smart ticketing with a single walk-up fare system across the North, integrated with other modes and with the opportunity for advance purchase and other discounts.

At the same meeting, new Northern franchise mobilisation director Richard McClean gave more details of the upgraded services, branded 'Northern Connect', which will be operated by the 55 diesel and 43 electric units to be built by CAF. Mostly running at hourly intervals, the new trains, which will be 23 metres long with doors at one-third and two-thirds positions in each vehicle, will be air-conditioned and 100mph capable. For the first time on these services, discounted advance tickets and seat reservations will be offered, but there will be no first class. A higher level of service will be provided at 36 designated 'Connect' Stations and, bucking the trend elsewhere, staffing will in future be provided at 45 stations which are currently unstaffed, while hours will be extended at a further 54. The 'Northern Connect' services will be introduced in stages up to December 2019 as the new rolling stock is delivered, and the aim is to have all Pacers withdrawn by October of that year, and the single-car Class 153 fleet by December.

All the remaining stock will be refurbished, with Wi-Fi, more space for cycles and customer information systems. The existing Class 158 fleet will be concentrated on Heaton depot in Newcastle for services in the North East, which are operationally largely separate from the remainder of the new Northern network. *Alan Williams*

KIRKSTALL FORGE OPENING IN MID-APRIL

THE NEW station at Kirkstall Forge in West Yorkshire is now planned to open in mid-April, according to the West Yorkshire Combined Authority.

The station, between Leeds and Shipley, had been due to open by the end of 2015 along with neighbouring Apperley Bridge, which saw its first passenger trains call on 13 December. A report presented to the Authority's Transport Committee on 26 February stated that construction of Kirkstall Forge was 'substantially completed' in mid-December, with the final supply of permanent power and telecoms currently underway. While the current target is for opening in mid-April, an official opening ceremony would be delayed until the end of the 'purdah' period for local elections.

Meanwhile, the report to the Committee stated that passenger use of Apperley Bridge station has increased 'more quickly than expected'.

Work to deliver a third new station at Low Moor, between Halifax and Bradford, is said to be making good progress following the substantive start on site in September 2015. The formation of the platforms is well advanced and track adjustment works are said to be practically complete, but during the main site works a previously unrecorded mine shaft was discovered for which remediation work is underway, and this is likely to delay the completion of the station until July; it was originally hoped to open the station in the spring.

SMART SEASONS IN THE NORTH BY 2020

TRANSPORT FOR the North's updated Northern Transport Strategy sets out plans for Smart North, offering a vision for simplified fares, integrated ticketing and improved passenger information, and a business case is to be presented to the Government for approval in the spring.

A three-stage implementation is planned, with introduction of smart season tickets and investment in new equipment including ticket machines made by 2020. At the same time TfN will develop the technology infrastructure to support later stages, leading to a second phase in which passengers will be able to travel using contactless bank cards and smart phones and a 'pay as you go' offer will be launched. This will be rolled out on a place-by-place basis as each area has the appropriate equipment in place. The third stage will incorporate the development of fare-capping and a 'fair price promise' to passengers, first on a daily and then on a weekly basis.

The strategy acknowledges that this is 'an ambitious aim', requiring agreements with the Combined and Local Transport Authorities (LTAs) and with commercial operators on how it will work in each area. Initially it is expected that each LTA will have its own scheme and scheme rules, which will become more aligned over time. The report notes that these second and third phases are 'planned for completed delivery beyond the life of the existing spending commitments', which run until 2020.

Meanwhile, TfN continues to develop a freight and logistics strategy for the region. Actions include increased network capacity and resilience for freight, support of strategically located interchanges and distribution centres and better connectivity to northern ports. For rail this would include the utilisation of capacity on the classic network released by HS2 and Northern Powerhouse Rail and provision of new strategic rail freight interchanges alongside infrastructure to allow larger and longer trains to access them, including gauge clearance works where necessary.

1973 stock: an eastbound Piccadilly Line service at Chiswick Park on 9 January 2016. The Picc trains will be the first to be renewed under the New Tube for London plans. Chris Wilson

TUBE UPGRADE FUNDING APPROVAL SOUGHT

PICC FIRST, THEN BAKERLOO IN NEW TUBE FOR LONDON PROGRAMME

TRANSPORT FOR London's board was asked to approve further spending on the New Tube for London (NTfL) programme at its meeting on 17 March.

NTfL will see a new fleet procured for the Piccadilly, Bakerloo, Central and Waterloo & City Lines, offering increased capacity and, for the first time, air cooling on deep level tube trains. Five bidders have been shortlisted – Alstom, Bombardier, CAF, Hitachi and Siemens – and an invitation to negotiate (ITN) was released in January for what is planned to be a 250-strong fleet, with contract award scheduled for October 2017.

TfL was seeking approval for an additional spend of £95 million to commence procurement of new rolling stock and signalling systems for the Piccadilly Line along with further development of the upgrades for the three remaining lines. This would include the issue of an invitation to tender (ITT) for a new signalling and train control system for the Piccadilly Line in October this year, with the intention of procuring a single control system for all four lines. Funding would also cover power supply upgrades and design and specification of infrastructure and railway systems upgrades. The intention is that upgraded services would initially be manually operated, with migration to automatic train operation following resignalling. According to TfL board papers, the NTfL programme 'will continue to provide the system capability' for future conversion to fully automatic (driverless) operation at a future date.

1972 stock: running parallel with the West Coast route at Northwick Park, a Bakerloo Line service from Harrow & Wealdstone to Elephant & Castle has just passed under the Metropolitan and Chiltern lines on 4 December 2015. The Bakerloo has moved ahead of the Central in the queue for new trains. Antony Guppy

The aim is to deliver modernisation of the Piccadilly and Waterloo & City Lines by 2026, with the Bakerloo Line following by 2028 and the Central Line by 2033. Previously the Central had been destined to receive new trains ahead of the Bakerloo, but TfL says it has committed additional investment to secure the continued safety and reliability of assets on the Central. It now intends to prioritise the Bakerloo and first replace the 1972 stock (which is the oldest fleet on the LU network), although this relative order is to be kept under review and 'informed by emerging asset condition and available funding'.

The Transport Commissioner's report to the board advised that work to refurbish the 1972 stock trains is underway, including replacement of flooring and ceiling ventilation fans and repairs to window surrounds, corner post and door pillars, while seat cushions and fabric are being replaced with a new moquette. The programme will allow the fleet to remain in service until the NTfL trains arrive. The report stated that the fourth train in the fleet was due for completion in mid-March, with trains five to seven due to be ready by the end of August, enabling refurbishment of all 36 trains to be completed in 2020.

The board was also to consider approval of spending to allow the full implementation of station capacity upgrade works at Bank. A new southbound running tunnel is to be built for the Northern Line, with the existing southbound platform set to become an underground passenger concourse. The scheme also includes a new entrance in Cannon Street, three new lifts and 12 new escalators. TfL's aim is to start work on site in April this year, with partial opening in October 2020 and the project completed by the end of 2021.

TfL management criticised over failed SSL contract

THE FAILURE of the London Underground sub-surface lines resignalling contract let to Bombardier in 2011 is 'a disaster for London' and blame lies with both TfL and the contractor, according to a report by the London Assembly's Budget and Performance Committee.

The contract was awarded in June 2011, and covered the provision of automatic train control on the Circle, District, Hammersmith & City and Metropolitan Lines by 2018. However, it was terminated in December 2013, with TfL paying a final settlement to Bombardier of £85 million. A new contract was subsequently awarded to Thales in summer 2015, with a new completion date of 2023, five years later than originally planned, with an increase of £886 million in the project's budget.

The committee says the 'nature, scale and sheer number of mistakes that were made… raise cause for considerable concern'. It believes that 'neither TfL nor Bombardier's management teams were up to the task of managing the programme', and queries whether TfL's Board has 'the right skills and experience for the job'. It says TfL is taking steps to address this, although the committee recommends the next Mayor of London should appoint a new TfL Board with 'the breadth of skills and experience to effectively cover all aspects of TfL's operational and investment activity'.

The report says the delay to the programme will have 'significant consequences for both passengers and TfL's capital programme'. While TfL has blamed Bombardier for its inability to deliver the programme, claiming it was 'duped' by the company about its expertise and experience, TfL's external auditor KPMG found that the procurement process was 'not well thought out' and that the scoring system for evaluating bids was 'flawed'. It found that by significantly underbidding its competition on price, Bombardier was almost certain to be taken forward, regardless of how it scored in the technical areas of the evaluation. This is because the system was 'far too weighted towards the commercial and cost elements of bid submissions and not enough towards their technical and operational content'.

Bombardier had offered 'a lot more and for a lot less', but KPMG found that the company's capability to deliver the stated benefits 'had not been adequately demonstrated or interrogated'. It also revealed that TfL 'seemed to change its procurement process as it went along', and that if it had followed the process as outlined in the Official Journal of the European Union notice then neither Bombardier nor the firm that finished second would have been in the top three at the evaluation stage.

NO-ONE HELD TO ACCOUNT

TfL has openly admitted it agreed a 'bad contract', and because the payment and penalty regimes were aligned to spending rather than progress, when ending the deal TfL was required to pay Bombardier a sum based on how much the company had spent rather than the value of the work it had produced. The committee believes that £67 million of TfL's expenditure on the project is of 'no value'.

Both TfL's internal and external assurance functions also come in for criticism regarding a lack of scrutiny, and the committee recommends that the next Mayor should review the external assurance provided by the Independent Investment Programme Advisory Group (IIPAG).

The committee says TfL's reaction to the lessons learned review conducted by KPMG has been positive and that 'the way it has set up a new delivery partnership with Thales provides some confidence', but nonetheless the broader question about the quality of judgement shown by the senior management team remains.

John Biggs AM, Chairman of the Budget and Performance Committee, said: 'What is most remarkable about this affair is that no-one in TfL has been held to account, and the Mayor, who chairs its board, serenely and indifferently acts as if a £900 million increase to the budget isn't an issue. In government, heads – political or official – would roll after such financial mismanagement. At TfL the key players have been promoted and nobody was to blame.'

AUTOMATIC FOR THE PEOPLE

IAN WALMSLEY CHECKS OUT THALES AUTOMATIC CONTROL ON 'S' STOCK

LONDON'S POPULATION is increasing at the rate of two full tube trains every week, and is expected to arrive at 10 million by 2030. The 'Four Lines Modernisation' (4LM) project is designed to keep up with this demand by taking the Circle, District, Hammersmith and City and Metropolitan Lines from 24 trains per hour up to 32tph in the central section. On a network as complex as this that is a major technical challenge, not to be confused with automating some end-to-end tramway.

Passengers are already enjoying the first stage of the upgrade with Bombardier's superb 'S' stock, but riding the Circle Line still sometimes feels more like a rural railway than a vital metro artery; the trains could do much more. Thales, Bombardier and TfL proudly demonstrated their automatic controlled S stock train at Old Dalby as spring peeped over the Leicestershire countryside. Incongruously in this rural setting there is a mini control room and lines of electronic racks controlling the train as it calls at virtual stations along the test track. All the driver needs to do after switching to 'automatic' is to start the train by pressing two buttons simultaneously, when the train takes off in a much more 'metro' manner than rural railway.

Star of the show: the S stock trial train at Old Dalby. Ian Walmsley

Look, no hands: S stock at speed on the test track while operating automatically. Ian Walmsley

This is not driverless operation, as he still starts the train and keeps a lookout, but the system is essential to maintain capacity. Recently someone discovered that you actually move more people up an escalator if everyone stands still, because there is no space like there is when people move. Motorways move more cars if they regulate speed, because cars drive closer together, and so it is with trains. But with the old 'legacy' signalling systems block sections are fixed, and fixed on the worst case. The new Seltrac signalling system is a moving block system, allowing operators to reduce the space between trains by regulating their speed; in fact the system can recover from disruption easier by using automated patterns of operation.

All this means you have to automate the control system, and the demonstration was impressive. Possibly even more impressive was the teamwork between the participants in the project; there was so much love I thought they would start playing Barry White records. The test train running now is called 'V1', which is the prototype test train; 'V2' will be the production version where the kit is all safely tucked away in equipment cases. Why the trains are named after weapons of mass destruction deployed on London is unknown, but probably speaks of the young age of the participants. After V2 the fleet then has to be fitted to make the whole system work; 53 trains by February 2018, 80 by September 2018. Not long to wait for less waiting time.

CROSSRAIL 2 BACKED

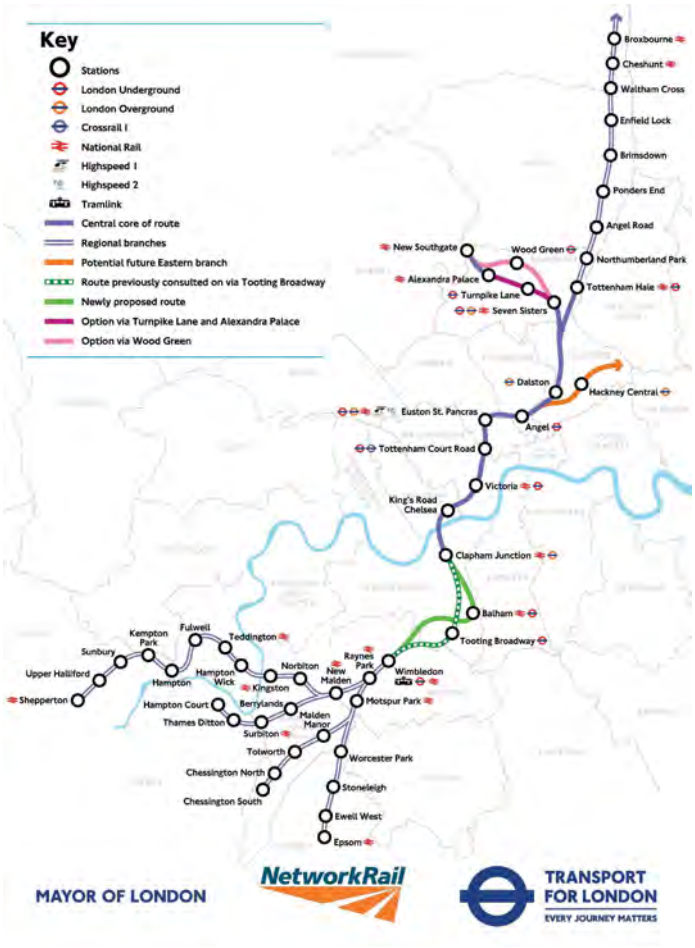
AFFORDABILITY FOR SCHEME MUST BE EXAMINED, SAYS ADONIS COMMISSION

CHANCELLOR GEORGE Osborne has backed Crossrail 2 in his budget by allocating £80 million for the development of plans for the new line. The move follows a recommendation from the National Infrastructure Commission (NIC), chaired by Lord Adonis, that a hybrid bill should be submitted by 2019 with the aim of the line opening in 2033.

Crossrail 2 is planned to run on a north-east to south-west alignment across the capital, with a central tunnelled section from Wimbledon to Tottenham Hale and New Southgate. Mr Osborne wants Transport for London to match his funding contribution with the aim of introducing a Crossrail 2 Bill in this Parliament.

In its report into London's transport system, the NIC stated that Crossrail 2 offers the best way to relieve the capital's most pressing transport challenges and is 'an essential response to the challenges London will face in the 2030s'. The challenges identified by the commission are overcrowding on key central London Underground lines, particularly the north-south Victoria and Northern Lines, lack of capacity and overcrowding on key rail routes into central London, particularly the South Western route into Waterloo, insufficient orbital rail links, particularly in east London, and insufficient transport access to key areas of future housing growth.

The NIC says Crossrail 2 provides 'a convincing response' to three of these challenges, and with the option of an eastern branch could in the future provide a further important contribution to the challenge of growth in east London. As well as relieving existing Underground lines and releasing capacity on heavy rail lines, it would also assist in onward dispersal of passengers arriving into London Euston on HS2, with the 2033 proposed opening coinciding with the completion of HS2 Phase 2 to Manchester and Leeds. The NIC notes that it has found no alternative proposals that effectively deal with the challenge of Underground capacity once all proposed Underground line upgrades are exhausted, or which can effectively mitigate crowding and dispersal challenges at Waterloo, Euston, Victoria and Clapham Junction.



In terms of funding, the NIC says it is crucial that London makes a significant contribution to the costs of Crossrail 2. While TfL's current plans would see London contribute just over half of the scheme's overall cost, the NIC believes there may be scope to increase this proportion by including risk sharing mechanisms which go further than those for Crossrail 1 as well as further devolution to London. Either way, it believes that a 'London deal for Crossrail 2' funding agreement, through which London contributes more than half the cost of the scheme and which includes substantial measures to realise the full housing benefits, should be agreed ahead of hybrid bill submission.

However, the NIC says that Crossrail 2 should not prevent development of other schemes, and that London must continue to plan strategically for the period 2030-2050 through the next iteration of the London Plan. This should also include a detailed examination of the scope to deliver other strategic projects, such as the Bakerloo Line extension, through alternative financing mechanisms.

THAMES VALLEY WIRES RETROFIT PLANNED

A RETROFIT of overhead electrification on the section of the Great Western main line between Reading and Didcot is on the cards following complaints about the visual impact of the current design.

With widely reported delays to the scheme, Network Rail is to ensure that the section between Tilehurst and Didcot is ready for Hitachi Inter-city Express (IEP) trains to begin testing in the autumn. However, local campaigners have protested about the design on this section, part of which runs through the Chiltern and North Wessex Downs Areas of Outstanding Natural Beauty (AONBs).

A letter dated October 2015 confirms that NR 'has committed to undertaking a review of viable design options for the OLE within the AONBs, the output of which will form the basis of a public consultation in early 2016'. NR issued a statement on its website in early March, saying: 'Developing these alternative designs is a complex process that involves balancing their appearance with safety, reliability and operational efficiency issues, but we have committed to consult with local communities when the design options are ready. Any works to modify the apparatus already installed to allow for the train testing will be undertaken retrospectively, subject to funding agreements.' It also confirms that installation of the current design will continue 'to ensure the successful testing of those new trains on the electrified railway'.

The revised date for completion of electrification between Reading and Didcot under the re-plan by Sir Peter Hendy is December 2017.

More on the Great Western electrification in 'Informed Sources' – page 26

Dramatic design: the AHR proposal for Oxford station features a restaurant on the roof.

VISION FOR OXFORD STATION

A FUTURISTIC new station at Oxford could include a rooftop restaurant. A scheme providing such a facility was among the winning proposals chosen as part of a design competition for the station.

The Oxford Station consortium's competition, managed by the Royal Institute of British Architects, attracted entries from six architects who produced ideas for what the development could look like. Following an exhibition and online competition, the public voted for their favoured design, with the winning entry from AHR securing over 70% of public votes.

A judging panel from Network Rail, Oxford City Council and Oxfordshire County Council along with the Department for Transport and Great Western Railway awarded the three winning places in the competition to AHR along with Wilkinson Eyre and Allies & Morrison. AHR's entry was described as 'original and impressive'.

Fiona Piercy, Chair of the Judging Panel said: 'We now need to work closely with Government and Network Rail and the private sector to secure the necessary mix of funding to deliver the next stage of the project. The design ideas will help us promote the best standards of architecture going forward.'

Automatic compensation scheme on c2c

C2C HAS launched an 'automatic delay repay' scheme offering passengers compensation for delays of as little as two minutes.

The scheme is available to passengers using c2c's smartcard, which the operator says is currently used by almost one in four annual season ticket holders. Compensation is paid at a rate of 3p per minute for delays of between two and 29 minutes. After this standard delay repay rules kick in, offering a refund of 50% of the cost of the single journey for delays of 30-59 minutes, 100% of the single journey for delays of an hour or more and the full value of the return journey for delays exceeding two hours.

c2c is using an interface with IBM which takes data from the smartcard and compares it with the TRUST train monitoring software to work out which train a passenger has used. Passengers can check their journey record and how much compensation they are owed on the c2c live app. Each month they will be sent an e-voucher for the total compensation due, which can be used for future ticket purchases or exchanged for cash if the amount exceeds £5.00.

GTR SERVICE BELOW STANDARD, SAYS WILKINSON

DFT BOSS VOWS TO 'BREAK THE POWER' OF £60K DRIVERS

THE DEPARTMENT for Transport's Managing Director Passenger Services, Peter Wilkinson, told a public meeting in Croydon on 18 February that the service provided by the new Govia Thameslink Railway franchise is 'not at the standard we expect' and issued an apology 'on behalf of the rail industry'.

The meeting was organised by Croydon Central MP Gavin Barwell and was also attended by representatives of GTR and Network Rail. Problems discussed included short formation of trains, passengers being over-carried due to stops being skipped without warning and large gaps in service on some routes due to cancellations.

Mr Wilkinson acknowledged that DfT had 'anticipated problems' for GTR in the new franchise due to the major Thameslink works at London Bridge and consequent reduction of capacity. He said that aside from the problems imposed by infrastructure work the other major cause of service that he freely admitted was 'very poor' was train crew issues.

He told the meeting that DfT 'had got it wrong – there were not enough drivers at the start of the franchise', not least as previous franchisee First Capital Connect 'had insufficient drivers', and merging the Thameslink operation with Southern in July 2015 had just 'made this worse'.

Mr Wilkinson added that the need for many trains to have guards and the basis on which drivers were employed made offering a reliable service very difficult. He said that DfT intended to introduce driver only operation (DOO) for all Southern services, starting this summer, removing the scope for trains to be cancelled or delayed due to a shortage of on-board crew.

His comments about drivers' terms and conditions made headlines, not least as he asserted that a 'sizeable minority' of drivers – who he claimed were earning £60,000-£80,000 per year and still benefiting from terms and conditions dating back to the days of steam – were responsible for weekend cancellations simply by not coming to work on Sundays. He said 'this time is coming to an end…within the next 12 to 36 months' adding that there may be 'some punch-ups' and that 'no government wants big industrial action on the railways but we have got to break this'.

Mr Wilkinson added that a driver recruitment programme was underway which would 'break the power of the drivers' affecting GTR's performance. He revealed that DfT has requested GTR over-recruit so that by December 2016 the franchise has 1,850 drivers, enough to cover the booked work, holidays and sickness plus all the one-off training requirements imposed by the introduction of the new Thameslink trains and new signalling and train control systems.

His comments about drivers provoked a reaction from the rail unions, with ASLEF general secretary Mick Whelan writing to Transport Secretary Patrick McLoughlin asking whether Mr Wilkinson's views 'reflect those of the Department for Transport'. Within days DfT issued a statement on Mr Wilkinson's behalf saying 'I apologise for any offence caused by my comments. I care passionately about the rail industry and I am committed to helping government deliver a better rail service for passengers. To do this we need to work with the whole of the rail industry.' *Keith Fender*

R|S|A

Railway Study Association

Developing railway professionals

Anthony Smith, chief executive, Transport Focus – Wednesday 13 April 2016

Anthony Smith will give a talk titled 'Highway to Hell – are coach, bus, car and rail customers incompatible bed-fellows or are they one of the same, wanting more of the same – and that includes genuine multi-modal integration?'

Having qualified as a solicitor, Anthony worked for five years as principal consumer lawyer for the Consumers' Association, publishers of Which? This was followed by a year as the legal consultant for Consumers International, a worldwide federation of consumer groups. On 30 March 2015 Passenger Focus became Transport Focus and in addition to representing passengers now represents users of the strategic road network in England. The RSA welcomes Anthony Smith back as a speaker, and his talk is certain to be lively, topical and relevant to this year's theme of 'customer service and innovation'.

This talk will start at 18.00 in classroom 2.02, Clement House, London School of Economics, 99 Aldwych, WC2B 4JF.

Midlands section meeting – Bob Machon, Managing Director at LFE Associates Ltd – Wednesday 20 April 2016

Bob Machon, a chartered engineer and MD at LFE Associates, will be reviewing the range of customer information and communications in the connected age that we now live in. The meeting will be in the Board Room at the Network Rail offices in The Mailbox, 100 Wharfside Street, Birmingham at 17.30 for 18.00.

Annual dinner – Thursday 23 June 2016

This year's keynote speaker is Mike Brown MVO, London's Transport Commissioner, and he will be hosted by our President Karen Boswell, Managing Director for Hitachi Rail Europe. This will take place at the Paddington Hilton Hotel, 146 Praed Street, London W2 1EE, with a reception starting at 18.00 and dinner served at 19.30. Tickets are now on sale and booking details have been circulated to members and an application form is available on the website.

Publications Officer Simon Feast writes:

We are delighted to announce an additional study tour for the RSA – this will be to Dublin to visit Irish Rail and possibly a number of transport companies, and a date will be announced for early summer shortly. Please keep an eye on our website.

Our past President, Mark Hopwood, presented to members in London on 3 March and gave a compelling insight into the renaissance of the Great Western Railway, following the rebranding of the company. Having presided over a turnaround in train performance during his tenure, Mark gave some enthralling insights into the wider work that his team has done in the communities with a myriad of stakeholders as well as efforts to revolutionise the customer experience through much improved on-train ambience and the quality of service provided at stations. Mark's presentation is available on the RSA website – look out for a write up in a future issue of *Modern Railways*.

You can read a write-up of the joint talk by Alex Hynes, MD Northern Rail and Stephen Head, former chair of Young Rail Professionals, on page 58 of this issue, while a write-up of the talk by Ray Stenning of Best Impressions is on page 60.

The full details of the 2015-16 programme are available on the website. If you wish to keep up to date with developments you can follow us on Facebook or Twitter using the links on our website.

An application form to join the RSA can be downloaded from the website at *www.railwaystudyassociation.org*, and membership benefits include 12 issues of *Modern Railways* and a regular speaker programme.

You can contact the RSA by e-mail at *secretary@railwaystudyassociation.org* or by post to Steven Saunders, Membership & Subscriptions, PO Box 375, Burgess Hill, RH15 5BX. Please enclose a stamped addressed envelope for a reply by letter mail.

Hear the speakers, ask the questions and then read all about it in *Modern Railways*!

www.railwaystudyassociation.org

NEXUS TO BRING METRO OPERATIONS IN-HOUSE

NORTH EAST Transport Authority Nexus proposes to bring operation of the Tyne and Wear Metro back in-house when the current deal with concessionaire DB Regio expires next year.

The current operating concession began in 2010 and runs for seven years, with the option of a two-year extension. However, the North East Combined Authority's Leadership Board meeting on 24 March was due to discuss plans not to exercise the option for the extension. The report to the meeting stated that both Nexus and DB 'are dissatisfied with the structure and the financial and operational performance of the current contract' and that the two-year period of in-house operation will allow Nexus 'to prepare the Metro business for the significant change that will be brought by investment in a new train fleet'.

The report stated that from Nexus' perspective operational punctuality 'has for some time been well below target levels', while fleet reliability is 'low by UK standards' and customer communications during system disruption 'has been of variable quality'. This has led to customer satisfaction with Metro being 'at a low point', while 'a number of contractual targets have been missed' and operator DB is earning 'significantly less than originally forecast in its bid'.

Nexus is developing an outline business case for a new fleet to replace the 90 trains currently in service, which are approaching 40 years of age. A draft specification for rolling stock is expected to be completed shortly with a target date of introducing a new fleet in the early 2020s. It is envisaged that any future operational arrangement would be based around acquisition and deployment of the new fleet, and will therefore be different to the present arrangement. Nexus expects to begin a procurement process to select a new operator under these terms in June 2017 ahead of a contract starting in April 2019, and a further report identifying options for this period will be presented in the summer.

The authority believes that in the interim period it would not be feasible to seek an external operator, hence the move to bring operations in-house. It is proposed to establish a dedicated project team, led by a Metro Transition Director, over the coming months. Nexus has reached agreement with DB that it would continue to invest in improved fleet performance and customer communications to the end of the contract in 2017, while it has also received confirmation from the Department for Transport that revenue grant funding will continue to be provided through to 2019.

METRO TO NEW STREET TO OPEN IN THE SPRING

WEST MIDLANDS transport authority Centro expects the extension of the Midland Metro to Birmingham New Street will open in the spring.

The city centre extension from Snow Hill was originally planned to open by the end of 2015. The section as far as Bull Street (pictured) began operating in December, but Centro suspended the remaining works for eight weeks to minimise the effect to shoppers and businesses during the busy pre-Christmas period. This work restarted in the New Year.

Network Rail has given approval for overnight testing of electrical systems on the extension on 23 April, which will check that these systems do not interfere with those controlling trains at New Street (and vice versa).

Steve Widdowson

STADLER AND ANSALDO CONSORTIUM FOR SUBWAY TRAINS

STRATHCLYDE PARTNERSHIP for Transport has awarded a £200 million contract for the supply of new trains, signalling and equipment for the Glasgow Subway to a consortium of Stadler Bussnang AG and Ansaldo STS.

Stadler will supply 17 new trains, with this part of the deal valued at £92 million. These will be of the same length and size as the existing rolling stock to fit the Subway's 4ft track gauge and restricted tunnel diameter of 3.4 metres. However, rather than the current three-car units, they will be four-car sets with open gangways and provision for wheelchair access, although this will only be available at two stations. The trains will have a maximum speed of 58km/h, and each will have 116 seats, 12 tip-up seats and standing room for 204 people. The new fleet is due to be introduced from 2020, and the deal includes additional technical service support and provision of spare parts.

Ansaldo will be responsible for provision of a new signalling and control system and a new control centre, while 'half height' platform screen doors will be provided at stations. The intention is that once the new trains and signalling have been fully tested the system will move to driverless operation.

The overall modernisation also includes refurbishment of stations; renewal of tracks and repairs to tunnels; and introduction of smart ticketing. The total cost of £288 million is being funded with a grant of £246 million from Transport Scotland, with the balance put forward by SPT.

Subway modernisation: platform screen doors and facilities for the disabled are planned as part of the deal with Stadler and Ansaldo.

SETTLE AND CARLISLE TO BE SHUT FOR 'MANY MONTHS'

NETWORK RAIL'S repairs to a 500,000-tonne landslip on the Settle and Carlisle line will involve building a structure underneath the affected section of railway to support it.

The railway between Appleby and Carlisle has been closed since 9 February following movement in the embankment at Eden Brows, near Armathwaite, with replacement buses provided. Network Rail says the project is expected to take 'many months', although the exact timescale is currently unclear due to the scale of the slip, the fact the earth is still moving and the inaccessibility of the location. Major earthworks will be required to stabilise the embankment.

Since the closure began engineers and geotechnical experts have been assessing the magnitude of the problem and have worked to agree an engineering solution, and preparatory works have been carried out by Story Contracting.

Rhiannon Price, Network Rail's project manager for the Eden Brows repairs, said: 'We have carefully considered many repair options and we are satisfied the one we're going with is the best.

'Our aim is to do a thorough job that leaves the Settle to Carlisle railway line in better shape than it was before this landslip.

As well as tackling this problem we intend to bring forward other, less major jobs we have earmarked on the shut section of line.'

Inaccessible spot: this aerial shot shows the difficulty of reaching the Eden Brows work site. Courtesy Network Rail

WEST COAST BANNED FROM THE MAIN LINE

Rail tour operator prohibited from operating until further notice

THE OFFICE of Rail and Road has issued West Coast Railways with a prohibition notice preventing it running trains on the main line railway.

The operator, which runs a significant number of steam-hauled services on the network, was issued with an improvement notice following ORR's investigation into a Signal Passed at Danger (SPAD) incident at Wootton Bassett on 7 March 2015. This mandated a range of improvements, including changes to WCR's management structure and implementation of a better safety management system, including improved documentation.

ORR says it believes WCR is not complying with the conditions of its safety certificate and that the 'significant risk to the railway' means a further improvement notice is not 'a viable option'. The prohibition notice means WCR cannot operate trains on the main line network until its governance and operations have been improved.

Since the issuing of the improvement notice last year further safety incidents have occurred, leading ORR to launch a formal review of WCR's safety certification. These include staff on a train turning off the Train Protection and Warning System (TPWS) isolation system (which was also the case in the Wootton Bassett incident), a train colliding with buffer stops and a train moving forward while preparing to leave a station following a miscommunication between the guard and driver.

Further to these incidents, ORR says WCR's general manager (appointed in the wake of the Wootton Bassett incident) has resigned, WCR has been operating trains longer than 10 coaches (contrary to agreement with ORR) and staff carrying out functions to ensure health and safety and/or compliance with WCR's safety management system have been undermined and their actions 'negatively interfered with by senior members of staff on the board, in particular the chairman'. ORR says it has 'significant concerns in relation to WCR's safety culture and leadership'.

Explaining its decision, ORR believes WCR has insufficient management and supervision of its train crews and also raises concerns in relation to the operator's route risk assessments. The regulator says there is a 'lack of clarity' in WCR's management structure, meaning it is unclear who is in control of the day-to-day running of the company, and there is no person responsible for safety or engineering on WCR's board. Governance is not considered robust, and ORR highlights that it requested changes to WCR's management structure in the previous improvement notice.

Specific points which ORR calls to be addressed before the prohibition notice is lifted are the make-up of WCR's board, provision of a clearer organisational structure, moving staff away from 'zero hours' contracts, implementation of a more robust route risk assessment process and implementing an improved process for managing staff.

ORR is separately prosecuting WCR and the driver of the train involved in the Wootton Bassett SPAD. At the first hearing at Swindon Magistrates' Court no pleas were entered, and the next hearing was scheduled for 18 March at Swindon Crown Court.

Arrangements for the 'Jacobite' steam workings on the West Highland line this summer are uncertain, with DB Cargo and ScotRail posited as possible replacements for West Coast Railways in working the trains.

On borrowed time: loco Nos 57314 and 57313 head working 5Z47, the 09.00 Carnforth Steamtown - Tyseley Steam Trust empty stock working, on 16 February 2016; the train is passing the site of Sutton Park station. This was one of WCRC's last workings prior to the imposition of the prohibition notice by the ORR. John Whitehouse

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VOITH
Engineered Reliability

Massive present: Transport Minister Andrew Jones, local MP Andrew Bingham and Ashley Bryan, Industrial Director at Hope Construction Materials, unveil the new wagons.

NEW CEMENT WAGONS FOR HOPE

HOPE CONSTRUCTION Materials has introduced 48 new aluminium wagons financed by leasing company VTG Rail. They were unveiled by Transport Minister Andrew Jones at a ceremony held at Hope's Derbyshire cement plant.

The wagons can carry 80 tonnes, more than the twice the payload of older 36-tonne wagons. This will increase the capacity of each cement train by 500 tonnes, which Hope says will enable it to reduce the number of trains it deploys while retaining capacity. The company's ambition is to see a 20% reduction in train movements in the first year of deployment. Hope intends to deliver two-thirds of its annual production of cement (one million tonnes) by rail.

The company will transport cement to construction projects around the UK using depots at Theale, Walsall and Dewsbury, while cement will also be delivered to its Dagenham depot when it opens later this year, where a new packing facility will allow the material to be packed in bags.

Hope is currently in the process of being acquired by Breedon Aggregates for £336 million; this deal is subject to the approval of competition authorities.

FUNDING FOR FREIGHTLINER

THE DEPARTMENT for Transport has awarded Freightliner a grant worth over £400,000 under its Mode Shift Revenue Support (MSRS) scheme.

The MSRS is designed to assist companies with the operating costs associated with running rail and inland waterway freight transport instead of road (where road would be cheaper). The awards come from the Sustainable Distribution Fund following the January 2016 bid round and cover intermodal traffic. DfT says the support is expected to remove up to 32,820 lorry journeys from the roads between January and March and achieve environmental benefits in excess of 4.8:1. The awards are paid in arrears subject to the traffic moved. MSRS has been approved by the European Commission to operate until 31 March 2020.

HS2 CONCERNS

AS THE High Speed 2 bill has progressed through Select Committee, the Rail Freight Group has argued that HS2 and Government have displayed 'a lack of ambition and urgency in confirming that use of released capacity on the West Coast main line would benefit rail freight'. Maggie Simpson, RFG Executive Director, said: 'We need clarity now on how released capacity will be used'.

Rail Freight Group

MODERNISING THE NORT

Transport is a key enabler of the economic and social aspirations of the Northern Powerhouse. Recent reports from across Government, including the National Infrastructure Commission, and, last month, from Transport for the North highlight these benefits and make the case for sustained investment.

Yet, building new railways or rebuilding current ones is expensive and the Treasury is bruised by recent enhancement costs overruns. Delay and cost are generated for new railways by protracted planning and legal processes, yet most observers agree that the north's Trans-Pennine routes just cannot wait for 'bypassing' from an HS3.

The current routes have not in fact changed significantly since the 1960s rationalisations that had reflected the falling off of usage at that time. We should not be in the least bit surprised that the highly shorn network struggles to cope with today's ridership, nor that it stifles rail freight development. Average speeds of 'express' trains across the Pennines are well under 50mph (the main route's new trains will be 125mph rated) and there is almost no capacity for freight. Rail freight forwarders and port groups, making very significant private sector investments in their facilities today, are unlikely to be able to continue to do so if they have a wait until 2035-40 for the rail network across the north to be able to deal confidently with their flows. There is a strong case for doing something significant now to the current rail infrastructure in parallel with assessing the concept of HS3.

So what can be done to unlock growth in the short term and the medium term? Take the North Trans-Pennine (via Diggle) route as perhaps the key corridor linking ports and inland terminals. Firstly, there are a series of minor interventions that could be undertaken quickly to deliver immediate benefits, albeit small scale: review of linespeeds, provision for longer freight trains, removal of axle-weight driven freight restrictions and provision of better loop entry/exit speeds would deliver journey time and capacity improvements for all users. Indeed, given the pressure for growth, it is surprising that so many of these restrictions still exist today!

Such measures will not however give the transformational impacts that are needed, so a package of more substantial improvements along the route also needs be developed as an integral part of electrification planning – not a follow-on. Once the wires are designed, let alone up, the route is in effect fixed to its current, 1960s, parameters. These works would be completed well ahead of

INTERMODAL ASSUMES COAL'S CROWN

THE TOTAL amount of freight moved by rail during Quarter 3 (Q3, October to December) of 2015-16 was 4.6 billion net tonne kilometres, 18% less than in the same quarter the previous year, according to statistics released by the Office of Rail and Road.

Intermodal traffic accounted for the highest proportion of this (35.9%), followed by construction (21.5%). The amount of coal moved was 0.71 billion net tonne kilometres, the lowest amount in any Q3 period since the time series began in 1998-99. Although representing a fall of 57.9% on the same period in the previous year, the amount of coal moved increased compared to Q2. ORR suggests that while the closure of Kellingley Colliery may have impacted coal movements, it is possible that by the end of the year the coal stockpiled ahead of the carbon tax introduction in April 2015 had diminished, increasing the need to move the commodity.

Also experiencing notable declines were international freight (down 32.5% year-on-year) and metals (down 15.4%). Tightened security at Calais due to the migrant crisis is cited as the likely reason for the former, while a drop in the price of metals leading to reduced UK production of steel combined with closure of steel plants is likely to have affected the latter. The 'other' category recorded a 15.5% year-on-year rise in freight moved, likely reflecting increased conversion of biomass.

During the quarter freight delay fell to 12.0 minutes per 100 train kilometres, 24% less than in the previous year's Q3. As in previous periods, ORR attributes this to the ability to revise schedules at much shorter notice and thereby minimise the impact of delays.

Coal no more: the coal loading site at Ravenstruther being demolished on 7 March. Just north of Carstairs on the West Coast main line, Ravenstruther was constructed in 1989. Coal was brought there from open-cast workings in the Douglas Basin, South Lanarkshire. Ian Lothian

RE-BRAND FOR DB SCHENKER FREIGHT

DB SCHENKER'S UK rail freight business has been rebranded as DB Cargo UK. The move is part of a full re-branding of DB Schenker Rail business units across Europe, which will all become known as DB Cargo during the course of the year.

Geoff Spencer, CEO of DB Cargo UK, said: 'The re-brand will continue to strengthen our presence and further build recognition in the markets in which we operate.

'The name change has no impact on existing contracts or commercial arrangements. However, over time, you will see the logo on our documentation, buildings and communications change from "DB Schenker" to the familiar "DB" corporate mark. Other than this, it's business as usual.'

H TRANS-PENNINE ROUTE

any HS3, and would thereafter work in synergy with it, delivering capacity for freight and inter-urban services.

Core components of such an upgrade are likely to be:

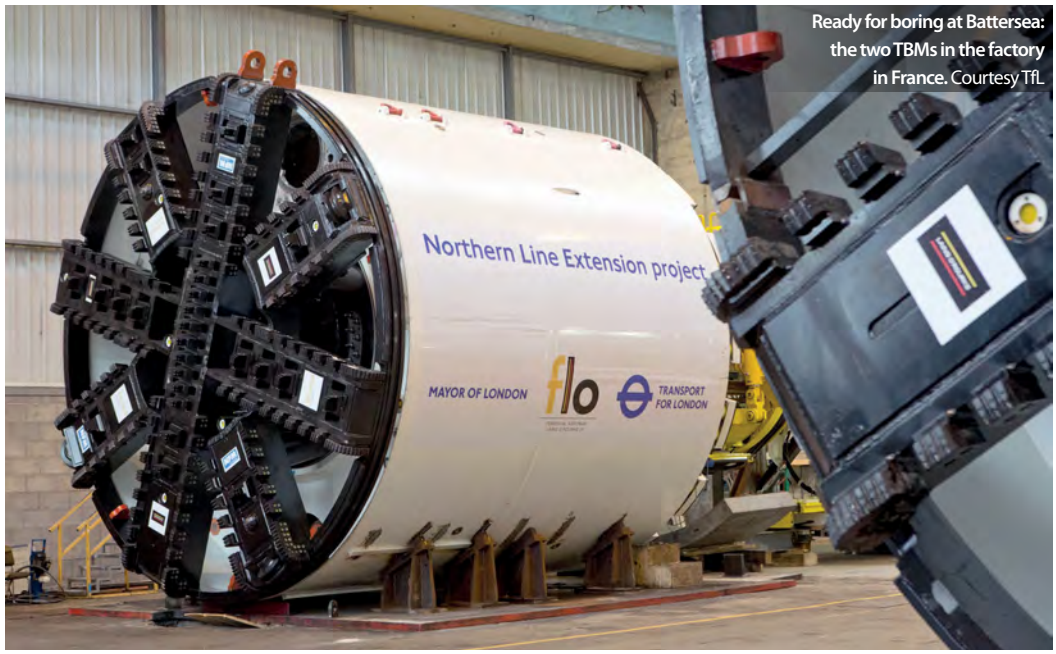
- Stalybridge-Diggle to be developed as a two-track railway with modernised signalling and with linespeed improvements through curve-smoothing along the valley side. On the other side of the valley is the closed 'Micklehurst loop' which, with environmentally-led tunnelling to avoid sensitive areas and curve-smoothing, may be the capacity/speed provider for this end of the route and perhaps the future route of HS3 out of Manchester. At Diggle a new grade-separated junction would allow trains from this route to join the current main line.
- The Diggle to Marsden tunnel section would see the currently disused single bore tunnels adapted for modern use (W12/ electrification) and the currently used double track tunnel would then be similarly re-engineered for electrification and W12 clearance.
- Marsden to Thornhill (Ravensthorpe) via Huddersfield was a four-track formation until 1965 (though with vegetation growth this may not be obvious to the casual observer) and, though track slewing since will have to be reversed in places, would have a third line reinstated throughout with bi-directional signalling at higher speeds. Such apparent largesse facilitates maintenance - what the north needs of this key route is an 'always open' railway.
- Thornhill to Holbeck West (Leeds) to remain double track though bi-directional for maintenance. Most Trans-Pennine freight would continue to leave the route at Thornhill, then being routed via Horbury, a line on which adequate future capacity exists.

