



◀ MOVING LONDON FORWARD



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15 November 2017



Bond Street Station 23 February 2016



Bond Street Station 23 February 2016



22 June 2017 – Shenfield



22 June 2017 – Liverpool Street



Crossrail

History

For decades railway engineers have aspired to link the Great Western, Great Eastern and Southern Railways; at last this is to be achieved by Crossrail. The long struggle to obtain statutory approval to for its construction came when the Hybrid Bill put before Parliament in 2005 received Royal Assent 3½ years later with funding from both the public and private sectors.

Crossrail is the vital piece in a complex jigsaw to improve the capacity and service of London's transport network and with it all the challenges to provide the public with a world-class affordable railway.

At the end, Crossrail's legacy must not be just a railway but to deliver a highly trained workforce capable of meeting the engineering and social challenges of the 21st Century.

This railway is long overdue for it has been considered on several occasions over the last 40 years. And even before that an examination of historical records will show that railway engineers since the early 1800's have had aspirations to connect the mainline network underground from east to west and north to south. To some extent this was achieved by the Underground system that evolved.

What is Crossrail

Crossrail is a high frequency urban rail service travelling at moderate speed. The route extends from Maidenhead in the west to Paddington and on through the West End and City to Stepney Green in East London where it splits with one leg going North East to Shenfield in Essex and the other going out through Canary Wharf beneath the River Thames to Abbey Wood in the London Borough of Greenwich. Crossrail trains will also connect to Heathrow Airport using the existing spur. In 2014 the Government announced that Crossrail services would be extended to Reading.

Why do we need Crossrail?

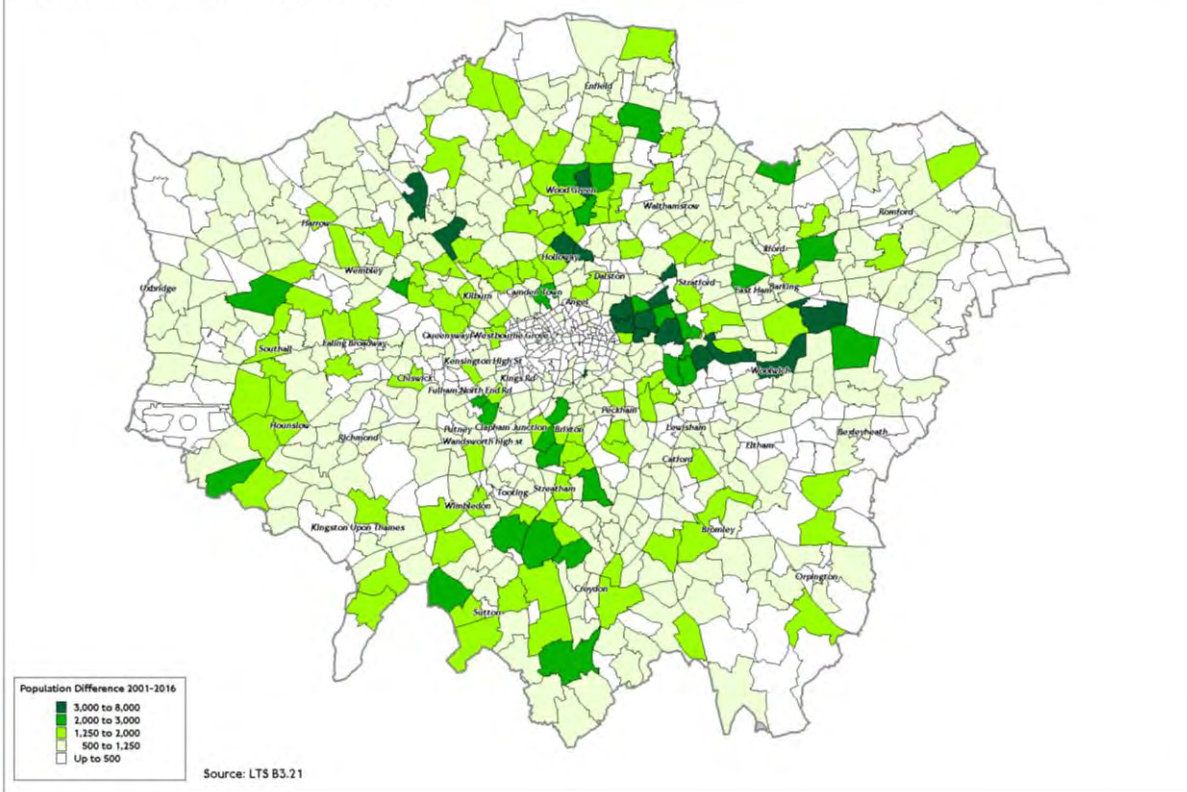
Prior to the current global recession it had been estimated that the growth in employment along the east west axis paralleling the path of Crossrail would result in another 636,000 jobs by 2016. Further it was anticipated that the population of Greater London would grow by 800,000.

Although there has been considerable improvement in bus capacity and upgrades on the Underground the transport system has been struggling to meet the existing demands let alone coping with further demand.

Even though the timing of these forecasts could be challenged in the current climate and may not be achieved until beyond 2016 the predicted demand remains. A delay could be of benefit as the phased opening of Crossrail does not begin until the end of 2018. What is certain is that without the introduction of Crossrail together with Thameslink, the continued upgrades to the Underground, the new and extended Overground and Docklands Light Rail the Capital will not be able to retain its prime position as the World's leading financial centre.

