REPORTS OF MONTHLY MEETINGS
CROSSRAIL AND THE ELIZABETH LINE IN HISTORICAL CONTEXT

by Simon Bennett

A report of the LURS meeting at All Souls Club House on Tuesday 11 September 2018

Simon is the former Head of Learning Legacy within Crossrail, having recently been made redundant. As a Civil Engineer, Transport Planner and Communications Professional, he has spent over 20 years working on the various stages of the Crossrail/Elizabeth Line project in its different guises.

The Elizabeth Line is a "High Capacity Metro Railway" which will have cost around £15.4bn (but with an expected net benefit of £42bn), will be 118km in length with 40 stations (ten of them new) providing a service at opening of 24 trains per hour in each direction in the central section. It will be a main line sized tunnel with overhead wiring. The first study into the potential for a cross-central London railway started in 1989; and has seen many Studies and Route Options and 2 parliamentary Bills since. Eventually, construction started in January 2009.

The initial Crossrail project was developed in the early 1990s with two routes in the west, to Reading and to Aylesbury, and one in the east. The Bill for that scheme fell in 1994, but the central route was subject to a Safeguarding Direction which protected it from conflicting development.

When the project was revived in the early 2000s the central section retained the safeguarded route but other options were studied for the branches, leading to the current route with terminus at Reading (extended from Maidenhead after Royal Assent) in the west; and Shenfield and Abbey Wood in the east.

The concept was always for a metro, stopping at all stations and with high capacity with the intention of reducing crowding on the central area of the TfL network. The Elizabeth Line will also reduce journey times greatly; such as Paddington to Canary Wharf from 30 minutes at present (with a change of train) to a direct route taking 17 minutes.

There were two periods of public consultation alongside the route development in 2003 and 2004 and permission was given to submit a Bill in 2005 with consideration of over 500 petitions and many Select Committee hearings in both Houses of Parliament before the granting of the Crossrail Act in July 2008. One of the major debates was around the provision of a station in the Woolwich area. It was originally not going to happen, but Greenwich Council desperately wanted a station in their area and it, basically, made good transportation sense to have a station in this urban area. Crossrail worked closely with Greenwich Council and Berkeley Homes (who own the development rights of the Royal Arsenal site) to make a deal for Berkeley to build the Station Box.

The Crossrail Act gave the Government authorisation for the work to begin and gave the Secretary of State the power to appoint a Nominated Undertaker, in this case Crossrail Limited and London Underground Limited. The Act also gave Compulsory Purchase powers and outline planning consent. The Environmental Minimum Requirements set the rules for applying for detailed planning consents with local authorities, and also includes the Construction Code, and environment standards. These are all detailed in a variety of documents which are available on the Crossrail website.

Crossrail was the largest construction project in Europe with 50km of new track within tunnels, 250m long platforms in each station and 250,000 holes bored for tunnel side brackets. Funding was from TfL and the Department for Transport with a large part (£4.1bn) of the TfL contribution coming from a Business Rate supplement levied on businesses in London and contributions from Heathrow Airport and the City of London through the DfT. As the funds came through both TfL and DfT this meant that the project had two "masters" and a Joint Sponsor Team was established to provide appropriate oversight.

The Project's procurement involved 60 main construction contracts which were tendered through Official Journal of the European Union. The biggest contract was that for the Eastern Tunnels at around £400m.

Tunnelling began in 2012 and was completed in 2015, with the longest run being Limmo Peninsula to Farringdon. Two of the boring shields (Ada and Phyllis) were buried east of Farringdon, two cut up and four recovered for resale. Some of the most complex construction was at Tottenham Court Road where the new tunnel had to be threaded through the existing infrastructure (above the Northern Line but below the escalators) with only 570mm clearance. In several areas, such as Soho with its film editing studios and the Barbican, the track is on a floating concrete bed to minimise noise and vibration.

Once completed, platforms will feature edge doors with information screens above, will be wider than the average LU platform and be significantly longer. Each platform is installed in stages with ventilation ducts underneath, platform door edge supports, cladding and ceilings. Every station also has ventilation shafts to surface level. The tunnel fit out involves 23 different contracts for drainage pumps, fans, cable management, emergency walkways, etc. Within stations there are help points, CCTV, DOO, customer information screens and public address systems.

Route Control for the Elizabeth Line is run in three sections: central area at Romford, western at Didcot and eastern at Liverpool Street (yes, that does mean that the control for the central section is based further east than the eastern section!). Signalling is on three different systems between CBTC, ETCS and TPWS/AWS which has caused great difficulties and is a major reason for the recently announced delay to central section opening. Traction power is also on a variety of rates from 400kV to 25kV from three bulk supply points and the existing Network Rail supply.

The Class 345 rolling stock, built by Bombardier as 205m-long, 9-carriage trains with 454 seats, four wheelchair spaces and ten multi-use spaces. They do not have toilets as this is seen as a metro, short journey system. The units will have 4G and Wi-Fi and be air-conditioned; and a maximum speed of 90mph (on the outer section only) and have a high power to weight ratio with regenerative braking.

Network Rail are responsible for the surface works on their infrastructure such as track realignment, upgraded platforms and platforms. Some stations will be rebuilt fully to cater for increased passenger numbers. A new viaduct has been built at Stockley, adjacent to Airport Junction, to accommodate the new access to Heathrow; as has a new dive under at Acton so the Elizabeth Line can cross under the lines entering Acton Yard.

The trains are operated by MTR Crossrail and stage 1 (Liverpool Street to Shenfield) opened in May 2017; stage 2 (Paddington High Level to Heathrow) from May 2018; stage 3 will be through central London to Abbey Wood; stage 4 will see the move from Paddington High Level to Low Level and connection of the central area to the Shenfield line; finally stage 5 (which is scheduled for December 2019) will see the full opening of the line from Reading and Heathrow in the west; through Central London to Shenfield and Abbey Wood in the east.

From an environmental point of view, it is expected that the Elizabeth Line will produce 40g of carbon dioxide per passenger kilometre; which compares with 57g on the DLR, 64g on the Underground and 75g by buses. 7.9 million tonnes of material have been excavated during contraction, of which 98% has been reused at Wallasea Island in Essex to raise the land level to provide a habitat for birds, managed by the RSPB.

The Archaeology programme has seen over 10,000 items uncovered from 20 sites. At Paddington there were Bison bones found, at Farringdon the Plague and Black Death pits were uncovered; and at Liverpool Street, three burial grounds were excavated (Roman, a Church and the Bethlem Hospital) with 3,000 skeletons to be exhumed and reburied elsewhere. One of the oldest items found was a Silver Denarius of Severus Alexander dating from between 228AD to 231AD.

Crossrail has left a learning legacy which has been Simon's area of responsibility for the last two years. This has resulted in peer learning applications, social media, publications, and industry training, seminar events; and the establishment of the "Crossrail Learning Legacy" website.

After a period of questions and answers which included a question about the idea of taking Crossrail to Richmond. Simon explained that the idea of Corridor 6 (Kingston Upon Thames or Richmond) to

decongest the South Western Railway lines out of Waterloo, would have involved extensive works, buying land in very expensive areas, and the complete closure of roads in the North Acton area; so overall the Richmond section would have been uneconomical, unpopular and unsustainable. Another attendee asked about fares and Simon explained that the fare structure will be as TfL's existing zones and Oyster and Travelcards will be valid.

The meeting then thanked Simon in the usual manner.

Amanda Griffiths