This programme of work is of course not without cost or challenges, but with the right approach could deliver significant usable outputs well ahead of HS3 and, through enabling work on the Calder Valley route, could be carried out as discrete packages with reduced need for wholesale line blockades. It also creates a high profile opportunity for testing alternative delivery models to bring in private sector funding and expertise.

Success, for the freight and passenger user, should see a step change in capacity and capability across this key artery, enabling new business to rail and facilitating the economic growth so needed by the North.

An opinion column of the Rail Freight Group, *www.rfg.org.uk*

NORTHERN LINE TBMs READY



Ready for boring at Battersea: the two TBMs in the factory in France. Courtesy TfL

TWO NEW 650-tonne tunnel boring machines (TBMs) have been manufactured by NFM Technologies in Le Creusot in central France for the Northern Line Extension project. The extension, which will run from Kennington to Battersea, is being built by Ferrovial Agroman Laing O'Rourke.

The two machines are set to undergo factory testing, and once this has been completed they will be dismantled and shipped to London. Teams in Battersea will then start their final assembly, which is estimated to take three months.

Each TBM cutting head is just over six metres in diameter. At over 100 metres long each, the machines are equivalent to the length of the pitch at Wembley Stadium. Each machine will undertake two individual tunnel drives to construct the 5.2-metre diameter tunnels.

Tunnelling for the Northern Line Extension is due to begin in early 2017 and will take six months to complete. Two new stations will be built: one at the heart of the Battersea Power Station redevelopment and another at Nine Elms to the east, serving new developments such as the US Embassy and the redevelopment of New Covent Garden Market, as well as existing communities.

The tunnelling will see over 300,000 tonnes of earth excavated and passed along nine conveyors before being loaded on to barges and taken to Goshems Farm in East Tilbury, Essex where it will be used to raise former landfill sites to create arable farmland.

DUTCH DIGITAL RAILWAY DEAL

NETWORK RAIL'S Digital Railway department has agreed a strategic partnership with Dutch railway operator ProRail to speed up delivery of the European Rail Traffic Management System (ERTMS) and the next generation of train control.

The two organisations have committed to share knowledge on ways to ensure that current technology delivers maximum benefit, and to collaborate on research and development activities to help make the next generation of digital technology available to national railways within a decade. A live next generation technology demonstrator is planned by 2017.

Martin Arter, Programme Development Director at Digital Railway, said: 'By working together, Digital Railway and ProRail are helping to secure maximum benefit from the digital revolution in rail and help set the agenda for the future'.

■ The House of Commons Transport Select Committee has announced that it is to conduct an inquiry into rail technology, focusing on signalling and traffic management. The committee will investigate the efficiency of NR's planned roll-out of ERTMS and whether the timings proposed in the company's Digital Railway programme are realistic.

CONWY VALLEY LINE REOPENS

THE CONWY Valley line from Llandudno to Blaenau Ffestiniog reopened on 22 February after flooding over the Christmas period caused damage at more than 100 separate locations. Network Rail worked with contractor Alun Griffiths Ltd to carry out the repairs, which include restoration of stone washed away by the flooding, repairs to bridges and embankments and replacement of signalling cables. NR's initial aim was to reopen the line by the end of February, and train services actually resumed around a week early.

A reduced timetable operated for the first two weeks due to the imposition of a 20mph speed limit over a six-mile section of track. During this period the first two southbound trains towards Blaenau Ffestiniog and one northbound morning service were replaced by buses; the full timetable resumed on 7 March.

Royal visit: HRH the Duke of Kent (left) at Rochester station. Courtesy Network Rail

ROYAL OPENING AT ROCHESTER

THE NEW station at Rochester has been officially opened by His Royal Highness the Duke of Kent.

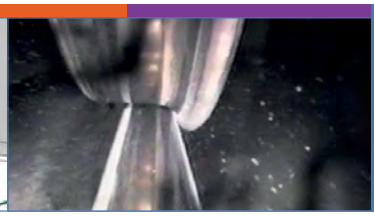
Built by Spencer Rail for Network Rail and operated by Southeastern, the £26 million station was completed in 2015 and came into use in December. It has longer platforms which can accommodate 12-car trains and is located closer to the town centre than the previous site, which has now been abandoned. A new multi-storey car park is set to open later this year, while the station is linked to the Rochester Riverside development by a subway.

Completion of the new station's Down platform has been delayed pending the demolition of a signal box, which was due to take place after the delayed East Kent Resignalling scheme's commissioning at Easter.

Meanwhile, planning approval and funding has been granted for a new station building at Strood, with work due to begin this summer. The scheme is currently in the detailed design stage, according to operator Southeastern. When work starts the current building will be demolished to make way for a new one, featuring a larger booking hall and better facilities. Work is due to be completed by summer 2017. The project will be delivered by Southeastern in conjunction with Medway Council, Network Rail and architect The Trevor Patrick Partnership.

ON TRACK FOR TOMORROW

PWI LONDON TECHNICAL SEMINAR



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The challenge of planning and delivering the maintenance and renewal of the railway is becoming increasingly harder for the railway engineers of the future given the combined pressures of reducing finance, increasing demand, reducing access and increasing sustainability requirements.

This seminar will explore how the life of the railway engineer of the future will be simplified through developments in either processes, people, plant or general application of new technology.

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If you have any questions please contact:

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Roger Ford

CONTROL PERIOD 5 ROL

We've got the orders – now comes the ketchup bottle* challenge

Begone dull care, say I. Push back the grey drizzle of interminable reviews, inquiries, reports and consultation documents that squat on our industry like a knot of toads.

Instead, it is time to update rolling stock orders in the current Control Period 5 (1 April 2014 - 31 March 2019). And, as Table 1 shows, there is much to lift the spirits. To put the grand total of vehicles in context, in the 10 years either side of 1994, British Rail and the newly-privatised railway each ordered roundly 5,000 passenger vehicles.

Today, approaching that number is due to arrive in just five years. But because it takes time to order trains and fill up the supply chains, around 570 trains – just over 4,000 vehicles – are going to be delivered in the last 27 months of CP5.

That equates to commissioning and accepting 20 trains a month, or five to six a week. While it may sound daunting, with long production runs a routine should be established.

As Chris Green recalls of his days at Network SouthEast in the 1980s, 'you knew it was Monday morning because a Class 31x EMU arrived on depot from BREL' After a safety check it went into service that day.

ORDER BOOST

While nearly 60% of the vehicles in Table 1 are absorbed by the 'big three' contracts – the Intercity Express Programme, Thameslink and Crossrail – this latest update reveals the influence of the new approach to franchising driven by the Department for Transport's Managing Director Passenger Services, Peter Wilkinson. Under his new bid evaluation regime, the highest/lowest Net Present Value of premium/subsidy is no longer the sole determinant of success.

Instead, the evaluation takes quality into account through weighting for passenger benefits. Given the combination of overcrowding and rising ridership, additional rolling stock is an unambiguous benefit, plus it comes with known lease rental charges and maintenance costs.

Add in other factors, such as the Conservatives making removal of the Class 14x Pacers part of the Chancellor's Northern Powerhouse commitments at last year's election, and it is easy to see why new rolling stock has become a near essential component of current franchise bids.

FINANCE

An important point to note is that the fleets for these 'franchise orders' are generally in the range of 150-200 vehicles. For EMUs this gives a value of £200-300 million, which is a comfortable size for financial institutions looking for a new home for their money.

In the financial world, confidence is key and Peter Wilkinson must be pleased with the way newcomers to rolling stock leasing are entering the UK market. Latest arrival is Rock Rail, itself a subsidiary of a recently formed infrastructure developer, Rock Infrastructure.

Rock Rail is funding the 25x6-car Siemens Desiro City EMUs that will replace the Great Northern Class 313 fleet. This is a near perfect funding opportunity, and not just in value – at around £220 million.

Rock Rail is buying a standard design, with the first of over 1,000 vehicles ordered for Thameslink now on test in the UK. An order from South West Trains for 30 units, already in the metal, provides further reassurance. Apart from Siemens' reputation, the sheer size of the

Thameslink build underway: Class 700 bodyshell at Siemens' Krefeld plant on 2 April 2015. Keith Fender

* *Shake and shake the ketchup bottle. First none will come and then a lot'll - Anon*

New face in South London: freshly-delivered Gatwick Express Class 387/2s Nos 387209/8 pause at Tulse Hill while working 5X69, the 10.00 Three Bridges Thameslink Up Depot to Cricklewood test run on 23 January 2016. At left a GTR Southern Class 455/8 set, No 455838, arrives with a Beckenham Junction service. Chris Wilson

LLING STOCK BONANZA

TABLE 1A: MAIN LINE ROLLING STOCK ON ORDER

Operator	Class No	Type	Sets	Vehicles	Formation	Manufacturer	Funder	Status	First service	Full fleet
IEP (GWML)	800	Bi-Mode	57	369	various [1]	Hitachi	Agility Trains West	Delivering	May 2017	July 2018
IEP (ECML)	800/801	Bi-Mode/EMU	65	497	various [2]	Hitachi	Agility Trains East	Ordered	Aug 2018	Apr 2020
TOTAL IEP			**122**	**866**						
Great Western Railway	802	AT300 Bi-mode [3]	29	173	5-car & 9-car [4]	Hitachi	Eversholt Rail	Ordered	May 2018	Dec 2018
GTR (Thameslink)	700	Desiro City EMU	115	1,140	8 & 12-car [5]	Siemens	Cross London Trains	Delivering	Imminent	Dec 2018
Crossrail	345	Aventra EMU	66	594	9-car	Bombardier	DfT/TfL	Ordered	May 2017	Dec 2018
GTR (Thameslink) [6]	387/1	Electrostar EMU	29	116	4-car	Bombardier	Porterbrook Leasing	Fleet in service		
GWR	387/3	Electrostar EMU	8	32	4-car	Bombardier	Porterbrook Leasing	Ordered	Subject to electrification	
LOROL [7]	378	Electrostar EMU		57		Bombardier	QW Rail Leasing	Delivered		
GTR (Gatwick Express)	387/2	Electrostar EMU	27	108	4-car	Bombardier	Porterbrook Leasing	Delivering		2016
GTR (Class 313 replacement)	701	Desiro City EMU	25	150	6-car	Siemens	Rock Rail	Bidding	Q2 2017	Q3 2018
SWT (HLOS build)	707	Desiro City EMU	30	150	5-car	Siemens	Angel Trains	Ordered	June 2017	Dec 2017
Caledonian Sleeper		Sleeper coaches	4	75	16 [8]	CAF	Caledonian Sleepers Rail Leasing	Ordered		Apr 2018
ScotRail	385	AT200 EMU	70	234	3 & 4-car [9]	Hitachi	Caledonian Rail Leasing	Ordered	Autumn 2017	Dec 2018
ScotRail	385	AT200 EMU	10	30	3-car	Hitachi	n/a	Option [10]		
LOROL [11]	710	Aventra EMU	45	180	4-car	Bombardier	TfL	Ordered	From 2018	
Porterbrook speculative build	387	Electrostar EMU		80		Bombardier	Porterbrook Leasing	Ordered		
Northern		Civity EMU	43	141	3 & 4-car [12]	CAF	Eversholt Rail	Ordered		Dec 2020
Northern		Civity DMU	55	140	2 & 3-car [13]	CAF	Eversholt Rail	Ordered		Dec 2020
TPE	AT300	Bi-Mode	13	65	5-car	Hitachi	Angel Trains	Ordered	Dec 2017	Dec 2018
TPE		EMU	12	60	5-car					Dec 2019
TPE		Bi-Mode	19	95	5-car					Dec 2020
Merseyrail		EMU	50	150	3-car			Bidding [14]		Early 2020s
TOTAL			**772**	**4,636**						
STATED REQUIREMENTS										
Essex Thameside capacity enhancement		EMU	17	68	4-car			Franchise commitment	2019	Early 2020s
PROVISIONAL										
Great Western Railway [15]	801	Bi-Mode	9	45	5-car					
FirstGroup (open access ECML)	AT300	EMU	5	25	5-car					
Alliance Rail (open access ECML)	390	EMU	12	108	9-car					
Alliance Rail (open access WCML)	390	EMU	4	24	6-car					
East Anglia Franchise [16]		EMU		210	n/a					
Midland Main Line Electrification [17]		EMU	35	175	5-car					
POSTPONED										
Hull Trains open access		EMU	4	20	5-car					
Trans Pennine Express electrification		EMU		150	5-car					

Notes

1 36x5-car bi-mode; 21x9-car bi-mode
2 12x5-car EMU; 30x9-car EMU; 10x5-car bi-mode; 13x9-car bi-mode
3 For West of England IC125 replacement
4 7x9-car bi-mode; 22x5-car bi-mode
5 60x8-car; 55x12-car
6 110mile/h dual voltage. Additional Thameslink capacity pending new fleet
7 Lengthened existing fleet to 5-car
8 Plus 11 spare vehicles
9 46x3-car; 24x4-car
10 Subject to three-year franchise extension option
11 Greater Anglia Inner suburban, Gospel Oak-Barking, Euston-Watford
12 31x3-car; 12x4-car
13 25x2-car; 30x3-car
14 Shortlisted: Bombardier, CAF, Mitsui/Alstom/J-TREC, Siemens, Stadler
15 Possible Cotswolds enhancement
16 Inter-city spec for 'Norwich in 90'
17 Bedford-Kettering/Corby. Possible destination for Porterbook speculative build

TABLE 1B: LONDON UNDERGROUND ORDERS IN PROSPECT

Operator	Type	Sets	Vehicles	Formation	Funder	Status	First service	Full fleet
Jubilee Line	Tube Stock	10	70	7-car	TfL	OJEU issued	Sept 2019	Jun 2020
Northern Line	Tube Stock	17	102	6-car	TfL	OJEU issued [1]	Aug 2020	Oct 2021
New Tube for London	Tube Stock	250 [2]			TfL	OJEU issued		2026 [3]

Notes

1 Under review due to budgetary concerns
2 Total requirement for Piccadilly , Waterloo & City, Bakerloo and Central Lines
3 Piccadilly and Waterloo & City Lines

Thameslink fleet means that technical issues emerging during current test running will have been sorted by the time the GN fleet is delivered.

On top of that, these dual-voltage vehicles are for a niche operation (services into Moorgate), and will be part of the Thameslink fleet. It is highly unlikely that a future franchisee would seek to replace them.

Under Rock Rail's deal, equity finance will be provided by SL Capital, part of Standard Life Investments, with Aviva Investors responsible for debt. Mark Versey, Chief Investment Officer – Global Investment Solutions, at Aviva Investors made the point that structuring the deal required a pragmatic approach, particularly around refranchising risk. That it went through the Investment Committee 'represents the high degree of confidence we have in the growth of the UK rail industry' he explained.

Table 2 shows the companies funding passenger rolling stock, in addition to the three long-standing rolling stock leasing companies (ROSCOs), plus where the money is coming from. However, as Table 3 shows, so far the newcomers have been one-hit wonders, with a single deal each, although QW Rail Leasing funded the lengthening of its existing Class 378 feet.

Thus, to date in CP5 the original ROSCOs have funded two thirds of the 'franchise' vehicles. The next stage will be for one of the newcomers to start to build a portfolio.

That said, the ROSCOs do offer more than money. They have substantial engineering resources, plus unique experience of operations, maintenance, overhaul and re-engineering.

In terms of manufacture (Table 4), Bombardier has won the most of DfT's 'franchise contracts' and is supplying the most vehicles. However this is being written before the builders of the TransPennine Express fleets have been confirmed. Table 4 suggests that with CAF's arrival in the UK main line market, building on its successes with light rail vehicles, Alstom's immediate prospects for a return to the UK rolling stock market now hinge on London Underground.

TABLE 2: NEW SOURCES OF ROLLING STOCK FUNDING

INTERCITY EXPRESS PROGRAMME (IEP)

Agility Trains

Shareholders

- Agility Trains West: Hitachi Rail Europe (70%), John Laing Investments (24%), MetLife Private Capital Investors (6%).
- Agility Trains East: Hitachi Rail Europe (70%) and John Laing Investments (30%).

Sources of IEP finance: European Investment Bank, Japan Bank for International Co-operation, Bank of Tokyo, Mitsubishi UFJ, Development Bank of Japan, HSBC, Lloyds, Mitsubishi Trust, Mizuho, Sumitomo Mitsui Banking Corporation (SMBC), Société Générale, Crédit Agricole.

THAMESLINK

Cross London Trains

Shareholders

- Siemens Project Ventures GmbH, Innisfree PFI Secondary Fund 2 LP, 3i Infrastructure plc

LOROL CLASS 378 FLEET

QW Rail Leasing Ltd

Sources of finance: National Australia Bank and SMBC.

GTR CLASS 313 REPLACEMENT

Rock Rail (subsidiary of Rock Infrastructure)

Sources of finance: equity - SL Capital (Standard Life Investments); debt - Aviva Investments

CALEDONIAN SLEEPERS

Caledonian Sleepers Rail Leasing Ltd (subsidiary of Lombard North Central plc)

SCOTRAIL CLASS 385

Caledonian Rail Leasing Ltd, Special Purpose Vehicle created by SMBC Leasing (UK) Ltd

Sources of finance: SMBC Leasing & Finance Inc, KfW IPEX Bank, RBS/Lombard

COMING NEXT

Any new orders placed from now on are unlikely to be delivered in CP5, which ends in three years' time. Indeed, we are already seeing manufacturers declining to bid, as with Siemens and Hitachi, because of capacity constraints.

In the case of Hitachi, the AT300 Class 802 bi-modes for Great Western's West of England services were to have been built at the

Hitachi-built Inter-city Express: pre-series test train No 800001 at Peterborough on 9 June 2015. Russell Wykes

company's home factory at Kasado in Japan because Newton Aycliffe was fully committed with IEP and the ScotRail Class 385 EMUs. The trains will now be assembled at the newly-acquired Pistoia works of AnsaldoBreda in Italy. That should be an interesting cultural challenge.

Note that in addition to the expected TPE order for AT300 trains, GWR is looking to add another 9x5-car sets to its existing contract. This is a further response to the new delivery schedule for the Great Western Electrification Programme (see following story). The extra units would provide additional flexibility for North Cotswolds and Bedwyn services.

ANGLIA OPPORTUNITY?

Those declining Invitations to Tender may be keeping their powder dry, or, rather, capacity available, for the potential major opportunity in the Provisional section of Table 1. This is the replacement Greater Anglia franchise: the scale of the opportunity should emerge in June when the new franchisee is announced.

All the manufacturers see this as a major deal. The question is, how major?

At the least this is expected to see the replacement of the loco-hauled inter-city trains (Class 90 plus Mk 3 stock) with 110 or 125mph EMUs. However, informed manufacturing sources are salivating at the prospect of combining this with the replacement of some, or even all, of the outer-suburban Class 31x units. Commercially, the timing would help maintain continuity of production at the start of CP6.

One other item of note in Table 1 is Porterbrook snapping up the last 80 Class 387 vehicles to add to its Bombardier Electrostar fleet. I have shown this as a 'speculative' build, but as we all know, when committing to north of £100 million, the ROSCO will have a shrewd idea of where the units will find a home. So perhaps 'pre-emptive' is a better description.

SQUEEZE ON THE TUBE

London Underground's Jubilee and Northern Lines Additional Trains (JNAT) programme drags on. Having delayed and complicated what was ostensibly a simple repeat order, procurement may now be undone by the onset of austerity.

When bidders were invited to pre-qualify back in August 2014, informed sources described LU's formal requirement as being 'on the woolly side of vague'. The base quantity was for five trains to augment the existing Northern Line fleet when the Battersea extension opened.

To this was added an option for 'up to' 18x7-car additional Jubilee Line trains to raise peak service frequency to 34 trains per hour (tph), exploiting the new Thales signalling. Finally, there were further options for up to 45 units for the Northern Line. Incumbent supplier Alstom suggested adding new traction packages to the mix.

Two years on and the requirement, due to go out to negotiation this month, is for either 10 trains for Jubilee Line Upgrade 2 (JLU2) or 27 trains – the 10 for JLU2 plus 17 for Northern Line Upgrade 2 (NLU2). And the NLU2 sets are at risk.

AUSTERITY

Between the prequalification questionnaire (PQQ) and the Invitation to Negotiate (ITN) came the 2015 Comprehensive Spending Review. This cut back central government funding, meaning that Transport for London is having to review LU's capital spending programme.

In this new world JLU2 now takes precedence over NLU2 because it has a better business case. The Jubilee project remains fully budgeted, including the extra 10 trains, and peak frequency is now set to increase from 30tph to 36tph by 2020. With a Benefit:Cost Ratio (BCR) of 8.6:1 is it one of the lowest risk, highest benefit schemes in the Rail & Underground (R&U) capital investment programme.

NLU2 with 17 additional trains would increase peak frequency on the Northern from 24tph to 30tph on the City and Charing Cross branches by 2022. However, the BCR is 4.8:1.

JLU2's combination of risk and benefit means that it will be preserved in all investment scenarios. NLU2 has a lower priority and a current value-engineering project is intended to ensure a 'lean cost'.

Perversely, delaying procurement of the NLU2 fleet would also weaken the financial case, because the payback time is determined by the remaining life of the existing trains, which were delivered in 1998. A 'go/no-go' decision on the NLU2 fleet will be taken this autumn.

So we have the mildly ridiculous situation of Alstom, Bombardier and CAF, having pre-qualified, being offered 70 vehicles plus, perhaps, another 102. And these trains are to be compatible with those already in service, built, and in the case of the Northern Line maintained, by Alstom.

Since these three, along with Hitachi and Siemens, have also prequalified for LU's New Tube for London (NTfL) rolling stock, it will be interesting to see whether Bombardier and CAF will devote precious engineering resources bidding for such picayune numbers in an attempt to keep the customer sweet, or will make their excuses and leave.

Note that LU will be issuing an Invitation to Negotiate, not Tender. And if Alstom is really serious about the UK rolling stock market it will need to put in an offer that makes NLU2 affordable come the review later in the year. mr

TABLE 3: WHO IS FUNDING WHAT?

Operator	Class	Vehicles
PORTERBROOK LEASING		
GTR (Thameslink)	387/1	116
GWR	387/3	32
GTR (Gatwick Express)	387/2	108
Speculative build	387	80
TOTAL		**336**
EVERSHOLT RAIL		
Great Western Railway	802	173
Northern		141
Northern		140
TOTAL		**454**
ANGEL TRAINS		
SWT (HLOS build)	707	150
TPE	803	65
TOTAL		**215**
QW RAIL LEASING		
LOROL	378	57
ROCK RAIL		
GTR (Class 313 replacement)	701	150
CALEDONIAN SLEEPERS RAIL LEASING		
Caledonian Sleeper		75
CALEDONIAN RAIL LEASING		
ScotRail	385	234
GRAND TOTAL		**1,521**
ROSCO TOTAL		**1,005**

TABLE 4: BATTLE OF THE BUILDERS

ORDERS IN CP5 (EXCLUDES 'BIG THREE' DEALS)

Manufacturer	Vehicles
Bombardier	493
CAF	281
Hitachi	234
Siemens	300

Roger Ford

GWEP TARGET DA

But targets are there to be beaten

Mr Walmsley and I had an intensive day out at Swindon on 19 February as guests of Network Rail's Great Western Electrification Programme (GWEP). Since both of us have written critically about this late-running and over-budget project, the aim of the day was to give the context to the current situation and explain how Network Rail is working to restore order.

That there was serious business ahead was emphasised when on arrival at the HOOB (High Output Operations Base) we were greeted by Regional Director Robbie Burns and over half a dozen of the GWEP team. That we were in for a detailed session was reinforced by the piles of foil-wrapped bacon butties on the table.

And indeed we were still going strong when my digital recorder ran out of memory three hours later and I had to revert to my mobile. With the talking finished, a tour of the yard followed to see the OHLE (overhead line electrification) hardware close-up and inspect the modules which make up the HOPS (High Output Plant System).

All this will be the subject of my next feature article, but for now I will concentrate on the electrification commissioning dates which are determining Great Western Railway's rolling stock and timetabling strategy. Table 5 shows the schedule developed in conjunction with Chairman Sir Peter Hendy's review of Network Rail's enhancements programme, known as 'Hendy dates' within GWEP.

TESTING THIS YEAR

Three Hitachi Class 800 bi-mode trains, 2x5-car plus a nine-car, are already test running on the East Coast main line. This has confirmed that the much-maligned Mk 3b British Rail Overhead Line Equipment (OHLE) provides satisfactory current collection with the pair of five-car units in multiple running at 125mph with two pantographs raised.

Test running under the Series 1 OHLE being installed on the GWML is clearly a priority. GWEP's 16-mile 'test track' is between Reading and Didcot; it was originally due to have been energised in September last year.

Energisation for test running is now scheduled for September this year. On my journey to Swindon on 19 February it was 'eyes out' most of the way and between Reading and Didcot the majority of OHLE structures were in place, registration arms were being installed and I was told that around 20 1-1.5 km tension lengths of wiring had been installed.

CONSERVATIVE

My observations suggest that the test track energisation date in the table may be conservative. This must surely be the case for Reading-Didcot inclusive of the stations, which is scheduled for December 2017.

Note that at its eastern end GWEP 'fringes' with Network Rail's separate Crossrail Surface Works programme. This £2.5 billion project includes signalling and electrification from Airport Junction to Maidenhead and Reading. Fellow OHLE watchers may care to note that this section uses a different design of OHLE.

Commissioning of this section is scheduled for June 2017. However, services beyond Heathrow Airport to Maidenhead and Reading will be the final stage of the phased introduction of Crossrail in December 2019.

TRAINS

As Table 5 shows, December 2018 is now the date for the completion of electrification between London and Cardiff. The political attractions of opening an electrified 'two capitals' service just over a year before the next election are obvious.

By July 2018 Hitachi will have completed deliveries of the GWR fleet, with the contracted 50 diagrammed sets available. Because of the delays to GWEP, DfT has taken the decision in principle to issue a variation order to Agility Trains West, the train service provider, to deliver the planned 21 Class 801 electric multiple-units as bi-modes. Ministerial imprimatur is pending, presumably waiting for a good day to bury embarrassing news.

Electric services to Bristol will follow in July 2019 but with

Wires up: loco No 70013 hauls a Southampton-bound container train under newly-installed catenary at Lower Basildon on 8 February 2016. Ken Brunt

ATES AND COSTS

trains running via Bristol Parkway. Electric services to Bristol via Bath are not scheduled to start until April 2020, some three years later than originally intended.

This is determined by the remodelling of the complex Bristol East Junction outside the station, which is now due to be carried out in Control Period 6 (2019-2024).

All this implies extensive diesel running under the wires from June 2017 as the first five-car bi-mode diagrams become available.

Plug in: DR76901 *Brunel*, aka the HOPS piling train, at Swindon. Ian Walmsley

PROGRESS

Of course, meeting, let alone beating, these dates depends on getting the HOPS up to its forecast installation rates. As of our visit, the record was 22 piles for OHLE masts in a 3.5-hour shift. Central to this acceleration has been a reversion in pile design to the method developed by the ORE, the predecessor of the European Rail Research Institute.

Apparently, new design codes for pile size and depth were introduced for GWEP. They have now been found to have overstated the depth of pile required. At some locations this required piles to be spliced to get the specified length. Reversion to the ORE method has enabled GWEP to standardise on a single length of pile for most locations, allowing the HOPS to operate as designed.

While HOPS has been talked of as a 'factory train', its various 'consists' work independently. Once the steelwork is up, the wiring consist installs the 1-1.5 km lengths of catenary and contact wire under tension, reducing the need for further possession.

EXTERNAL FACTORS

At the meeting it was explained that, with installation rates improving, progress is now being determined by the many consents still needed for work affecting listed structures and related issues such as visual intrusion in Areas of Outstanding Natural Beauty.

Take the reference to Steventon Bridge in footnote 3 to Table 5.

This bridge, just outside Didcot, is adjacent to two level crossings. As a result the contact wire will be at maximum height to provide clearance over the crossings before descending to pass under the bridge.

What matters in such situations is the gradient of the contact wire and the speed of the train. These factors determine the rate at which the pantograph rises or falls as it follows the contact wire. Too steep for the speed and you either increase the contact force and wear or, in the other direction, lose contact, causing arcing and more wear.

To meet the maximum gradient requirement at Steventon the bridge could be raised or the track lowered. Each solution creates practical problems as well as financial and consent issues.

An interim solution could be to leave everything as it is and accept the higher contact wire wear rates associated with a steeper gradient until the council replaces the bridge in 10 years' time.

COST

As of now, the lower figure of £2.6 billion, at Quarter 3 2012 prices, quoted at the Public Accounts Committee hearing in October ('Informed Sources', December 2015) is the official Anticipated Final Cost (AFC). While the Treasury is biting the bullet on GWEP, significant cost reduction is essential if electrification is to survive ordeal by Benefit:Cost Analysis in future.

Just how much the unit cost can be brought down through GWEP's value engineering programme and greater installation efficiency remains to be seen. mr

TABLE 5: GREAT WESTERN ELECTRIFICATION SERVICE DATES

		Entry into service date	
Route Section		**Original aspiration**	**Hendy dates**
3	Test Track [1]	Sep 2015	Sep 2016
	Airport Jct-Maidenhead	Dec 2016	June 2017 [2]
1/1a/3	Reading-Didcot	Dec 2016	Dec 2017
5	Didcot-Wootton Bassett [3]	Dec 2016	Dec 2018
6D/P	Wootton Bassett-Bristol Parkway	Dec 2016	Dec 2018
8/9	Bristol Parkway-Cardiff	Dec 2017	Dec 2018
2	Reading-Newbury	Dec 2016	Dec 2018
4	Didcot-Oxford	Dec 2016	June 2019
7	Wootton Bassett-Bath	May 2017	April 2019 [4]
6F	Bristol Parkway-Temple Meads	May 2017	July 2019
	Bristol Temple Meads (all platforms) [5]	May 2017	April 2020
10	Cardiff-Swansea	May 2018	TBC

Notes

1 16-mile section between Reading and Didcot
2 Crossrail requirement. Not in GWEP QSRA
3 Solution for Steventon High Street Bridge needed
4 CP5 plan does not include specific date to Bath
5 Roof renewal and Bristol East Jct to be completed before electrification

Roger Ford

NETWORK RAIL EXPLORES CRITICAL ASSET SALES

Confusion abounds as national press gets wrong end of stick - allegedly

On 4 March Network Rail announced that it was exploring with global investors and electricity network operators the possible sale of its electrical power assets. This follows a market testing exercise by consultants KPMG last year.

NR Chief Executive Mark Carne told *The Daily Telegraph* that with 'a highly complex integrated network', there was a 'whole range of different possibilities' open to participation by the electrical market. He did at least caution 'I'm not going to sell any of this unless I can demonstrate, firstly that that it's value for public money, but secondly that (potential bidders) can also demonstrate to me that they can operate those assets in a way that is superior and better to the way we operate them'.

Just to make sure, I checked with Network Rail whether the 'exploration' included the actual current collection equipment – the support masts and overhead line equipment. Apparently it does – at least initially. I forgot to be specific and include the 750 volt DC third rail.

NR describes its exploration of new sources of capital and expertise (expertise in what is not specified) as 'a key part of (the) strategy to benchmark its competitiveness against the market, maximise commercial opportunities and inject private capital into the railway to help fund investment'. I could understand private funding for grid supply points, but monetising the physical interface between power supply and trains would be a goldmine for lawyers and consultants. And we all know what happened when Railtrack contracted out OHLE (non) maintenance.

GSM-R progress: driver training underway. Courtesy Network Rail

ALARM BELLS

However it was the bottom of the list that really rang alarm bells I know the NR Chairman thinks we spend too much time looking back to British Rail and not enough looking forward, but the privatised railway has a corporate history too.

In 1995 British Rail Telecoms was privatised and sold to Racal for £132.75 million. Under a contract with Racal, Railtrack bought in the services it needed to run the railway.

In 2000 Racal sold its telecommunications business, which included the rail network, to Global Crossing for £1 billion. Railtrack was not warned about the sale and had no contractual basis to complain. In 2002 Global Crossing filed for Chapter 11 bankruptcy protection.

With no control over the cost or performance, let alone enhancements to capacity and capability, Network Rail brought telecommunications back in-house. Since then, at a cost of around £2 billion, Network Rail Telecommunications (NRT) has done a sterling job creating the new Fixed Telecommunications Network (FTN) and implementing the European standard GSM-R radio.

As we know, communications technology is constantly evolving. So NRT has been upgrading the FTN to use Internet Protocol (IP) based data transmission. What is known as FTNx will provide the extra capacity needed by the growing railway, with its increasing demand for bandwidth.

EUROPE TOO

It's not just NR that learned the hard way that telecoms is a core railway activity which you contract out at your peril.

In 1996 Deutsche Bahn thought it was a good idea too and outsourced its telecommunications infrastructure into a company called DBKom. Mannesmann acquired 49.8% of the company, which was also intended to offer telecommunication services, including a public telephone, in competition with Deutsche Telecom. The venture did not go well and today DB's telecoms network is back in house.

Even the French had a go. Just before the separation of rail operator SNCF and infrastructure company RFF in 1996, French Railways tried to get in on the liberalisation of telecommunication, setting up Télécom Développement, a joint venture with communications company Cegetel. The aim was, again, the commercial exploitation of the railway's fibre optic network.

Yet again it didn't work out. RFF had kept a majority shareholding in the business and eventually bought back the railway assets.

CONFUSION

I was not alone in interpreting the press release as indicating that NR was now considering selling off this redeveloped capability that is such a powerful enabler. So when *The Financial Times* got round to the sale announcement, the reporter came onto me for background and gave me a little quote in the resulting article expressing my concern about the telecoms assets. Actually, I said 'This is sheer madness that ignores past experience'. The *FT* also used the historical background referred to above.

That article appeared on Saturday 12 March, and that evening the railway press received an e-mail from NR with some corrective helpful quotes from Chief Executive Mark Carne. On signalling, the message is: 'We are not selling the telecoms network. However, we do have unused capacity in our fibre optic network. It is commercially sensible to see if we can sell this capacity to telecoms companies - we don't need it and they do'.

Now I suppose spare capacity on the FTNx network is an asset, but why didn't the list in Table 6 say 'Telecoms capacity'? And why did it take a week to clarify what 'telecoms assets' meant in a list of physical assets? Or, to put it another way, must we now assume that any statement that appears self-evidently bonkers needs clarification? That's going to keep me busy.

TABLE 6: NR'S SHOP WINDOW

Network Rail has embarked upon a comprehensive programme of examining its assets and looking at ways to realise value that will help fund the company's Railway Upgrade Plan. These include:

- Commercial estate – 7,500 properties
- Freight yards
- Major stations
- Electrical power assets
- Land for housing
- Surplus land
- Telecoms assets
- Depots

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Roger Ford

PILOT SCHEME FOR DIGITAL RAILW

New dawn for the Wherry lines? Loco No 37405 leads the 06.40 Norwich Crown Point – Lowestoft empty coaching stock working over Reedham swing bridge at sunrise on 19 February 2016. David Staines

Now we know that Network Rail has lost the plot

Supposing you wanted to test the integration of the European Train Control System (ETCS) Level 2 with a Traffic Management (TM) system and a Connected Driver Advisory System (C-DAS), which part of the network would you choose? Well, you would want a route with trains at close headways and busy junctions so that the TM could work out pathing strategies and the C-DAS transmit these to drivers so that they maintained the optimum speed.

And the obvious answer is the Norwich – Lowestoft / Great Yarmouth 'Wherry' lines. You disagree? You have noted that this is the April issue?

I kid you not. Unless the Notice in the Official Journal of the European Union issued by Network Rail on 25 February is an April Fool to put the BBC's spaghetti harvest in the shade, Wherry lines is indeed the route selected by the Digital Railway team to demonstrate the integration of ETCS Level 2, TM and C-DAS at an estimated cost of between £35 million and £50 million.

Yes, £35-50 million spent on a line currently struggling to justify replacing its mechanical boxes with even a value-engineered version of Modular Signalling. This integrated system is expected to be commissioned by December 2018.

Doesn't that date rings a bell? Oh yes, that's when Thameslink Project Director Paul Bates and his signal engineers hand over not only ETCS Level 2 plus TM, but ETCS Level 2 with an Automatic Train Operation (ATO) overlay, collectively capable of running 24 trains per hour through the Thameslink central core.

Since ATO takes the same information from the signalling system as C-DAS, but instead of telling the driver to speed up or slow down, talks directly to the traction and braking systems, you might be forgiven for thinking that two trains per hour between Norwich and Lowestoft, plus another to Great Yarmouth, not forgetting the two trains a day Berney Arms Jazz service, was not exactly a challenging test for a £35 million integrated system. You might even wonder what the point of it is since, if Siemens and Hitachi deliver the goods on Thameslink, the Wherry lines scheme will be redundant before it enters service.

SERIOUS BIT

Still, I suppose I must take it seriously. NR is tendering the Wherry lines pilot scheme as three lots, ETCS, TM, or an integrated system combining the two. The TM will include provision for an interface with the C-DAS. The ETCS Level 2 installation will also include provision of a simulator for the route.

According to the OJEU Notice, the aim is to create an early 'design and build deployment site' which will be used to develop a digital railway 'toolkit'. Mention of 'toolkits' is always a bad sign *(I thought you were taking this seriously? – Ed)*.

Anyway, this toolkit will provide the standard building blocks for the future national roll-out of the integrated systems. Also covered by contracts will be maintenance and support for both ETCS and TM. This is likely to be for 10 years with an option to extend for a further five years. These support contracts will not come into effect until after the start of Control Period 6 on 1 April 2019.

No mention is made of fitment of ETCS to rolling stock on the route. This will involve first-in-class retrospective fitments for three classes, assuming the Class 153s survive the 2020 accessibility deadline, followed by fleet installations. Informed sources doubt it can be done in time, let alone conversion of the locos needed for the Yarmouth trains.

COST CRITICAL

What makes it even more ridiculous is that the OJEU emerged a month after a 'Project stakeholder scope development review' for the Wherry lines resignalling was held on 26 January. This revealed that after the estimates by WS Atkins (NR's signalling framework contractor for Anglia) had shown that replacement with conventional signalling was unaffordable, development of lower cost alternatives started in June 2015. This work showed that Modular Signalling (ModSig) could deliver the required functionality at low cost subject to 'some scheme changes'.

A classic ModSig setup is proposed, with six independent 'islands'. Signals and points within each island would be controlled from two remote workstations using data transmitted over the NR Fixed Telecommunication Network.

A simplified electric power supply for each island would reduce the size, and cost, of equipment housings. Illustrating the detailed value engineering, where cabling needed to cross the track, it would run through hollow sleepers rather than via plastic pipes under the track.

Bi-directional working between Lowestoft and Oulton Broad station would be eliminated and Automatic Route Setting would not be required. Level crossings would be manually controlled barriers (MCB) with CCTV monitoring rather than obstacle detection.

WHERRY LINES PILOT SCHEME SCHEDULE

January 2017	Contract award
December 2017	Development of ETCS Level 3 Version 3.5.0 complete and available for deployment
June 2018	TMS training system ready
December 2018	Commissioning of ETCS and TMS

WHERRY LINES EARLY DEPLOYMENT PROFILE

INFRASTRUCTURE

Route length 70km - 99 track km
Double and single track
Two terminal stations plus 10 intermediate stations
Eight signal box closures
Eight level crossing closures.
Two level crossings to remain

ROLLING STOCK

Five Class 153 DMU
Nine Class 156 DMU
12 Class 170 DMUs
Hauled set with Class 37 / Class 47 diesel locomotive
Class 66 diesel locomotive for ballast train working

Source: Network Rail

VAY INTEGRATION

Implementation would be phased with a nine-day blockade for Yarmouth station remodelling in October next year followed by a further nine-day blockade in February 2018 for Stage 1 of remodelling at Lowestoft plus Brundall. Following level crossing upgrades, a final nine-day blockade in October 2018 would see the signalling commissioned after Lowestoft Stage 2 and Reedham re-modelling. mr

Open letter to:
Mark Carne
Chief Executive Network Rail

Dear Mark,

I have always regarded open letters as a journalistic trope more concerned with the self-importance of the writer than any serious intent. However your interview with *The Times*, published on 20 February, gave such a misleading impression of the current state of signalling technology that I am willing to take the risk of being considered presumptuous by the *Modern Railways* readership.

Why was I genuinely angered by this article? Partly because it portrays the railway as technically backward, 'too reliant on technology from the 19th century' in your words (and I am assured by your press office that all the quotes are genuine). This only reinforces negative perceptions within Government.

But my real concern is the way you disparage the achievements past and present of the signalling profession. I won't go through the article in detail – you are a busy man – but will focus on one comment.

You told *The Times* that digital signalling technology had already been introduced on parts of the London Underground such as the Victoria Line, adding 'You compare that to the way we run our overground trains – we are in the dark ages'.

For heaven's sake, Britain's railway engineers and their suppliers have been the pioneers in the application of digital technology to signalling and telecommunications. From the first commercial application of computer based interlockings, the best-selling SSI (Solid State Interlocking), in 1985, to the creation of the Integrated Electronic Control Centre (IECC) with Automatic Route Setting, to Modular Signalling, the digital solution for lightly-used lines.

Compared with the schemes your signal engineers are tackling today, the Victoria Line is a straightforward application. A fleet of identical trains, running end-to-end on a line with no junctions and no weather to affect adhesion.

Compare that with your Thameslink programme, which is pushing the envelope of signalling technology to get 24 trains per hour reliably through the central core in the peak, with 30 trains per hour available for perturbation recovery.

Not only is Siemens (which as Invensys signalled the Victoria Line) installing Level 2 ETCS, the company is then going to overlay Automatic Train Operation – an ETCS world first as far as I know. In parallel, Hitachi is supplying a Traffic Management System to smooth the flow of trains arriving at the portals.

Dark ages? I think not.

Digital technology abounds on the network. If you had half an hour to spare we could pop over to the second generation IECC Scaleable at Marylebone and I could explain why I was so impressed by the facilities it provides, not to mention developments in the pipeline such as integrating a Connected – Driver Advisory System with Automatic Route Setting. Similar workstations are already controlling your Great Western main line as part of the resignalling – including Reading.

So, please can you stop promoting 'Digital Railway' as some separate wonder-solution that will bring signalling into the 21st century. Instead, as Chief Executive, you should be celebrating the technical achievements and challenges of your real 21st century railway, which has been exploiting digital technology for almost as long as I have been writing for this magazine.

Yours hopefully

Roger

Ian Walmsley

WHERE THE TRAIN

The DfT has announced a £1 million competition for ideas to promote rail tourism. Put your money away lads, here are some free ideas

There has never been a better time to launch an initiative like this, and it is remarkable that the Department for Transport is paying. What with including quality in franchise bids, enhancing northern services and now this, I might even start to like them. *(Steady on – Ed)*. Currently over half the money spent by tourists from abroad is spent in London, and most of that on a cab from the airport and an inedible hotel breakfast.

Meanwhile the UK is overflowing with tourist attractions, well worth a visit but undiscovered by most foreign visitors, and a real challenge if you want to use only public transport. Getting tourists out of London by rail will not be easy, because it relies on what the railway is worst at: co-operation. So don't underestimate the problems.

Success for a project like this will depend on building a large enough market to make it worth the effort, which means it must appeal to UK residents as well. It needs UK-wide branding and must not be confined to franchise areas. It also needs new ideas, and they tend to only happen at franchise changes. Once a franchise is let the poor bloody infantry are too busy making it work to bring in anything which makes this harder, therefore this has to be an open access operation.

FLYING SCOTSMAN

If you ever doubted that people want to like railways, look at the reaction to the return of *Flying Scotsman* to traffic. People turned out in their thousands to see this fine machine, while the news media struggled with the fact that there is a 'Flying Scotsman' locomotive, and a named train which can be hauled by any locomotive.

Great as the loco looks, what we are really seeing here is the power of branding. Yet modern train operating companies (TOCs) have shown themselves to be pretty poor at this. I don't believe one train operator has yet placed a rail brand in the greater public mind, with the possible exception of Virgin. InterCity, Gatwick Express, Eurostar and all the surviving named trains go back to British Rail or before, yet people love this sort of thing.

Southeastern, regularly the UK's least-liked train company, has the 140mph 'Javelin' trains – painted dark blue and only to be found right down the bottom of the company's website home page: boring. Even TOCs who have hung on to a couple of named trains offer minimum promotion of them, usually just a

Back on the main line: loco No 60103 *Flying Scotsman* powering past Arksey while working from London King's Cross to York on 25 February 2016. Alexander Cromarty

IS HAVE NO NAME

code letter in the timetable – you can be on one and not even know it.

The general public liking for railways is also highlighted by television, with a range of rail-based programmes led by the man who created jacket-envy, Michael Portillo. Trains often feature in advertising as well: people want to believe, we are pushing on an open door.

LAND CRUISING

Thanks in part to Lottery funding and a general rise in civic pride around the country, there is no shortage of places to go and things to do – at least in the summer months. The chances are a trainload of passengers would not all want to do the same thing, which means you need to have options within the scheme. The best example of this is how cruise ships operate, where you start with a ship of 2,000 people, yet your tour in port may be with 20 people slicing through Francis Drake's Bay on a catamaran under full sail or getting hammered at a vineyard with other Saga louts. Other tours are available, including quite a few railway ones as it happens, but the key things are ease of booking and hosting. Adding tours is as easy as adding baggage to a flight, and every tour will be accompanied.

The DfT competition highlights heritage railways as a destination, which is all very well, but most of them are only open at weekends. Heritage railways are great, but they vary a lot and I'm not sure the average foreign tourist is going to be mad about going on a train trip to go to another train trip at the end. There are dining specials, and having dined on nearly all of them I think the only one I would rate as a top international tourist attraction for 'normals' (non-railway enthusiasts) would be the Bluebell Railway Pullman Diner.

Bread, sir? Full meal service on the Great Western Pullman. Courtesy GWR

Ian Walmsley

That is not to say they couldn't be part of the mix, but Americans are not going to ditch Madame Tussaud's, the London Eye and Buckingham Palace for a ride in a Mk 1 coach behind an austerity tank to a station in a field.

ONCE IN A LIFETIME

Look, I'm sorry to have to say this (again), but for tourism our trains are a bit rubbish. We have spent years squeezing more seats in with no respect for comfort, window positions, catering or social interaction. There are no spare trains and we can't afford to cut the capacity of what we have, but we are approaching a real once-in-a-lifetime opportunity.

What we want is a train that is quiet, comfortable, has large windows and a catering vehicle. It also needs to have almost go-anywhere route availability, be reversible for branch lines, be able to carry cycles and ideally be fully written-down in financial terms because it won't have much to do in the off-season. Obviously such a dream machine isn't going to just appear for us…

well actually it is, and if you haven't guessed it, it is the HST (now being replaced by IEP). Pause for wistful sigh.

HST vehicles were designed around a First Class seat bay, so I would see these trains offering 2+1 seating in all vehicles, similar to most top-flight tourist trains around the world. Come the end of the HST era there would be enough spare First Class seats to make three really smart trains and avoid having to use new seats. Apart from the catering vehicle and the disabled toilet vehicle they would be laid out as eight bays of six seats, 48 per vehicle. By the way, one class means fewer wheelchair spaces and only one universal toilet is required.

COST EFFECTIVE COMPLIANCE

The disadvantages with HSTs are the cost of making them compliant to disability regulations and the cost of maintaining the power cars. The disability compliance cost is primarily new power doors and, to a lesser extent, providing a passenger information system. Visit Britain indicates that the UK has 70% more visitors between April and September than in the other half of the year, so realistically this project is only going to be viable between April and September, and outside that many tourist attractions are closed anyway.

The number of station calls will also be very limited, and any tourist train would need at least one customer host. My view is that the host could also operate the doors for those who could not manage them, and deploy the wheelchair ramp as required. HSTs already have accessible toilets so for this application I don't believe any door modifications should be required. Having said that, Ricardo Rail recently presented a proposal for fitting HSTs with Class 442-style (nearly) compliant doors for about half of the Chiltern Railways gold standard version. That still costs about £1 million per train, and since we would need a host anyway I think some compromise would be in order.

As for passenger information, flat screens could show destination-based advertising and maps. This could link to passengers' own devices by Wi-Fi rather than annoy everyone with scrolling advertising. I would let Volo loose on that side of things.

The other big cost driver, the power car maintenance, would be less than half what it is now, since it is mileage-based and these trains would do no more than one round trip per day and only work six months per year. The diagrams, which I will come to next, would also be less demanding than belting up and down main lines all day.

GO YOUR OWN WAY

Every train has to start in London, and leave between 08.00 and 10.00 to make the most of the day. This is a busy time for commuters, but these trains do not have to go the quickest way so diversionary routes could be used. Ideally they would all leave from the same place, so Marylebone seems ideal as it is in a tourist area and has connections to the west and north. Capacity would be an issue so it might be necessary to start them from different places, but that should be avoided if possible.

Stratford-upon-Avon: tour destination. Stobart Pullman topped-and-tailed by Nos 47802 and 47712 shunting between Platforms 1 and 2 after arriving from Letchworth on 15 March 2008. Peter Tandy

The routes would be accompanied by a rolling guide, linked to the information screens referred to above. A live map would show where you are and tell you a bit about the area with bits of local trivia. Stops would be limited to points where coach tours can connect, here are some examples I can think of, no doubt you could think of others:-

- The Bard and Beat Explorer: London – Stratford-upon-Avon – Chester – Liverpool;
- The Yorkshire Explorer: London – Stoke-on-Trent (Potteries) – Harrogate – York;
- The Heritage Explorer: London – Salisbury (Stonehenge) – Bath – Cardiff;
- The Royal Explorer: London – Cambridge – King's Lynn (Sandringham).

All trains would offer hotel packages to spread the tour over a few days, although that would have to be booked as a hop-on-hop-off package and would be too chaotic. There would be the option of breaking the journey and picking it up the next day, all arranged during the online booking.

Join the Stonehenge tour here? Great Western Railway power car No 43034 at the head of an HST at Waterloo on 27 December 2015, when GWR services were being diverted away from Paddington due to engineering works. Tim Squires

Trains would have their own traditional-looking livery, featuring train name boards on every vehicle and, of course, a headboard on the front. Slam doors would actually add to the traditional feel of the experience, trim would be more Orient Express than Super Express.

With enough advertising backing and links to holiday companies demand would grow, but eventually I would see these trips operating every other day with none on Sundays (too difficult). There would be a need for three trains, allowing one for maintenance/standby. Every train would offer franchised catering and would return to London in the evening.

All this is probably more ambitious than the DfT had in mind, but I think it is the only way the average tourist will be coaxed out of London. Ticket offers on service trains would have to be off-peak and we would be expecting customers to change trains at places they are unfamiliar with. There are always some who would do this, but not that many.

While I have said these trains would be spare in the winter, there are plenty of possibilities for relief trains or spot hire to concerts, sports events and so on, but the tourist trains would be the justification for their existence.

COULD THIS WORK?

If we take a quick look at the numbers, a 2+8 HST set with catering would carry around 350 passengers, so with a load factor of 80% and an average fare of £69.00 (tours extra) they would bring in £19,320 per trip, 12 trips per week making 312 in a summer season. The revenue would therefore be about £6 million per year.

My indicative business case is shown in Table 1 (annual figures). All the table shows is that it could be viable; I wouldn't stake my house on it as there is coach competition for the closer destinations.

For the record, if power doors are required that kills the job.

THE EXPLORERS

I find it strange that the upcoming generation seems to prefer to look at phones to exploring, but maybe making it easier would get them out and about. At the other end of the age range there is quite a lot of travel, and more importantly many pensioners have the free time and disposable income to make this work. The majority of visitors to London are from France (1.9 million), the USA (1.8 million) and Germany (1.3 million), and these three countries account for about half of the visitors in total, so targeting the marketing is not too difficult. Looking at these numbers you have to believe that we could fill 12 trains a week.

Driving to tourist spots is not a rewarding experience, so the idea of comfortably accessing the best bits of England would appeal to many. If this project worked it would take 560 tourists out of London, six days a week. That makes 87,000 per year, so although that doesn't make much of a dent in London's 16.8 million tourists, it's a start. If the idea became established it could be extended with more trains or perhaps specific vehicles in service trains, so it's worth thinking about. I look forward to seeing what wins the competition.

TABLE 1: INDICATIVE COSTS OF HST TOUR TRAIN OPERATION

Three HST sets (Angel or Porterbrook)	£300,000
Maintenance of three sets, six-month low mileage	£200,000
Train crew costs	£900,000
Cleaning, fuelling and servicing	£500,000
Track access and stabling	£1,500,000
On-train hosts	£200,000
Marketing	£500,000
Mods to train, £200,000/vehicle, 10-year lease	£1,000,000
TOTAL ANNUAL COSTS	**£5,100,000**
ESTIMATED REVENUE	**£6,000,000**
ESTIMATED ANNUAL PROFIT	**£900,000**

Ian Walmsley


Ian Walmsley

THE COMBINED WISDOM OF THE RAIL SUPPLY INDUSTRY

Last month *Modern Railways* dutifully reported the launch of the Rail Supply Group's 'Fast Track to the Future' document, which, among many laudable aims, looks to double rail sector exports. Wading through the world class (18 mentions) management-speak I thought it would be interesting to see how this will be achieved.

First off, let me say that there are lots of great things going on, and the report has sampled many of these to produce a sort of industry yellow pages, but to maintain your (OK, my) interest let's just look at rolling stock, and the five areas the RSG thinks will bring us world domination. Here goes, hang on to your seats:

- energy management;
- customer experience;
- advanced control;
- whole life asset optimisation; and
- high value rolling stock systems.

FLYWHEELS

Energy management refers to batteries and flywheels, which, if they are useful anywhere, are for non-electrified secondary routes. I spent a lot of time trying to make a business case for these when oil was $100 a barrel and couldn't get close, so now oil is $40 a barrel (rising slowly)… work it out. Here is a pocket business case – a DMU does about 140,000 miles a year, it consumes about a litre per mile per vehicle, for which depots currently pay 32p and the best energy recovery you can expect is 15%. You therefore save about £560 per month; but then you have to deduct maintenance cost of the extra kit, so probably more like £400 allowing for bearing changes every few years and some periodic checks.

If you save £400 per month, and put that on your rental per vehicle you have, at the most, £45,000 capital to spend. Can anyone fit them for that? No chance.

Flywheels need really strong containment as they have a lot of energy in them, and if one let go when at full revs (i.e. the train stopped in a station, storing energy from braking) you might want to keep your head down. Containment and the mass of the flywheel means you pay a weight penalty, costing about what you saved in the first place – and that is before we add in the capital spend.

CUSTOMER EXPERIENCE

It is just funny putting this in really, but the report majors on data management and contactless payment – as found in McDonald's and newsagents. I suppose we could lead the world in explaining delays, but we don't at the moment and it isn't really the way to go. If your train and its connections are all on time you don't need the data, although you can get it on most phones anyway.

ADVANCED CONTROL

This refers to the European Train Control System (ETCS), which I leave to my colleague Roger Ford, but readers will be aware that fantasy stubbornly refuses to become reality in this area. Satellite positioning is also highlighted, as found on most local buses and many taxis. That'll show 'em, nobody will have come up with that one.

WHOLE LIFE ASSET OPTIMISATION

This one is something rolling stock leasing companies talk about when bored, and has been around for decades. It might mean high-tech kit so you always know what is happening on the train, or it might mean keeping the initial cost down so your train is always cheaper to lease. Actually nobody knows, but remote condition monitoring is highlighted, which has been fitted to just about every train for the last 10 years as standard. As a modification it only works if you have an unreliable train on a high value diagram, and now Class 319s are coming off Thameslink it won't work (financially) anywhere as a retro-fit.

As for the final bullet point, high value rolling stock systems sounds great, but this lists seating and space optimisation – i.e. taking seats out. I can't decide if the UK leading the world in train seats or customer experience is the most ridiculous, then last of all the report offers 'novel propulsion systems' to take the prize.

COMMITTEES

Something happens to people when they get co-opted onto committees like this; there seems to be an urge to fit in, co-operate, to play nicely. But at the same time not to disclose anything which might lose your competitive edge.

The obvious points are there, like wanting a long-term plan (wouldn't we all?), but if you want to lead the world you don't do that with hokum like flywheels and novel propulsion systems, you build better trains. We don't talk about electrification. mr

Ian Walmsley

LAST TRAIN FROM

Is Brexit an opportunity to ditch unnecessary regulation?

I am undecided on Brexit, which is not like me. Further out of character, I sought advice from the Rail Safety and Standards Board (RSSB) - which, for the third surprise in a couple of sentences, will still talk to me.

CRY FREEDOM

Those who are concerned about cost and quality have probably all bemoaned our submission to European Standards, yet the idea of common standards for Europe sounds attractive at the simplistic level. If manufacturers can make products suitable for all of Europe with only one set of approvals, there must be economies of scale.

It must be 20 years since I heard the theory. But we are still waiting for the price reductions, partly because standards agreed across Europe have to cover for everyone's anxieties.

Then there are tunnel regulations based on the Alps applied to the Severn Tunnel, bridge parapet heights, and the myth of the Trans-European Transport Network (TEN-T), requiring our railways to be suitable for trains that don't fit. Surely a return to autonomy would save a fortune.

MIGRATION TO EUROPE

Actually railway regulations are closer to what we joined in 1973, a common market. Since January 2015 the TEN-T routes are no longer relevant since the UK has fully signed up to the European Technical Standards for Interoperability (TSI), perhaps most famously the Passengers of Reduced Mobility TSI (PRM-TSI). This is a good example of how being in the group setting the standards is a good thing, as if there is one thing the UK is truly world class at it is writing standards. Not quick, but by gosh we're good – and consequently the PRM-TSI is virtually identical to our 1998 disability regulations, just eased a bit here and there. The RSSB also carries out impact assessments on proposed standards to get a feel for what they will cost us, and may use this in negotiations if needs be.

In November the RSSB board decided to migrate the majority of the remaining Railway Group Standards to European Standards, which will take a while because all countries need to agree them. I suspect this will drive up their costs more than ours, as it is always difficult to argue for less safety. Simplification is the aim, although this has never been Europe's strong suit.

The issue of fire regulations is a tricky one, where Europe is much less demanding than we are; but one man's excessive requirement is another man's safety asset. Secondary safety (which is the lack of interior sharp edges and things that fly about in accidents) is another area where the UK is ahead of the game. Looking at some of the interiors in Europe, and particularly the recent accident in Germany, I suspect we might be offering our standard for Euro-ising. This will also help with the problem of European trains having more comfortable seats than ours – by making theirs as bad as ours.

Breakthrough with Boris? Prime Minister David Cameron addresses the Mayor of London (left) and staff in the Crossrail tunnels. Transport for London applied for (and received) a derogation on European standards to allow the tunnels to be narrower than in the interoperability requirements, with former Transport Commissioner Sir Peter Hendy arguing 'Crossrail is never going to host German freight trains so there is no need to be able to accommodate them'.

MARKET FORCES

So we are well on the way to European standards for everything – what if we left? Manufacturers would want to keep the economy of scale, which must exist somewhere, presumably in their profit margin. Although building to new, reduced British Standards would save some money in materials and weight, it would mean you could not export your equipment to Europe, and, rare though this is, a UK manufacturer would not want to be less competitive by adding extra design costs for export.

Brexit would mean new trade agreements would need to be set up, and if I was on the EU side of the table the first thing I would insist on would be that the UK offers a compliant network for EU trains if it expects to export into the EU.

It would also be a brave soul to say 'no, we don't want a train that safe, we can take a bit more risk'. As a rule the person making that decision does not have a cash-hungry bus bandit looking over his shoulder, so why take any extra risk? Having got to where we are now, existing designs are compliant so you would have a hard time justifying any change.

'I think if we did leave the EU we would basically just have to put a new cover on the regulations' says Mark Phillips, Director of Research and Standards at RSSB.

DEVIATIONS

This is where the UK is not very good; we see regulations as set in stone, and not worth the trouble of deviating from. I have seen this in rolling stock, where manufacturers don't want even a small risk of failing to secure an approval and see deviations as a sign of failure.

BRUSSELS

In Network Rail's case, deviations are seen as a lot of bother and import risk to timescales. So the obvious answer is to get more money from the taxpayer.

The RSSB approves 99% of the deviation requests that come to it, which shows either pragmatism or a quiet word before applying (probably both). (In 2015 RSSB had 139 applications – 106 were approved, 16 withdrawn by the applicant, 16 awaiting more information and one was rejected.) The organisation recognises that some rules just don't make sense in some places, but it is up to the 'duty holder' to make a case, with risk analysis supporting the request for deviation. The duty holder keeps the responsibility for the change; the RSSB only provides the advice.

One shocking move away from standardisation is the revered Rule Book, which the RSSB is devolving to offer some flexibility around the core. It is more concerned that there is a Rule Book rather than exactly what is in it.

You can see the way this is going, which is the operator should know best. We can but hope that operators will not see application for deviations as a failure. Specifically, they could propose such radical ideas as opening a train's doors without checking the platform is still there when it is obvious that it is, but the initiative rests with operators.

FREEDOM IS A MIRAGE

So it seems that even if the country votes for Brexit it won't make that much difference to the railway. This got me thinking about other industries, and I'll bet they are quite similar. This doesn't make me a fan of the EU, but I can't pretend Brexit is a path to freedom; at least as far as engineering is concerned, we're in too deep. mr

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TRANSPENNINE EXPRESS

Theo Steel's article 'The Quest for Speed' (February issue) included a table of journey time changes over the last few decades between key regional centres. However, the most recent times quoted, dated 2014, did not reflect the radical speeding up of many TransPennine journeys in the new timetable introduced in May of that year.

Use of the Chat Moss route between Liverpool and Manchester, mostly now cleared for 90mph, took 15 minutes off journey times to and from Liverpool. Manchester – Leeds journey times were reduced by five minutes by concentrating intermediate calls in two of the five services per hour, leaving the other three with just a Huddersfield stop. Hourly through Liverpool – Newcastle links were reintroduced, with a journey time of around three hours and a 60mph average speed. The table below gives the timings from May 2014.

At the same time, peak capacity in and out of Manchester and Leeds was increased by 33%. This was partly achieved by using the Class 185 units freed up by the introduction of the new Class 350 EMUs on Manchester Airport – Scotland services, and partly by getting more effective use out of the resources through the faster journey times. But with TPE reporting the highest percentage of seats occupied of all operators except London Overground, and high year-on-year growth, it is quite clear that the situation is not static, and of course higher speed and frequency themselves generate further passengers.

The enhancements committed in the new seven-year franchise awarded to FirstGroup last December were summarised in your January issue. New trains with higher speeds, 125mph where possible, greater frequencies and a new level of on-board experience will create a true 'Inter-city for the North'. For those of us who work in the industry in this part of the world (I started at Stoke 39 years ago), for our customers, and for those who are not yet our customers, this is truly a 'wow' moment.

DAVID LANGTON
Timetable Strategy Manager
TransPennine Express

Theo Steel comments: 'Oh mea culpa! To be fair when I wrote the article I was aware that TPE was doing most of what I was suggesting, and we had not had the franchise announcement. I do rate three hours for Liverpool to Newcastle as a real achievement.'

RAIL DEVOLUTION

John Reynolds of Tonbridge Line Commuters ('Forum', February issue) raises some understandable concerns about the proposed transfer of south east London metro services from the South Eastern franchise to be awarded by the Department for Transport to a management concession to be awarded by Transport for London (TfL). Kent County Council (KCC) has also rightly been concerned to ensure that the interests of Kent's rail passengers would be protected in the event of such a transfer of suburban rail services, and I can assure him that KCC has negotiated the following 'red lines' in our assurance agreement with the Mayor and TfL:

- that there would be no detrimental effect on Kent's rail fares as a result of devolution;
- that the existing paths for Kent's main line services would be protected, and that there would be no reduction or diminution of services from Kent by guaranteeing their existing paths; and
- that extra capacity on peak metro services would only be delivered through the lengthening of existing trains or through the allocation of additional paths where there is spare capacity, and there would be no negative impact on longer distance Kent services.

Mr Reynolds is quite right to refer to the unacceptable way in which commuters from Sussex were adversely affected by the introduction of the new East London line services to West Croydon and Crystal Palace, but that was a unique situation which simply would not arise in the case of Kent's main line services operating through the south east suburbs to their London termini.

KCC's aspirations for metro transfer also include the introduction of Oyster ticketing at Dunton Green, Sevenoaks, Dartford and Gravesend, as well as a reduction in journey time for some main line services by the omission of some suburban station stops in Greater London once these are served by the full Thameslink network in Kent from 2018. In short, with our 'red lines' in place to protect our passengers' interests, KCC regards metro transfer as a 'win-win' for both south east London and Kent.

STEPHEN GASCHE
Principal Transport Planner – Rail
Kent County Council

SMART TICKETING

Articles in your February and March issues on smartcards remind me of my Swedish holidays. In Sweden local public transport, whether train, bus, tram or boat, is franchised by 21 county transport authorities known as lanstrafiken, operating like Transport for London.

Each lanstrafiken issues its own smartcard, on which can be loaded a season ticket and/or an electronic purse. For almost all local journeys passengers will use a smartcard to 'pay' for their journeys.

For longer journeys you log in to a national computer and book a seat for a specific train (or coach) journey on a specific day. Last year I booked from my computer in Nottingham a train journey from Lulea to Kiruna and a coach journey from Kiruna to Lulea. In both cases I printed off an A4 size 'ticket' and, like the Swedes, put the tickets into a transparent cover. These A4 tickets show date, time and price, and where a seat is reserved the coach and seat number. It will show the passenger's name; he/she must carry an identity document. Each A4 ticket has a barcode on it. To get this system to work in Britain all our ticket gates would need to be adapted to read barcodes.

The situation in Sweden ('one county one smartcard' – 'print at home' for long journeys) is much simpler than in Britain, where each individual transport operator promotes its own smartcard. In Greater Nottingham there are five competing smartcards.

Contactless bank cards are useless for long journeys, season tickets and reservations. And what about children?

Smartphones are not the answer as not everyone owns one. And what if the battery is 'flat' at the crucial moment?

Area-wide smartcards such as Oyster are still the best answer for local public transport, while the printed ticket is best for long journeys. I would not want one national smartcard for the whole country. When I visited the Netherlands, the general verdict on their national 'OV Chipkaart' was 'it's too complicated'.

ROGER SEXTON
Nottingham

I have read the articles in your March issue concerning ticketing with considerable interest. I can well understand the advantages to an organisation like Transport for London of smartcards, but from time to time I run up against the problems for an occasional traveller in a 'smart' area.

I visit Sweden moderately frequently, and there, as here, the move is towards smartcards and mobile phone apps. The problem is that in any case not everyone has a smartphone; that even if a visitor from elsewhere has one, the use of the app (supposing they have found out how to get it) may be ruinously expensive, and in any case the organisation from whom the user is trying to buy a ticket must be willing to deal with 'foreign' smartphones.

TRANSPENNINE JOURNEY TIME ACCELERATIONS

	2014 journey time (hr:min)		Average speed (mph)	
Route	**Quoted**	**Actual**	**Quoted**	**Actual**
Leeds-Newcastle	1:36	1:31	inconsistent	71
Liverpool-Leeds	1:47	1:28	43	51
Liverpool-York	2:13	1:54	inconsistent	53
Manchester-Leeds	0:56	0:49	46	52
Manchester-Newcastle	2:41	2:24	55	62

This is clearly technically possible, since you report that TfL is already doing it, but it certainly was the case that SJ in Sweden would only download tickets to phones registered in Sweden.

The alternative is for the passenger to get a smartcard of the appropriate variety. But there is usually a charge for the card itself, even if you know where to get one, and you probably have to load it with money in a round sum – a multiple of, perhaps, £5, or, in Sweden, Kr100. The ticket you want to buy will not, of course, actually cost such a multiple, so buying just one ticket becomes an expensive and probably protracted nightmare!

This is when paper tickets are, from the point of view of the traveller, unbeatable. The wonderful smartcard systems are great for regular travellers, but for anyone doing a one-off trip they are an expensive (usually) nightmare.

As an aside, I have three different smartcards from Sweden. They are all used for Pay as You Go, in different regions, but only one is smart enough to charge me what the journey I take actually costs; for the other two I have to know – or find out – how many zones I need, and buy a ticket before I start my journey. One of the systems actually gives me a paper ticket with a time stamp – I have to complete the journey within a limited time. The third one puts the ticket on the card, where a ticket inspector can use their hand-held reader to check it – but I cannot see it. At least it also tells me how much I have left on the card. Oyster is far smarter, with its tap-in, tap-out, daily capping, and so on.

Long live the paper (if not tangerine!) ticket – for foreigners, very occasional travellers and technophobes.

MIKE HARRIES
Crewe

SHREWSBURY – WOLVERHAMPTON ELECTRIFICATION

You report that West Midlands Rail is advocating electrifying the line between Wolverhampton and Shrewsbury ('News Front', last month). When I worked in Birmingham 20 years ago, I was lent a report about such a project. Having experience of railway electrification, I was disappointed to see little on the number of bridges that would need raising or whether there is sufficient clearance for wires in Oakengates Tunnel, near Telford. On the other hand, there was a lot about the number of diesel trains required to serve places west of Shrewsbury. This looked like an exercise in foot-shooting! I hope West Midlands Rail will think carefully before doing any study.

However, a simple solution should soon be emerging from Hitachi's factory at Newton Aycliffe in the form of hybrid trains. A train from London with a hybrid at the country end and an electric unit at the London end could be split at Wolverhampton, with the hybrid continuing to serve Aberystwyth and Wrexham alternately.

Administrative boundaries, such as between England and Wales, are completely artificial. What matters is where and how people want to travel.

DAVID H. T. SMITH
The Thursfield Smith Consultancy
Shrewsbury

Unnecessary aggravation? Queuing on the concourse at Blackpool North. Chris Heaps

POOR SERVICE AT THE SEASIDE

Now that we know that the Northern Rail franchise has been awarded to the Arriva group with effect from 1 April, may I express the hope that the new incumbent will take steps speedily to improve the treatment of passengers at Blackpool North. In my experience, based on an annual visit to Blackpool over the last 10 years, the staff there are amongst the most – if not the most – unhelpful at any station in the country.

Every year, I arrive at the ticket barriers clutching an advance first class ticket from London which I ask to retain as I need it in support of an expenses claim. Every year, my request is initially refused, despite the fact that the ticket has already been inspected and stamped at Euston and on the Virgin service to Preston, and that the only train on which it is valid is already close to crossing the Scottish border. So far, but only after extensive negotiations, I have eventually persuaded the station staff member that I am not going to use this defaced piece of card for any nefarious purpose, and I have been let through.

On the return journey, I usually arrive at least 20 minutes before departure. Although the station has no fewer than eight platforms, and my train is clearly already in the station, I am not allowed to board but am directed to join a long queue stretching across the concourse. Eventually, but literally only a few minutes before the departure time, passengers are allowed access to the platform, and I often worry that any lame or elderly passengers at the back of the queue may miss the train.

Such restrictions may have been necessary when thousands of tourists visited Blackpool in the 1960s or earlier in numerous trains of 10 coaches or more. They are certainly not required in the 21st century, when the majority of trains serving Blackpool North are formed of only two-car or three-car units.

CHRIS HEAPS
Dorking, Surrey

POINTS

The route from Woking to Portsmouth is not exactly as described in your article on South West Trains (page 48, February issue). There is no ascent of the North Downs as the line passes under them at Guildford, where they narrow almost into insignificance. Steep inclines prevail on the sandstone heights further south and on the South Downs, but the only significant ascents as steep as 1 in 80 are for five miles on the Down line and two miles on the Up. Speed on the 1 in 80 northbound ascent of the South Downs is restricted anyway by curvature. Speed restrictions and frequent stops are greater impediments than gradients to higher average speed, for which reason it is unlikely to increase by much even with more powerful traction.

ROBERT MOOR
Dorchester

Alan Williams (February issue) refers to his school friend who has been a regular reader of *Modern Railways* and its predecessor *Trains Illustrated* for over 50 years.

My first *Trains Illustrated* was the September 1952 issue, featuring a Britannia leaving Twerton Tunnel with the down 'Merchant Venturer' on the cover, and I have not missed an issue since. I remember being enthralled, even at the age of nine (that's given the game away!), by CJA's account of a cab ride on the 'Atlantic Coast Express' in my first TI!

KEITH FARR
Cholsey, Oxon

Difficult to beat that!
Thanks for your devotion - Ed.

RAILWAY HELD TOGETHER WITH STICKY TAPE

…literally, in the case of this milepost on the Cumbrian Coast line shared by ACoRP on Facebook. Meanwhile, clearance work for the Great Western modernisation programme at the west end of St Anne's Park tunnel in Bristol has uncovered this broken boundary fence next to a water culvert, which some long-lost ganger bodged together with a fishplate. ACoRP/Richard Giles

THIRD RAIL EXPANSIONISM

Hope springs eternal at Waterloo: never mind that the third rail currently ends at Worting Junction, over 100 miles to the east of this sign at the new station at Cranbrook in Devon. They're sure that once the sparks get here they'll be malachite green 750V DC, not 25kV overhead. D. W. V. Hunt

TOO QUICK TO BIN?

'WE GOT rid of 15 tonnes of scrap paper' chirruped Network Rail as it cleared out arches under Waterloo recently to create space for a theatre. But just what was in those 15 tonnes? Importantly, did they include the original plans for the construction of the sea wall at Dover, the absence of which has hampered the team working on the reconstruction of the wall? The lack of plans was blamed on poor record keeping by the Southern Railway (p12, last month), but our mole reports that they were around in the early 1990s when work was in hand preparing for the Channel Tunnel. And yes, at that time they were housed in the arches at Waterloo.

THE PAST ON FILM

HERE'S AN idea for an idle half-hour of web surfing: the British Film Institute has released its Railways on Film collection of over 200 titles on BFI Player. These are mostly unseen films and many of them are free to view: luxuriate in John Betjeman's lament for steam as the 'Fifteen Guinea Special' climbs Blea Moor, or chuckle at the formal get-up as Neville Chamberlain opens Captain Deltic's local station in 1926, the year of the general strike. Recommended.

DUKE OF BURGUNDY AT EAST WEST PROJECT

ON 25 February 2016, 24 volunteers from Network Rail and the East West Rail Alliance joined the Upper Thames Branch of wildlife charity Butterfly Conservation to create a new habitat for a colony of the rare Duke of Burgundy butterfly on a patch of land adjacent to the Marylebone to Birmingham line.

The colony – one of just three found in Buckinghamshire – currently sits on private land near Princes Risborough, just north of High Wycombe, but the site has recently gone up for sale.

Lucie Anderton, environment manager for Network Rail said: 'It's great to help support Butterfly Conservation. The habitat site is by the railway line which we will be upgrading as part of East West Rail and confirms our commitment to engage with local conservation groups to help preserve and protect the environment'.

The team made a clearing by chopping down dogwood and creating a hedge from the dead wood, to create an environment to attract the butterfly to make it their home and to lay eggs.

Fit for a Duke: volunteers clear away dogwood. Courtesy Network Rail

modern railways

Passenger numbers are climbing in the North and there is a buoyant outlook in the region. This is Manchester Piccadilly. Paul Bigland

RAIL IN THE NORTH

Pacers out, bi-modes in: it is all change in the North following recent announcements. The replacement franchises for Northern and TransPennine are very exciting news for the region, with new trains and extra services. The old 'steady state' notion is abolished, replaced by a vision for expansion.

Come and join *Modern Railways* to explore the implications of the new policy for this key part of the country at a conference we are organising for the spring. To be held at the atmospheric National Railway Museum in York, the conference will consider how rail transport can play its part in generating economic growth in the region, along with the bottlenecks and obstacles that need to be addressed to get the most out of the new franchises.

SPEAKERS ON OUR PROGRAMME

- David Brown, Chief Executive, Transport for the North
- Alex Hynes, Managing Director, Northern
- Leo Goodwin, Managing Director, TransPennine Express
- Stuart Baker, Project Director, Rail Network Upgrades, North & Stations – Department for Transport
- Michael Hulme, Managing Director – Trains & Modernisation, Alstom
- and more

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C2C'S TORRID TIM

Retired railway manager **THEO STEEL** reflects on the row about overcrowding on the line out of Fenchurch Street in the wake of the introduction of the December 2015 timetable

I had better first of all declare a personal interest. I was born and bred in Westcliff, later living near Southend East and for the last 15 years have been a user of Thorpe Bay. I have watched, managed and competed with c2c (or the London, Tilbury & Southend as we once knew it) since 1949. I was both consulted over the franchise renewal and worked with National Express on the bid.

A LITTLE HISTORY

The pre-1990s signalling on the LTS route permitted up to 24 trains per hour (tph) between Barking and Fenchurch Street. The line was used to capacity during the peak hour until the slump of the early 1990s, which caused traffic to decline by 24% in the peak; it did not recover until recently (up until about 2010, the highest loads in the peak were as long ago as 1970). For the purposes of this article it is sensible to go back to 1996 when the pre-2015 timetable was introduced. Chafford Hundred had just been opened, with West Ham following in 1999. The mid-1990s signalling permitted a maximum of 20tph in and out of Fenchurch Street, and West Ham was not designed into the signalling – this was put right in time for the Olympics in 2012.

The whole c2c route is in the Thames Gateway area – the largest regeneration area in in the UK. But it is an area that has proved quite intractable with both low general economic growth and, until recently, rail growth. Deprivation is interspersed with wealth. Until the 2011 census, the area was dominated by an increasingly ageing population. Rail market share is high along the route and it is still very dominated by the peak and London traffic, although there is more local traffic these days - particularly education linked, with colleges by the stations at Southend since 2004, Grays since 2014 and one to come at Basildon.

Until 2010 I was involved with strategic planning in the Thames Gateway. In 2007 we made a submission to show that shorter journey times on rail would be helpful to economic development in South Essex. During this period Transport for London was in negotiation with the Department for Transport over the extent of each organisation's influence on shared routes into London. In the event c2c was tendered with broad agreement about the specification from all parties.

Consultation on the new franchise started as early as 2009, prior to c2c being caught up in the West Coast refranchising hiatus.

METABLE CHANGE

The DfT consultation document suggested that trains might be removed from the route; at the time the ORR's on/offs figure showed patronage at 59.4 million journeys.

In the event the successful National Express bid for a new 15-year term starting in November 2014 saw a stable fleet initially, with the introduction of 17x4-car new trains from 2019 onwards. Some services currently operate at 135% passengers in excess of capacity (PIXC).

The franchise award to National Express was popular with customers and seen as a good deal for both the Department for Transport and National Express.

ROLLING STOCK

Class 357s introduced in the late 1990s work the c2c route. By 2006 the class had settled down after a difficult start, and this has been a high-performing, Golden Spanner-winning fleet.

Five Class 357s were used on the Great Eastern from 2005 to 2007 but were returned to c2c after Bob Spink MP obtained assurance in Parliament that they would be coming back to South Essex. There are now 74x4-car Class 357 units to handle the traffic with 71 diagrammed (in the slam door era the line had over 100 units allocated with about 80 in service daily).

In 2008 the High Level Output Specification (HLOS) envisaged 8x4-car Class 321s being transferred to the route to cope with growth; in the event they stayed working out of Euston. Many c2c commuters work in banking and finance – sectors particularly hard hit in the post-2008 recession – so keeping the '321s' at Euston was probably the right decision.

But with passenger numbers once again climbing upwards, c2c has recently been looking for extra rolling stock, with two Class 360/2s from the Heathrow Connect route once mooted as the likely trains (p11, last month). These would have been freed by using Class 332s on the T4 shuttle and running three Class 360/2s for three Heathrow Connect diagrams on weekdays – tight

Weekend Liverpool Street service: unit Nos 357218 and 357312 at Forest Gate while working a c2c service giving direct access to the Westfield shopping centre at Stratford. Antony Guppy

Change here for the Underground: unit No 357034 forms a Shoeburyness-bound working at West Ham, while on the far right an eastbound Hammersmith & City Line train arrives. Antony Guppy

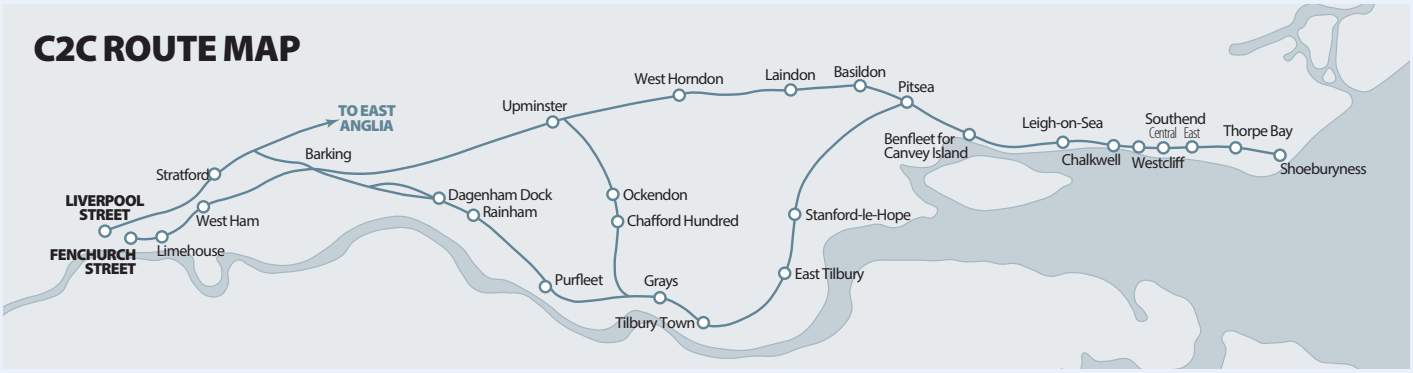
TABLE 1: HOW THE C2C TIMETABLE WAS ADJUSTED

TRAIN ARRIVALS AT FENCHURCH STREET

Time	Previous timetable		13 December 2015 timetable		18 January 2016 timetable	
	No trains	No units	No trains	No units	No trains	No units
07.00 – 07.29	7	11	9	13	9	12
07.30 – 07.59	8	16	10	17	10	17
08.00 – 08.29	9	20	10	21	10	22
08.30 – 08.59	10	22	10	21	10	21
09.00 – 09.29	8	14	10	14	10	13
09.30 – 09.59	6	11	9	14	8	13
TOTAL	**48**	**94**	**58**	**100**	**57**	**98**
Average length (units)	1.96		1.72		1.72	

TRAIN DEPARTURES FROM FENCHURCH STREET

16.00 – 16.29	5	9	9	12	9	12
16.30 – 16.59	6	11	9	14	8	10
17.00 – 17.29	10	21	10	17	10	19
17.30 – 17.59	10	23	10	22	10	22
18.00 – 18.29	8	15	10	17	10	16
18.30 – 18.59	5	8	9	13	8	11
TOTAL	**44**	**87**	**57**	**95**	**55**	**90**
Average length (units)	1.98		1.67		1.64	



diagramming that became academic when Class 332s encountered technical problems and Heathrow Express needed all the Class 360/2s it could lay its hands on. With this deal off the table, other stock is sought to bridge the gap until the new trains promised in the franchise deal come on line in 2019. Class 387s released by the arrival of Class 700s at GTR are one possibility, but these have the drawback of 2+2 seating - c2c would prefer 2+3 for its busy peak services.

TABLE 2: ADJUSTING THE STOPPING PATTERN IN LONDON

STOPS IN THE MORNING PEAK

	Previous timetable	13 December 2015 timetable	18 January 2016 timetable
Barking	36	55	45
West Ham	33	57	56
Limehouse	35	56	55

STOPS IN THE EVENING PEAK

	Previous timetable	13 December 2015 timetable	18 January 2016 timetable
Limehouse	33	57	56
West Ham	33	57	50
Barking	33	56	49

PERFORMANCE

The 1996 timetable, much influenced by the late Barry Flaxman, longtime Southend Railway Travellers Association and later Rail Passengers Committee Chair, remained in place until December 2015. In 2006 a revised timetable was introduced but dropped quickly as it was not reliable, not liked by customers and didn't actually serve the market particularly effectively. (This episode has been remembered over the past few weeks by some customers.)

In recent years the c2c route has earned a reputation for good timekeeping, taking the Golden Whistle for the best right time performance moving annual average (MAA) in the South East in the year ending with period 9 of 2015-16 in the awards organised by this magazine and the Institution of Railway Operators in January this year. The right time MAA score was an impressive 84.4%, while the Public Performance Measure (arrivals within five minutes of right time) was up at 97%.

Period 9 was the last period of the old timetable. The new timetable introduced in December 2015

attracted a lot of publicity regarding overcrowding, but did not dent PPM much – on the MAA measure PPM has been over 96% in the first two periods of the new timetable (although the right time slipped from the mid-80s to the mid-70s). The generally positive Network Rail contribution to this situation should not be forgotten.

DECEMBER CHANGES

The December 2015 timetable features marginal journey time improvements off-peak and worse journey times in the peak. There is much more extensive stopping in the peak hours at Barking, West Ham and Limehouse, effectively turning the c2c line into a metro route in the inner London area with three-minute frequencies.

The growth of Canary Wharf to over 100,000 working there needed recognition in the c2c timetable, with West Ham a key interchange with the Jubilee Line. For comparison, the long-established City of London, which has traditionally dominated c2c commuting, has between 350,000 and 400,000 people working in the square mile. Interestingly, current development in the City is very much concentrated on the Fenchurch Street area, giving a further boost to the c2c route.

An innovation has been a quarter hourly service in the peak direction of travel from Chafford Hundred/Ockendon. This single track line was served by a shuttle from Upminster to Grays/Tilbury Riverside until 1986 but it is now the busier route to Grays.

Save for this stretch of single line, the rest of the railway is double track, 75mph maximum speed with 12-car platforms at all stations (albeit they are not used on the Tilbury loop as yet). As detailed in a feature in the September 2015 issue, the potential for increasing the linespeed at some locations to match the 100mph capacity of the Class 357s is being explored.

Some Laindon starters were extended in the December timetable to or from Leigh-on-Sea to produce very necessary extra capacity on that part of the line. There is also more eight-car off-peak operation.

Another feature of the new timetable is some operations out of Liverpool Street on Saturdays and Sundays, giving direct access to the key emerging centre at Stratford. In the consultation on the new timetable with the London boroughs there was a very strong desire to see Barking better connected with Stratford, now a key East London hub. The Boroughs of Newham, Barking and Thurrock had some of the highest population growth figures in the 2011 census – all up over 10% on 2001 – marking an influx of younger people. Barking Reach is to be developed and the Barking to Gospel Oak line is to be extended there. Hence some direct trains at weekends to Stratford – and remember, these are of benefit to the whole mainline route, not just the areas of London that c2c serves.

THE TIMETABLE IN PRACTICE

I first got to see the 2015 timetable in August 2014 and it was clear that the emphasis on inner London stops and slowing in the peak would be a major customer issue in Essex.

Prior to implementation two Up fast trains were reintroduced into the schedules, with two back in the evening. The 07.18 ex-Shoebury – non stop from Chalkwell to West Ham and now expanded to 12 cars – caters for 08.30 City starters very effectively and actually overtakes a train at Laindon. It is as fast as any train recently and takes 58 minutes from Shoeburyness to Fenchurch Street. This is better than anything in the last timetable! And it shows what can be done.

The reaction to the new timetable in the consultation period was fairly muted, but in the four weeks prior to implementation on 13 December there was a lot of shock and horror.

The initial week of the new timetable saw the return of the 'Misery line' tag; reports are that there was a pretty extreme social media campaign. Responding to the adverse reaction, by 17 December, c2c had removed 10 Barking stops in the morning peak and seven stops at each of West Ham and Barking in the evening peak. It turns out there is a neutral section in the wrong place on the Down line at West Ham, which prompted the removal of the West Ham stops.

This began to restore operational robustness – necessary at the right time level given the delay repay arrangements for automatic refunds for over two-minute delays introduced in February! Two days of free travel have also been given to season ticket holders to reflect the decline in standards on 15/16 December.

There were over 50 alterations in the peak made progressively on 17 December, 4 January and 18 January. They included adjustments to stops and train lengths; these are summarised in Table 1.

One or two of the changes covered morning contra-peak flows to ensure that the significant educational traffic into Southend was adequately catered for. Many of the changes were welcomed, although some contradicted some of the timetable principles: the c2c operating team has needed to be broad shouldered!

Clear efficiency gains have been obtained in the new peak timetable by running fewer trains through to Stanford-le-Hope – until 2011

Pastoral south east Essex: unit No 357004 passes Hadleigh Castle while performing a Fenchurch Street – Shoeburyness service. Antony Guppy

Martyrs in eternal rest: unit No 357021 passes the Roman Catholic Church of the English Martyrs while departing from Fenchurch Street. Antony Guppy

the bay at Grays was four-car only, thus forcing eight-car trains to run further east to turn round at Stanford-le-Hope. The Grays bay is now eight-car.

However, longer timings and extension of trains from Laindon to Leigh-on-Sea work in the opposite direction as regards productivity.

We can see from Table 1 that overall capacity is up and more trains operate, particularly in the evening when, as everywhere, the peak has spread. The average train lengths have declined, but not in the morning peak hour. The operational challenge of running at full line capacity over the peak should not be underestimated and holding the PPM at over 96% is a major achievement.

On the other hand, note that there is no half hour where there are there more than 22 units used into Fenchurch Street, when the maximum capacity is 30. There are not many London routes where there is scope for such significant expansion at the cost of units and mileage only. This underlines the case for extra trains.

It should be noted that 17 units are being converted to metro configuration with a loss of 60 seats per unit, but more standing room created.

NEXT STEPS

Table 3 shows each station on the line and the annual usage figures for given years. The 2015 figures were before the new timetable, but looking at the stations it is hard to argue that the timetable priorities were driven other than by the growth foci. In particular Barking and West Ham have grown from very significant base numbers.

The sheer growth on the route has put the new timetable under pressure. Evening peak numbers in January 2016 stood at 24,900 per night, as compared with 20,800 in October 2015 – it is little surprise then that there is overcrowding.

With DfT, c2c is seeking to introduce additional rolling stock this year by borrowing some from another route.

The pattern on c2c reflects the growth seen on the TfL orbital routes, where it is concentrated in the inner London areas. But there is also significant growth further out on the c2c route.

Cynics have suggested that the December 2015 timetable was little more than a raid on London Underground traffic, but it seems this is incorrect. c2c has analysed loadweigh data and this shows that two-thirds of the additional passengers the company is carrying in the morning peak today compared to last autumn are from stations in Essex rather than those in London.

The company says: 'We have had 10%+ growth since last autumn at eight stations - and seven of them are in Essex. The eighth is Rainham, which in many ways identifies itself as an Essex commuter station and doesn't have the Tube as an alternative.

'Not all this growth will be because of the timetable change, but we presume most of it is.'

Behind all this are the rapid changes in the housing market and social mix of London and its environs. A catchment area with full employment and an active housing market is a new development for the c2c route. And it is now perceived as a route that enables high London earners to live in much more cost-effective property out in Essex.

WILL THE PROBLEMS HAUNT C2C?

As time went by, we could see that a capacity shortfall was becoming an increasing risk. But anticipating growth on the scale that has been seen recently would not have helped National Express win the bid. The growth that was seen to 2013/14 was at about the 3% level factored into the bid. 2014/15 saw an acceleration in growth. Fascinatingly, this has been against a decline in petrol prices.

There are some infrastructure developments that would help improve timings – the route from Barking to Pitsea would not be difficult to upgrade to 90mph, if not 100mph, and more use of Laindon for fast trains to overtake slower services could improve matters.

The most interesting future pointer will be the next National Passenger Survey – will the stats back up the many (and often genuine) complaints about the new timetable and capacity? Former Anglia Railways Managing Director Tim Clarke reminded me that customer attitudes on the Great Eastern main line have never recovered since the 2005 timetable was introduced, despite changes since.

As Sir Peter Parker used to say, it is eight inches from a halo to a noose… Will c2c slip? Time will tell. mr

Grays, now boasting an eight-car bay: unit No 357036 arrives from Fenchurch Street. Antony Guppy

TABLE 3: HOW PATRONAGE HAS GROWN ON C2C

	1996/97	2009/10	2013/14	2014/15
Fenchurch Street	15.2m	15.1m	18.2m	17.6m
Limehouse	82k	2.5m	3.2m	3.3m
West Ham	not open	2.1m	3.7m	5.3m
Barking	3.1m	6.5m	8.3m	9.7m
Upminster	2.8m	3.0m	4.5m	4.9m
West Horndon	211k	338k	355k	356k
Laindon	1.4m	1.7m	1.9m	2.0m
Basildon	1.5m	2.4m	2.8m	2.8m
Ockendon	281k	562k	692k	752k
Chafford Hundred	243k	1.9m	2.1m	2.3m
Dagenham Dock	55k	291k	361k	370k
Rainham	600k	1.3m	1.7m	1.8m
Purfleet	240k	403k	501k	541k
Grays	1.8m	2.8m	3.2m	3.5m
Tilbury Town	410k	793k	842k	898k
East Tilbury	255k	305k	320k	341k
Stanford-le-Hope	663k	923k	998k	1.0m
Pitsea	883k	1.0m	1.1m	1.1m
Benfleet	2.3m	2.8m	3.4m	3.4m
Leigh-on-Sea	1.2m	1.8m	2.0m	2.0m
Chalkwell	640k	1.4m	1.7m	1.8m
Westcliff	599k	980k	957k	1.1m
Southend Central*	1.9m	1.8m	2.0m	2.9m
Southend East*	448k	1.7m	1.9m	1.7m
Thorpe Bay	635k	780k	812k	828k
Shoeburyness	277k	607k	689k	699k
TOTAL	**37.5M**	**59.4M**	**68.1M**	**73.3M**

Notes

k = thousands, m = millions

** Southend stations volume reassessed 2014/15. The reassessments are more accurate and are at the expense of the Southend Victoria route.*

All stations are unique to c2c other than Barking, which is shared with the Barking - Gospel Oak line, and Upminster, where the Romford line accounts for modest numbers. Limehouse, West Ham, Barking and Upminster also have Underground / Docklands Light Railway patronage.

Travelcards/Oyster have always been interavailable out to Upminster and were extended out to Grays by both routes in 2010.

Source: Office of Rail & Road, station off/on figures.

Entries are invited for the *Modern Railways* 2016 RAILWAY INDUSTRY INNOVATION AWARDS

The Railway Industry Innovation Awards, organised by *Modern Railways* and run in conjunction with the Fourth Friday Club, are the longest-standing award scheme in the industry. Winning an award can generate great kudos for the winner and does wonders for company morale.

We are now inviting entries for this year's awards. Full details can be found on the Fourth Friday Club website, www.4thfriday.co.uk

AWARD CATEGORIES

Outstanding examples of innovation are sought in the following award categories:

- Engineering and Safety
- Environment
- Cross-Industry Partnership
- Small Scale Project
- Passenger Experience
- Operations and Performance
- Major Project

Awards luncheon

The awards will be presented after a Fourth Friday Club luncheon on Friday 24 June 2016. Companies interested in taking tables at the lunch should contact Chris Shilling on 01778 421550, e-mail: chris@shillingmedia.co.uk.

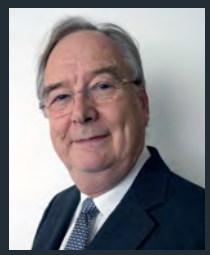
KEY DATES

LAST DATE FOR RECEIPT OF ENTRIES:
Thursday 14 April 2016

AWARDS LUNCHEON
Friday 24 June 2016

Hosted by *Modern Railways*' Roger Ford

GUEST SPEAKER
Stephen Glaister, Chair at the ORR



Stephen is Emeritus Professor of Transport and Infrastructure at the Department of Civil & Environmental Engineering, Imperial College London where he has also been director of the Railway and Transport Strategy Centre.

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COPING WITH GROWTH

We shouldn't lose sight of the big picture: the railway is a success, Network Rail Chairman **SIR PETER HENDY** tells **JAMES ABBOTT** and **PHILIP SHERRATT**

Sir Peter Hendy doesn't make speeches at retirement dos. 'People want me to go on about how marvellous it was in the old days – whereas I think it's marvellous now,' says the Network Rail Chairman. 'Lots of the problems we have nowadays are related to growth, which is remarkable. Take London Bridge for example – we've had amazing growth while we've been rebuilding it, so no wonder we have had a few difficulties fitting everyone in.'

For a public transport professional like Sir Peter, with a long and illustrious career in the industry behind him, the situation nowadays is quite a contrast to how things were when he started out. He remembers an era of dwindling passenger numbers and government indifference, if not downright hostility, to the public transport sector.

By contrast, now we see journey numbers climbing by several percentage points each year, and government urging the industry to get on with modernisation as quickly as possible in order that railways can play a wider role in supporting the national economy.

Sir Peter's opinion is that this turnaround needs to be more explicitly acknowledged in Network Rail's targets. 'It doesn't surprise me that many people in Network Rail think the regulator is the customer' he says, noting that there were 54,000 e-mails sent from Network Rail to the Office of Rail and Road (ORR) last year. 'We've got over 300 regulatory targets, extending down to the condition of the clocks on station platforms.

'But Network Rail doesn't get rewarded for coping with growth. So when people ask the question "Is Network Rail any good?" I would say, if it can cope with growth, "yes!".'

The Network Rail chairman wants fresh thinking to take hold, in which the passenger and freight train operating companies (TOCs and FOCs) and their customers are placed

The chairman: Sir Peter Hendy. Courtesy Network Rail

The growing railway: crowds at King's Cross, 16 February 2016. M. John Stretton

Scotland: performance exemplar. This is Anniesland on 21 February, with a ScotRail service at left. At right, loco No 73967 (with No 73968 on the rear) passes through with empty stock from the West Highland sleeper heading for Oban (at the time the sleeper was being diverted from Fort William to Oban due to engineering works; as there are no servicing facilities at Oban, the train was returning to Polmadie on Saturdays before heading back to Oban on Sundays). Stuart Fowler

ahead of regulatory box ticking exercises in the corporate mind. And he wants incentives realigned to take account of the challenges of accommodating more trains and passengers on a network that in many places comprises infrastructure dating back almost two centuries.

'I believe we're grown-up enough to decide our maintenance and renewals spend without someone else setting targets' says Sir Peter. 'Now we're a public sector body I'm not sure if the previous, more intrusive style of regulation is appropriate. If the Secretary of State wants us to do something, we do it.'

TARGETS

Getting the incentive structure right is a thorny issue. Take the Public Performance Measure (PPM), for example. This has plateaued about two or three percentage points below the regulatory target, stubbornly resisting measures to push it upwards.

'The first thing we have to recognise is that PPM is a better measure for some services than others' says Sir Peter, pointing out that for a frequent urban or suburban service, whether or not there are long gaps in the service is a much better indicator from the customers' point of view than whether the 10.28 arrives at its terminal station on time. That is why the lost customer hours measure was developed for the London Underground: Sir Peter lauds LCH as an effective incentive as it aligns the concerns of the operator with those of the passenger.

'So first we have to get the right measure. Then we have to get it right between Network Rail and the TOCs – the two partners should have the same performance and financial incentives. Then we've got to temper this with some view of how crowded the railway is.'

On the South West Trains routes into Waterloo, for example, it is virtually impossible to achieve right time peak working. Removing some trains from the timetable and shutting doors in the face of passengers trying to board might improve the PPM statistics, but would leave crowds of people fuming on platforms – so is unlikely to happen.

But such a policy can make sense in some circumstances. Sir Peter recalls a time during his stint as London Transport Commissioner when the service on the Northern Line south of Kennington was thinned with the express intention of getting trains down to Morden on time for the return working and making the service work better.

So it is a case of horses for courses. 'But none of this has anything to do with a five-year PPM target… so we have to ask "What is the best way for the regulator to help the industry run properly?". And Sir Peter detects some recognition of this, with 'a new realism in the ORR about what the targets are useful for'.

Getting the targets right and aligning the incentives are key issues. For example, many of the delays that make the service perform poorly are 'sub-threshold' – below the three minutes where money changes hands – but both Network Rail and TOCs need to be on the case for resolving the one and two-minute delays, because these are the ones that accumulate and prompt the service to fall apart.

Of course, having NR and TOC working in alliance helps in this respect. The formal alliance between SWT and NR's Wessex Route broke up last year, but NR and TOC are currently in alliance in Scotland. It may be no coincidence that there are good performance figures north of the border: NR's Scottish Route took the Golden Whistle as best Route for minimising delay minutes at the awards event organised in January by this magazine and the Institution of Railway Operators. 'There you have a good alliance with the TOC and a strong MD (Phil Verster) with a clear set of objectives from Transport Scotland, and yes, it is working.'

But you don't necessarily need a formal alliance to achieve this, says Sir Peter. He is impressed with what new NR board member Rob Brighouse has told him about how things worked at Mr Brighouse's former company, Chiltern: there was no formal alliance, rather a statement of shared objectives, but this delivered the goods ('Informed Sources', December 2014 issue). 'It's happening elsewhere on the network, for example Martin Frobisher (London North Western Route Director) sits down with Virgin West Coast with the same objectives. There's an obvious logic: if the metrics are the same, it is much more likely to work.

'We're in a transformation period. (Managing Director, Network Operations) Phil Hufton is driving the bid to improve performance on all the Routes.'

DEVOLUTION

This emphasis on the Routes prompts the question of just how far devolution should go. The post-Hatfield chaos prompted the iron fist from the centre in the Coucher era, but since then the Routes have been given more autonomy – and many were expecting more devolution to be recommended in the Shaw Report, the publication of which was imminent at the time of this interview with Sir Peter.

One TOC MD sums up the devolution question thus: 'Network Rail seriously has to ask what the point is of Milton Keynes' – not an existential plaint about new towns, but rather a questioning of the relevance of the NR HQ, with the implication being that all the good ideas and implementation arise in the Routes.

'Everybody wants a national network, with system-wide safety and other standards. And then there are some things, like rail, where it makes sense to buy on a national basis' counters Sir Peter. But he is fully up for the devolution agenda, reckoning you only need about 5% of the company's employees in HQ roles.

Establishing independent Routes makes internal benchmarking feasible. One of the criticisms of Sir Roy McNulty's 2011 report on cost reduction on the railways was that comparing the UK infrastructure operator to those on the Continent is like comparing apples and oranges: the conditions are so different as to render making a meaningful comparison difficult. Separate Routes within the UK should be more comparable with each other. 'That (benchmarking) is better done by internal people rather than a regulator, because you need interpretation' opines Sir Peter. 'That is what we did at TfL: we'd do the benchmarking, and then we'd show it to outsiders.'

PROJECTS

Next up was the vexed question of investment projects. First, Sir Peter wants to dispel a myth: Control Period 5 is not a disaster. It is full of projects, the Chairman insists, that are going well: it is just that there are one or two high-profile ones (Great Western electrification of course being one) that are not.

Sir Peter's recipe for a successful project is to be clear about what you are trying to achieve before you dig the first sod. 'With Crossrail, it may have taken a long time to get the green light, but the advantage of that was that we knew every element of it before we started. We knew what signalling it would have, what type of trains, the ground conditions for the tunnels, the condition of the infrastructure either side of the central tunnel. So we knew what it was and it is coming in on time and on budget. We will open in 2018 with the train service we planned. And nobody says that for £15 billion it is costing too much.'

Contrast that, he says, with the Great Western electrification, where the announcement giving the go ahead caught Network Rail in a state of unpreparedness. Sir Peter points to the Severn Tunnel: when the plan was authorised, nobody knew how the link to South Wales was going to be wired (it is a tribute to team leader Robbie Burns, says the chairman, that now they do).

'Was £800 million (the original projected cost) ever likely to be realistic, bearing in mind the cost of the West Coast route modernisation? Answer: no.' So does that make the £2.5 - £2.8 billion that Mark Carne suggested to the Public Accounts Committee last autumn a reasonable cost?

Sir Peter believes it is 'about right', and stresses that compared to past projects, costs are bound to have gone up. 'It is a different railway nowadays, with different safety standards. It is a busier railway and windows of time (for engineering work) are far harder to come by than they were 20 years ago. When we started these big electrification schemes nobody asked how expensive they'd be – they asked if they could be done.'

But he insists that progress is being made and the project is being brought under control. 'We spent £130 million on the Great Western main line in 10 days over Christmas. There is just one pile left to drive between Reading and Didcot,' he said, speaking in early February. Furthermore, the railway is learning the trick of investing this enormous amount of money while not impacting current performance, which Sir Peter says is a tribute to the close working relationship with operator Great Western Railway. 'Periods 9 and 10 (the back end of last year) were some of the best ever on GWR, despite the enormous amount of work going on.'

GWR and NR are working together to ensure the Inter-city Express Programme timetable comes into effect in December 2018, with four London trains per hour at Bristol Parkway (two to Temple Meads and two to Cardiff) and four at Temple Meads (two via Parkway and two via Bath).

Timings may be affected by the necessity of adopting diesel engines in the hybrid units for some of the trip. Sir Peter Hendy says if the wires reach Wootton Bassett, an IEP can make it to Bristol in the same time as an HST – but note Wootton Bassett should be there for the crucial 2018 date (Table 5, p27). Expect an announcement 'shortly' on converting more of the straight electric IEPs to hybrid, allowing more routes to be converted to IEPs ('the day a hybrid train gets to Swansea, the people of Swansea will think the electrification is finished'). Indeed, Sir Peter says hybrids are an 'elegant solution' and believes they will prove very useful across the network, not just on the Great Western.

PLANNING HORIZON

Sir Peter Hendy's report on Network Rail's spending plans last year shunted many projects into the future, crossing the border into Control Period 6 (2019-24). With the amount of money available for CP6 not yet fixed, there remains some uncertainty about just what will get finished, and when.

This question of what happens across the borders of the Control Periods highlights a criticism of the spending system: five-year periods may be fine for monitoring operations and maintenance spending, but it is just too short a timespan for dealing with investment projects that stretch over many years. (Retired managers from the British Rail era, familiar with a three-year planning horizon,

Western wires: GWR green unit No 166201 at Lower Basildon, 8 February 2016. Ken Brunt

Track for the future: workers shovel ballast during renewal works at Bathampton Junction on 15 August 2015. M. John Stretton

say the current generation does not know how lucky it is, but Sir Peter, as he is keen to emphasise, is all about looking forwards rather than back.)

The chairman points to TfL's 10-year business plans, funded for the next five years, as the sort of regime the railway needs. 'Crossrail wouldn't fit into a Control Period – and I will stress again that it is on time and on budget because it is properly planned.'

So the general sliding to the right in the Hendy report is realistic, its author suggests. 'On trans-Pennine electrification, for example, you can't build it until you know what it is you are building. We now have the time to work out what that is.'

One consequence of delaying projects is that a backlog is building up. 'We'll be starting CP6 with a huge hangover from CP5. Not all that work is costed – we need to know the costs to plan properly for CP6.'

Nevertheless, the Great Western fiasco has raised questions about whether NR should be undertaking project work at all, with the suggestion that perhaps it should be hived off. Sir Peter is unconvinced. 'Francis's organisation (NR's Infrastructure Projects division, led by Dr Francis Paonessa) is a contracting organisation – the Routes are in charge of the railway.' And he says this is the way it should be, remembering the Public Private Partnership on the Underground when the projects people were top dogs, to the detriment of the travelling public. 'Bechtel was able to tell Boris (Johnson, mayor of London) it could have the railway anytime it liked.'

Some commentators suggest that Andrew Adonis's sudden enthusiasm for electrification when he was transport secretary caught the railway unprepared and consequently unrealistic promises were made. The NR chairman says that the railway should be wresting control of its own destiny by being more assertive: with cross-party consensus supporting a programme of continual improvement, Network Rail and its partners should be realistic about the quantity of project work that can be undertaken and the timescale for it. 'The railway should have a long term plan stretching over more than five years, and we should give the politicians an idea about what should be done next.'

Of course, how we should pay for that programme has become a vexed question since the Network Rail credit card has been cut up. The emphasis now is on getting pension funds, Local Enterprise Partnerships and others to contribute to the cost of projects. 'We've got a viable set of projects and we want to lever in as much private sector money as possible', says the Chairman: new NR finance chief Jeremy Westlake has been charged with pursuing this. Sir Peter recognises that the fresh emphasis on private sector money underlines the need for fair regulation, to ensure that investors are protected while guarding against windfall gains.

MORALE

Now that Network Rail is explicitly recognised as a nationalised industry, some assert that the mood in the company has changed, with civil service rules, ethics courses for junior managers and the little perks that brighten up working life, such as cash incentives for staff suggestions, thrown out. By comparison, the TOCs are seen as attractive places to work, with employee travel permits and a flexible attitude. Meanwhile, the generous salaries on offer at HS2 have drawn many talented people across from NR – it is not surprising that many think planning virtual railways in a warm office beats checking the points on a rainy November night in Nuneaton.

While acknowledging that Network Rail has gone through a difficult patch, the chairman rejects the idea that morale in the company is at rock bottom. He relates how he has toured the country viewing the weather-related problems of the past winter and found people cheerfully turning out for 12-hour days in all weathers to get things back on track – not the sort of behaviour to be found where employees don't believe in the organisation.

Nevertheless, there is a feeling abroad that NR is an insular institution: as one TOC MD put it, 'the world is run by people that turn up – and Network Rail doesn't turn up'. Sir Peter asserts that with 36,000 employees, Network Rail is a large ship to steer and 'it takes a long time to change people's attitudes'.

He points out that the very size of the company can hinder action: TOCs, being smaller, have shorter chains of command and thus find it easier to be nimble on their feet. But he is determined that things will and indeed are changing, citing Phil Hufton's performance drive as evidence that things are getting done. 'I believe a credible, competent story is emerging' Sir Peter says. 'Can we sustain this to become more customer focused and easier to deal with? Watch this space.'

As for Sir Peter personally, having taken the seat behind the chairman's desk, does he feel he might have bitten off more than he can chew? No, he says, he went into this challenge with his eyes open.

One of the refreshing things about Peter Hendy is that you know he doesn't have to do it (he's comfortably off and already has the handle on his name). He does it because he cares passionately about public transport. But he points out that he is far from alone in this: 'People don't work here because they are paid lots of money. They do it because they believe in the railway and think it is wonderful to be associated with it.'

Anyway, most of the hard stuff lands on the desk of Chief Executive Mark Carne, whom Sir Peter describes as 'bloody good'. Being chair is a cakewalk by comparison, he avers. 'I had 10 years of doing six days a week as London Transport Commissioner. Now I am doing four days a week, and that's just right at my age.' mr

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Frequented by freight: core sections of the Valley Lines are still used by coal trains. This 12 February 2016 view shows a train bound for the loading terminal near Hirwaun, beyond Aberdare, approaching the DDA-compliant station footbridge at Pontypridd. Rhodri Clark

VALLEY LINES CONCESSION

Light rail is on the table as Welsh Government makes devolution bid

The Welsh Government aims to begin procurement of a vertically integrated Valley Lines concession this summer, in the hope that circumventing Network Rail will enable enhancement works to benefit from time-limited European Union grant aid.

It will invite bidding consortia to present their own ideas on the mix of heavy and light rail and the most appropriate methods of resignalling and electrifying local railways in the Cardiff city region. It is taking this approach because it believes that railways have been 'messed up' by people who 'don't know what they're doing' prescribing rolling stock and signalling.

Welsh rail infrastructure is a non-devolved subject, but the Welsh Government pushed ahead as it believed the Shaw review of Network Rail's future shape and financing would support its proposal to transfer the Valley Lines from Network Rail. Issues around debt and risk transfer are significant hurdles. The Welsh Government already has a fixed debt ceiling. Senior Welsh civil servant James Price said: 'The concession approach that we're looking at attempts to kind of avoid that issue by the concessionaire holding the track rather than Welsh Government, albeit they'd be working for the Welsh Government, and hence the borrowing should be off the balance sheet'.

TIME WINDOW FOR EU FUNDS

The UK Government has allocated £125 million as its contribution to Valley Lines electrification, which was conceived as a follow-on to electrification of the Great Western main line to Swansea. After delays to the latter, this sequencing is no longer compatible with the Welsh Government's plan to use EU funding for some of the work. The funding period ends in 2022, but by then the government would need to demonstrate the benefits accruing to the public from the expenditure.

Mr Price said physical works would need to start in 2018, which dictated that procurement of the concession should start this summer. 'There are three or four big consortia who really want to bid for this, so there's enough of a field who want to do that,' he told a Welsh Assembly committee.

He acknowledged that there was some scepticism. 'There has been some noise from certain parts of the rail industry… where they're basically saying: "Look, if you'd only be like the DfT and tell us exactly what you want to buy and specify the signalling and specify the rolling stock, then it would be easier for us and we could bid a whole lot more easily".

'That is undoubtedly true, but I think it's also undoubtedly true that the same people would say that one of the reasons why the railway is so expensive and so messed up is that people who don't know what they're doing keep saying, "That's the rolling stock you're going to use and that's the signalling we're going to use". So, we're saying: "You're the experts. You tell us what you want to do".

'That extends to if you want to use all heavy rail or some light rail or something that we've never heard of, frankly, because what we have learnt is that the boundary between heavy rail and light rail is increasingly being blurred,' said Mr Price.

DIGITAL RAILWAY

Although much of the Valley Lines system has been resignalled under the current Cardiff Area Signalling Renewal, the Welsh Government appears to be

expecting another resignalling. Mr Price said: 'A lot has been said about digital railway, and most people are highly sceptical about getting that in in the UK, but the only reason they're sceptical about getting that in in the UK is because Network Rail says it's got to be done across the whole of the network.

'If you were to separate off an element of the network and a bidder could come in and use the same system that they'd been using for five years in France – which is compliant with EU regulations – there's no reason why it couldn't be dropped in overnight. People have talked about costs of £7 million or £8 million for resignalling the whole thing if you did it in that way. So, we really are pushing people to come up with that type of solution, but I think that part of the problem in dealing with Network Rail is that it's so different from their standard processes for doing things. How would you risk assess that?'

LOSS OF FAITH IN NETWORK RAIL

The Welsh Government would have to take a view on the risks it was prepared to accept – including the possibility of catastrophic failure – with devolution of rail infrastructure, Mr Price said. 'Network Rail's own assessment of their own assets I don't think is sufficiently good… so we have already started working with Network Rail to assess the quality of Valleys lines, because that's the first place we were looking at for a potential concession.'

Despite rail infrastructure not being a devolved responsibility, the Welsh Government has committed or spent almost £200 million on rail infrastructure over the past two years, said Mr Price.

Welsh transport minister Edwina Hart said some of the comments her government had received were coloured by the fact that the concession could deliver modernisation 'without the necessity of using Network Rail'. She also told the committee: 'I think it [Network Rail] was an organisation that was ripe for fundamental change, in terms of the way it has dealt with public money and its overspends, and the fact that it's hardly ever kept to a commitment. But of course it's not devolved to us, so we continue, obviously, to deal with them on a day-to-day basis, but they fail to deliver across the piece in Wales.

'The majority of our projects have had cost increases all the way through. There is a cumulative delay, I think, of over 14 project years on the projects that we've got.'

Slippage in Control Period 4 has resulted in commissioning of Cardiff Central resignalling being deferred to the Christmas 2016 holiday. The new Platform 8 at Cardiff Central, which will relieve the double-track Valley Lines bottleneck through the city centre, cannot be brought into use before then because the new track and signalling for the platform are integral to the resignalling.

The Welsh Government already has experience of bypassing Network Rail for enhancement work. It appointed its own contractor to construct Pye Corner station, which opened on the Ebbw Vale branch in 2014. The Office of Rail and Road has asked for details of the station's construction for use in benchmarking Network Rail.

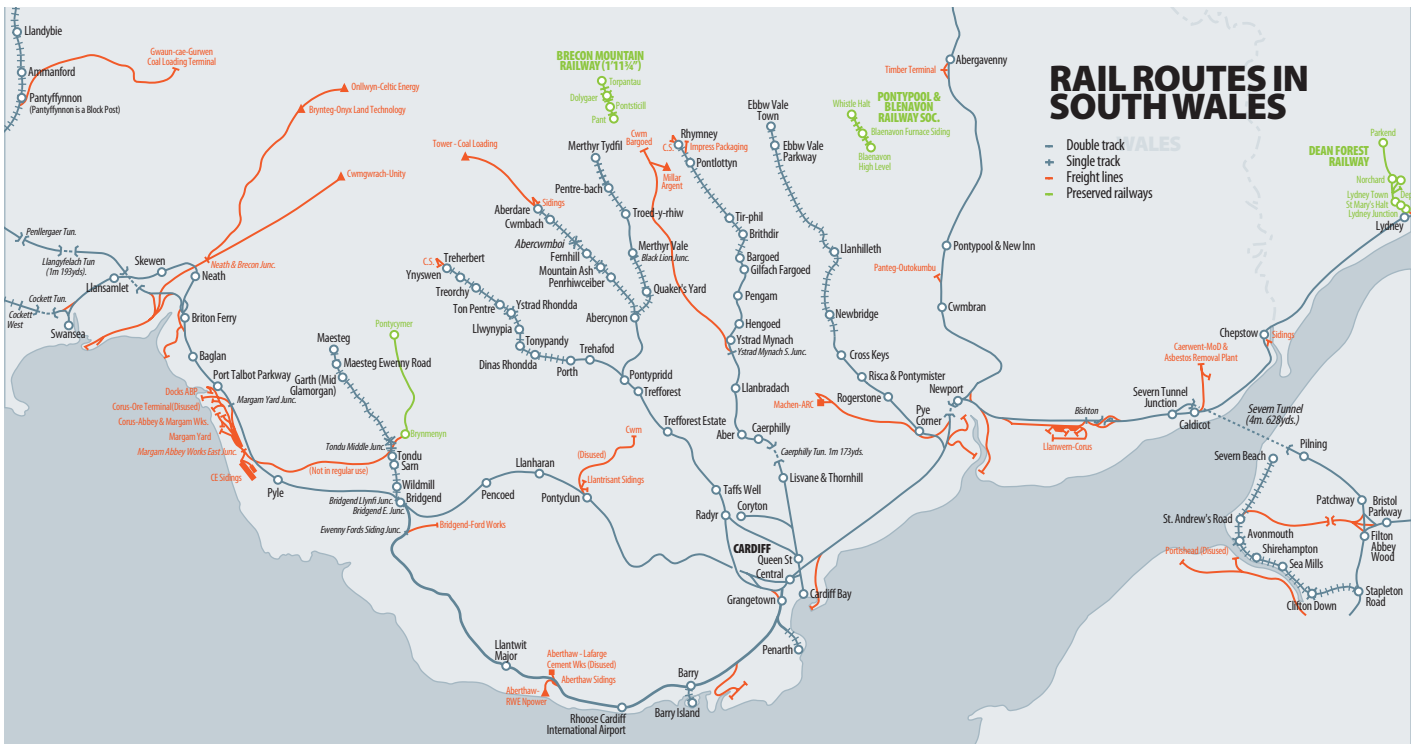
FREIGHT CONCERNS

Robin Smith, the Rail Freight Group's Welsh representative, told *Modern Railways* that balkanisation of Britain's rail network could be a problem for freight operators. He said that core sections of the Valley Lines continued to handle coal trains from loading terminals in the Valleys and to Aberthaw power station on the Vale of Glamorgan line, which was also used for other freight movements.

'That existing capacity for freight trains must be protected in any restructuring that's envisaged. With the [UK] Government having turned its face against coal-fired power stations post-2025, we need the ability to move coal until then. It cuts across the Welsh Government's timescales.'

The boundaries of the proposed Valley Lines concession have not been defined. For ticketing purposes, the Valley Lines currently encompass the Vale of Glamorgan, Maesteg and Ebbw Vale lines, including some sections of track and stations on the South Wales main line. When asked to clarify the boundaries, a Welsh Government spokesman said: 'The concession, or asset agreement, is currently the subject of ongoing discussions with Network Rail.' *Rhodri Clark*

Waiting on resignalling: the new Valley Lines platform at Cardiff Central was completed last year but will remain out of use until early 2017. The banner on the fence sets out project milestones for the benefit of passengers waiting on Platform 7. Rhodri Clark



THE RAILWAY MAN

ALEX HYNES, Managing Director of Northern Rail, and **STEPHEN HEAD**, Chair of the Young Rail Professionals, gave their thoughts on career progression at a meeting of the Railway Study Association in London. **JOHN GLOVER** was there

Big chair to fill: Northern MD Alex Hynes in Alice in Wonderland prop at Liverpool Lime Street on 22 May 2015. The chair was aimed at bringing attention to the extra seats available on the Class 319 Northern Electric service. Tony Miles

Alex Hynes has been Managing Director of Northern Rail since August 2013 and has now been confirmed as the MD-designate of Arriva Rail North from 1 April 2016. The new company has been awarded the contract to deliver the largest transformation of rail services in the North of England for a generation.

He has been in and around railways for the last 18 years. Prior to Northern, he spent eight years at the Go-Ahead Group in three different roles. Before this he had two years at the Office of Rail Regulation (ORR); he also spent five years with the Halcrow Group.

ADVICE FROM ALEX HYNES FOR YOUNGER PEOPLE

If I was still in my twenties rather than my late thirties, what advice would I give myself?

The first is to play hard and to work hard, while you have the opportunity. Extra responsibilities inside and outside work will grow as you get older; your diary only ever gets fuller.

When you stop learning in a job and it starts to feel comfortable, that is the time to leave. You need to stay on the learning trajectory, two years in your twenties, five years in your thirties.

You need to have a plan for what you intend to do. That way, you can be proactive and not reactive. You wouldn't try to run a railway without a plan, so why would you leave your own career to chance?

In formulating a plan, work out what it is that makes you tick.

Don't forget, people want you. On Northern, 38% of staff are over 50 years of age, which is a potential time bomb. The industry needs young people with the appropriate skills.

A SPONSOR

Get yourself a senior sponsor, someone who knows you and your talents. I worked hard for my sponsor and made him look good. He rewarded me with the biggest career move of my life, appointment as commercial director at London Midland at the age of 30. Having never

At the sharp end: inside the ticket office at Manchester Victoria on 24 February 2015. Paul Bigland

AGEMENT LADDER

worked in a train operating company (TOC) before, I went overnight from having no staff to 800. The next two years were a bit of a blur.

Network well and often. Going to seminars and meeting people is all part of learning. Talk is work.

Rewards will come, though not perhaps immediately. Some young people, when asked to do some more work, react by putting their hands out. That won't wash. You will need to accept the responsibility first; the rewards will come later. Trust me.

Remember to be nice to people, and not horrible. You may find yourself working for them one day. This is a small industry and people don't forget.

DELEGATION

Learn to delegate; this is the most important skill you need to acquire. You will also have to develop a successor, and a team. If something isn't right, send it back!

Who wants to work for a micro-managing boss? No-one. Delegation will enable you to go home on time.

You also need good all round knowledge as well as the technical side. I spend one day a week out and about on the Northern network, seeing as much of it as I can.

Managers need an appreciation of front line work. In 2014, every single manager at Northern was persuaded to spend five days on the front line and the result was a fundamental change in the culture. This was valuable interaction with the people doing the real jobs.

Green machine: the SNC-Lavalin entry in the IMechE's 2013 Railway Challenge. Ian Walmsley

LEADERSHIP

We live in an age of leadership. Why? Because people do not do as they are told any more. We have to lead, engage and inspire them. Management is no longer sufficient; we live in a fast-paced, ever changing world. The expectations of both customers and staff are rising and we need to meet that. I have developed my own model of leadership based around the four 'I's.

These are Involving, Improving, Inspiring and Innovating. Briefly:

- Involving: keeping in contact with customers, stakeholders, suppliers and staff;
- Improving: getting better every day, finding out how to do it better;
- Inspiring: appealing to everyone's better nature, getting and keeping them on your side;
- Innovating: how can we do things differently, to deliver a better service at lower cost? Don't fall for the argument that it will need more resources, more people.

THE YOUNG PROFESSIONAL'S VIEW, FROM STEPHEN HEAD

As a graduate engineer from the University of Bristol, I joined Interfleet Technology's (now SNC Lavalin) brilliant graduate scheme, which exposed me to a large variety of work, including railway operations. Credit must be given to others and their patience in answering endless questions when I was trying to understand how it all works: that applied to signalling in particular.

I had a mentor, who provided help and guidance, but also offered me the opportunity to work on a big new project: remote condition monitoring on East Coast. This was a real opportunity to get involved.

I was thrown in the deep end with the IMechE's railway challenge: design, build and commission a locomotive. Albeit only 10¼in gauge, this had to be designed in ten weeks and built in five. It needed others to help and had a budget of around £15,000. This was an incredible experience, which included commissioning the result. I am pleased to report that my group won the competition.

Here I got great help from Interfleet Technology, including someone to coach me through the project. He always had time and was there for me, providing a guiding hand when I needed it.

I moved down to London to join the Railway Control Systems (RCS) team, where my manager understood what I want to achieve and then helped me to achieve it. This led to work on the European Train Control System for Freight programme, latterly as Project Manager. Again, I benefited from the unwavering support of my mentor.

CAREER PROGRESSION

A move to Caledonian Sleepers didn't fit in with RCS or freight, but it was the right move for me. I am now Fleet Engineering Manager there, which is all about rolling stock and nothing to do with signalling.

Through my career thus far, I have benefited hugely from people making opportunities available for me, from on-the-job coaching and people believing in me.

Picking up on Alex Hynes' point about networking, the Young Rail Professionals consists of young people helping each other out and sharing ideas. I have held a committee position since 2013 and was chair for 2015-16.

Best Impression: a Brighton & Hove Volvo hybrid double-decker, in a livery devised by Ray Stenning's firm, at Hove station. Alan Millar

RAIL-BUS INTEGRATION

RAY STENNING outlined to the Railway Study Association the weaknesses in rail-bus integration and suggested how matters might be improved

'Best Impressions' is a company specialising in branding, livery, interior design, publicity, advertising and marketing. It was founded by Ray Stenning over 30 years ago, initially with the bus industry in mind, but rail soon came knocking at Best Impressions' door with the privatisation of the industry.

First for a Best Impressions livery was Midland Mainline, to be followed by South West Trains and East Midland Trains; more recently it was the turn of Northern Electrics and Virgin Trains East Coast. But there is more to it than just liveries; Best Impressions has also been responsible for London Midland's interiors, signage, maps and advertising campaigns.

'It is all about "creating desire", said Mr Stenning. 'You need to use all the means you can to encourage people to purchase your product.'

ONWARD TRAVEL

For the vast majority of people, railway stations are neither the start nor the finish of the total journey they are making; the more difficult part is likely to be how to reach one's final destination from a station in what may be an unfamiliar town.

For many, the taxi is the mode of choice. They have confidence in the product; people trust cars.

The opposite tends to be true with buses; many erroneously believe that buses are for poor, old and smelly people. Why would I want to catch a bus?

How to do it: bus information outside Ealing Broadway station.

BUS PRESENTATION

Not all bus companies excel in the presentation of their product; interiors can be bleak.

Inter-urban buses tended to be rather better, and Mr Stenning instanced vehicles used by Trentbarton, Arriva for its Sapphire services and Transdev's 36, the latter operating in the Harrogate area. These have positively luxurious seating.

In a railway context, the Leyland National bus of the 1970s formed the basis of the Class 140-144 designs of Pacer units for British Rail. They were, and are, not loved. But while they are still in use on the railway, they have long disappeared from the roads.

BUS STOPS

How good is the signage to the bus stop, and how easy are they to find? There may be a bus station close by, but that is relatively unusual. Mr Stenning feels more can and should be done. 'The information at the bus stop needs to be tip top in quality, and their location needs to be obvious or well signed if it isn't.' How do we promote or advertise buses? 'I'm on the bus' was part of a high-profile, successful promotional campaign featuring large images of people on the side of the vehicles in Brighton with genuine testimonials.

'What has to be got over is that buses are a normal means of travel for ordinary people' he said.

The bus can also be a quick way of getting between places. 'Don't waste time' was the theme of advertising an express coach service between Nottingham and Derby, reminding

people that time in transit on this comfortable service with Wi-Fi can be time well spent.

TOC INTEREST

But how interested are train operating company managements in the bus services which complement their own rail services? Are they seen as providing a useful and valuable service that benefits their own passengers? Or are they felt to be insignificant and unimportant in a railway sense?

'If we are serious about getting people to use the bus for onward travel, then we have got to really believe in it' said Mr Stenning. That means people need to be informed clearly about the options available and their cost, and to do it with a style that inspires confidence in the bus offerings. The PlusBus ticketing facility is a move in the right direction, but it never gives the impression of being more than half-hearted.

A brand is more than a livery plus a logo. It is the whole. Similarly, marketing is not just sales.

'I don't know where the buses go' is a familiar complaint. Good, well presented displays with some form of mapping help enormously, but too often the reality sees a tatty noticeboard with a few timetables stuck on it, seemingly at random. The service needs to be advertised properly and sold.

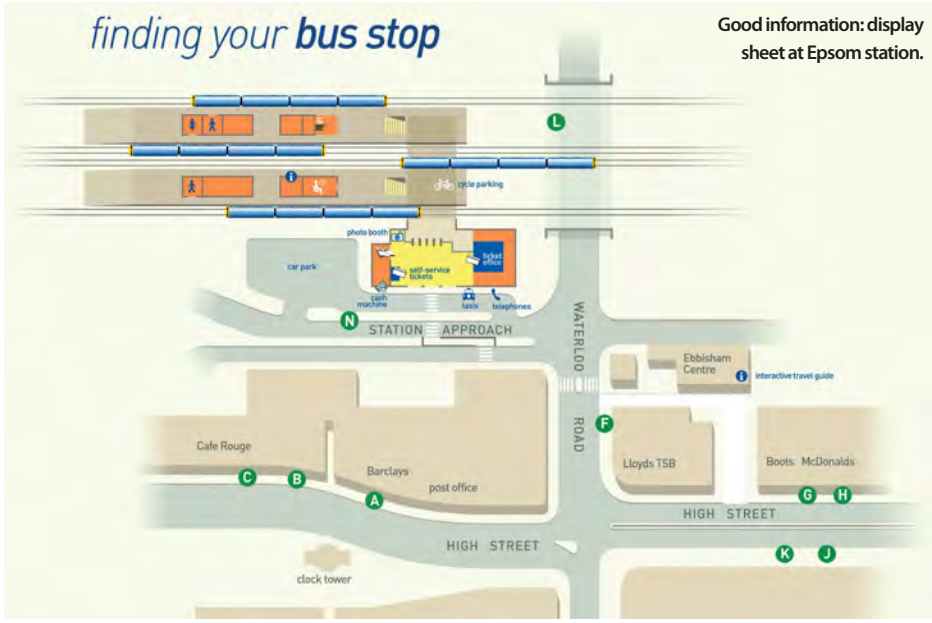
PHYSICAL ARRANGEMENTS

Taxis look like taxis and are nearly always easily found, but what about buses? Here the provision may or may not extend to a bus stop on a pole, but may be no more than a marking on the road which is easily obscured by parked vehicles. Or out of sight down a hill with no wayfinding, as at Pulborough.

Similarly, at Truro, the bus stop is down the road. Buses use the station forecourt at Newark Northgate, but where are they? When located, how is one supposed to get to them, safely, given the kerbs to be negotiated and the lack of pavements?

At Par station there is one bus stop, which carries a timetable for buses in both directions. Does that mean there is another stop somewhere, and if so buses in which direction call at this one?

'We aren't serious enough about it.' Even at the revamped Birmingham New Street, bus information is still only available from a glass fronted office, with stickers on the window.



Good information: display sheet at Epsom station.

Whose responsibility is all this, or whose responsibility should it be? What might rail franchises usefully say about the subject?

BETTER PRACTICE

There are examples of good practice. York for instance has comprehensive help notices, while at Ealing Broadway a notice next to the bus stopping area gives where and when information for each bus route. This includes a map of the Broadway.

As buses approach Reading station, a screen on board the vehicle shows various onward travel options by rail that include departure information for the next half dozen trains or so.

East Midlands Trains and Trentbarton buses provide onward travel with through tickets to Loughborough University. Similarly, there are through tickets on Skylink buses from Derby station to East Midlands Airport virtual station.

At key stations in Surrey such as Epsom and Redhill, the county council did provide a stylish list of bus departures with a map telling you how to get to the bus stops, all easy to understand information.

But county councils tend to run out of money, so progress may only be temporary. Changes in budgetary provision, the involvement of new individuals or revised management priorities can all lead to a lack of permanency in such arrangements.

Perhaps the deregulated bus industry (outside London) needs to try harder. As it is, local authorities often do some bus company work for them, including providing timetables for the public.

ONGOING WORK

There is a need to inform the public on how to use the bus, to advertise and promote the services using every trick in the book. The more people that use the bus, the more things will really get better.

The effort must be kept up. What is provided must be revisited regularly, to make sure that the displays are still correct and that any damage is repaired. It is a mistake to just leave it. *John Glover*

Uninviting approach: bus outside Newark station.

RESHAPING OF THE

South West Trains operations director **MARK STEWARD** reviews the company's deep alliance with Network Rail, describing its successes, some of the issues it encountered and some possible learning points

29 April 2012 was a historic day for the railway into London Waterloo. For commuters travelling to work it was just another day. But the way the railway was operated changed completely as South West Trains and Network Rail joined together to form the Wessex alliance. Rather than just an informal arrangement as seen elsewhere, this was a deep alliance, with finances and staffing merged to form what was effectively one organisation, although the two companies remained as separate legal entities. From that day, staff didn't work for SWT or NR – they worked for the alliance.

The alliance was designed to be a 'controlled experiment', a trial to see whether such an arrangement could be replicated elsewhere. It was headed by SWT's Tim Shoveller as alliance managing director, overseeing an alliance executive. Above this sat a governance board of senior people from both organisations, to whom any unresolved issues could be escalated, although in practice this kind of intervention was never required. Network Rail chief executive Sir David Higgins encouraged the alliance to 'challenge the norm'. Much of the drive to form the alliance came from the individuals involved, who truly bought into the concept of working together to improve performance for passengers.

PAIN SHARE GAIN SHARE

The financial situation was unique. SWT and NR had a 50:50 pain share gain share arrangement, which meant that both gains and losses would be shared equally between the two bodies, and this had profound implications. Ordinarily, SWT would retain a proportion of any Schedule 8 compensation payment it received from Network Rail as part of its income, with the remainder representing a net overall loss to the industry. But under the alliance regime, this lost amount would be split equally between SWT and NR, so both companies suffered financially from adverse performance. This provided a true financial imperative to drive improvements, root out any delay (no matter who caused it) and ultimately provide a better service for passengers.

This drove many of the joint initiatives introduced by the alliance. SWT as the operator had a real vested interest in making sure the track and infrastructure was fit for purpose, and this manifested itself in a more rounded approach to maintenance of the railway. For example, where ordinarily a train operator might have refused NR a possession to carry out routine maintenance, SWT understood the importance of giving proper access time, in the knowledge that this would reduce the likelihood of delays.

Seven additional staff were brought into the access planning team, helping to eliminate the prevailing situation where possessions would be altered at short notice, leaving NR with scant chance of effectively planning maintenance. By allowing proper access, costs were reduced, there was less likely to be a need

Capacity buster: the presence of the alliance helped drive through the plan to increase capacity into Waterloo – this included the arrival of 24 two-car Class 456 EMUs which will be used to lengthen trains on suburban routes. On 20 May 2015 unit No 456014 leads a classmate and a four-car Class 455 away from Wimbledon – operation of 10-car trains on this line will not be possible until platforms at Waterloo have been lengthened in summer 2017. Paul Bigland

WESSEX ALLIANCE

for a further possession to complete the work and reliability of the infrastructure improved. This last point is crucial – planned disruption, properly communicated in advance, is always preferable to unplanned, short notice incidents which result from failure of the infrastructure.

OPERATIONS

From the operational side, there was a big increase in full crew working (keeping drivers and guards together for their entire shift), which helps avoid delays and makes it easier to recover the service when delays do occur. Ordinarily, an operator would plan the most efficient use of train crew for its own purposes, and with drivers and guards working under different terms and conditions this would not mean an emphasis on full crew working. But with NR also having a vested interest a business case could be made, and the number of guards within the alliance was doubled, increasing full crew working from 37% to 83%, deemed to be the amount which yielded the greatest benefit.

Other operational changes also saw staffing increases. The number of personnel at the integrated control centre at Waterloo went up, again in an attempt to improve incident recovery. Vacancies were filled for mobile operations managers, a decision to withdraw shift signalling managers was reversed and additional electrical control room operators were drafted in – the incumbent staff had to work overtime simply to keep the railway running, not a healthy situation in a safety critical role. The view was that short term investments such as these would yield long term savings.

The two organisations also examined where they could assist each other. An agreement with trade unions saw SWT driver managers pressed into action and driving to help support service recovery. SWT drivers also began driving NR's multi-purpose vehicles (MPVs) – they know the routes and the appropriate braking points, and this presented a cheaper solution than hiring in drivers as NR would do, while also offering flexibility over when the MPVs could be used. Route conducting was introduced for operation of the high output ballast train, whereby a staff member from SWT could assist a driver who did not have the appropriate route knowledge, avoiding the cancellation of a working and ensuring this important maintenance could run to schedule.

IMPACT

The benefits of these initiatives did not manifest themselves immediately, at least as far as statistics were concerned. Many within the industry saw public performance measure (PPM) falling and dismissed the alliance as a failure, yet without the joint measures introduced the situation would undoubtedly have been worse. The truth is that there is a lag effect here, and in 2014/15 PPM began to pick up (as shown in the graph), and the benefits of the alliance could then be quantified.

RESHAPING

The situation changed in 2015. On 12 June, it was announced that the alliance would be 'reshaped'. The post of NR Route managing director was reintroduced, with changes to the management structure and commercial arrangements. The aim was to retain 'the best and most successful parts of the alliance'. So why the change – what elements of the alliance weren't working as had been hoped?

There were a number of learning points. As one example, Network Rail's Infrastructure Projects (IP) division was not part of the alliance structure, because it was simply too big. This meant that while NR staff at Route level bought into the pain share gain share arrangement, IP didn't, resulting in significant performance and hence financial risks to the alliance from a third party. The same was true of NR's National Supply Chain, which had to juggle competing demands across the entire network, but this also had a significant effect on the alliance's numbers and its possessions strategy.

Another issue was a lack of decision-making autonomy at Route level. This meant that some decisions made by the alliance executive and agreed by staff from the NR Wessex Route were not always followed through at senior levels within Network Rail. From the outset, the alliance had been encouraged to challenge the norm, but some of the learning from within the alliance was not accepted or fully understood, perhaps because of the complicated arrangements and hence communications. A major frustration was that some nationwide Network Rail policies would be dictated to Route level, even though the alliance could see that from a whole railway system approach these decisions were hurting the alliance – but there was no choice but to accept these instructions. Other matters, such as the pay dispute at NR during 2015, were also outside the alliance's control but would affect its ability to run the railway.

NR itself had changed as well. As it had become a public sector organisation following reclassification on 1 September 2014, there were major financial implications when it came to use of public money. This impacted the alliance and the pain share gain share financial model which had been central to the arrangement.

From my own perspective, I found that a disproportionate amount of my time – probably something like 80% – was spent on Network Rail business. This was a concern for SWT's owner Stagecoach – were its interests being balanced correctly, and was there a danger of the business suffering as a result?

At the time of the alliance's formation, Stagecoach was chaired by Sir Brian Souter, while from the NR side Sir David Higgins as chief executive helped drive the initiative. The changes in personnel that have since taken place may have had an unintended effect as well.

LEGACY

So what did the reshaping actually mean? As is clear, the pain share gain share agreement could not be maintained, and was discontinued. But while some of the contractual elements of the deep alliance ended, there is a clear operational legacy, with one station management team at Waterloo, one head of control, one head of performance and one head of planning. The integrated control centre at Waterloo has also been retained.

Some of the commercial agreements outlined earlier are also maintained, such as full crew working, SWT staff driving MPVs and route conducting. These principles are to be extended, and Network Rail's new mobile maintenance train (MMT) will be driven by SWT drivers. The principles with regards to planning access for possessions are also being continued.

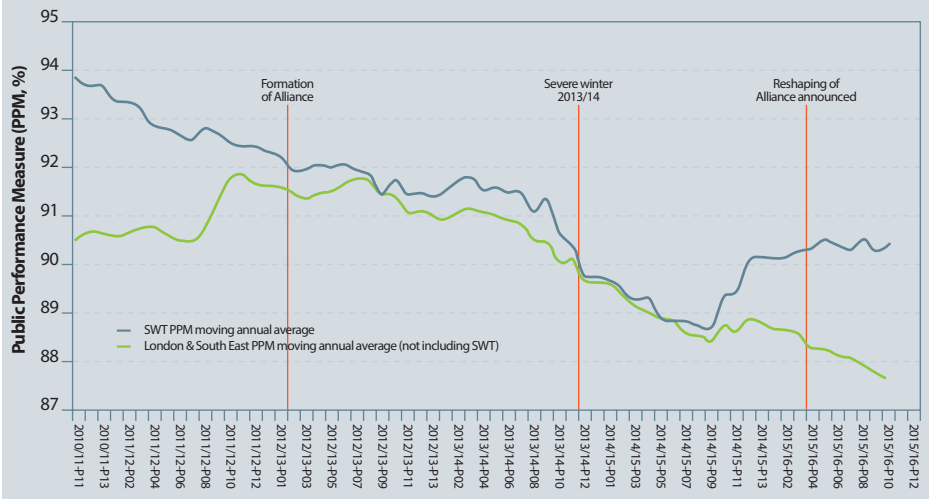
One of the alliance's main achievements was driving through the plan to increase capacity at Waterloo, by procuring extra rolling stock and amending the infrastructure to create a 10-car suburban railway. Securing approval for this to be completed during the current Control Period would have likely proved impossible without the alliance, and these plans will still go ahead.

While the deep alliance may no longer be in existence, a strong ethic of teamwork, close working and collaboration continues, with a focus on the most effective areas and on doing the right thing for customers. mr

This article is based on a presentation given to the Institution of Railway Operators. The views expressed here are personal and do not necessarily represent those of South West Trains.

SOUTH WEST TRAINS PERFORMANCE

BEFORE, DURING AND AFTER THE ALLIANCE



SCOTS GET SMART

Two out of three Scottish rail journeys will be by smartcard in five years' time, says Holyrood

Wave and pay: Scottish Transport Minister Derek Mackay (left) and ScotRail Alliance Commercial Director Cathy Craig launch the smartcard strategy at Glasgow Central on 1 March. Courtesy ScotRail

Scottish Transport Minister Derek Mackay MSP joined the ScotRail Alliance Commercial Director Cathy Craig at Glasgow Central station on Tuesday 1 March to unveil plans for expanding smartcard coverage in Scotland.

The ambition is to have 65% of ScotRail journeys made with smartcards by April 2021.

When Abellio took over the franchise on 1 April last year, smartcards were available only for season ticket holders and limited to just four routes: Edinburgh-Glasgow via Falkirk High; Glasgow to Ayr and Largs; and both Edinburgh and Glasgow to Dunblane and Alloa via Stirling. The Edinburgh-Tweedbank line was added from its opening in September 2015.

Abellio's franchise commitment is for 60% of ScotRail journeys to be made using smartcards by 1 April 2019, and the first step towards meeting this challenging target will be to extend smartcard availability to season ticket holders on the rest of the ScotRail network by the end of this summer – dubbed 'the summer of Smart' in ScotRail's publicity. This will be followed by making the majority of other ticket types available to smartcard users by 2017. By 2019 all ScotRail tickets, including some multi-modal products, will be included.

MULTI-MODAL AIM

The Scottish Government's longer-term aim, reiterated by the Minister on 1 March, is for passengers on all forms of public transport to be able to pay for their journeys using some form of smart ticketing, and a technical presentation by Transport Scotland the previous week made it clear that the ScotRail initiative was just part of a wider programme, linked by the same underlying technology and reinforced by franchise commitments which will also extend

to Scottish island ferry routes and already include concessionary travel on some internal air services.

In addition, the Scottish Concessionary Travel Scheme, which since its inception in 2006 has been based on an ITSO-standard entitlement card, has created a pool of 1.3 million concessionary smartcard holders, together with 600,000 young people in Scotland who have a similarly-enabled card. This is paralleled by a bus fleet in Scotland which since 2010 has been equipped with ITSO card readers on all 6,000 buses, and a back office infrastructure for collating journey data and allocating revenue.

The contract for the Scottish concession scheme back office was retendered in 2011, and the new provider, ACT, is implementing the latest ITSO 2.1.4 standard. In parallel, all *saltire*cards, the national entitlement cards in Scotland, are being reissued to the higher capability CMD2 (customer medium definition) protocol.

BRAMBLE SEED

The ScotRail smartcard uses the same standards, but as part of its franchise bid Abellio opted to use the supplier that had equipped the Glasgow Subway for smartcard ticketing, Nevis Technology. Nevis is a partnership between SPT, the Subway's operator, and Ecebs, the East Kilbride-based smartcard software firm, and in the two and a half years since the Subway was re-equipped the proportion of passengers using the system's multi-journey Bramble smartcard has grown to just over 45%.

The Glasgow Subway is of course a completely gated system, and is a single zone for charging purposes. But while ScotRail's main terminals and larger intermediate stations already have gatelines, the network also includes a high proportion of ungated and unstaffed stations, even on suburban routes. In addition, the fares manual has to reflect not only the extensive permutation of journey end combinations but also the differing commercial demand characteristics of a system that encompasses rural lifeline services, long distance inter-city routes, and the high-density inter-urban and suburban services of the central belt.

This complexity is why the roll-out of smartcard ticket availability is being phased: commercial director Cathy Craig emphasised to *Modern Railways* that each stage will be carefully monitored. Lessons learned from customer and staff feedback will be built into the programme.

The technology will allow customers to purchase tickets online, and validators will be installed at unstaffed stations which will enable passengers to update their smartcards as well as to tap in and out of the system. On-train revenue staff will be equipped with hand-held readers to enable them to interrogate smartcards during the course of a journey, but issues such as the integration of the seat reservation system into the smartcard environment are for future resolution.

NO DISCOUNTS

ScotRail's smart-enabled photocards are issued without charge, and can be applied for online or via a dedicated phone line. Special offers will be available to encourage passenger take-up of these cards, but there is no intention of following SPT's precedent of a discounted fares structure for smartcard users. Instead, the strategy appears to be based on the attraction of the flexibility and increasing convenience that smartcards will offer to users as availability is extended across more routes and modes. Car parking and cycle hire are already seen as potential add-ons for users.

Transport Scotland's Commercial Director Bill Reeve, who is overseeing the public transport smartcard initiative in Scotland, is confident that, with what he describes as 'big building blocks' already in place, the Ministerial ambition for seamless multi-modal smartcard travel across Scotland is indeed deliverable. Key to this are the ITSO standard's interoperability and open architecture – the fact that bus, rail, the Glasgow Subway, and shortly the franchised ferry services will be using the same technology means that different operators' ticket products can be loaded on a single smartcard.

Discussions are well underway with the major bus operators, and it is hoped that these will lead to rail passengers being able to include bus travel in Scotland's four largest cities on a ScotRail smartcard during 2017. An e-purse capability will follow soon after. This cross-availability should also work in the other direction, for example by allowing an SPT Bramble card to carry a ScotRail product. But Transport Scotland also encourages a future where multi-modal branding becomes part of a Scottish smartcard which emphasises the integrated nature of the total system – indeed ScotRail and a number of bus operators already include the *saltire*card brand on their smartcards.

DIFFERENT BACK OFFICES

Bill Reeve is unfazed by the fact that different back office providers share in the processing of Scottish smartcard data, pointing to the fact that two of the bus operators already use their own back office to process concessionary fare transactions, but the relevant data are transferred automatically to the Transport Scotland system.

He also recognises that the technology is evolving rapidly, and that contactless bank cards (EMV cards) and smartphones are likely to form part of the Scottish smart ticketing scene in the near future, especially as applications which can download ticket products and add stored value directly to a smartphone become more widely available.

When asked why ScotRail has not emulated Transport for London and already built contactless EMV payment cards into its system, Mr Reeve makes the basic points that the relatively low transaction limit that currently applies to this form of payment is incompatible with the fare levels for longer distance rail journeys, and that ITSO ticket devices are already in place across rail and bus networks – EMV capability is just beginning to be installed. Once issues such as this are resolved, he is confident that the ITSO standard provides the future-proofing which will allow different media easily to be slotted in alongside travel cards as part of the array of methods which passengers will use to access smart-enabled public transport in Scotland.

Bowling along: a Class 318 runs alongside the Clyde while working from Balloch to Cumbernauld on 14 May 2015. Jonathan McGurk

Commuter crowds: passengers join a train at Glasgow Central Low Level on 27 July 2010. Regular travellers will be a core market for smartcards. Tony Miles

Keith Fender

EUROPE

BOMBARDIER PLANS CUTS IN TRANSPORTATION DIVISION

Bombardier has announced a programme of job reductions across its rail-based Transportation business. The move follows group results for 2015 which showed that turnover fell by nearly 10% (US$1.94 billion) to $18.17 billion; of this the Transportation division contributed $8.281 billion (down 14% on 2014). Overall group earnings before interest and tax (EBIT) profit of $554 million (before special items) were almost entirely due to the Transportation business, which contributed $465 million, down 12% on the previous year; the aviation business contributed little profit but required restructuring and debt write-off costs totalling $5.6 billion! This gave a net EBIT-based loss of $4.838 billion for the group.

Bombardier says that in some cases it will be recruiting new rail manufacturing jobs in areas where the company is traditionally not strongly represented. However, the reduced current forward order book, worth $30.4 billion in late 2015 (compared with $32.5 billion the year before – down 6.4%), is leading to job cuts across the Transportation business, with 7,000 worldwide across both the rail and aviation businesses (2,830 in Canada). Germany, where the headquarters of Bombardier Transportation is located, will see around 1,430 of the current 10,500 jobs cut, the majority at rolling stock and tram plants in Goerlitz, Bautzen and Hennigsdorf. In the UK, on top of the aviation jobs being cut in Belfast, 270 jobs are to go at the company's Derby site – as in Germany the majority of the cuts will be to contract rather than long term staff.

Bombardier spent much of 2015 looking for new sources of investment in both its rail and aviation businesses; as a result, it has become increasingly dependent on funds from the Canadian government or state-owned Canadian firms. In September media reports suggested that an offer from a Chinese government-owned firm for 80-100% of Bombardier Transportation, valuing the company at up to $8 billion, was declined on the basis that a majority shareholding was not for sale. Within two months the $1.5 billion sale of a 30% stake to Quebec state-owned investment firm Caisse de dépôt et placement du Québec was announced, and this was finalised on 11 February. In addition, the Quebec Provincial Government has recently agreed a $1 billion investment in the C-series airliner business, and as part of this $3.2 billion of previous expenditure is being written off. A further injection of $1 billion in the aviation business by the Canadian Federal Government is also under discussion.

ALSTOM INVESTS IN RAIL BUSINESS

In November 2015 Alstom completed the sale of most of its energy business to General Electric (GE) in the USA, raising €12.4 billion. Much of this will be used to repay older debt and to restructure the balance sheet of the company now it is focusing on the rail transport market, although shareholders will receive around €3.2 billion via a share buyback arrangement.

Alstom now has funds to expand its business and a variety of deals have been announced, starting with the €700 million purchase of GE's signalling business following the energy sale. Before the GE deal was finalised, Alstom had announced the purchase of rail maintenance and refurbishment firm Motala Train in Sweden, plus Balfour Beatty's 50% share in the Signalling Solutions joint venture in the UK.

At the end of December Alstom announced it had bought a further 8% stake in Transmashholding from Russian Railways, meaning Alstom now owns 33% of Russia's biggest rail engineering firm. In February it was announced that Alstom had bought a further 25% stake in the Kazakh EKZ locomotive-building joint venture from Kazakhstan Railways (KTZ), making Alstom the majority shareholder alongside KTZ (with 25%) and Transmashholding (part-owned by Alstom, with 25%). Kazakh EKZ is building

Part of the Bombardier order book: the first of 60 new Class 490 EMUs being built for use by DB Regio on the Hamburg S-Bahn network takes shape at Bombardier's biggest factory at Hennigsdorf, just north of Berlin, on 11 December 2015. Options for up to 86 more of these three-car units have been agreed. Keith Fender

Set for replacement: SNCF Sybic loco No 26031 is seen at Clermont Ferrand on 16 March 2015 with a Corail Intercités service for Paris. Keith Fender

Prima-derived electric locos for KTZ, and in 2015 won an order in conjunction with Alstom to build 50 locomotives for Azerbaijan Railways. Kazakh EKZ plans to manufacture transformers for electric locos in Astana, Kazakhstan and will also export some of these back to Alstom for use in Europe.

Outside Europe and the former Soviet Union, Alstom has announced it is buying a 51% share in Commuter Transport and Locomotive Engineering (CTLE) in South Africa, and is also establishing loco production facilities in India as part of a contract to supply and maintain 800 double-section Prima electric locomotives. In January the company signed an agreement with Iranian Railways to assist with modernisation of the country's network now that many international economic sanctions restricting trade have been lifted.

FRANCE

FUNDING CUT FOR OVERNIGHT TRAINS

In mid-February the French Government announced plans to remove all but two of the overnight train services operated by national operator SNCF. The services ran under the Lunéa brand as part of the *Trains d'Équilibre du Territoire* (TET) contract for non high speed long distance services agreed with the Government in 2010. The Government has given SNCF notice that it will cease funding for services on all routes from 1 July, with the exception of Paris – Briançon and Paris – Rodez / Latour de Carol.

Figures presented by the French Transport ministry show that usage of overnight trains has fallen by 25% since 2011 and that they represent 25% of the €400 million losses from the current TET operation whilst carrying 3% of the passengers, each of whom benefits from a subsidy of €100 per ticket.

The services to be withdrawn are:

- Paris Austerlitz – Cerbère;
- Paris Austerlitz – Hendaye (Irun) / Tarbes;
- Paris Austerlitz – St Gervais / Bourg St Maurice;
- Paris Austerlitz – Nice; and
- Luxembourg / Strasbourg – Nice / Port-Bou.

Decisions taken around a decade ago by SNCF led to the 2007 removal of all sleeping cars, with Lunéa services just offering lower quality couchette services plus seated accommodation. This means that all the potentially higher margin (and much higher ticket price) business travellers who might use overnight trains elsewhere in Western Europe (such as those operated by Austrian and Swiss Railways) have had no choice but to switch to hotels and air travel or TGV journeys. The French Government says that, apart from the two routes to be retained, alternatives exist (or will soon as new LGV routes open – although some, such as those serving Hendaye (Irun) / Tarbes via Bordeaux, are not due to open until mid-2017) so passengers can use daytime TGVs (and presumably overnight hotels).

The Government also requested that a tender for potential future operation of the overnight services by other providers be undertaken, with a call for expressions of interest to be launched in conjunction with the regional governments in areas served by the routes which will be withdrawn. The results of this tender will be announced on 1 July. The French Government will not offer new operators any subsidy for these services, and it seems unlikely that any regional government will either.

The timing for the removal of the SNCF-operated night services coinciding with the peak holiday season seems to mitigate against any new operator being able to start replacement services (assuming any are interested) before 2017.

Possible operators include Transdev, which provides international sleeper services between Paris and Milan/Venice under the Thello brand in conjunction with Trenitalia, and even Russian Railways, which operates international services linking Moscow with both Paris and Nice and has been suggested as a possible new operator on the Paris to Nice route, although whether this is a serious proposition remains unclear.

NEW DAYTIME ROLLING STOCK

The French Government has also announced more details about its programme of investment in rolling stock for the future operation of daytime TET services, currently operated under the Corail Intercités brand, with expenditure of up to €1.5 billion planned between 2017 and 2025.

New higher speed (200km/h) electric trains will be introduced from 2020 onwards on the Paris-Limoges-Toulouse, Paris-Clermont Ferrand and Bordeaux-Toulouse-Marseille services, which are currently operated with Corail coaches and electric locomotives. SNCF will launch a tender for these later this year after undertaking a three-month consultation with stakeholders and communities on the functionality of these new trains 'to take into account the expectations of travellers'.

For services on the Paris-Caen-Cherbourg route, additional trains will be bought using existing contracts between SNCF and Bombardier in conjunction with the Normandy region. Exactly which type of train is envisaged is unclear.

34 new Coradia Liner trains have previously been ordered from Alstom in a €510 million contract, and these bi-mode trains will in part replace diesel-operated TET services from Paris Est to Troyes/Belfort in the next 12 months. Another contract for a further 30 Coradia Liner trains will be placed with Alstom for delivery from 2018 once consultations with regional governments have been concluded.

Discussions between the French Government and the regions on optimising existing TET services with regionally-funded TER services are continuing, led by Prefect Mr François Philizot. These were prompted by the Duron report, presented in July 2015, which suggested the removal of some parts of the TET operation (p83, July 2015 issue), with a target date of 1 July 2016 for conclusions to be agreed. The French Transport

Keith Fender

ministry says usage of TET services has declined by 20% since 2011, and they are expected to require a subsidy of around €400 million in 2016.

VIIA BRITANICA DELAYED

Plans to introduce VIIA Britanica Autoroute ferroviaire services carrying lorry swap bodies on rail wagons between Calais and Le Bolou, south of Perpignan close to the Spanish border, have been postponed. The service was due to start on 12 January but has been delayed by continuing problems with migrants trespassing on railways around the port of Calais. The port intends to improve security and screening of lorries in the coming weeks, but the service will not begin until approval is granted from French Government officials.

MORE REGIO2N EMUs FOR BRITTANY

SNCF has ordered four more eight-car Regio2N part double deck EMUs from Bombardier on behalf of the Brittany Region in a contract worth €34 million. The new trains will be delivered in 2019 and join 10x8-car and 7x6-car trains already on order, some of which are now in service.

GERMANY

HUMAN ERROR CAUSED BAD AIBLING COLLISION

As we reported last month, a head-on collision between two Stadler-built Flirt EMUs near Bad Aibling in Bavaria on 9 February left 10 people dead (with another passenger dying some days after the accident) and around 100 injured, many seriously. The trains were operating services on the line between Holzkirchen and Rosenheim east of Munich, which is single track with passing loops at several stations.

On 16 February German prosecutors opened criminal proceedings against the signaller operating the panel at Bad Aibling station, who permitted the two trains – travelling in opposite directions – to enter the single track section. Lead prosecutor Wolfgang Giese told a news conference that there was no suggestion the action was deliberate but that the DB Netze employee, who had 19 years' experience, had not done his job properly. He will be charged with causing deaths through negligence and 'interfering with railway operations', both of which can carry prison sentences in the event of a conviction.

The trains were timetabled to pass 5km further east at Kolbermoor station, but investigations have revealed that the signaller overrode the PZB90 signalling system to allow the eastbound train, which was running just under 10 minutes behind schedule, to depart Bad Aibling. Realising his mistake too late – as the westbound train had already left Kolbermoor – he then attempted to contact the drivers of the trains by radio but was unsuccessful, and the collision occurred within a few minutes.

NATIONAL EXPRESS STILL WAITING ON NUREMBERG DECISION

Deutsche-Bahn has continued its legal challenge to the decision by the Bavarian transport authority (BEG) to award National Express's German subsidiary the contracts to operate the Nuremberg S-Bahn network. Following earlier rulings requiring BEG to reconsider the information provided by both bidders, National Express was again confirmed as winner of both contracts in mid-December (p81, February issue). DB then sought another legal review of this decision and this process is ongoing, although following a further ruling by the High Court in Munich, which was expected in March or soon after, there is unlikely to be any legal scope for further appeals, unless the Court decides to reject the previous rulings.

National Express told *Modern Railways*: 'We are disappointed that DB have again chosen to challenge the process made to award us the Nuremberg S-Bahn contract. The authority (BEG) believes it has met the criteria set down by the courts and we will provide any information they require to defend themselves against this latest action. The German rail market remains very attractive to us.... and we are working on three further bids in 2016.' National Express added 'The rolling stock contract with Skoda will be finalised after having signed the contract with the Passenger Transport Authority, BEG.'

DB has taken the approach of legally challenging almost all domestic contracts it fails to win – an approach that is far less common (although not unheard of) in other competitive markets (such as the UK or the Netherlands, in both of which DB subsidiary Arriva is very active). DB has not only challenged contracts won by National Express but also by Go-Ahead and Abellio (the overseas subsidiary of Dutch operator NS). On 17 February the legal challenge to the decisions awarding both Go-Ahead and Abellio contracts around Stuttgart was dismissed by the courts, but DB has since initiated a final High Court appeal to this decision as well.

In March 2013 DB challenged Abellio's success in winning contracts in eastern Germany around Leipzig, and the protracted legal dispute led Abellio to remove itself from the contracts seven months later. The contracts were never signed as it was apparent that the necessary rolling stock orders could not be agreed in time for the December 2015 start date. As a result, DB Regio, which was the runner-up bidder, was awarded the contract. This started as planned in December 2015 but without the new train fleet specified, as DB was also unable to procure it in time. However, unlike its competitors DB has other rolling stock, which has been cascaded temporarily into the Leipzig area until the Talent 2 EMUs ordered from Bombardier are delivered later this year.

ABELLIO WINS EAST GERMAN DIESEL CONTRACT

Abellio's Abellio Rail Mitteldeutschland subsidiary has won both the contracts tendered for operation of the Dieselnetz Sachsen-Anhalt service in eastern Germany. The deal, awarded by regional transport authority NASA, will run for 14 years from December 2018 and comprises two lots representing 8.6 million train kilometres a year. It will replace services west and south west of Magdeburg serving towns in the Harz mountains currently operated by Transdev company HEX, and services currently shared between DB Regio and HEX on eight

other regional routes elsewhere in the state of Sachsen-Anhalt. Abellio has ordered 52 LINT41 DMUs from Alstom to operate the new contracts.

FIRE DESTROYS CROWDED TALENT DMU

A potentially disastrous incident was narrowly avoided on 6 January when a Talent DMU operated by Berlin-based Transdev subsidiary Niederbarnimer Eisenbahn caught fire in the eastern Berlin district of Biesdorf whilst working a Berlin Lichtenberg – Küstrin-Kietz service. Around 180 passengers escaped without injury thanks to a quick thinking driver who stopped on a level crossing, enabling rapid exit from the low-floor train.

The fire quickly engulfed the entire train (built in 2005 to a 1990s design) and gutted it. Over 80 firefighters and around 30 emergency vehicles attended the scene, and putting the fire out took several hours. Why a minor fire led to such an intense blaze that destroyed a stationary train will no doubt be part of the investigation, which is ongoing.

Temporary solution: a DB Regio double deck push-pull train operating a Leipzig route S2 S-Bahn service to Connewitz calls at Wilhelm Leutschner Platz in the Leipzig City Tunnel on 16 December 2015. These trains have been drafted in temporarily pending the arrival of Bombardier-built Talent 2 EMUs later this year. Keith Fender

IRELAND

HEAVIEST FREIGHT TRAIN IN IRELAND TRIALLED

Iarnród Éireann (IÉ) ran a trial train between Dublin Heuston and Sallins on 15 February, consisting of 16 autoballaster wagons hauled by a Class 201 locomotive (No 226), with a classmate dead in tow (Northern Ireland Railways' No 8209). The purpose of the operation was to test the ability of the locomotive to haul heavier freight trains up the prevailing gradient of between 1 in 85 and 1 in 140 over the 4½ miles between Dublin Heuston and Clondalkin. IÉ is keen to enhance the efficiency and competitiveness of freight services, and the trial enabled it to assess the feasibility of increasing the maximum length and weight of freight trains from 18 bogie flat wagons (36 twenty-foot equivalent units, or TEU) to 27 bogie flat wagons (54 TEU). With a trailing weight of 1,296 tonnes, this is

Heavy haul: the test train approaches Hazelhatch on 15 February with IÉ loco No 226 leading. Courtesy Iarnród Éireann

believed to be the heaviest train to have ever operated on the IÉ network. *Tim Casterton*

VEHICLE LICENCE PLATE RECOGNITION CAMERAS INSTALLED AT CROSSINGS

Iarnród Éireann has begun installing licence plate recognition cameras to combat a significant increase in the number of level crossing barriers being damaged by vehicles at CCTV-controlled crossings in Dublin. The first to be installed were at Sydney Parade, Merrion and Sutton DART (Dublin Area Rapid Transit) level crossings in January and February. *Tim Casterton*

Modernised: Green Cargo has been rationalising its loco fleet but increasing the number of electric locos by bringing stored locomotives back into use. Since 2010 it has undertaken a programme to refurbish older Rc2-type locos dating from the 1960s, equipping them with improved traction equipment and new drivers' cabs. Now known as type Rd2, upgraded loco No 1100 passes Partille, east of Gothenburg, on 20 April 2015. Keith Fender

POLAND

PKP CARGO TO BUY ORLEN KOL TRANS

In November PKP Cargo announced it was to buy the smaller Polish rail freight company Orlen Kol Trans plus associated rail freight operator Euronaft Trzebinia from its owner and founder, oil company PKN Orlen. The purchase price agreed is PLN 250 million (£45 million). The purchase is subject to approval from the Polish competition authorities, who announced in February that they will need more time to study the deal's impact.

Figures released by Polish rail regulator UTK showed that, in common with neighbouring Germany, the volume of freight transported by rail in Poland in 2015 fell by 1.97% to 224.9 million tonnes, but the distance travelled increased by 1.04% to 50.6 million tonne kilometres. For comparison, the 2015 figures for Germany (the two neighbouring markets share some traffic as well as the current market trends) were 361.2 million tonnes (down 1%) and 114.3 million tonne kilometres (up 1.4%).

In Poland, PKP Cargo remains the market leader with 47.84% of volume and 55.64% measured by tonne kilometres, although both market shares were slightly lower than in 2014; DB Schenker Rail Polska is the second largest company measured by volume but the fifth largest by tonne kilometres. Lotos Kolej, owned by oil group Lotos, is the second biggest operator by tonne kilometres and third placed by volume alone. Freightliner PL is the country's sixth biggest operator with 2.52% market share by volume and 2.74% measured by tonne kilometres. Orlen Kol Trans plus its associated operator Euronaft Trzebinia are smaller, representing around 2.55% of the market.

SWEDEN

POSITIVE YEAR FOR GREEN CARGO

Conditions in the Swedish rail freight market appear to be improving, and results for the largest operator in the country, state-owned Green Cargo, showed a small profit of around Kr15 million (£1.2 million) in 2015, compared to a similar sized loss in 2014. Turnover fell slightly to Kr3.8 billion (approximately £325 million), but cost reductions during the year helped increase profitability. Green Cargo also owns 49% of DB Schenker Rail Danmark in neighbouring Denmark (the remaining 51% stake being held by DB Schenker). Green Cargo and other Swedish operators may have benefited in the last quarter of 2015 from the decision of Swedish rail regulator Transportstyrelsen to withdraw the operating license of freight operator TX Logistik from early October, citing defects in its safety management system.

KISS EMUs FOR STOCKHOLM REGIONAL SERVICES

Stadler is supplying 33 new four-car double deck KISS EMUs to Swedish leasing company AB Transitio on behalf of MÄLAB, a joint venture comprising the regional governments of Stockholm, Sörmlands, Östergötland, Västmanland, Örebro and Uppsala. They will be used to operate regional services connecting cities in the wider region around Stockholm; the contract is worth Kr3.5 billion (£295 million). The 105-metre-long 200km/h trains will have 340 seats and are due for delivery from 2018 onwards. Stadler will build the trains in Germany.

Change of owner imminent: Orlen Kol Trans has a fleet of largely Soviet-built diesel locos plus some modern Traxx electrics. In the company's distinctive red livery, M62 loco No 1684 and a TEM2 loco pass Sochaczew, west of Warsaw, on 24 September 2012 with an oil train. Keith Fender

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233/16

Airport shuttle: unit No 332003 at Paddington on 16 February 2016, just prior to the withdrawal of the fleet due to problems with the anti-roll bar. M. John Stretton

HEATHROW EXPRESS FLEET GROUNDED

HEATHROW EXPRESS'S fleet of Class 332 EMUs was temporarily withdrawn from service in early March after a structural defect was found on the underside of one of the trains.

The issue was discovered as part of a routine inspection on 28 February and is understood to relate to the failure of the bracket for an anti-roll bar on a driving vehicle of unit No 332014. The entire fleet was subsequently withdrawn as a precautionary measure, with the five Class 360/2 EMUs normally used on the Heathrow Connect service transferred to the Express. Connect services were suspended, although Great Western Railway, which jointly runs the Connect service with the airport, instituted an hourly shuttle service between Paddington and Hayes & Harlington to serve the intermediate stations on the Great Western main line.

On 6 January the driver of No 332014 reported a 'loud bang' from below his vehicle, and subsequent inspection showed that the bracket to which the vertical link for the anti-roll bar is attached was cracked where it is welded to the underside of the coach.

When the anti-roll bar was removed a section of the bolster, to which the bracket was welded, came away. The bolster is a reinforced box section of the underframe which takes the loads where the vehicle rests on the bogie. Subsequent analysis suggests that the cause of the failure was the lack of fusion in one of the welds used to join the vertical and horizontal plates which form the bolster. In this case, the lack of fusion in the joint matched the position where the mounting bracket for the anti-roll bar was attached to the bolster. This weakness led to fatigue cracking, culminating in the failure.

Following earlier cases of cracking in this area which emerged in 2003, a modification was made. The procedure appears to have involved removing a section of the bolster, and it is considered 'highly likely' that the lack of fusion occurred during replacement of the cut-out section.

Siemens and parts supplier CAF investigated the problem, and on 11 March Heathrow Express stated that the '332s' "would be phased back into service where they will continue to be monitored as normal'. As they did so, the '360s' would return to their normal duties on the Heathrow Connect service.

The similar Siemens/CAF-built Class 333 units in service with Northern in West Yorkshire are understood to have a different design of underframe and have therefore not been affected by this issue. *Roger Ford*

LOCO-HAULED SPECIALS TO THE ARENA

AS REPORTED last month ('News Front'), London Midland ran special trains for two Wasps rugby matches at Coventry Arena on 28 February and 12 March. The regular service on the Coventry-Nuneaton route is provided by a single-car Class 153 DMU, which offers inadequate capacity for the large crowds which would use the new station on match and event days, meaning the station would otherwise be closed for safety reasons.

LM hired in a six-car charter set from Riviera Trains powered by DB Cargo Class 67 locomotives. On 28 February power was provided by Nos 67028 and 67006, while 12 March saw No 67028 partnered with No 67005. *Tony Miles*

SPECIAL TRAINS FOR COVENTRY ARENA ON MATCH DAYS

Services operated (calling only at Coventry Arena):
13.50, 14.50, 17.50, 18.50 Nuneaton – Coventry
14.19, 17.19, 18.19 Coventry – Nuneaton

Rugby shuttle: loco No 67006 at Nuneaton with a Wasps rugby special on 28 February 2016. No 67026 was on the rear. Stuart West

OPERATORS VYING FOR CLASS 387s

SEVERAL OPERATORS are vying for the new Class 387/1 EMUs currently working on Thameslink services but eventually destined for Great Western Railway's suburban services in the Thames Valley.

The battle has intensified after a deal for c2c to sub-lease two Class 360 EMUs from Heathrow Connect to boost capacity ('News Front', last month) fell through. Industry sources report that this is because the release of the sets would leave the Connect service running three sets on three daily diagrams, which was thought to be too great an operational risk.

c2c has now set its sights on hiring some '387/1s', but GWR is anxious to receive units so it can begin driver training ahead of introducing an electric service between Paddington and Hayes & Harlington in May. However, Govia Thameslink Railway is seeking to retain the sets for a longer period due to delays in introducing new Class 700 EMUs into passenger service as a result of a number of issues, including problems with the Traffic Management System, doors and pantographs.

New stock for the Gatwick Express: Rail Minister Claire Perry (centre) formally introduced Class 387/2s on the airport shuttle at London Victoria on 10 March 2016. She is flanked by Angie Doll, Gatwick Express Passenger Service Director (left); and Charles Horton, the MD of GTR. Antony Guppy

The introduction of GWR's service between Paddington and Hayes will replace the current through trains to Greenford. Initially this would involve only a small number of services due to restricted access at Hayes & Harlington until infrastructure work at the east end of the station is completed in December 2016. With good progress being made with electrification at the eastern end of the Great Western main line, GWR is also looking to introduce electric trains on services to Maidenhead in May 2017 and intends to ensure sufficient driver training is completed by this date. Whilst the completion date for wiring to Maidenhead is shown in the re-plan of Network Rail's Enhancements Programme by Sir Peter Hendy as being June 2017, *Modern Railways* understands that work is ahead of the new schedule and this section may be completed by the end of 2016.

According to industry sources GWR has suggested that rolling stock shortages at GTR following the release of the '387s' could be managed by the retention of Class 442 sets on Gatwick Express trains for longer and the deployment of the new Class 387/2s destined for the airport shuttle on the Thameslink route. This would enable the '387/1s' to be released to GWR as planned. One problem with this suggestion is that the '442s' will shortly be due C6 exams, and with the Department for Transport monitoring GTR finances very closely it may not be willing to sanction additional spending when the retention of the '387s' for a while would be a more cost-effective solution.

It could be that the quest to find additional short term capacity at c2c may be solved by early delivery of the next batch of '387s', construction of which is to begin shortly at Bombardier's Derby facility. *Tony Miles*

A DIGEST OF THE MAIN CHANGES IN NETWORK RAIL INFRASTRUCTURE DURING JANUARY 2016; COMPILED BY MARTYN BRAILSFORD OF THE BRANCH LINE SOCIETY (WWW.BRANCHLINE.ORG.UK).

Change for Crossrail: the new bay platform under construction at West Ealing for the Greenford spur is visible to the right of loco No 56103 passing with spoil empties on 19 January 2016. Iain Scotchman

ANGLIA

Manningtree (2:6A)
The Down Refuse Siding, behind platform 3, at Manningtree (59M 35ch) has been taken out of use until further notice.
Acton Wells Junction (2:1L)
The catch point at 8M 76ch, located on the Up Cricklewood, has been recovered and replaced with plain line.

EAST MIDLANDS

Nothing to report.

LONDON NORTH EASTERN

Newcastle Area (2:22A)
A number of track renewals have taken place on King Edward Bridge South Junction (79M 42ch). The points between the Up Main and Up Carlisle have been relocated 40 metres (2 chains) further south. The facing points on the Down Carlisle, which form part of the facing crossover with the Up Carlisle, have been moved 15 metres (¾ chain) closer to Newcastle.
Clipstone Junctions (2:30A)
The lines from Clipstone West Junction (15M 15ch) to Clipstone South Junction, Clipstone East Junction (15M 40ch) to Clipstone South Junction and any remaining lines south of Clipstone South Junction have now been lifted. Clipstone Signal Box (15M 20ch) remains to control part of the line between Warsop Junction and Thoresby Colliery Junction.
Level Crossing
The following change has taken place: *Between St. Neots and Huntingdon (2:15C);* Cardells (UWC) at 54M 07ch has been fenced off, but retained for staff access; all equipment has been recovered.

LONDON NORTH WESTERN

Banbury (3:13B)
The Down Neck (believed to be the line behind Banbury South Signal Box) has been reduced in length by 1½ chains.
Between Coventry and Nuneaton (4:11B & 4:14B)
Two new stations have been opened, Coventry Arena at 3M 56ch and Bermuda Park at 8M 03ch. Coventry Arena consists of two platforms, platform 1 is located on the Down Line and is 78 metres (85 yards) long, whilst platform 2 on the Up line is 149 metres (163 yards). Bermuda Park also consists of two platforms, both 77 metres (84 yards) in length. Platform 1 is located on the Down line and platform 2 on the Up line.
Between Bolton and Salford Crescent (4:48A)
Both Farnworth North Junction (9M 12ch) and Farnworth South Junction (7M 67ch) have been abolished and all pointwork has been recovered and plain lined.

SCOTLAND

Craigo (1:16D)
The Up Siding has been removed and the trailing point on the Up Main at 205M 14ch has been plain lined. The trailing crossover at this location has been locked out of use.
Leuchars (1:14C)
As indicated in a previous column, the trailing point on the Up Fife at 50M 71ch, which served the redundant Up Sidings, has now been plain lined. The associated trap point has also been recovered.

SOUTH EAST

Nothing to report.

WALES

Newtown West Junction (3:22)
At approximately 169M 75ch two new crossovers have been installed, a trailing one between the Down and Up Main lines and a facing one (closer to Cardiff) between the Down Main and Up Relief lines. Both crossovers have been secured out of use until further notice.
Cardiff (3:22)
A new facing connection has been installed between the Up Platform line (platform 2) and Up Main line at the Newport end of the platform. This connection has been secured out of use until further notice.

WESSEX

Between Staines and Windsor and Eton Riverside (5:25A)
The facing crossover (at approximately 19M 50ch) on

the Down Windsor line leading to the former Staines West Oil Terminal has been removed and has been plain lined.

Point Pleasant Junction (5:1R)

The trailing crossover between the Down Windsor Fast and the Up Windsor Fast lines (at approximately 5M 09ch) has been renewed 90 metres (98 yards) closer to Wandsworth Town station. The associated crossover connecting the Down Windsor Fast and Down Windsor Slow lines has also been renewed, the points on the Down Windsor Fast have been renewed 16 metres (17 yards) closer to Putney station and those on the Down Windsor Slow have been renewed 4 metres (4 yards) closer to Putney station. Finally, the points connecting the Down Windsor Slow onto the Putney Reversible lines have been renewed 12 metres (13 yards) closer to Wandsworth Town and the trap points on the Putney Reversible line have been renewed 6 metres (7 yards) closer to East Putney station.

WESTERN

Maidenhead (3:2C)

Maidenhead Spur, at the eastern end of Platform 5, has been renamed 'The Over-Run' and has been shortened, until further notice, to an operational length of 50 metres (2.5 chains). A temporary stop block has been provided to protect the closed section of the line.

Slough (3:2C)

The Windsor Branch Siding (18M 55ch) has been brought into use and has been renamed Bath Road Siding. The operational length of this platform is 134 metres (6.7 chains).

Swindon Area (3:4B, 4C & 14C)

The area defined by Rushey Platt Junction (78M 36ch) to 87M 60ch on the Badminton (South Wales) lines, the east end of Box Tunnel on the line towards Bristol Temple Meads, and milepost 97 on the line to Melksham, which was formerly controlled by Swindon Power Signal Box, is now controlled by the Swindon workstation at Thames Valley Signalling Centre (TVSC), Didcot.

There have been no permanent way alterations and all signals are now prefixed SW. Reversible working between Swindon Station and Wootton Bassett Junction / Wootton Bassett West has been reintroduced, whilst it has been temporarily withdrawn between Thingley Junction and Bathampton Junction, and Wootton Bassett West and Hullavington. The ground frames at Wootton Bassett and Thingley Junction Up Siding are now released by the signaller at Didcot TVSC.

A few line name changes have taken place. The Down Sidings at Wootton Bassett Junction are now known as the Down Wootton Bassett Sidings and the Up Goods Line is now the Up Wootton Bassett Goods Line. At Thingley Junction the Up Sidings are now the Up Thingley Sidings. Finally the Down Branch between Thingley Junction and Melksham is now the Melksham Single.

Chippenham barrow crossing (WL) at 94M 01ch, which crosses the Down Main line at the Bristol end of the station, has been closed and associated equipment has been recovered.

Oxford (3:12C)

The sidings adjacent to bay platform 3 (63M 41ch) have been taken out of use until further notice. The relevant points have been clipped and locked. Platform 3 continues to be used.

Level Crossing

The following change has taken place:

Between Castle Cary & East Somerset Junction (3:12A); Dennings (UWC) at 122M 01ch has been closed and all associated equipment, including telephones, has been recovered.

LONDON UNDERGROUND

King's Cross St Pancras sub-surface lines (5:44B)

In December 2015 the trailing crossover to the east of the station was removed and plain lined. It was replaced with a scissor crossing to the west of the station. Also note that the engineer's siding to the west of the station was abolished in January 2015.

Information has been grouped according to the main Network Rail 'Routes' in January 2016. All details can be subject to subsequent amendment. Books and Diagram Reference Numbers (in brackets) relate to the latest relevant Quail Track Diagram books obtainable from Trackmaps at www.trackmaps.co.uk

INFORMATION REVOLUTION ON CUMBRIAN COAST

OPERATOR NORTHERN has completed the installation of digital information screens at stations on the Cumbrian Coast route, in partnership with Saturn Communications.

The screens provide customers with real-time train running information, a live link to Northern's Twitter feed, the latest BBC News headlines, digital advertisements and the local weather forecast.

The installation at the final station, Seascale, marks the culmination of a £200,000 project. The information screens have overcome the traditional challenge of Cumbria's rural setting by connecting to a fixed broadband line which allows them to link directly into the latest live information. Other stations to have the screens fitted were Corkickle, Wigton, Dalton, Cark and St Bees.

The Cumbrian Coast line: loco No 37609 (with No 37423 on the tail) at St Bees on 23 May 2014. Rob France

COMMONTIME FOR SOUTHEASTERN APP

OPERATOR SOUTHEASTERN has chosen mobility application provider CommonTime to deliver a new 'Employee Service Information App' (ESIA). The ESIA is designed to improve communications between the operator's frontline and control room staff by the use of secure, multi-user and bi-directional messaging. It will initially be used by a selected group of 750 staff, with potential for a further rollout to an additional 450 employees within the next six months. The solution will be developed using CommonTime's mDesign rapid mobile application development platform. All mDesign apps will work online and offline, and can be used across all contemporary mobile operating systems without the need for recoding.

GROWTH AT EUROTUNNEL

DESPITE A difficult year in 2015 with the migrant crisis at Calais disrupting cross-channel travel, Eurotunnel boosted its revenues by 5% to €1.222 billion.

The group reports that its passenger shuttle car activity recorded a record annual market share of 52.6%, with 2.6 million passenger vehicles transported. The truck shuttle service also broke records by carrying nearly 1.5 million trucks. EBITDA (Earnings Before Interest, Taxes, Depreciation and Amortisation) for the Channel Tunnel fixed link concession increased by €2 million year-on-year to reach €523 million. Eurostar also broke traffic records, transporting nearly 10.5 million passengers through the tunnel.

The group's Europorte subsidiary increased revenues by 9%, with GB Railfreight continuing to develop and starting its new contract to provide traction and drivers for the Caledonian Sleeper service in April 2015.

For the group as a whole, EBITDA rose to €542 million, net consolidated profit increased from €74 million to €100 million and a 22% increase in the share dividend has been proposed. Continuing growth of the truck and car markets, additional capacity from three new truck shuttles, the launch of Eurostar's direct London-Amsterdam rail service and prospects of rail freight growth are all cited as positives for the company going forward.

STRONG REVENUE GROWTH AT c2c

NATIONAL EXPRESS has reported revenue growth of 9.5% in its UK rail division during 2015, driven by rising passenger numbers on its c2c franchise.

The division delivered an operating profit of £0.6 million during the year, compared to a £10.1 million loss in 2014 (which reflected bidding costs). This included the absorption of a £29 million increase in the premium paid to government for c2c under the new 15-year franchise, which began in November 2014. National Express says that targeted digital marketing has helped increase revenues, with overall passenger numbers growing by 5.3% and off-peak journeys increasing by 7.6%.

Rail was National Express's best performing segment, although revenues, profits and margins grew in every division. Revenues for the group as a whole rose by 3.8% year-on-year, and operating profit rose by 7.5%.

National Express says it 'will continue to bid selectively' when it comes to UK rail franchises, and that while it continues to monitor the market for opportunities that meet its strict criteria, the current focus is on securing 'smaller, lower risk German rail franchises where the risk is acceptable and meets our capital-light investment criteria'.

RVEL GRANTED OPERATORS LICENCE

RAILWAY VEHICLE Engineering Ltd (RVEL) has been granted a Safety Certificate and non-passenger Train Licence by the Office of Rail and Road (ORR), allowing the company to operate non-passenger services.

The initial Safety Certificate, covering a period of five years, will allow RVEL to operate trains between the Derby Railway Technical Centre and Old Dalby test track in support of its existing engineering and re-engineering business. RVEL hopes to operate its first train along this route in mid-2016.

In connection with this, the company has also reorganised and strengthened its board, which is led by managing director Andy Lynch and is now structured as follows:

- Andy Houghton, Commercial Director;
- Peter Erwin, Operations Director;
- Paul Riley, Engineering Director;
- David Rogers, Finance Director;
- Rupert Brennan Brown, Communications Director; and
- Gary Stewart, Safety and Assurance Director.

RICARDO ACQUIRES CHINESE VENTURE

RICARDO RAIL has concluded its acquisition of the Lloyd's Register Rail business. Following Chinese government approval, the transfer of a small rail joint venture (JV) owned by Lloyd's Register Group and CCS in China has been completed.

Ricardo plc CEO Dave Shemmans commented: 'The Ricardo Rail business is performing well across its existing international footprint and with the addition of the Chinese JV, we are now well placed to maximise our position in this fast-growing and increasingly important rail market'.

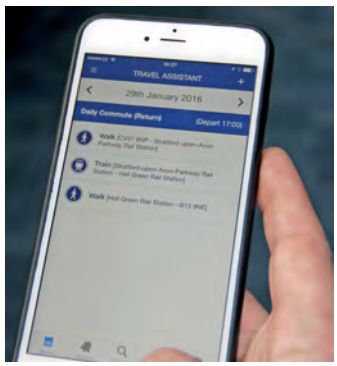
SIEMENS' DERBY OFFICE

SIEMENS RAIL Automation's new office in Derby has been officially opened. The decision by the signalling and train control specialist to create a permanent base at Trent House follows the company's successful completion of a number of recent signalling projects in the East Midlands, as well as its involvement in some major new projects in the region. The Derby-based team numbers some 35 staff, including designers, signalling engineers, testers and project support staff. The team has already begun design work for the Derby station remodelling, and over the Christmas period also provided support to Network Rail with track works on the Kettering to Corby project.

REAL TIME INFO ON NEW APP

A NEW app for public transport users in the West Midlands is being developed by transport authority Centro and technology company Enable ID.

The MyJrny app, available for iPhone and Android, combines scheduled journey timetables with real-time network information, helping passengers avoid disruption and overcrowding and alerting them to cancellations. It covers all modes of public transport as well as walking, cycling and driving, providing personalised travel advice before passengers set out as well as on-route. The app is based on Hub-of-All-Things (HAT) technology, the result of a £1.2 million research project led by Warwick University and being tested in Birmingham and Singapore.



Door to door advice: the MyJrny app.

BETTER CONNECTIONS AT CHILTERN

MOBILE OPERATOR EE is to deploy a trackside mobile network for Chiltern Railways in order to improve on-board connectivity. The network will remove coverage blackspots, particularly in tunnels, and add extra capacity. EE is due to complete the deployment in December. Chiltern's parent company Arriva will use the project as a test bed to determine whether it will upgrade trackside networks on its other rail routes.

Thomas Ableman, commercial director of Chiltern Railways, said: 'It was always our vision to deliver truly connected mobility and now, thanks to our partnership with EE, Chiltern will have the fastest and most reliable Wi-Fi in the country'.

EE CEO Marc Allera added: 'This is just the beginning of a new approach to building a mobile network that's always there for our customers, giving them the connection they need'.

The Government has pledged funding for improvements to Wi-Fi provision, both by increasing the number of trains offering the service and improving lineside connectivity.

FORTHCOMING EVENTS

New Oxford - Marylebone Rail line, lecture, 6 April, Oxford
Details at http://nearyou.imeche.org/eventdetail?id=11449

V300 Zefiro Italy, lecture, 7 April, Derby
Details at http://nearyou.imeche.org/eventdetail?id=11135

European Railway Traffic Management System (ERTMS) on the GW route, lecture, 12 April, Swindon
Details at http://www.theiet.org/events/local/227867.cfm

Class 458s – 'Living the Dream', lecture, 12 April, Crewe
Details at http://nearyou.imeche.org/eventdetail?id=11191

Learning Lessons from the Railway Industry, lecture, 13 April, Workington
Details at http://nearyou.imeche.org/eventdetail?id=11838

Shift2Rail - A Game Changer?, lecture, 14 April, Milton Keynes
Details at http://nearyou.imeche.org/eventdetail?id=11811

Behind the scenes at the National Railway Museum, visit, 16 April, York
Details at http://nearyou.imeche.org/eventdetail?id=10822

Growing the Network – the Expansion of the Docklands Light Railway, lecture, 18 April, London
Details at http://events.imeche.org/ViewEvent?code=L6318

ScotRail Alliance – the first year, lecture, 21 April, Glasgow
Details at http://nearyou.imeche.org/eventdetail?id=10771

***Modern Railways* Fourth Friday Club and Northern Rail conference, 22 April, National Railway Museum, York**
Details at www.4thfriday.co.uk
and on page 43 of this issue
Official publication: *Modern Railways*

IMechE Railway Division south west centre AGM, followed by lecture: West of England rolling stock strategy, 25 April, Swindon
Details at http://nearyou.imeche.org/eventdetail?id=9376

Reliability and Asset Management 2016, seminar, 27 April, London
Details at http://events.imeche.org/ViewEvent?e=6354

Swanage Railway's Project Wareham, lecture, 27 April, Poole
Details at http://www.theiet.org/events/local/234409.cfm

Mail Rail – the Post Office Underground Railway, lecture, 3 May, Bromley
Details at http://www.theiet.org/events/local/224531.cfm

Train Describer Systems on the Tube, lecture, 4 May, London
Details at http://www.theiet.org/events/local/234870.cfm

Intelligent Rail Infrastructure, seminar, 5 May, London
Details at http://conferences.theiet.org/intelligent-infrastructure/

Maintaining the Pendolino – 12 years on, lecture, 10 May, Preston
Details at http://nearyou.imeche.org/eventdetail?id=11192

Engineering the Railway Passenger Journey, seminar, 18 May, London
Details at http://events.imeche.org/ViewEvent?e=6350

Crossrail, lecture, 18 May, London
Details at http://nearyou.imeche.org/eventdetail?id=11391

Milton Keynes Centre Site Visit – Wolverton Railway Works, 19 May
Details at http://nearyou.imeche.org/eventdetail?id=11812

The New Borders Railway, lecture, 19 May, Penrith
Details at http://www.theiet.org/events/local/233453.cfm

Glasgow Subway – Rolling Stock and Signalling Update, lecture, 19 May, Glasgow
Details at http://nearyou.imeche.org/eventdetail?id=10768

Railway Industry Innovation Awards at the *Modern Railways* Fourth Friday Club, luncheon, 24 June, London
Details at www.4thfriday.co.uk
and on page 50 of this issue
Official publication: *Modern Railways*

Rail Vehicle Enhancements 2016, exhibition and forum, 6 October, Derby
Official sponsor: *Modern Railways*

Chris Stokes

FIRST CLASS IS A MESS

The principal long distance operators generally provide a clearly differentiated product, with much more generous seating and, in some cases, free meals. The two Virgin franchises are probably best, with a full breakfast and a reasonable offer at other meal times, together with free wi-fi. CrossCountry also provides free food on its Voyager routes, although the quality is markedly less good, closer to a dismal packed lunch. Great Western provides comfortable, spacious seating in Mk 3 trailers, but the catering offer is limited to free tea, coffee and biscuits. East Midlands Trains offers complimentary breakfast, but only tiny snacks for the rest of the day.

First class pricing on inter-city routes is much more sophisticated, too, as the days when many civil servants and businessmen would routinely travel first on expenses have long gone. Governments of any colour constantly look over their shoulders at potential criticism from the media – *The Daily Mail* test – so even MPs have to slum it with their voters. The market has changed, with a significant proportion of first class passengers now travelling on advance tickets which they've paid for themselves, because they have chosen to buy extra space, less crowding, free wi-fi and complimentary catering.

However, outside the traditional inter-city routes, the first class offer is poorly differentiated, and in some cases almost insulting. The only reason that anyone would knowingly travel first class on Southern or Southeastern is that there is a greater likelihood of getting a seat at peak periods, at least to the extent that first class is properly protected. The seats are identical to standard except for paper antimacassars, and there is no separation between first and standard.

There are some ludicrous examples: why would anyone conceivably use first class from Canterbury or Ashford to London when the much faster Javelins are single class trains? Yet Class 375s run with first class everywhere in Kent. And the East Croydon – Milton Keynes service also nominally has first class, completely ignored by both passengers and staff; indeed I'm told these trains are officially declassified over the most heavily loaded section between Harrow and Clapham Junction, but that's not what the timetable shows, and first class fares are quoted on Southern's website.

Refurbished saloon: the new look in a Virgin Trains East Coast first class Mk 4 carriage. Courtesy VTEC

Even South West Trains, which has a significant first class market from places like Winchester, primarily driven by the likelihood of getting a seat at peak periods, offers first class on routes like Portsmouth – Southampton. When was the last time a passenger from Netley or Sholing bought a first class ticket?

London Midland is better, with clearly separate accommodation, and some effort to police first class, although there appears to be a policy, whether official or not, of allowing staff to use first class off-peak. London Midland also offers significantly cheaper fares than Virgin between the West Midlands and Euston, and, astonishingly, has first class passengers making the journey. Anecdotally, many have simply booked the cheapest first class fare on a website, assuming they will get wi-fi and catering during their 2¼-hour journey.

The Department for Transport has joined in this lunacy, too. All the new Thameslink trains have been specified with a first class section at each end, so the eight-car trains to be used, for example, on the Wimbledon loop will have a higher proportion of first class seating than the 12-car Bedford – Brighton services, even though this route has never had first class and there is no conceivable first class market. In practice, first class will be ignored, further devaluing the brand.

With characteristic vision, Chiltern abolished first class right at the start of its first franchise, despite having some of the most well-heeled passengers in the country, although it has now crept back as 'Business Zone' on its locomotive-hauled fast Marylebone – Birmingham trains. So you can buy a first class ticket to Crawley, but not to Beaconsfield.

Outside the inter-city routes and TransPennine Express, which also genuinely differentiates its first class offer, first class is often little more than a confidence trick, and passengers generally recognise this, and don't buy. Franchisees should review their first class offer, either making sure it's distinct and special where there is genuinely a potential market, or making services standard class only. This isn't egalitarian ideology, it's good business sense – make the best use of your available capacity for all your passengers.

It seems that Mark Carne, Network Rail's Chief Executive, is still living in a world of fantasy on the potential capacity improvements as a result of European Rail Traffic Management System (ERTMS).

In a 20 February article in *The Times*, he says that analysis by Network Rail has shown that the digital technology can increase the number of trains running on existing lines by at least 40%. Mr Carne has also publicly stated that peak-hour capacity on the fast lines into Waterloo can be raised from 24 to 35 trains an hour. Has he ever used a stopwatch to time how long it takes a 12-car train to clear the throat at Waterloo to allow for the next movement?

Back in the real world, Network Rail is having to throw the technological kitchen sink at the Thameslink core section between St Pancras International and Blackfriars to deliver the planned 24 trains an hour. The route will have European Train Control System plus Automatic Train Operation – the first time ETCS has been combined with ATO – together with a state of the art Traffic Management System, but it still faces the challenges of integrating a range of different services from north and south of the Thames, with all the risks to punctual presentation of trains that this entails, as well as delivery of tight dwell times at each station.

The Times piece states the new technology is a far cheaper way to boost capacity than big ticket schemes such as the £56 billion HS2 project. I remain deeply sceptical about HS2, but less so than about Mark Carne's magic technology. mr

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EX-MINERS FIND NEW CAREERS IN RAIL TELECOMS

BRINGING ABOUT the poignant dissolution of a once-thriving industry, the closing of North Yorkshire's Kellingley Colliery in December 2015 marked the ending of the last deep coal mine in Britain, prompting redundancies and late-stage career severances.

Seven miners, made redundant when Kellingley Colliery closed down, are establishing a new career in the telecoms industry. Sheffield-based Network Training and Resource Solutions (ntrs), the training and resourcing partner of Linbrooke Services, caught wind of the mass redundancy and decided to tackle the issue head-on. Tony Gaunt, ntrs' Head of Training, approached the former miners with the offer to help transfer their skills and guide them back into work through becoming masters of a new trade. Meeting with the miners, Mr Gaunt discussed the training opportunities ntrs could provide and the potential opportunity of being deployed across the rail and subsea transmission sectors following the training.

As a firm advocate of employing second careerists with industrially valued qualities, CEO Lee Hallam explains that Linbrooke 'employs people who have already proven their dedication, commitment and loyalty within the military or parallel industries and recognise the need for team work. They identify with the sense of camaraderie out on track straightaway… consistently going the extra mile to deliver safely and efficiently'.

The Kellingley Seven: ex-miners proudly display certificates marking expertise in telecoms.

Utilising the company's National Training Academy and training expertise, ntrs trained the Kellingley Seven in telecoms and Linbrooke is now sponsoring them to complete their railway familiarisation and personal track safety (PTS) course needed to work on the railway. Although they are completely new to the telecoms division, their collective 220 years in a similar industry was apparent, ensuring they all passed the course to an exceptional standard.

Senior Trainer David Mallinder stated that 'training men from parallel industries with such a diligent work ethic has been incredibly rewarding. Proactive and dedicated, the miners have displayed initiative and prowess and we are going forwards with the intention to try to integrate them into our company'.

Providing the men with purpose, further sponsorship and work experience, Linbrooke is proud to have played such an instrumental part in assisting these local men back onto a worthy career path. Gary Lane, one of the Kellingley Seven, expressed his gratitude through saying 'I feel like I walked through the training centre doors six weeks ago as an ex-miner and can now walk back out as a telecoms engineer. Thank you to the trainers who have made this possible!'

NEW FACES AT SNC-LAVALIN

CONSULTANCY FIRM SNC-Lavalin has made a number of new appointments to its rail and transit team.

Darren Carpenter joins as project director – major projects in the rail and transit team. Mr Carpenter was with The Louis Berger International Group, where he spent several years working in Saudi Arabia as project chief engineer and rail infrastructure and rolling stock delivery manager for the Riyadh Metro, Lines 4, 5 and 6. He has also held a number of senior roles at Network Rail, most recently leading the engineering team working on the Great Western Electrification Programme and prior to that working on the UK's first deployment of European Rail Traffic Management System (ERTMS).

Luke Tandy has joined the engineering vehicle certification department as senior engineer from Network Rail, where he was part of the plant, traction and rolling stock team within NR's safety, technical and engineering directorate. During his time at NR he was involved in a number of projects, including the introduction of mobile maintenance trains.

The company has promoted senior engineer Adrian Staples to become section head, on-track plant. Mr Staples joined Interfleet in 2013, and during his time at the company has secured a number of on-track plant projects within the UK and Europe. In 2015 he was appointed as a Rail Safety and Standards Board (RSSB) signatory for on-track plant.

Dan Smail has also joined the department from JCB Attachments, where he was design and development engineer, responsible for development, new product introduction and sign-off procedures.

Within the rail control systems team, three new recruits have joined from Signalling Solutions Ltd (SSL). Doug Blanc has been appointed as technical director for control centre and traffic management systems; his most recent role was as platform manager for traffic management at SSL. Former SSL lead product engineer Dave Robson has been appointed as principal consultant, while Richard Eadie becomes head of conventional signalling, having formerly been lead development engineer at SSL. SNC-Lavalin says the combined expertise of the three appointees spans nearly 60 years within the rail sector and includes periods at DeltaRail, Westinghouse and Atos.

MURGATROYD FOR INTERSERVE

INTERSERVE HAS appointed former Balfour Beatty Rail director Kevin Murgatroyd as its new sector director for transport. Mr Murgatroyd was part of BB Rail's executive team for the past nine years, latterly as director and general manager of the company's rail plant and rail civils divisions.

OPS SPECIALIST ON THE MOVE

HITACHI INFORMATION Control Systems Europe has appointed Graham Goswell as Director, Railway Operators. Mr Goswell joins from Network Rail, where he was the Professional Head of Operations; he has a background in control room and operations management. He began his operations career as a signaller in 1998, progressing through management and specialist roles. He also brings experience from the European rail industry, particularly around European Rail Traffic Management System (ERTMS) and other technology deployments across railway operations and the application of the European technical standards for interoperability (TSI).

Formerly known as The Railway Engineering Company Ltd (TRE), Hitachi Information Control Systems Europe brings together the products and experience of TRE with advanced traffic management and information control products from Hitachi.

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One of the perks of a railway scribbler is that you occasionally get to ride 'up front' in the cab. Over the years I have ridden the length of both the East and West Coast main lines, through the Channel Tunnel and across France and Belgium on Trains à Grande Vitesse. So when Northern invited me to ride in the cab on my local line from Middlesbrough to Whitby as part of an exercise to establish where improvements in linespeed might be possible for the additional services promised in the new franchise, I supposed it would be a rather more leisurely version of the same. How wrong can you be! Right from the off it was clear that this 35-mile journey was not going to be an orderly procession of colour light signals, each with its own reassuring hoot or tinkle of an Automatic Warning System.

The line is single track throughout and abounds in speed restrictions for the many curves and infrastructure limitations such as weak bridges and unstable embankments. And, of course, level crossings. The overall line speed is 55mph as far as Battersby, where trains reverse, 45mph on to Grosmont, and then 30mph for the last leg into Whitby, but within those maxima there are many reductions down to as low as 15mph, so in addition to stopping and then accelerating away again from the 16 intermediate stations, our driver seemed to be almost constantly adjusting our speed.

From Nunthorpe, the first passing place on the line, the three single line sections on the remainder of the route are controlled on the 'No Signaller Key Token' (NSKT) system, so at each passing place the driver has to unlock a location cabinet, contact the signaller at Nunthorpe, surrender the token for the section just left, and obtain a new one for the section ahead. Apart from at Whitby, none of these cabinets are under cover, so in the sort of weather that routinely afflicts the North Yorkshire moors, it is quite possible to get soaking wet while conducting these operations at Battersby and Glaisdale. No wonder our driver privately confided that this duty was not the most popular at his depot!

The state of the track seemed generally good, with Network Rail having renewed several sections in recent years, and I had concluded that some increases in linespeed might be possible, especially on the long, mostly straight section between Nunthorpe and Battersby.

But then we reached Grosmont. Ahead of us, towards Whitby, the track twisted and turned along the banks of the River Esk. But the line did not proceed in a series of graceful curves – more a series of linked short straight sections, much like a 50p coin, each joint identified by a pronounced snatch of the wheels beneath us. That, opined the Driver Manager who was accompanying us, is the difference between a railway used just by lightweight diesel units and one that also carries steam trains. Clearly, Network Rail has some work to do here to bring the line up to acceptable present standards, let alone for any increase in linespeeds that may be proposed.

But perhaps the main inhibitions to any improvements to the current 90-minute end-to-end journey time are the many level crossings along the line. By far the majority are either foot crossings or gated user-worked crossings, and it is the latter that are mostly the problem. Some are rarely, if ever, used, others not for most of the year but then intensively around harvest time, and yet others daily to give access to homes and farms. But all need to be maintained, and although every one carries a notice declaring that the penalty for leaving the gates open is £1,000, the requirement seems to be routinely ignored and we came across several left wide open. Drivers tell me that they regularly report such transgressions – there have apparently been several near misses and at least one collision in the recent past – but I have been unable to find any record of a conviction.

Perhaps Network Rail should take a rather more robust line on this issue. Most such crossings have a nominated user – either the adjacent landowner or their agent. If I leave my car illegally parked, it is likely to get clamped and only released when I pay the fine. So why not padlock the gates of those that misuse them in a similar manner?

If linespeeds are to be increased, crossings with automatic controls will need to be upgraded, too. Of the five such crossings on the line, all but one are locally monitored (ie by the driver of an approaching train), requiring either a severe speed restriction or, in two cases, coming to a complete stand before proceeding. In contrast, there is no speed restriction on road traffic using the crossings.

There is no better way to get an impression of a line than from the cab. I came away from that trip with two very clear impressions. The first was that, far from being a doddle, driving on such a line must be pretty demanding. My trip was in daylight in reasonably benign weather. On a dark moorland night, or in fog or falling snow, with few lineside lights or other references, the job would clearly require a high level of concentration to ensure that none of the many speed restrictions are missed, especially as, because it is essentially a low speed line, there are very few advance warnings.

The second impression was that substantial funding will be necessary to improve the number and speed of services as envisaged in the new Northern franchise. A single leap from the present 19th century token working to European Train Control System would seem to be an option, potentially providing much more flexibility and capacity than now on the long single line sections, without any need for expensive additional trackwork.

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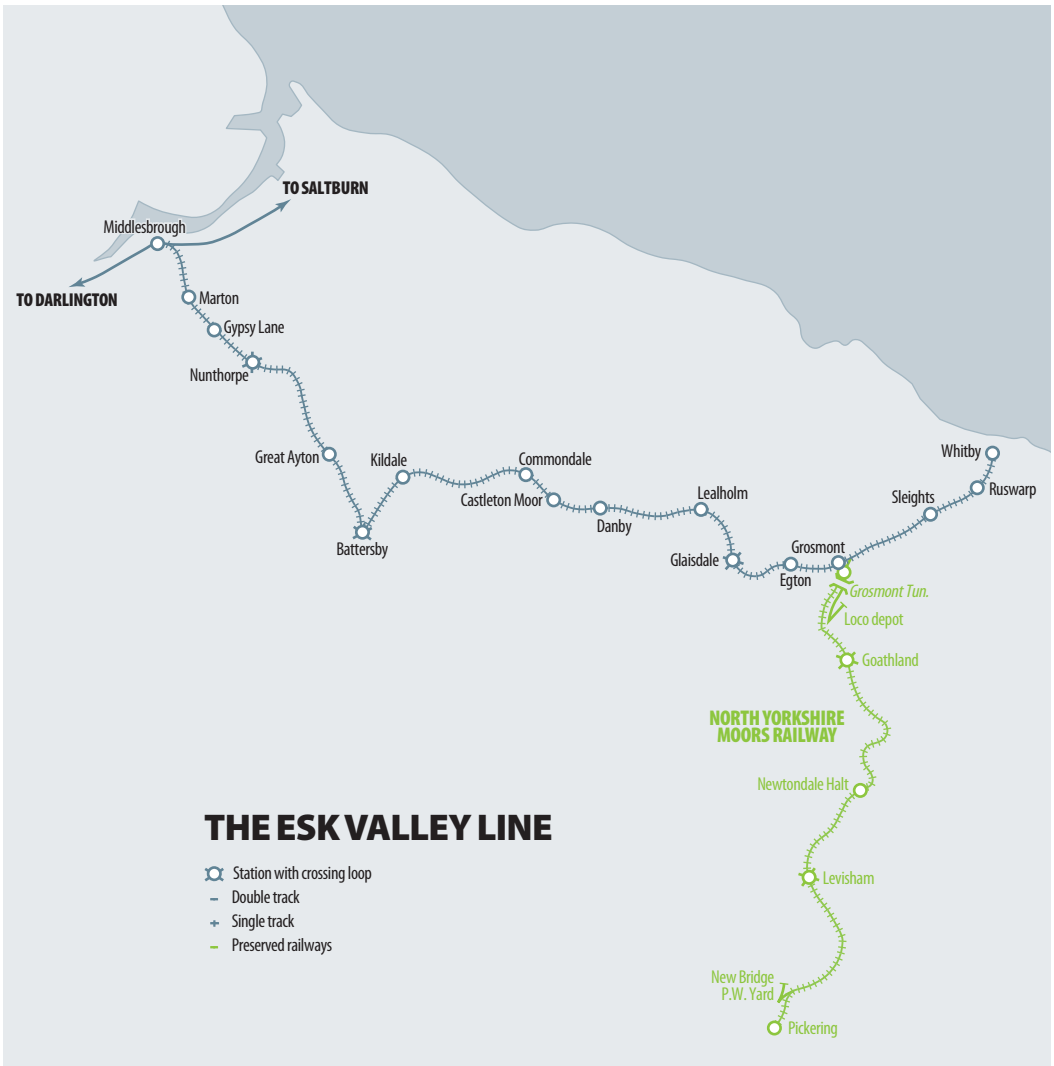

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A commemorative Elizabeth Line roundel was presented to The Queen. **Crossrail**

CROSSRAIL TO BE THE ELIZABETH LINE

Construction for the new railway is now over 70% complete

Her Majesty the Queen on 23 February 2016 visited the Crossrail station under construction at Bond Street, where the Mayor of London, Boris Johnson MP, announced that, in her honour, the new railway will be known as the Elizabeth Line.

To give Her Majesty a tour of the Bond Street station site, the Mayor was joined by Secretary of State for Transport, Patrick McLoughlin MP; London's Transport Commissioner, Mike Brown; and Crossrail Ltd's Chairman, Terry Morgan, and Chief Executive, Andrew Wolstenholme.

The Queen was presented with a commemorative Elizabeth Line roundel, and met a wide range of people involved in the construction of Crossrail, including apprentices working on building the railway, engineers fitting out the station, and drivers of the trains that will serve the line.

Terry Morgan, Chairman, Crossrail Ltd, said: 'Construction for the new railway is now over 70% complete and is being delivered on time and within budget. The Crossrail project is one of the most ambitious and complex infrastructure programmes ever undertaken in the UK, the scale of engineering being delivered under the capital is quite incredible. The opening of the Elizabeth Line in 2018 will be a significant moment for London.'

The Queen met a wide range of people involved in the construction and future operation of Crossrail. **Crossrail**

In front of one of the running tunnels at Bond Street, the Queen and Transport Commissioner Mike Brown. **Crossrail**

FINISH LINE IS IN S

The next year will see the new railway take shape, Crossrail's Programme Director, **SIMON WRIGHT**, tells **DAN HARVEY**

The tunnels have been dug, but the Crossrail construction programme rolls on. After the fanfare of the east-west tunnel breakthrough in May 2015, the focus has shifted - but the drive to get the infrastructure built remains relentless.

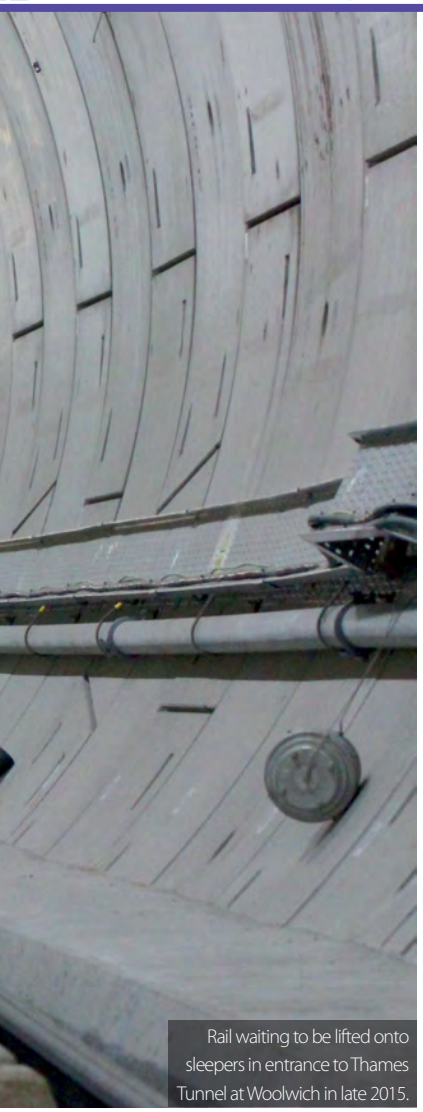
As the overall programme reaches the three-quarters-complete mark, the dirty business of lining tunnels with spray concrete is coming to a close, leaving vast spaces underground which need to be fitted out with all the apparatus that befits an operational railway.

The standard Crossrail sequence is that the tunnel builders pour the first stage concrete - a tunnel floor with a kerb that provides a guide to the rail alignment that will slot inside. The tunnel teams then depart and welded rails are brought into the tunnel and laid on the ground. Systems contractor ATC (Alstom, TSO, Costain) then brings in a vast multi-purpose gantry which slots track slab into position and then lifts up the rails, threading them into position on top of sleepers. This Herculean lifting operation can be accomplished with just one human overseeing the Metalliance-built gantry.

TRACK SLAB

Crossrail is using five types of track slab. With a total length of 41.2km,

Vertical alignment of Crossrail tunnels.



Rail waiting to be lifted onto sleepers in entrance to Thames Tunnel at Woolwich in late 2015.

IGHT

standard track slab accounts for around 80% of the central section of the Elizabeth Line. Direct fixed track has been chosen for use in the Victorian engineered Connaught Tunnel beneath the Royal Docks. This design allows engineers to create a flat surface on top of significant undulations in the ground and to work within height restrictions.

High attenuation sleepers - similar to standard slab - will be used in a few small areas to reduce noise and vibration, with floating track slab to be used to minimise noise and vibration along parts of the route. The track slab floats on a combination of Elastomet rubber bearings and heavy duty springs, and a light version will be used between Tottenham Court Road and Bond Street under Soho. The track slab is constructed and then jacked up to accommodate the bearings and springs. A heavier version is to be used where the Crossrail route passes close to the Barbican concert venue.

With rails correctly aligned, the slab then needs to be fixed in place - a job for ATC's 465-metre-long concreting train. Based at Plumstead, the concreting train heads west with all the supplies required on board to produce a suitable mix that can then be hosed into position by the systems team on the ground. At this point the railway of the future is now recognisable.

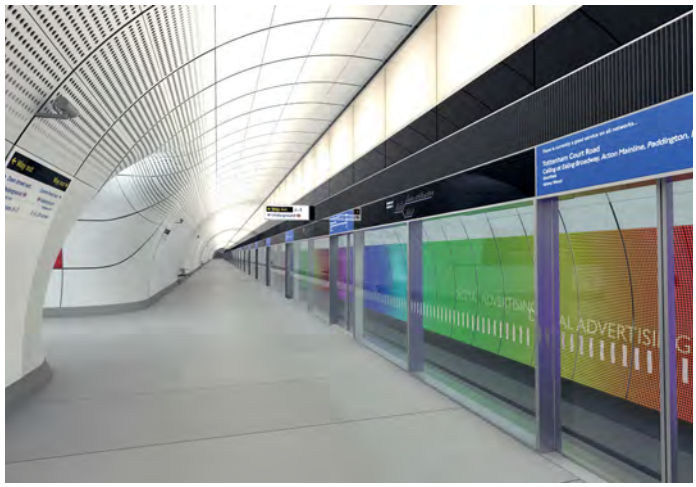
With the concreting train operating from Plumstead, tracklaying has begun along Crossrail's eastern stretches. The peccadilloes of the born-again Connaught Tunnel dictated that this rebuilt Victorian structure should get track early on. The new-build Thames Tunnel followed, and since then the concreting train has joined up these sections and progressed all the way from Plumstead to the Victoria Dock portal and beyond. The concreting train is regularly achieving 170-180 metres a day, working mainly at night.

In the west, Crossrail tunnels retain the temporary rails of the narrow gauge service locomotives, but not for much longer. Permanent rail laying and concreting began on a second front in March, and, while the absence of a concreting train will mean this is not such a mechanised operation, the rails will advance to eventually join up beneath central London. Programme director Simon Wright says that more than 20% of permanent track is now in place.

Crossrail discussions invariably throw up a few surprises, and this talk of how to bring supplies into the tunnels throws up another: did you know Crossrail's tunnel portals will have some of the steepest gradients on the national rail network? It makes sense when you think about it - to keep costs down and minimise the impact on the environment you want to have the transition from surface level to underground take place in the shortest reasonable distance. Mr Wright says that some of the portal approaches - notably Pudding Mill Lane - will be covered to ensure rail adhesion.

Once the concreting train has been through, the drilling machine follows. This is another impressive rig - this one built by Rowa Tunnelling Logistics - which does what it says on the tin. Crossrail tunnels need a lot of holes - 250,000 give or take - in order to support brackets for 25kV overhead electrification (expect the fixed overhead rail to be installed from 2017), emergency

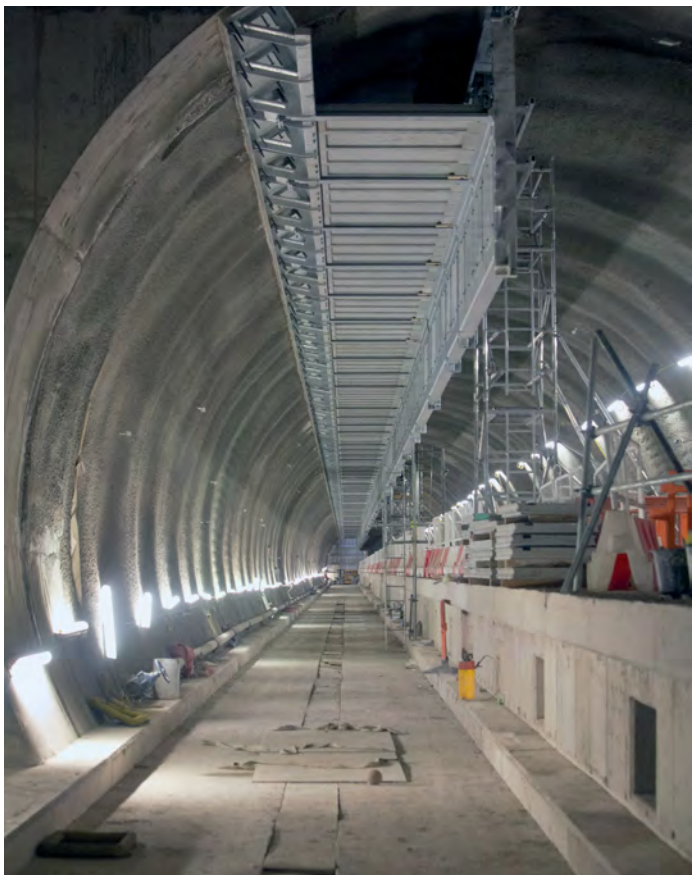
Bond Street station platform in January 2016 with brackets in place for platform edge screens.



Crossrail station model showing how platform edge screens will enclose the track.

Multi-purpose gantry lifting sleepers into place in Thames Tunnel in November 2015. **All photographs courtesy of Crossrail**

The concreting train begins its first journey on Crossrail at the Plumstead portal in October 2015.



Bond Street station platform in February 2016, with brackets in place for platform edge screens and ducts above the track. Air extraction duct openings can be seen in the platform side.

escape walkways, leaky feeder for signalling cables - all these and more need to be attached to the concrete segments which make up the running tunnels.

Drilling was never going to be glamourous, but this is undoubtedly a clever piece of kit. The locations for the many, many holes are programmed into the rig with positions calculated to avoid the joins between concrete segments and other inappropriate locations. Lasers are used to match up the physical tunnel layout with the drilling rig's blueprint and the machine is then unleashed to drill. This is one example of how the mucky engineering business of yesterday has been transformed into a clean and tidy precision-based procedure: each drill bit on the machine has vacuum abstraction to take the concrete dust away. Unpleasant vibration-induced workers' injuries such as 'white finger' are now a thing of the past; with Crossrail the drilling rig takes the strain.

PLATFORMS

While the tunnels are being kitted out with rails and fittings for systems, Crossrail stations are becoming recognisable as such. Platforms have been built - although, for now, temporary barriers separate station worksites from the running tunnels. Privately delivered Canary Wharf has been finished since May 2015 (when Cofely GDF Suez started its planned and preventative maintenance contract to look after the station and its assets, until handover to Rail for London in 2018) and the other new stations are at varying stages of development. Custom House, built with pre-fabricated components in Yorkshire and the only all-new surface station, is the most advanced, with escalators and lifts already installed.

Beneath the new central London station platforms - facing the track - distinctive square recesses look like an ideal spot for placing candles or similar new-age paraphernalia. In fact these are air ducts which will suck out brake dust and other pollutants from trains, keeping the Elizabeth Line tunnel environment clean and notably different to the Underground. This is a system characteristic of an underground modern railway -

Crossrail cannot claim to be first with this particular innovation, but for the UK this is a step forward.

Underneath the platforms space is split 50/50 between the ducts for this extractor system and a services tunnel for cables and pipes. Above the platforms are smoke extract ducts which are unlikely to be in regular use but, should there be a fire underground, will swiftly evacuate any smoke - getting rid of the principal danger of an incident of this kind. In terms of normal ventilation underground, the movement of trains will be the primary mechanism for keeping air in the tunnels fresh.

At Tottenham Court Road the builders have left square concrete blocks at regular intervals along the first stage concrete floor. This is because TCR is one of the locations that will receive floating track slab in view of the recording studios above ground in London's Soho district. These blocks will act as bookends for the sprung track, stopping it from edging forward whenever a train brakes at the station.

Jubilee Line excepted, platform edge doors remain a novelty for UK rail users, so the pictures of brackets being installed at Bond Street and other Crossrail stations give a tantalising sense of how bang up-to-date the new railway is. The physical separation of Crossrail station platforms from running tunnels takes the form of platform edge screens (PES), with the sliding platform doors underneath. The PES will include all the platform lighting in the form of illuminated panels stretching the length of the new station platforms. These will reflect light onto the glass fibre reinforced concrete panels which will be used to clad platform areas. The effect should be sophisticated while minimising maintenance and the need to attach lights to the tunnel roof. A similar but not identical system can be seen on the finished Canary Wharf station platforms.

The actual platform screen door modules - which will include real-time information displays above the sliding panels - are being manufactured by Knorr-Bremse in Chippenham. Simon Wright says the first production doors have been signed off, allowing the contractor to ramp up manufacturing.

At Paddington, work starts in April to dig a new 165 metre pedestrian tunnel to enable passengers to interchange between the Bakerloo Line and new Crossrail platforms. The new subway will run below Crossrail and Bakerloo platforms and will therefore include escalators and lifts at each end to make interchanging between Tube and Crossrail as easy as possible. Currently around 165,000 people a day use Paddington Underground services, with the figure expected to rise to 248,000 when Crossrail arrives.

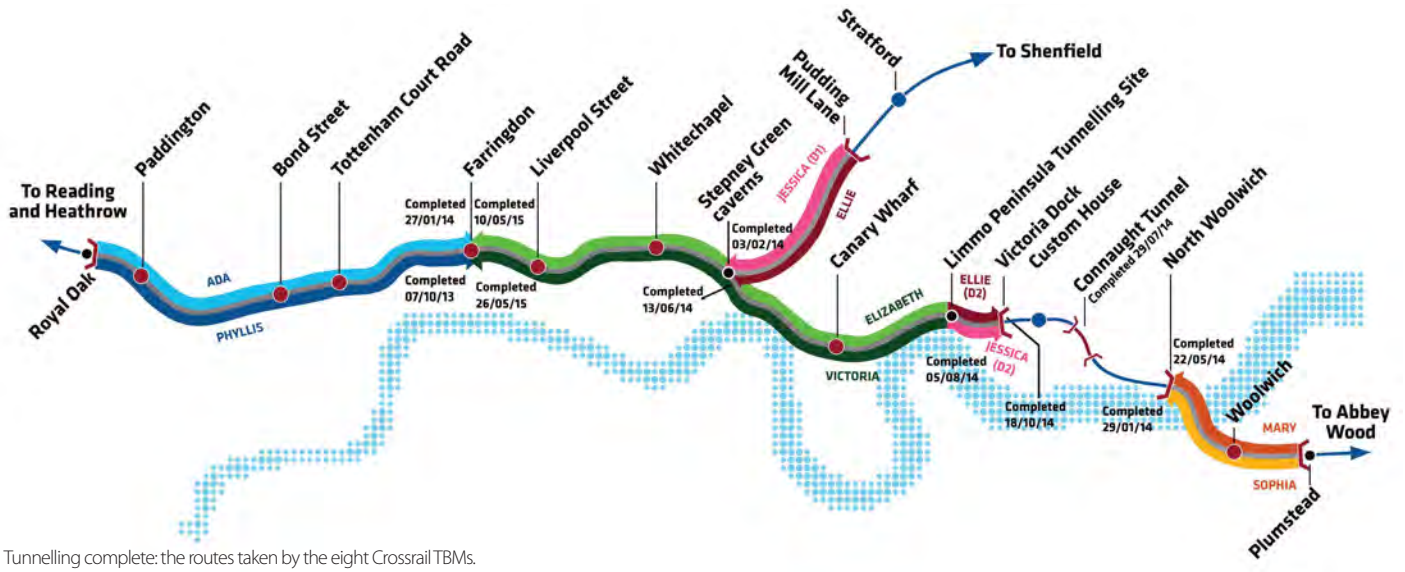
CROSSRAIL MILESTONES IN 2016

Limmo to Stepney Green ready for track installation	Q1 2016
Bond Street station - completion of platforms and platform edge screen to support track installation	Q1 2016
Royal Oak Portal - head house complete for systems installation	Q2 2016
Farringdon - completion of construction of the Lindsey Street box	Q2 2016
Liverpool Street - spray concrete lining works complete from Moorgate Shaft and hand over shaft to C502	Q2 2016
Track concreting complete Victoria Dock Portal to Stepney Green	Q2 2016
Commence floating track slab installation at the Barbican	Q2 2016
On Network Works - Driver Only Operation (DOO) equipment complete Harold Wood Station.	Q2 2016
Woolwich station equipment rooms ready for systems installation	Q3 2016
Tottenham Court Road - completion of Western Ticket Hall civil works	Q3 2016
C360 - Eleanor Street Shaft equipment rooms access available for Systems installation	Q3 2016
On Network Works - slew remainder of North Kent Line	Q3 2016
Whitechapel - completion of westbound platform and platform edge screens to support track installation	Q4 2016
Pudding Mill Lane - complete civil engineering for Network Rail to start Up electric works	Q4 2016
Permanent way complete within tunnels	Q4 2016

COUNTDOWN

As mechanical and electrical systems are installed at stations, Mr Wright indicates that the challenge is

Floating track slab preparation beneath Soho, between Tottenham Court Road and Bond Street. The blocks will 'bookend' the sprung track.



Tunnelling complete: the routes taken by the eight Crossrail TBMs.

co-ordinating and integrating the myriad activities which need to come together to get stations ready for handover to the future infrastructure operator. Where Tube stations already exist this will be London Underground, with Rail for London (the TfL subsidiary which also manages the Overground) taking on stations without an LU interface (such as Custom House), and Abbey Wood remaining the responsibility of Network Rail.

Major Crossrail contract awards are largely complete, but there is one to come in 2016 - that for construction of the new asset maintenance depot at Plumstead. The reason this contract has had to wait is because Plumstead is currently being used by Alstom/TSO/Costain as a construction base and compound for plant, including the concreting train. The new depot is set to go up in 2017.

2017 will also see the first new Crossrail Class 345s in operation. These are scheduled to enter service on the Great Eastern route from Liverpool Street from May 2017, replacing existing Class 315 units. Dynamic testing of the electric multiple-units will take place on Crossrail's south eastern spur from late 2017. Stage 2 follows in May 2018, with Class 345s running from Paddington high level to Heathrow Terminal 4.

All this activity gears up for the major event which is the Stage 3 launch in December 2018. This sees Crossrail trains running through the new tunnels under central London and Docklands, with the vast new station complexes brought into passenger service.

The next year will see the new railway take shape as tracklaying continues and station shells are transformed into recognisable entrance halls, concourses and platforms. The age of concreting is coming to an end and the skilled trades are coming in to help the engineers get Crossrail finished. The finish line is within sight. mr

Concrete track slab in the restored Connaught Tunnel below the Royal Docks east of Custom House. The tunnel was previously part of the North Woolwich branch.


Track and switches installed west of Custom House station where the route climbs eastwards from Victoria Dock portal.


Custom House, the only all-new surface station, is the most advanced in construction. View to the east in February 2016.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SURFACE PROGRAM

Crossrail and Network Rail are 60 per cent through the investment programme on existing railways

Around 75% of the Crossrail route runs above ground on the existing rail network, reaching to Shenfield and Abbey Wood on the two eastern branches, and to Heathrow, Maidenhead and Reading in the west.

The investment programme to transform these sections of railway for Crossrail includes major works such as the new flyovers at Airport Junction, the diveunder at Acton, and a new station at Abbey Wood, as well as a complete rebuild of seven existing stations, plus electrification and signalling work.

Matthew White, Crossrail's Surface Director, says that even standing alone, the eastern and western surface works 'are enormous programmes in their own right, so to integrate these sections of the railway with the new tunnels is a significant challenge.

'We need to get the functionality right, know what we want across the two railway systems when they are joined up, and know when everything needs to be delivered.

'All that is wrapped up in an agreement with Network Rail as our industry partner – an investment with a funding limit of £2.3 billion.'

Mr White stresses that 'We're very aware that we have a huge taxpayer investment in what we're building in the surface works, and it's very important that Crossrail acts as a client and customer for the enhancements required on these "on-network" sections.

'We take that responsibility very diligently', he continues. 'My experience is that a client that knows what they want, and when, gives its delivery team a chance of achieving it on time and budget.'

Mr White believes Crossrail is very rigorous in how it performs as a client and customer. 'The way we work together is to create a set of outputs we want for Crossrail in terms of a reliable, high capacity, and highly connected railway. The outputs are in the form of functional requirements – about 400 of them – and key output dates when each element is required. Those are our links into the rest of Crossrail, the Central Operating Section.'

Incentivisation is applied via a target price to promote delivery under budget – 'quite a novel thing in this regulated rail world', says Mr White. 'The dates in the delivery process are also incentivised – not just the end dates, but stage by stage. We are currently about 60% through, and there have already been a number of key dates – so we know exactly where we are in delivery of those functional requirements.'

That creates confidence for all parties, 'and if things change, because technology or other factors move on, we can change those requirements.'

Matthew Steele, Network Rail's Programme Director, Crossrail, says that there is a genuine joint approach between Crossrail and Network Rail, 'both in the way it is set up and the work of individuals: our transparency means that virtually everything is shared with Crossrail – including schedule, technical specification, cost, and how we are managing things. But of course Crossrail are quite properly robust with us, and we are with our contractors.' A programme team of about 400 people is dedicated to Crossrail within Network Rail.

EASTERN ROUTES

Abbey Wood is set to be a fantastic terminus for the future, says Mr Steele. The first 18 months of work in this area have seen groundworks and preparations by Balfour Beatty to move the North Kent line southwards by about 10 metres, creating space for two new tracks for Crossrail which will run for about a mile

Abbey Wood station – architect's impression. **Crossrail**

MME PARTNERSHIP

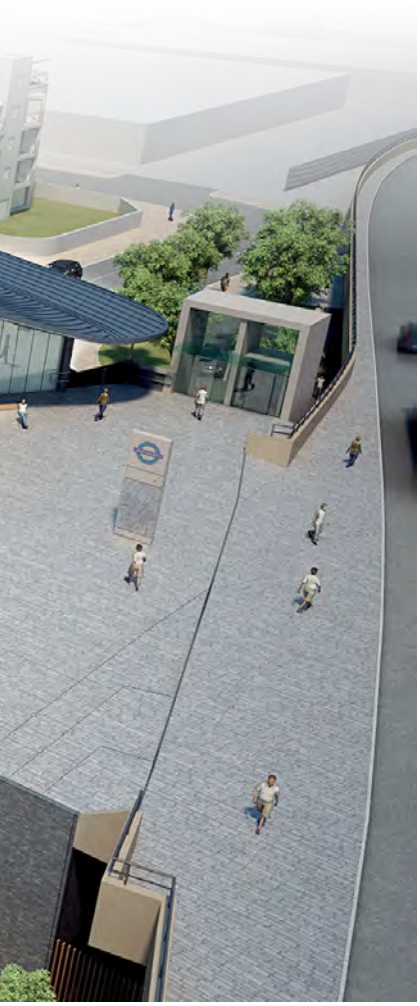
between the Plumstead tunnel portal and Abbey Wood station.

The first new platform at Abbey Wood was opened in February, and the next stage is to start to build the station in earnest at Easter 2016. When complete, it will have two island platforms, one for Crossrail trains and one for the North Kent line.

The section from the Pudding Mill Lane tunnel portal to Shenfield is largely about station works in preparation for Crossrail, says Mr Steele – station building enhancements, new footbridges and platform extensions. Costain's work here picked up pace in early 2016 with a new footbridge going in at Harold Wood, new overhead lines installed along the route, and platform extensions at several stations. The new wiring will see an end to speed restrictions imposed during summer months when fixed wires can expand and sag in the heat.

Remodelling at Shenfield with an extra platform will create a layout that can turn the full Crossrail service round without conflict with the Greater Anglia service. Resignalling works by Signalling Solutions – not new signalling but building upon the existing relatively modern system – will also increase capacity, with new Smartlock interlockings.

The Rail Operating Centre building at Romford is now in place and ready for Crossrail to start installing the signalling equipment.



Forming part of the new junction with the Heathrow airport line, the eastern flyover at Stockley will carry a link from the Up Airport Relief line (left) across the Relief lines to the Up Main line. View to the east in December 2015. **Alan Wallwork**

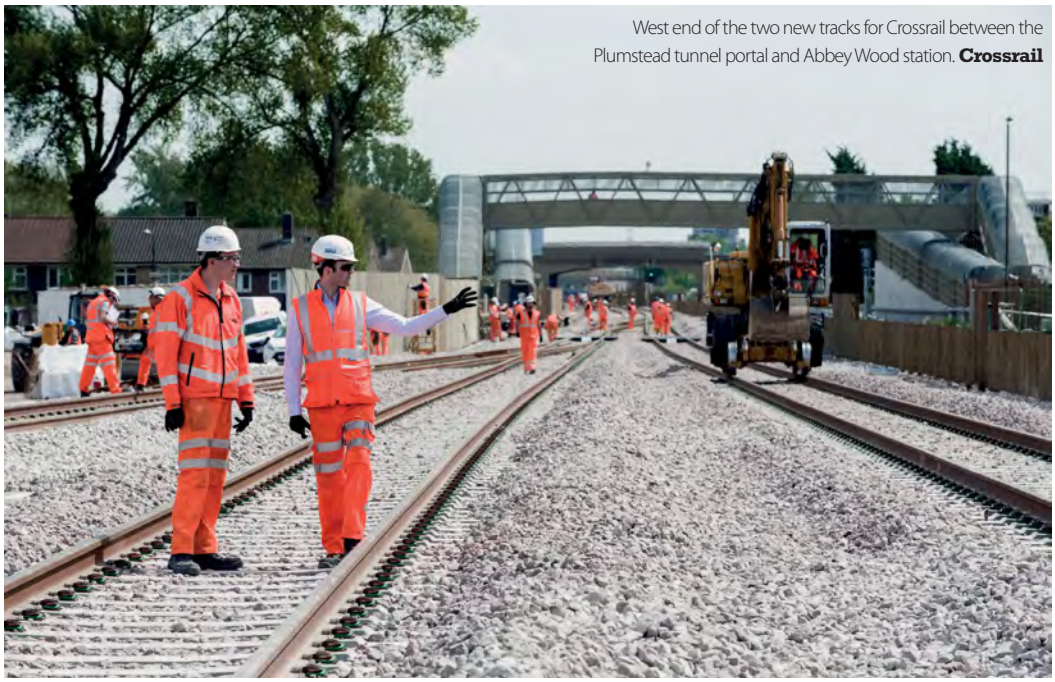
GREAT WESTERN

In the west there are several big civils projects, with the most significant changes to the existing infrastructure. Running west from the Westbourne Park interface between tunnelled and surface sections, the first really big work has been at Old Oak Common – creating space and connections for the Crossrail depot and the Crossrail lines. The Great Western Railway depot has been kept operational throughout.

At Acton, Network Rail and BAM Nuttall's civils work has been completed on the new diveunder, and trackwork is now going in. To make room for this, Acton yard had to move eight metres to the north, line by line over many weekends, then a new ladder junction was put in. The new junction will enable long empty stone trains to snake westwards out of the yard while eastbound Crossrail trains roll through beneath. Segregating the freight and Crossrail trains adds so much reliability into the timetable, it is

Work in progress on the new western flyover at Stockley in April 2014. **Network Rail**

First new platform at Abbey Wood, opened in February 2016. **Crossrail**



West end of the two new tracks for Crossrail between the Plumstead tunnel portal and Abbey Wood station. **Crossrail**

Overhead lines were upgraded at Chadwell Heath, Romford and Ilford at Easter 2015. **Network Rail**

well worth the investment to create it, says Crossrail's Matthew White.

At Ealing Broadway, Network Rail and Vinci Construction are extending platforms and providing a new ticket hall and footbridge. Acton Main Line, Southall, West Ealing and Hayes & Harlington are also gaining new station buildings.

The significant work by Network Rail and Carillion at Airport Junction, Stockley has progressed through several major stages. The first spectacular phase, in 2014, saw the new flyover across all four lines installed. The recent phase creating a 146-metre tunnel further east across the Relief lines will lead to commissioning of the new junctions at Christmas 2016. This job presented real challenges in building next to a live railway, says Mr Steele – work has been carried out during traffic hours on the middle section with just two-hour windows at night to lift 146 forty-tonne concrete beams into place, at about two beams per night. 'The logistics to get that completed have been complex but it has worked well', he says.

Some significant signalling changes have been needed, with interlocking renewals with Alstom Smartlock completed by Signalling Solutions – at Easter 2015 new signalling was commissioned between Airport Junction and the Twyford area: all four tracks have had signalling renewed and control moved to Didcot.

Signalling changeover between the Central Operating Section's communications based train control (CBTC) and train protection and warning system (TPWS) on the eastern surface route will take place at Stratford station, while on the western side it will take place on the move in the Westbourne Park portal area. Signalling between Westbourne Park and Heathrow will ultimately be by European Train Control System, with enhanced TPWS initially between Westbourne Park and Airport Junction.

Remodelling has also been carried out in the West Drayton and Maidenhead areas, including for turning back trains in sidings. Overhead electrification has been carried out by Balfour Beatty between Stockley and Maidenhead, with the GW electrification project continuing the wiring westwards.

MAJOR POSSESSIONS

A lot of work is done at night, at weekends, and Christmas and Easter possessions are seeing major activity, taking every opportunity to do as much as possible.

The blockades run for Crossrail are some of Network Rail's biggest ever – Christmas 2015 saw a £60 million package with a four-day all-line block on the western route, and a six-day block of the Relief lines. 3,000 people were at work and completed 325,000 person hours in 10 days, using 24 cranes and over 180 pieces of plant.

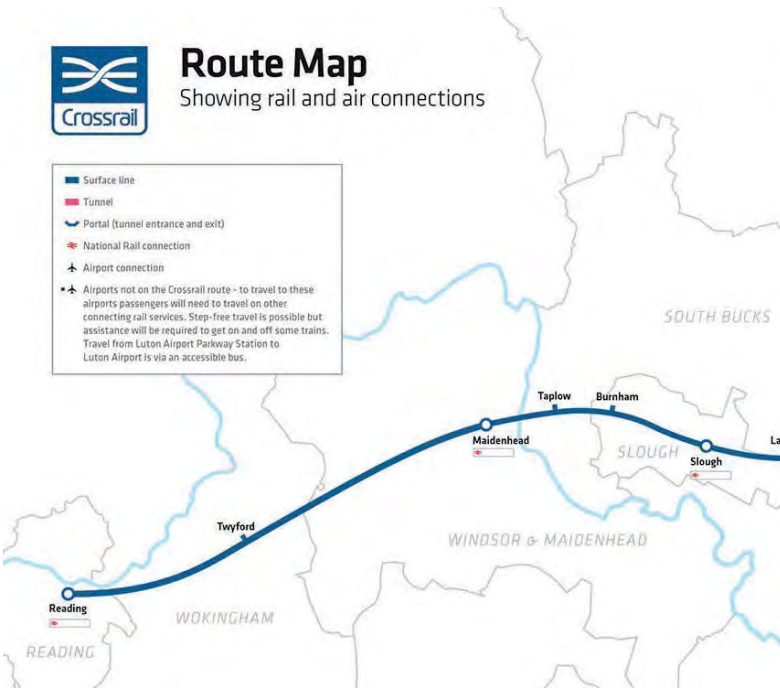
'This enabled us to get a lot done – preparation is absolutely critical in terms of getting the work done, safely, and handed back on time,' says Mr Steele. Easter 2016 will see major activity on all three surface sections, including Abbey Wood and virtually all stations in the east, and at the main locations on the western side.

Mr Steele says the supply base has really stepped up to the challenge of this activity – 'an order of magnitude bigger than anything else that's being done currently: they work closely with us and are really committed to deliver Crossrail.'

Commitment to safety is also dovetailed between Crossrail, Network Rail and contractors: in a joint safety week recently, work was scaled down on sites, and personnel including site supervisors and managers took part in activities designed to increase safety awareness – for example, putting people into a rail-road vehicle to understand what its driver can and cannot see.

PLATFORMS

For station platform clearances, Crossrail and Network Rail have set out to improve the sometimes



large stepping distances at the Great Western stations, so work is being undertaken to improve those subject to fleet compatibility. The clearances have to cater for existing fleets and new fleets, especially on the Great Western route where Inter-city Express Programme trains are being introduced as well as Crossrail's new trains. 'We have worked through carefully, platform by platform to make sure we understand what we've got to do and how', says Mr Steele.

There will be level boarding at Abbey Wood as the Crossrail platforms there will be part of the dedicated Crossrail route, so the same standards apply as at Crossrail's Central Operating Section stations.

Wherever possible, platforms are being lengthened – major work at Christmas 2015 to rationalise the entire West Ealing junction was largely to give space for platform extensions there. But in a few cases where low passenger numbers are predicted or there is constraining infrastructure such as an overbridge, selective door operation will apply to a few doors.

COMMUNITY RELATIONS

The major engineering work has presented many real challenges – delivering work around the operational railway, disrupting services as little as possible, and managing the safety of staff and travelling public.

These major civils works are being carried out in quite densely populated areas, so Network Rail has worked with communities to make sure people understand what it is doing, says Mr Steele, and has concentrated on minimising intrusion in terms of noise and lorry movements. Happily, a four-track railway means two tracks can generally be kept open.

Scheduled at weekends and holiday periods, a lot of engineering activity takes place when people tend to be at home relaxing, so the challenge is to inform, consult, and take opinions on board – it is a project in its own right, including door-knocking, letter dropping, and social media activity, says Mr Steele.

'We've knocked on 25,000 doors in the last few months alone – this is unprecedented in scale, and represents a new level of recognition of the need to engage with communities.'

Having a human face and popping round to talk is a big help, and Transport Minister Claire Perry has been duly impressed by the level of engagement.

BENEFITS

Mr White says that realisation of the benefits of Crossrail has helped to mitigate community concerns over disturbance: asking people in local communities on the route what they feel are the benefits of Crossrail for them as a family, as a business, or as a commuter, 'they often identify the much better connectivity that Crossrail will bring, whether it is to Stansted or Gatwick via Farringdon, central London, or local connectivity – or sometimes they want to discuss the new lifts at stations to improve access, cross platform interchange, or the much higher capacity Crossrail will be providing, from the combination of new signalling, new trains and service frequency.'

The final strand is reliability, which may often be taken for granted, but it is certainly identified as a priority when it is missing – 'to achieve this, a lot of the investment is going into making existing assets more reliable.'

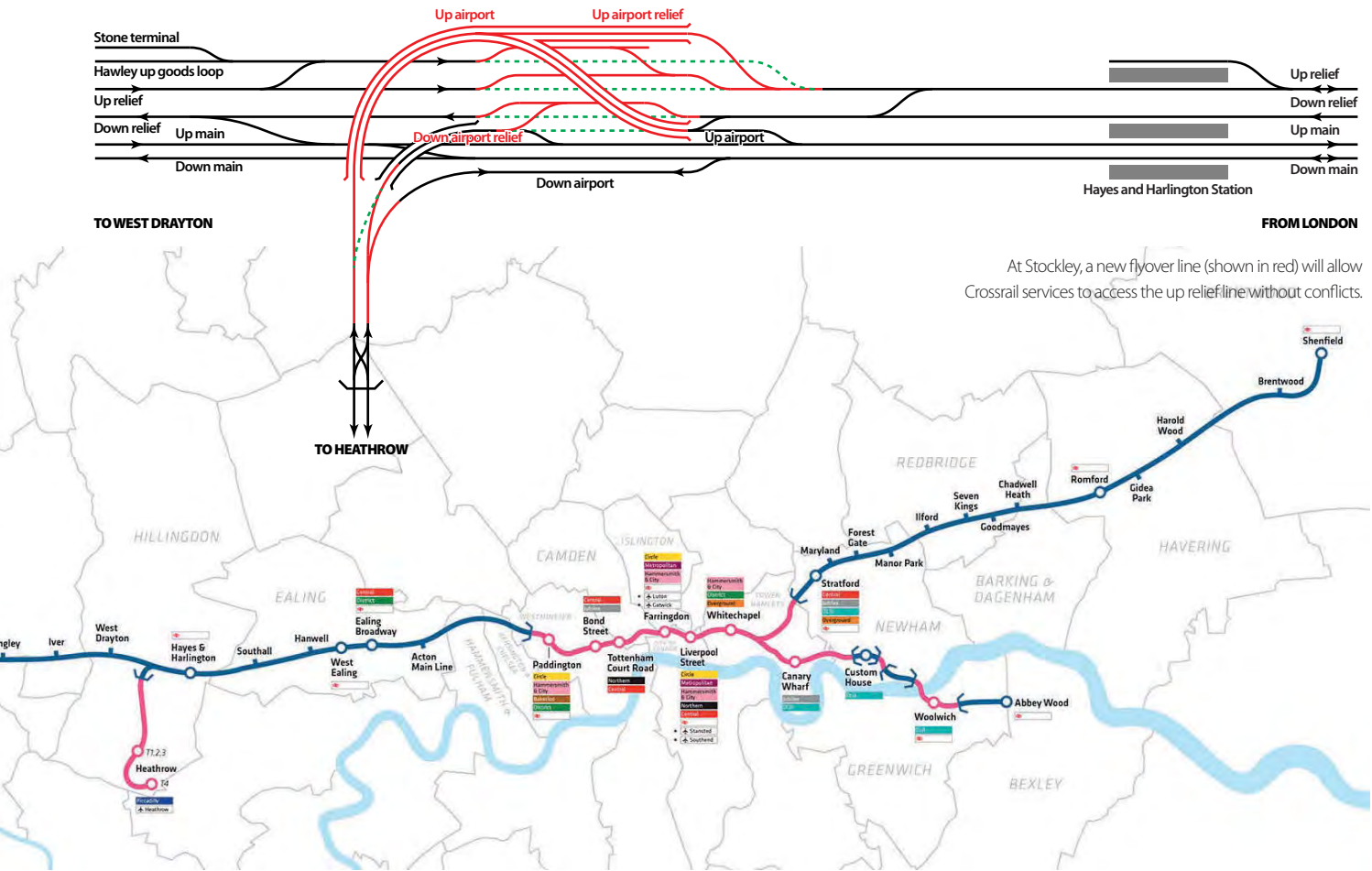
Alongside the transport benefits, economic benefits are expected to come in Crossrail's wake, and commercial development is already springing up, for example at Abbey Wood.

LEGACY

'We are as focused on the end product as we are on how we get there', Mr White sums up. 'Lots of what we do on Crossrail is about the processes we use to get to that end product, so transparency and collaboration are very key components of that, along with the high levels of safety that we demand.

'One of the advantages of having Crossrail's special purpose organisation is that there is a clear mission and it's defined in outputs and dates – we are of course working ourselves out of a job, but the positive motivation is the legacy and quality of product that is being created.' And the recent Elizabeth Line announcement has really sent a buzz round the teams, report Mr White and Mr Steele.

'On the Learning Legacy website that has just gone live, the story that people will be able to follow is not just about how we created huge underground tunnels and spaces, or rebuilt the railways to east and west, but how we worked together with the supply chain and also as partners', concludes Mr White. *Ken Cordner*



At Stockley, a new flyover line (shown in red) will allow Crossrail services to access the up relief line without conflicts.

345 COUNTING C

IAN WALMSLEY takes a first look at the Class 345 for Crossrail

Just like at Birmingham New Street, changing platforms is never easy. Bombardier's new 'product platform' is the Aventra – and when the preceding Electrostar product platform reaches its imminent end, it will be a 20-year old design, so it's time for a change. (I envisage a smiling Porterbrook greeting 'Evening Electrostar', last of the line.)

Electrostar has been a great design, recording record reliability, and it is the lightest and most efficient of any of the post-privatisation EMUs: but it can't meet the demands of Thameslink or Crossrail. Siemens took Thameslink, and its Class 700 is a fine piece of engineering, however I am delighted to say that Bombardier's Class 345 is also a fine piece of engineering, indeed possibly finer. That class number was reserved back in the 1980s, probably the longest time ever taken to become reality.

Crossrail is more 'metro' than suburban, as it doesn't have the long runs to the coast that Thameslink has, so the interior is classic 'people mover' style with lots of standing space, but still has seats for 450 passengers, mainly longitudinal. Having said that, remember that this is a new platform, adaptable for many duties, including 'inter-city', so I will be looking at the train, not just how it is kitted out for Crossrail. If this was a standard ship we would now be looking at the MBNA Thames Clipper version, but the hull could just as easily be a Cunarder.

Cabs for the Class 345 under construction in the Bombardier cab shop at Derby.

INTERIOR

Lets get this out of the way first before I start enthusing (and I will) – personally I don't like the interior colours, but as Jon Hunter (TfL's Head of Design) explained, it's all about 'creating that feeling of height and space inside the carriage, using progressively lighter colours between the floor and ceiling – a proven architectural approach – and aligning elements of the design with the new stations'. More sophistication than 'S' stock was required, and in the UK sophistication apparently means grey – or as Mr Hunter puts it, 'a more restrained colour palette than we are normally used to seeing in the current age of overly bright rolling stock'.

I can see why they changed the floor from an earlier proposal for a light colour – I have white vinyl in my kitchen and you can see a cornflake on it from the bottom of the garden – so Class 345 has a dark grey, two-tone floor. Uniquely (as far as Google images is concerned) the walls are a dark grey with an LED light-washed white ceiling augmented by centre spotlights. Advert panels are included as on Underground trains, but the whole look was darker than I'd been expecting. LED panels make light-washing obsolete in my book, direct light is a good thing. TfL thinks it looks good, it

ON IT

wanted a 'relaxing and calming, not over bright and sterile' train more in keeping with the stations; so I reserve judgment until we get the full Elizabethan experience.

The trim is shades of purple with a spectral-lines-style moquette, which I do like, but the seats that are not longitudinal are from Fainsa, in my view suppliers of some of the most uncomfortable on the market. Bombardier tells me it has listened and the seats have been specially adapted to meet TfL's requirements for Crossrail. TfL wanted to use materials that 'wear in, not wear out', so stainless steel is used in high wear areas, and you couldn't have a more proven product for metro trains.

One nice touch is the reappearance of the two-level armrest on the longitudinal seats, which avoids fighting for space with your neighbour as one naturally takes the upper, the other the lower level. You find these in old theatres and Underground trains, and they do work. Another welcome classic feature is the strap-hangers, redesigned to provide a bit of lateral stiffness, but still a strap-hanger.

Impression of Class 345 for Crossrail. **Crossrail**

Great care has been taken to keep a consistent theme with the panel shapes, and conceal the numerous fixing points where access is required – which is basically everywhere. Fixings will be designed to avoid rattles appearing over time. Unlike the Class 700, Wi-Fi is being installed from build.

HVAC

Heating ventilation and air conditioning is by Melco (Mitsubishi) and is based on the Underground's 'S' stock, currently reaching the end of its production run and spreading joy over the capital. There is a big module in the middle of the vehicle roof supplying large ducts and vents down the centre of the ceiling. This is great for limiting noise and draughts; it has a lot of work to do, as every train will be importing heat into the tunnel and doors will be opening every few minutes. The 'S' stock was the perfect proving ground for this, so no worries here.

Low-level heating is also provided under the longitudinal seats, which is fan-assisted as in DMU practice. Further heating comes from the HVAC unit in the roof, and simulations show good even temperature distribution across the vehicle.

TRACTION

Now I go into full enthusing mode, the traction being from Bombardier's company in Vasteras, Sweden. Formerly known as ASEA, this company built the first fleet of thyristor-controlled locomotives and has led the world in solid-state traction ever since. The Electrostar equipment came from there, based on the Stockholm C20 Metro kit, and the Aventra has a similar traction motor installation to the new C30. Some readers may recall the grief introducing Electrostar, with software reissues, but this

Near-complete exterior of Class 345 vehicle.

Class 345 bodyshell on the Derby production line, with a FLEXX Eco Bogie in the foreground. **Production photographs courtesy of Bombardier**

TESTING, TESTING

Bombardier in April 2015 awarded Balfour Beatty a £12.5 million contract to create a production, testing and office facility at its Derby plant for the construction of the new Crossrail fleet.

The facility measures approximately 250m by 40m, enabling it to handle 4x10-car trains at a time. The 66 trains ordered for Crossrail are of nine cars, about 205m overall length.

The new facility includes four tracks, each with full length overhead wires and inspection pits, connecting with the existing test track on site. Office space is in a two-storey annexe, and power upgrade works at the site for the overhead line equipment were also included in the contract.

Nottingham-based architect CPMG designed the new Bombardier facility.

The building allows for newly built trains to be fully assessed in a safe environment before they commence commissioning and entry into service.

Prior to this, Bombardier's new £1.6 million 'iron bird' integration test facility at Derby came into use, inspired by the aviation industry, where advanced pre-production testing takes place in a simulated environment. It was officially opened in December 2014 by the Mayor of London, Boris Johnson.

Looking forward to this spring, the first Class 345 trains are to arrive at Network Rail's Railway Innovation Development Centre at Melton Mowbray – the Old Dalby test track. Here single train testing will be carried out to prove the trains' systems, including the transitions and wayside systems.


Two Class 345 bodyshells on the Bombardier production line.

was all about meeting impossible safety case demands. Eventually Railtrack accepted the trains, although very little changed with the way the equipment worked. Today the safety case process is more mature and predictable.

New motors are designed to just fit between the bogie frames and are rated at 225kW compared to Electrostar's 250kW, and 55% of axles are motored, giving acceleration of 1m/s^2. You might wonder 'why bother changing from Electrostar electronics if it is so good?', but they are 20 years old and the new motor means a new drive. Why a new motor? Well that's the bogie, because it's worth it.

BOGIE

The bogies are the FLEXX Eco Bogie B5000-derivative inside-frame design, similar to that on the Meridian (probably the only good thing about Meridians in my view). This bogie saves a lot of weight, is track friendly, yet seems tiny under the Class 345's substantial 23-metre-long coach. The bogie looks well engineered, and a long way from the British Rail Research prototype I remember looking at in the Railway Technical Centre research workshop back in the 1980s. The design is from Derby, although the manufacturing is done on the continent.

All brakes are disc; there are no tread brakes (as used on the Class 700 where motors and disc brakes were not fitted into its inside-frame design power bogies). Most braking will be done electrically, regenerating power to the grid.


Interior of Class 345 bodyshell.


Impression of Class 345 interior. **Crossrail**

BODYSHELL

The bodyshell is brilliant, and I say this as a passenger and an engineer. Windows are huge, and the deadlights between them only 25cm (38cm including the rubber seals). By comparison a Meridian is 64cm, 80cm if you include the curtains. There are three doors per side, but, looking at the vehicle and imagining no middle door, you can see what a fine inter-city vehicle this would make. The doors have even taller windows, which means standing passengers can always see where they are without limbo dancing. The opening is 1,450mm wide, easily enough for two passengers to board at once (most EMUs are 1,300mm, 'S' stock 1,500mm). Bodyshells are made of extruded aluminium (from China and Germany) and constructed from four main sections; roof, floor and two sides. All but the sides are welded in Derby, and the sections are placed in large rotating jigs where they can be fitted out with gravity on your side. If you have ever changed a light fitting in your ceiling, imagine how much easier it would be if you could rotate the house.

The side sections have a 'webbed' lattice in them, which varies in thickness to meet load demands, and the vehicle is 'tubed' by Huck-bolting the sections together, which has been shown through dynamic testing to resist the type of 'unzipping' failures seen on older welded aluminium designs. This is all a development of Electrostar, learning lessons of moisture traps and snags. Inside there are no obstructions, other than remarkably narrow door aperture strengtheners just wide enough for the buttons. All the kit that would be in the end cupboard has to move to make way for the wide gangway, so that is all in the ceiling or underframe, just like the Class 700.

Bodyshells are shot blasted and designed with no tight edge radius points, to ensure a perfect paint finish and a life much longer than train operating company liveries.

DOORS

The reliability nemesis of so many trains is entrusted to IFE, which excelled on Electrostar. Doors routinely caused 20% to 30% of failures on 1980s designs, so the electric doors on Electrostar and Juniper were a revelation when they appeared. The doors are sliding-plug, and Bombardier deserves great praise for not bottling out and going for simple sliding doors. Sliding-plug, as the name suggests, plug the aperture and make a good noise-proof and draught-proof seal. They also mean you don't have to have a door pocket which takes away interior space and means a blank wall next to it instead of a window. The penalty could be speed of operation and complexity, but the IFE test rig has been running for a year and achieves significantly improved open/close times compared to Electrostar plug doors.

The door headers look top quality and are a neat, compact design with the controller further down the roof section, well away from any water ingress. Windows and doors have carefully designed drain holes to channel away rain, condensation or any other misplaced fluids.

Complete doors are mounted in jigs for rapid assembly into the vehicle. Also jigged are the main wiring looms, which are made on site at BTROS (the interiors and cabling subsidiary of Bombardier), just the other end of the works. I watched the pre-tested looms being lowered into place on the upside-down underframe in a few minutes. I first watched Mk 2 vehicles being assembled here in 1973, and the vastly simpler wiring in those took a lot longer.

Inside, the silver insulation and equipment that will be hidden by the trim panels looks very space age – one designer suggested we should leave it like that as it looks so cool and impressive (and brighter!).

Cab doors are worth a mention, as the powered swing-plug ones have caused problems before. We now have an inward-opening slam door, like on a locomotive, which will be more reliable and allows a droplight to be inserted with no fear of beheading the driver by sliding open. It can't infringe the gauge line, but is still interlocked for safety.

CAB

The bolt-on cab is primarily of locally supplied parts from Garrandale (which makes all the jigs) and built up in the now extensive cab shop. The Class 387 Electrostars in there suddenly look rather quaintly old. The new cab has done an excellent job of disguising the crash structure and anti-climbers beneath the skin. I have moaned before about the lack of flair in Bombardier designs, but not this time.

The full width cab has no problem accommodating European Rail Traffic Management System (ERTMS) equipment and has gone through many design optimisation workshops. Drivers and human factors experts have pored over button positions, moving some of them about on areas of Velcro on a mock-up desk to get them just right. My experience is that you do this, and then bring in the driver's reps who put them back again, but TfL and Bombardier involved drivers from the start. The cab HVAC was a bit noisy on Electrostar so that has been put right for Aventra – always keep the driver happy.

WEIGHT

Every ounce (sorry, gramme) in the train will be accelerated every few minutes every day for the next 40 years or so, and will contribute to pummelling the track, so the fewer grammes the better. Apart from that, TfL expects to carry up to 1,500 people per train, and the key thing is to keep the axle load significantly under 20 tonnes when fully laden. Regular readers will be aware that newer trains are almost always heavier than old ones and the lightest we have in service are the oldest, the Class 313s, which are next for scrap.

Bombardier's crowning achievement here is to get the weight per unit length to less than an Electrostar and almost down to that of the '313', although we will save the figure for the weigh-in.

PROCESS

This train is a fine piece of work, and it has been achieved by good customer-supplier relations, sensible specification, good engineering and sufficient time allowed for 'challenging and creative conversations' as the designer called them (I've had some of those in my time). TfL's contract asked for about nine months before design freeze, with milestone dates to agree the design. 'If you know what the customer wants early enough a mutually agreed result can be achieved with minimised impact on the design and development programme', says Martin Wilson, Chief Engineer on the project. The last thing to be agreed is usually the seat covering moquette - and this was no exception on Crossrail.

TfL's specification only quoted train length, leaving open the vehicle lengths from short articulated to long conventional. Nobody in their right mind would go for 26-metre long, but 23 metres was achievable and that's what Bombardier chose for Crossrail. While most cost-effective, that can bring a big stepping distance to the centre door on a curved platform, but fortunately the route doesn't have any bad ones.

POTENTIAL

As a platform, the design will be offered in various guises for future contracts up to 125mph, and has already won the TfL order for 180 Class 710 vehicles for London Overground to replace the old Class 315 and 317 trains inherited when it took over services out of Liverpool Street last year. Class 710 is a 20-metre, two-doors-per-side variant. Merseyrail is another target, where low weight could be enough to avoid sub-station upgrades, but the interesting one to me is East Midlands Trains electrics. As a 125mph unit it would cope well with Corby commuters and the 'Master Cutler' crowd – it is all about the interior.

Bombardier is using two production lines in its existing Derby facilities, each with five bay stages. A new test shop is being built to take the 240 metre-long trains. The first train was well advanced when I visited in early February, and a lot had been learnt from 'train zero', which, like the 'iron bird' in aircraft building, is a life-size test rig. This is way more complete than previous versions I have seen, with correct-length pipe and wiring runs along with most auxiliary systems.

Those who thought the coming of Hitachi to the UK spelled the end of Bombardier were wrong, indeed historically the UK has always sustained two big builders; it is the third that doesn't survive. UK train operators, far from wanting to 'buy British', seem to have a degree of 'positive discrimination' in favour of overseas suppliers, sometimes based on problems encountered years ago. With the new design, Bombardier can take them all on. I think we will see this product platform around for many years, capitalising on the success of Electrostar, and who knows, maybe even exporting to Europe? 345 – count on it. mr

TRAIN DEPOT

The new rolling stock maintenance depot for Crossrail is taking shape at Old Oak Common.

One of the largest depots to be built in the UK in recent years, it will have nine roads, each over 200 metres long. Its roof is the size of four football pitches, and 33 sidings will be able to accommodate half the initial fleet of 66 nine-car Class 345 trains of 23-metre cars. The depot has been future-proofed, with space to extend for 11-car trains and a capacity to service a fleet of up to 84.

Bombardier, in conjunction with main subcontractor Vinci, signed a rolling stock and depot provision agreement with Transport for London in April 2014. The agreement covers not only building the trains and the depot but also 32 years of train maintenance. So the manufacturer has been driving the design of the new depot, building in features aimed at achieving the best possible maintainability, reliability and presentational standard of the trains. These include an automatic vehicle inspection system, of a type already installed by Bombardier at its Gautrain facility in South Africa and at the Voyager depot at Central Rivers, and a heavy cleaning facility, as well as automated carriage washing machines.

A planning requirement was that the depot should generate a fifth less carbon dioxide than would be expected for its size. Bombardier's design exceeds this requirement, with green measures cutting by a third the carbon dioxide generated by depot operations. Over 30% of the depot's energy requirements will come from renewable sources, with the building incorporating photo-voltaic cells, solar thermal panels and sheep's wool insulation in the walls and roof. Pipes buried deep underground will sink heat in summer and draw up warmth in winter via heat pumps.

A central boiler plant produced by NG Bailey's Bradford factory is designed to save time on site and improve quality through assembly under factory conditions. The boiler plant will serve hot and cold water services, and compressed air networks for the maintenance pits and workshop.

NG Bailey is also providing ventilation and cooling systems to the main workshop, controlled by a latest-generation building management system.

The nine-road shed will feature a Hegenscheidt wheel lathe and a road equipped with jacks capable of lifting an entire train. A pair of roads each for light and heavy maintenance will be equipped to swap out bogies and deliver them to an on-site bogie workshop. Other roads will cover inspection and heavy cleaning.

Safety in operation is a key consideration, and the depot will be fully signalled, with the covered roads protected by Zonegreen's Depot Protection System.

Around 260 people are involved in construction of the depot and when operational it will employ 80 staff. It will include accommodation for 300 members of train crew based at Old Oak.

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STAND BY FOR OP

Operator, trains and infrastructure are gearing up for the phased opening, Crossrail's Operations Director, **HOWARD SMITH**, tells **DAN HARVEY**

Crossrail operations director Howard Smith compares commissioning Crossrail to a ski jump: it's a long, arduous climb to the top, but once you start the descent, things happen very quickly.

As one of the select group that has been involved in development of the Crossrail programme in its current incarnation since the early days, Mr Smith is clearly relishing the prospect of years of planning finally translating into an operational railway. Having led Transport for London's Docklands Light Railway and London Overground arms, he was appointed operations director for Crossrail Ltd in 2013 and now reports to both Crossrail's Chief Executive, Andrew Wolstenholme, and TfL Rail's chief, Mike Brown. But Mr Smith's involvement with Crossrail dates back to 2004 - prior to joining the project team, he was on the TfL/Department for Transport joint sponsor board.

Fast forward a decade and the top of the ski jump was within sight. Crossrail's five stage opening process was due to begin in 2017 but, before that, the often overlooked 'Stage 0' saw MTR Crossrail, concessionaire for the future Elizabeth Line, take over the running of existing services from Liverpool Street to Shenfield on Sunday 31 May 2015.

Using the interim brand of TfL Rail, the trains and stations on this unremarkable commuter route, which will soon be integrated into the new cross-London service, have been tidied up, and business is booming. Mr Smith is pleased with progress: with TfL Rail achieving a national rail-topping 95.7% PPM for period 10, MTR has done a good job, he says. Passenger numbers are currently a hefty 15% ahead of the year target - a trend that presents a challenge if burgeoning demand on the existing railway is to be met.

But Stage 0 launch was just the slow push off from the top of the ski jump. From here on in, things get much more exciting: from May 2017 a phased commissioning of Crossrail will change rail services in and around London every six months until the full Reading to Shenfield/Abbey Wood network is operational in December 2019.

NEW TRAINS

When Stage 1 begins, passengers get to experience the first new Crossrail trains - the Bombardier-built Class 345 Aventras - initially operating as seven-car (rather than nine-car) formations to allow them to fit into short platforms at Liverpool Street high level. About half the existing fleet of former Anglia Class 315s will be replaced with the new Crossrail stock.

While Crossrail services will remain limited to the Liverpool Street-Shenfield route, the next timetable change in December 2017 will see operator MTR Crossrail given responsibility for stations on Crossrail's future western route - from Acton Main Line west - having taken on responsibility for the Great Eastern stations in 2015.

May 2018 sees the launch of Stage 2, with MTR becoming responsible for running services from Paddington to Heathrow Airport - effectively taking over the Heathrow Connect service, which is currently run jointly by Heathrow Airport and Great Western Railway. There will be a significant

PERATION

difference - this date has also been chosen for the introduction of the European Train Control System in the tunnel between Airport Junction and Heathrow. This will be the first section of ETCS to be used by Crossrail services and, subject to ETCS in the Thameslink core not going live until later in the year, it will be the first use of the new train control system in London.

Stage 3 - in December 2018 - is the big one, the point at which the skier soars off the jump and into the air, to continue the analogy. The Crossrail central section tunnels will open, and a 15 trains per hour service in each direction will operate between Abbey Wood and Paddington. Of course, this also sees the opening of all the cathedral-like stations for which Crossrail will become known - Paddington low level, Bond Street, Tottenham Court Road, Farringdon, Liverpool Street, Whitechapel and Canary Wharf as well as the overground Custom House.

LINK UP

December 2018 also sees the TfL Rail branding dropped and the wraps come off the Elizabeth Line roundels. However, at this point Crossrail will be operating as three separate, unconnected routes.

That starts to change with Stage 4, in May 2019, when the Shenfield services which MTR started with get routed into the Crossrail tunnels, allowing trains to run all the way through to Paddington. Finally, with Stage 5 in December 2019, a similar approach on the western sees Heathrow trains routed via the new Paddington low level, rather than the main line station, to allow services to operate through London, from Heathrow to Shenfield/Abbey Wood and vice versa. At this point the Elizabeth Line will have 24 trains per hour (tph) in each direction during the peaks, operated by 66 trains and 450 drivers.

There remains a minor piece of unfinished business at Liverpool Street. Stage 4 launch in May 2019 allows Shenfield-Liverpool Street services to be routed into the Crossrail core and, as a consequence, the platform constraints of Liverpool Street high level no longer apply: the '315s' will be removed from service altogether and seven-car Class 345 formations lengthened to the standard nine carriages, a process which is expected to take a few months to complete. With the trains diverted underground, Network Rail can begin work to extend the platforms at Liverpool Street high level so that a small number of Elizabeth Line services can continue to start/terminate at these platforms. MTR is expected to operate four Shenfield trains an hour during the peaks to and from the high level station once the platforms have been lengthened. The date for completion of this work has yet to be confirmed.

Thames Tunnel westbound track, at Woolwich station. **Crossrail**

TfL Rail's No 315861 waits to lead the 09.34 departure to London Liverpool Street at Shenfield on 2 October 2015. An additional bay platform here will increase turnround capability for Crossrail services. **Antony Guppy**

MORE CROSSRAIL

If you want to look beyond 2020, undoubtedly there will be further changes to Crossrail operations. The planned opening of High Speed 2's phase one in 2026 will add a station to the network at Old Oak Common. Mr Smith says that the plan is to extend the 14 of the 24 trains per hour which will initially start/terminate at the Westbourne Park sidings (outside Paddington) on to Old Oak. HS2 Ltd has agreed to build 3-4 platforms and turnbacks to support this, and tweaks to signalling would be required between Old Oak Common and Westbourne Park to enable this extended service.

In the meantime, there is a question mark over how long the initial Crossrail service will be adequate for passenger demand given that rail patronage is forecast to increase, spurred by factors including population growth in London and development of the economy. Crossrail has been designed to allow additional capacity to be provided - the 24tph peak frequency could in time be uprated to 30tph, delivering a 25% increase. The nine-car Class 345s are capable of extension to 11 carriages given the 240 metre length of central station platforms. This would require additional platform edge doors; when Crossrail opens these will be installed along 200 metres of the platform length.

COMMISSIONING

Preparations for the phased commissioning of Crossrail are at an advanced stage. Crossrail's train control centre - the second floor of the Network Rail rail operating centre in Romford - is ready. At present the first floor of Romford ROC is the train control base for Greater Anglia services to and from Liverpool Street. However, Romford will soon manage the communications-based train control (CBTC) system used to oversee Elizabeth Line trains from Westbourne Park to Abbey Wood and Pudding Mill Lane. Crossrail trains further west will be under the supervision of Network Rail's Didcot centre while signalling on the Pudding Mill Lane to Shenfield section is the responsibility of the Liverpool Street IECC. Counter-intuitively, this means the central section control (at Romford) is based at a location east of the signalling centre for the above ground section.

Romford is a vitally important part of Crossrail operations. Not only will it control trains and signalling but it will co-ordinate passenger information, manage ventilation and deal with enquiries from passengers. As has increasingly become standard practice, staff from TfL, Network Rail, MTR and train manufacturer and maintainer Bombardier will work side by side.

Having passed the first test of taking over existing Shenfield services, MTR is getting ready to run trains over the new Crossrail infrastructure. Under a concession contract signed with TfL in 2014,

On track: GB Railfreight's No 66767 hauls the Crossrail concreting train through the Thames Tunnel in November 2015. **Crossrail**

Tottenham Court Road station in January 2016, with temporary hoardings on platform (right). **Crossrail**

the operator is paid according to its performance - including the punctuality of trains and condition of stations. With TfL retaining revenue risk, the idea is that MTR will focus on those areas it can control and the economic uncertainties that have upset many rail franchise projections can be avoided.

The Crossrail train operations contract builds on TfL's experience of the London Overground concession in which MTR is a partner. Howard Smith brings his experience as Overground Chief Operating Officer to Crossrail: the MTR operating concession is effectively an Overground Mark Two, although he describes it as a more sophisticated version which takes into account the complexities of the Crossrail network.

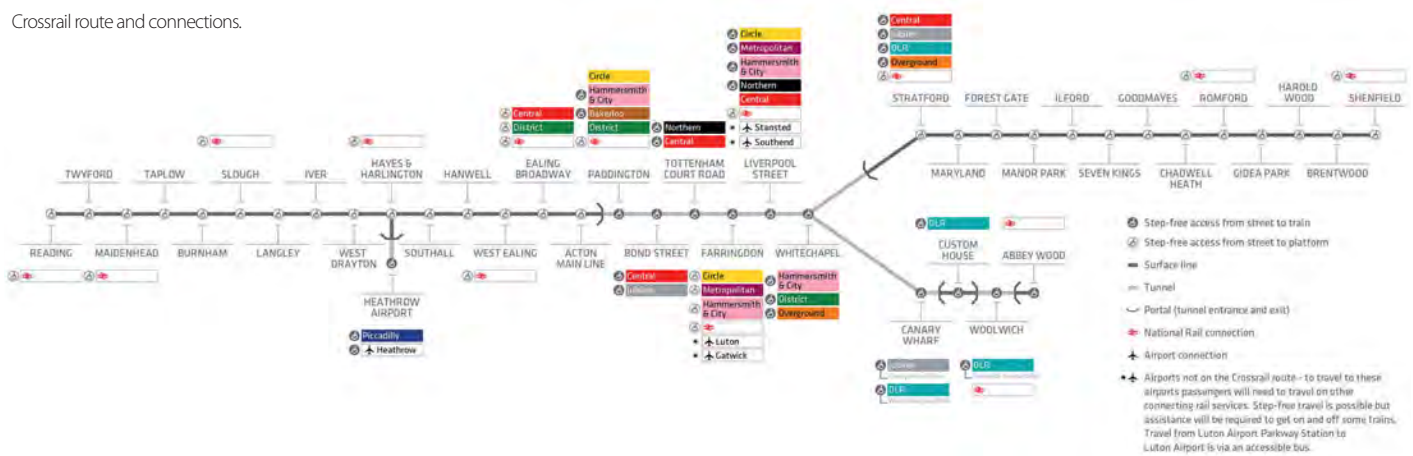
In terms of track access, the detail of what MTR pays to Network Rail and Heathrow Airport (which owns the infrastructure from Airport Junction) is fiendishly complicated and subject to regulatory mechanisms. But, while track access contracts are agreed between MTR and the infrastructure owners, TfL stands behind these and effectively pays the track access fees. MTR knows that so long as it runs trains on time it will not be left out of pocket.

BIG PICTURE

Take a step back from the details and contract clauses, and one realises that these myriad pieces of the jigsaw come together to create the big picture that is Crossrail. So what do Howard Smith and the operations team hope to achieve? According to Mr Smith the ambition is two-fold: first is the intention to deliver Crossrail not only as a unique railway, but as one which slots in seamlessly with - and which is part of - the wider TfL network. Second is the ambition to create a railway that sets the benchmark in European metro operations. Put simply, it aspires to be at least as good as the best anywhere on the continent.

With operator, trains and infrastructure looking ready for the phased opening, the challenge is to bring all the component parts of Crossrail together into a successful whole. Howard Smith seems confident that this will happen: 'We're making the final tweaks now that get us ready for the trip down the ski jump in the next few years,' he says. mr

Crossrail route and connections.



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TRAINING THE I

New drivers needed for a big increase in service

MTR Crossrail, the operator selected to run the new Elizabeth Line, is ramping up its establishment in preparation for a big expansion in operations. Having been in charge of the Liverpool Street to Shenfield line since May 2015, MTR is preparing for the next stage – takeover of the Heathrow Connect service – in May 2018. Then will come the inauguration of the first cross-city section, from Paddington to Abbey Wood, in December 2018, prior to the Shenfield, Heathrow and Reading legs being bolted on to the cross-city core over the following year.

In the meantime, MTR Crossrail has to replace the ageing Class 315s on the Shenfield run with the first Class 345 Crossrail trains, with the first ones due to enter service in May 2017.

It's a massive organisational task. The existing drivers on the eastern and western legs will need training on the new traction, and a cadre of new drivers will be needed to allow a big increase in service with the coming of the new infrastructure.

Simulators from training consultancy RPD are used to introduce trainee drivers to the sights and sounds they'll encounter on the railway. **MTR Crossrail**

DRIVERS

Altogether, some 390 drivers will be needed, many of them new to the industry – so a large training programme has been put in place.

The first drivers joined the MTR Crossrail roster when the company took over the Shenfield route from Abellio last year: 86 drivers based at Gidea Park and Ilford driver depots transferred companies under the Transfer of Undertakings – Protection of Employees rules. Some of those 86 were qualified driver instructors, key personnel for the task ahead.

ENTHUSIASTIC RESPONSE

A comprehensive web-based recruitment campaign has been complemented with MTR Crossrail stalls at job fairs and community events - the company aspires to provide employment opportunities in the areas through which the Elizabeth Line will run whenever it can. A YouTube feature 'Train driving – the ideal career for women' has been part of the drive to encourage applications from all sections of the community.

With a salary of up to £55,000 on offer, a total of 16,000 people have applied to become drivers on the Elizabeth Line. Given the large pool from which the company can choose, it has been possible to set the bar high in the psychometric testing applicants undergo. 'We are helping the wider industry' comments MTR Crossrail's Area Depot Manager – East, Rob Mawby, 'as our sifting has identified a group of people who exceed the level used generally in the industry'.

For the first tranche of new drivers, to be based in the east of the capital, the testing process whittled out 214 people for interview, with 117 eventually selected.

Those that have passed the Elizabeth Line testing come from a range of backgrounds. 'Late 20s to early 30s is the average age: this is a second career for many,' explains Ian Potter, MTR Crossrail's Head of Competency and Learning. 'We've taken on quite a number from the emergency services – police, paramedics and so on. But then we've also got people from backgrounds such as banking and insurance.'

The new recruits are being taken on 10 at a time to give an ongoing throughput to the training programme, with 50 having joined the company by mid-March 2016. The first candidates will complete their training in mid-May, with 10 a month finishing going forwards.

ST MARY AXE

Recruits undergo classroom training at MTR Crossrail's HQ at St Mary Axe in the City of London, along with visits to the live railway at Ilford depot and Gidea Park. MTR Crossrail has a daily 'Q' train path in the schedules, giving an opportunity for recruits to try their hands on the controls of a Class 315 once they have reached this stage of readiness.

But first they have to become familiar with the principles of railway operation in a classroom setting, and here MTR is adopting a fresh approach. 'The old idea was a traditional lecture-based approach, but this was a dry method of teaching that is not necessarily appropriate for adults' says Mr Potter.

'So now we're going for group engagement rather than the old "chalk and talk". We will set a task and then the group has to accomplish it with reference to the Rulebook. In this way we drip feed information in and over time the class grasps the Rule.

'The approach gives the opportunity for individuals to learn at their own pace and is appropriate for mature learners – although I have to say it makes more work for the group facilitators!'

It is an approach MTR has already used with success on its London Overground concession and is now being applied for the Elizabeth Line.

SIMULATORS

A useful training aid is a suite of low-cost simulators acquired from training consultancy RPD. 'We use them to introduce trainee drivers to the sights and sounds they'll encounter on the railway' explains Rob Mawby. 'It gives them a broader understanding for when they come to get on a train.'

So for example, trainees come to understand what the colour sequence is for multi-aspect signalling, how Automatic Warning System cancellation works and what a Temporary Speed Restriction board looks like. Drawing on gaming technology, the system has been programmed with the Liverpool Street to Shenfield line, so trainees get an accurate impression of the line on which they will drive.

The controls are basic: simple levers replicate the functionality of power and brake controls, door opening and closing and the like. The RPD system makes no attempt to exactly replicate the controls in the cab – that will be the job of the Class 345 simulator when that arrives. But it does give trainees a grounding in how the railway works, with accurate representation of what they will see outside the window. And while an all-singing, all-dancing cab simulator costs upward of seven figures, this remarkably effective system comes in at around £25,000 a set.

'The best training of all comes on a real train,' opines Mr Potter, 'but you can't simulate out-of-course events when you're out on the real railway, such as temporary block working. This machine allows us to do that and to talk the trainees through it.'

Under refurbished overhead electrification, No 315831 is at the rear of the 10.04 Shenfield-Liverpool Street TfL Rail service, departing from Goodmayes on 2 September 2015. **Antony Guppy**

I-PADS

In another initiative aiming to make the most of information technology, MTR Crossrail is issuing all drivers with iPads so that there is no need for a paper Rulebook.

'MTR has developed a driver app, so amongst other things the driver can bring up his schedule, showing the diagram he is on for the day' explains Mr Mawby. 'Soon we will be able to send Weekly Operating Notices to the iPad, moving away from noticeboards in depots and putting the information right in front of the driver.'

'We also have a fault-finding app. So for example if the Passenger Information System is not working, the iPad will explain how to reboot the system. It will prompt the driver to take appropriate action, such as talk to the signaller. Time taken on faults is monitored, with the possibility of a "cut and run" prompt so that the system can help prevent delay minutes building up unnecessarily.'

MTR Crossrail regards this bid to be on the cutting edge of information technology as crucial to the company's operating strategy going forward. 'It helps to upskill the drivers, so it won't be such a shock when the new trains, which will have a lot of new technology built in, start to arrive' says Mr Mawby.

COUNTDOWN TO THE NEW SERVICE

A sufficient number of appropriately trained drivers will be needed at each stage of Crossrail opening. Obviously, it would be difficult to organise the training so that all the newly-trained drivers arrived just before they were needed, meaning that there will be slack in the driver workforce in the coming months and years.

'We always planned on some over-establishment, but the slack will give us flexibility to cope with events like an engineering blockade at Gidea Park, while also allowing existing drivers to be trained on Class 345s when the time comes' says Mr Potter.

The surfeit of drivers will disappear soon enough, in a couple of years' time, when trains on the Elizabeth Line are criss-crossing London every few minutes. *James Abbott*

Class 315 No 315853 brings up the rear of TfL Rail's 10.30 Liverpool Street-Shenfield train, arriving at Stratford on 28 August 2015. **Antony Guppy**

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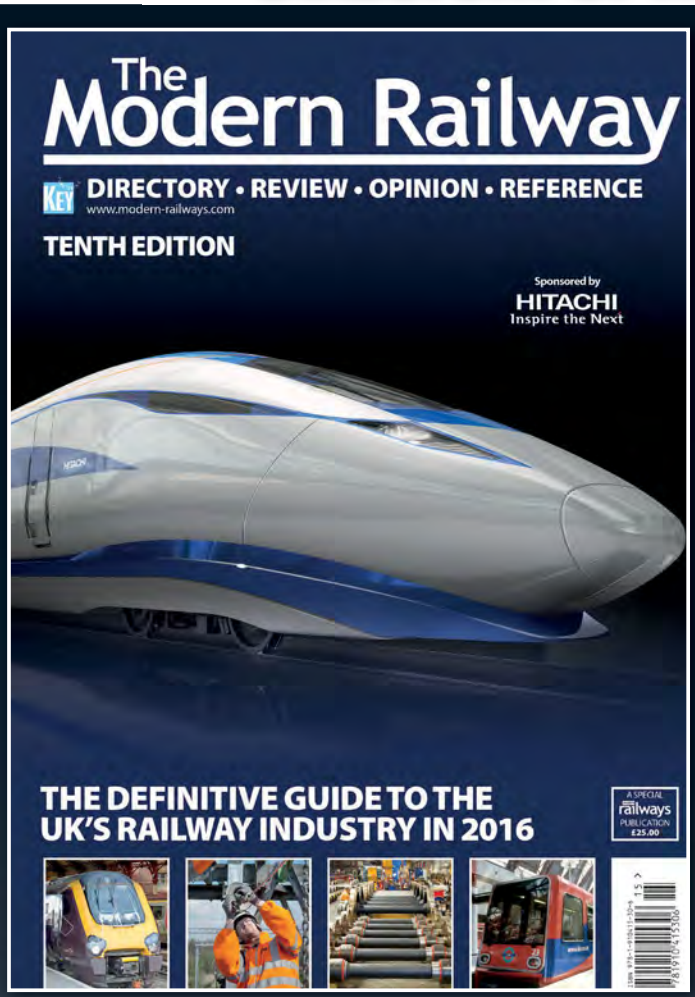

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The Plumstead railhead, currently the main base for infrastructure installation in the Crossrail tunnels, will later be the site of the permanent infrastructure maintenance depot. The tunnel portal is at the bottom right (south west) of this February 2016 photo. **Crossrail**

INFRASTRUCTURE PERFORMANCE

Head of Infrastructure **JON JARRETT** explains the plans to keep Crossrail's infrastructure safe, reliable and delivering the service promise

Though the first track has only recently begun to appear on the Crossrail route, optimising Crossrail's infrastructure for performance and reliability has already preoccupied its team over more than seven years.

If Crossrail's product in terms of service to London is the timetable, then for the infrastructure management, this means providing for the required volume, tonnage, frequency and speed of trains – and to do this they need (among other things) dependable signalling, track and electrification, and platform door systems.

Rail for London's Head of Infrastructure for Crossrail, Jon Jarrett, has been involved in developing the philosophy, policy and now the standards for the infrastructure and its maintenance since 2008, and has relished the opportunity to be able to influence specifications to build in reliability and maintainability.

He sees the infrastructure manager's job as doing three things:

- ensure the safety and compliance of the infrastructure to make sure it meets requirements;
- ensure performance and reliability of the infrastructure to meet the timetable;
- control the operational budget.

'In managing the infrastructure to deliver the timetable, the operators expect me to be on top of the risks and opportunities, and have a full understanding of what we can do to meet our aims,' he says.

'We all need to know how the elements of the infrastructure fit together and how they interact'.

SAFE ACCESS

One of the highest profile elements of Crossrail's infrastructure is the train control system – this will not just manage the trains but also safe access to the infrastructure.

This will reduce the risk inherent in traditional methods of taking possession of the track for maintenance, which involve

having people on the track. For possession and track access control on Crossrail, a systemised and verifiable process will see pre-planning and pre-booking of possessions using the signalling logic, in a similar way to allocating a train path. The booking will be confirmed by the signaller, and give reassurance through a verifiable process for people on the ground.

It can be likened to only one person holding a baton in a relay race (or a single-line railway token), says Mr Jarrett – the system will identify that person and confirm that they understand their accountabilities and the transfer process.

The system can also regulate the movement of engineering trains in among passenger services, and can give engineering possession access to the track right behind the last service train. In case of delay in gaining a possession, it can help in making informed decisions about options for shortening or postponing a task.

The core principles and terminology of safe access are the same as traditional systems, says Mr Jarrett, but as well as being a safer method, the new Crossrail system offers performance benefits, maximising the availability of the infrastructure as a resource for operations.

A new way of taking electrical isolations with remote switching and earthing is also to be used, applying the principles and existing technology used by the electricity network companies.

TRACK AND TRAIN

Alongside Crossrail's rolling stock team, the infrastructure team has worked to achieve the best possible match between the trains and the infrastructure, looking to create a very track-friendly train.

Track design is traditionally based on permanent speed restrictions, but with its single rolling stock type, Crossrail has based much of its alignment design on train speeds on each part of the route. For example, approaching a station, trains might slow from the maximum 100km/h, ramping down gradually to an initial 70km/h. Matching the track design to the deceleration profile should offer improved track wear characteristics with enhanced asset life, says Mr Jarrett, and could also give a more comfortable ride for the passenger as the cant changes. It will be possible to alter and optimise braking zones to give more even track wear and wheel wear.

Wheel-rail interface calculations have been used to influence the relationship with train design and the type of rail. Crossrail has specified a head hardened LHT350 rail as used quite widely in Europe – this offers a balance of the qualities of hard and softer rails, with a harder wearing surface and also some flexibility to protect against migration of rail contact fatigue.

Additionally, Crossrail is planning to adopt train-borne track lubrication – applying lubrication exactly where the train needs it. Application locations can be moved based on the condition of track, and adjustment can be made to avoid over-lubrication.

INSPECTION

For track inspection, Crossrail plans to introduce technology that predominantly removes the need for manual visual inspection, using pattern recognition on plain track as a safer replacement for the traditional weekly walk. This will however be overlaid with a more detailed skilled artisan verification inspection at longer intervals.

Digital pattern recognition technology, similar to that used by Network Rail's track monitoring train, gives the ability to inspect the rail system frequently and systematically, and to spot condition changes, any specific head wear variations, or components that are beginning to change shape. 'This reliability centred maintenance approach is less based on time, more on condition and risk: so with the right technology we can assess asset condition and determine any planned interventions that may be required', says Mr Jarrett.

He adds: 'Initially, of course, we won't have asset history to base judgements on, so there will be a lot of work on verification of assets to help us understand the pattern of condition over a period. We need to balance the benefits of automation with those of manual processes – the new systems need to help the humans understand what's happening to the infrastructure, they won't replace them. What we are developing is a better way of providing information to help with informed decisions.'

Skilled and competent people will however still be deployed on switches and crossings inspections: while track circuits will not exist as a performance risk on Crossrail, points and points detection are still part of the design and need to be as reliable as possible.

Alongside a number of intelligent 'yellow machines', three of Crossrail's Class 345 trains will be equipped for track geometry recording.

TECHNICIANS

Mr Jarrett wants to achieve professional status for Crossrail's infrastructure staff, and initial discussions have taken place with the Permanent Way Institution, for example, over recognition and qualifications for engineering technicians.

He uses the example of a Formula 1 pit-stop, where a highly organised blur of activity can be seen: but when the response isn't needed, the technicians are back inside the garage, checking data and analysing live operating performance.

In a similar way, Crossrail's infrastructure technicians will spend time looking at how assets perform, looking at their history through regular inspections to see whether any degradation is taking place. This informed and knowledge based approach is intended to increase the chance of attending to an asset before its performance reduces or it fails – and also help achieve this during safer, planned access rather than reacting to failure. A rule of thumb is that preventing 20% of relatively large incidents could reduce the performance impact by 80%.

Technicians will have regular sessions at the training school, to gain experience with simulated equipment failures, as a new way of ensuring competence in an environment where real-life equipment problems are planned to be rare events. Crossrail intends to have competency-led teams whose members have different functional expertise: so the team can offer all the skills needed to deal with an asset, rather than being organised along traditional independent functional lines such as track or signalling. In the example of the Formula 1 pit-stop, everyone works together in the rapid response.

PROCESS

Crossrail's infrastructure teams will be organised into three groups:

- compliance and engineering;
- planning and performance;
- delivery and quality.

This is designed to ensure compliance after every inspection. The compliance and engineering team will find and prioritise the work, then it will be passed to the planning organisation to decide how to fit it in with track access. Then once it is in the plan, the delivery people will make sure it is done to the right specification and quality - and feed it back to the people who originally found the problem to go and inspect it. This is intended to encourage a feeling of ownership, like the 'length' gangs of old - permanent way workers who would take pride in their section of track, and aspire to win 'prize length' awards. Mr Jarrett wants his teams to feel empowered to take decisions and recommend actions.

All this is to be backed by systems for asset management, rostering, competence management, and resourcing; and a project is in hand to build systems starting from an understanding of good practice, rather than imposing a ready-made system.

Helping to cement the professional teamwork ethos in the infrastructure teams, tablet / mobile devices will be used to aid recording, assurance and competency management.

WORKFORCE

Crossrail expects to have about 250 people in its infrastructure teams, and specialist services contractors will also work alongside the Crossrail teams.

The first tranche of Crossrail infrastructure apprentices, part of TfL's overall scheme, start in September 2016, the second in 2017. As well as apprentices, Crossrail expects to build up its team from two other main sources – those with previous railway experience, and those with equivalent skills, such as electricians, ex-forces personnel etc. Training will include technical disciplines and familiarisation with the Crossrail environment.

A new maintenance depot will be built next to the Plumstead tunnel portal, specifically for and connected directly to Crossrail.

EVOLUTION

Mr Jarrett doesn't claim that infrastructure management for Crossrail is a revolution, but an evolution building on and taking the best from the really good work done by others – while it is literally rewriting the rule book, in co-ordination with the Rail Safety and Standards Board, 'we're not ripping up any rules, but looking to see if we can apply them in a different way – and ensuring the result meets the requirements of affordability, compliance, performance and absolute safety'. *Ken Cordner*

SIGNALLING CROSSRAIL

Trains will be driven and controlled by a Siemens CBTC system

Crossrail is currently Europe's largest infrastructure project. The project's completion in late 2019 will provide faster, more frequent trains which will link Heathrow and Reading in the west with Shenfield and Abbey Wood in the East. From December 2018, the new service will be known as the Elizabeth Line in honour of Her Majesty the Queen, and will deliver significantly reduced cross-capital journey times into Central London.

The new railway will serve 40 stations over 100 route kilometres, including through two new 21km tunnels beneath central London, and up to 24 trains per hour (tph) will operate in the central Crossrail section (Paddington to Whitechapel), with 12tph running to Stratford and Canary Wharf.

Crossrail will increase central London's rail-based transport capacity by 10% - additional capacity that is desperately needed to support the city's rapidly-growing population. The new railway will bring an additional one and a half million people to within 45 minutes of central London and will halve the time taken to travel to central London for many residents in the city's western suburbs.

A railway that's fit for the 21st century clearly requires a modern signalling solution, and in 2012, Siemens was awarded the Signalling and Control System Contract (C620), which covers the central Crossrail area and will interface with existing Network Rail infrastructure at its fringes. Siemens was also awarded Contract C660, which includes the CCTV, public address and passenger information systems, help points, SCADA monitoring, local station and central control as well as 4G communication for emergencies.

Siemens Rail Automation Mass Transit Delivery Director, Adrian Stubbs, outlines the company's core signalling solution: 'Throughout the central section, trains will be driven and controlled automatically by our Trainguard MT communication-based train control (CBTC) system, which Siemens is also deploying on S-Bane in Copenhagen, where the first line went into operational service on 29 February 2016. The system allows trains to operate with reduced headways and to run with precise speed control and stopping accuracy, which is crucial to the safe and successful delivery of 24tph operation.

As well as the Crossrail signalling and control system contract, Siemens is responsible for the C660 contract for central section communications and control systems, with design and testing for C660 undertaken at Ashby-de-la-Zouch. **Siemens**

'Within the central section, there will be no conventional lineside signals, because the CBTC system provides in-cab signalling to the driver. However, we will also be deploying our Trackguard Westrace interlocking system for train detection, points control and route setting, the system having been designed to allow seamless transition with CBTC and ETCS without affecting safety or performance.

'These trackside signalling elements will communicate with the on-board system and with the automatic train supervision (ATS) systems at a new route control centre in Romford. The use of axle counters as a secondary means of train detection will also cover the use of engineering plant in the central area – or in the unlikely event of CBTC failure. This would enable the signaller to still move trains safely.'

Outside of the central section, trains will operate over existing Network Rail tracks and infrastructure, and under the control of Network Rail's automatic warning system / train protection warning system (AWS/TPWS). To the west of Paddington, this will be on the Great Western main line, and it is planned that trains will operate under European Train Control System (ETCS) level 2 control.

To the east of the Pudding Mill Lane portal (where Crossrail trains heading eastward emerge from the central section tunnels), signalling will be controlled by the existing Network Rail interlocking at Liverpool Street. However, between Pudding Mill Lane and Stratford, Crossrail trains will inter-operate with non-Crossrail trains bound for the existing Liverpool Street station platforms.

The dynamic switchover from CBTC to ETCS will allow trains to travel from or into the core section without having to stop. This is a world first for the application of this technology. In the west, the transition between CBTC and ETCS will take place while the trains are on the move.

With CBTC, communications are via a data network, with signals being transmitted by radio. Consequently, the entire Crossrail central section tunnel will be fitted with radio antennas, providing accurate information on current train location and speed. This is a particularly important feature for Crossrail, with a two and a half minute 'rhythm' required to deliver 24tph in each direction in peak travel times.

The signalling and control system has a significant number of complex interfaces, especially with the new Crossrail trains. To enable a smooth transition of trains from Network Rail operation in the outer sections where main line systems are used, to the mass transit system CBTC in the central section, the required interfaces are currently being developed and tested.

All Crossrail station platforms will be fitted with platform screen doors (PSD), requiring a further interface with the signalling and control solution. The system will provide functionality which automatically inhibits a platform door from opening if the corresponding train door is identified as faulty by the train management system, and vice versa if a platform door is faulty. The signalling and control system provides the high-integrity data link between the train and the PSDs to ensure that they are only opened at the right time – when a train is stationary in the platform.

The system implementation will be tested using the Crossrail Integration Facility - a laboratory test rig which is being built by Siemens. Rolling stock integration testing at the test track in Melton Mowbray and installation of the signalling infrastructure will begin later in 2016 as station technical rooms become available and tunnel fit-out progresses.

The first on-board CBTC hardware set has been supplied to the train manufacturer for integration, with full supply progressing later this year. Dynamic testing on the railway will begin in November 2017, with central section Elizabeth Line services operating from the end of 2018. mr

The Clayton CD40.

CROSSRAIL EXPRESS

A rapidly-produced world first

The fact that seven locomotives are being built for Crossrail had passed me by, but the CD40 locomotives currently emerging from Clayton Equipment Ltd of Burton-on-Trent will haul some of the first works trains through the Crossrail tunnels.

Following test running on *Mytesttrack.com*, known to most as the Ecclesbourne Valley Railway, the CD40s are now being introduced ahead of schedule, just the first remarkable feature of this build. They are the world's first Euro IV (USA Tier 4) emission-compliant tunnelling locomotives, required for when battery locos just can't cut it. Sometimes claimed to be impossible for diesel multiple-units, Euro IV does not come easy, as half of the bonnet space is taken up by emissions-cleaning equipment. AdBlue is mixed at about one part in 10 to diesel to remove NOx emissions, using two Selective Catalyst Reduction (SCR) Units. NOx then becomes nitrogen, water and a bit of CO_2.

A 390kW (523hp) Deutz engine powers the two driving axles via a Voith hydraulic transmission. These locos are limited to 20km/h, but it is all about tractive effort (98kN), and that means weight. The buffer beam, for example, is 100mm thick steel plate, helping them to 40 tonnes, or 20 tonnes per axle. The large cab has good visibility all round and features a swivel driver's seat with controls built into the arms, like the ultimate gaming chair. Less-used controls are on the cab side wall next to the driver.

Now the big surprise. As a rule it takes three years to build a new train, indeed five years is not unusual. The first two locos were delivered in January 2016, yet the order was placed on 4 August 2015. Before you say, 'well, it's only a shunter', remember that it still has all the kit a big loco has, just smaller. It took some jiggery-pokery getting the main components, but this British-built locomotive went from a clean sheet of paper to delivery in six months. Express delivery! *Ian Walmsley*


Deutz engine in the Clayton CD40.


Selective Catalyst Reduction (SCR) unit.


Driver's seat.

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