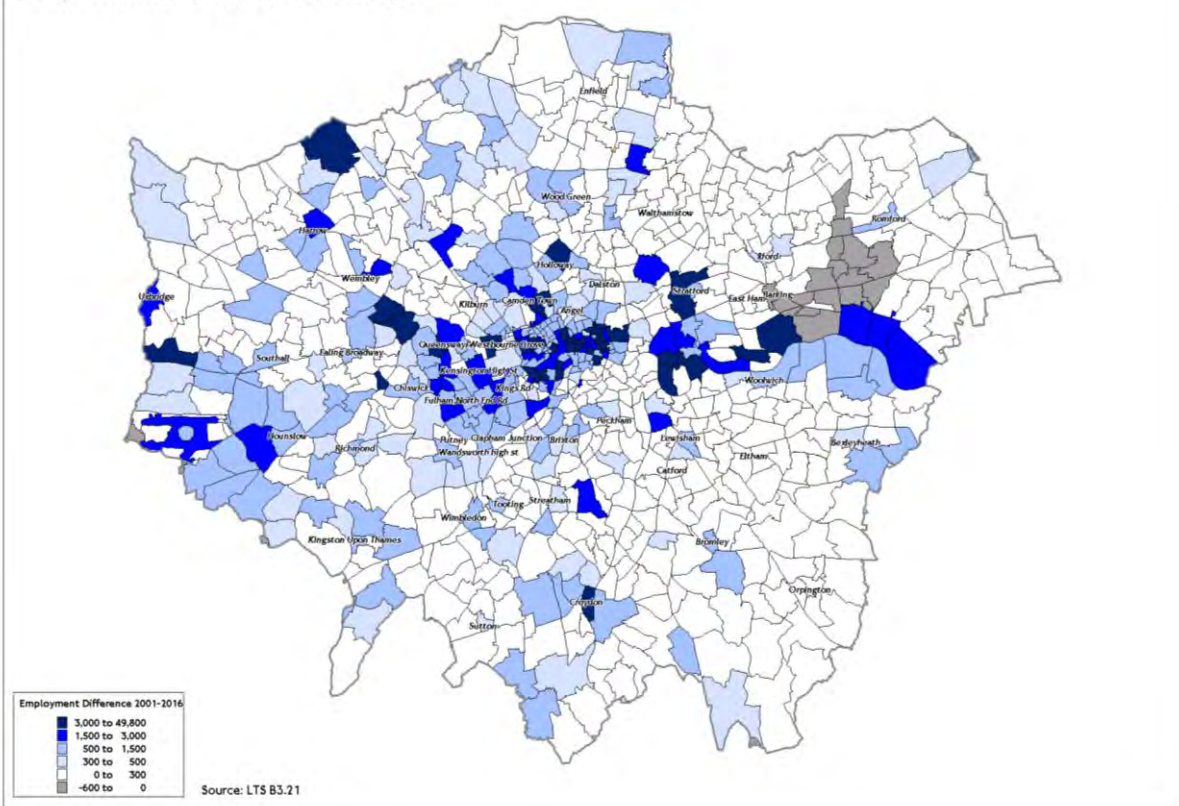
Employment growth – 636,000 –concentrated on an East West axis

Population Difference 2001-2016 by LTS Region



Population growth – 800,000 more general distribution

Employment Difference 2001-2016 by LTS Region



The Benefits and Economics

The wider economic benefits.

The economic appraisal conducted for the 2007 Business Case carried out by Volterra Consulting and Colin Buchanan extended the analysis of economic benefits by developing an approach which quantified and valued the impact of Crossrail on central London growth and productivity by applying the theory of agglomeration.

This approach suggested that the economic impacts of Crossrail on business productivity valued in this way were both very large and entirely additional to the transport impacts.



◀ Crossrail: The benefits



Linking Key Business Areas



◀ Heathrow



◀ Canary Wharf



Transport Benefits



◀ Transport Benefits

- ▶ Relieve overcrowding on existing Tube and train services
 - ◆ 10% extra rail capacity for London
 - ◆ Bring an additional 1.5 million people within 45 minutes commuting distance of London's key business districts
- ▶ Decrease journey times into and across London
 - ◆ 24 trains per hour
 - ◆ Reliable, efficient service
 - ◆ Additional commuter services

Crossrail Journey times

Although not a high speed railway in today's parlance Crossrail will reduce journey times considerably for example: Maidenhead to Liverpool Street is reduced by 34 minutes, Bond Street to Shenfield by 10 minutes and Canary Wharf to Heathrow by 28 minutes. Of equal importance is that potentially a further 1.5 million passengers will be within a 60 minutes commute from the City centre. And this will be achieved in the comfort of air conditioned trains of a style and type consistent with a new railway of the 21st Century.

The frequency of service in central London will at peak be 24 trains per hour in each direction and will bring considerable relief to overcrowding and congestion on the Underground. Crossrail will also increase the capacity of the public transport network by 10% which is significant by any standard.

The new railway will not only provide employment for its operations and management but will engage some 14,000 persons at the peak of construction and upon completion is expected to enable another 30,000 jobs within the central London area.



◀ Decreasing journey times

	Current journey time	Crossrail journey time
Slough to Tottenham Court Road	55 minutes	36 minutes
Ilford to Bond Street	35 minutes	22 minutes
Abbey Wood to Liverpool Street	40 minutes	17 minutes
Maidenhead to Liverpool Street	65 minutes	51 minutes
Heathrow to Canary Wharf	51 minutes	40 minutes
Reading to Canary Wharf	64 minutes	46 minutes

How did it all begin?

The History

So how did it all begin? An examination of historical records will show the great railway engineers of the 19th Century always had aspirations to connect the mainline network across London from east to west and north to south.

London's Traffic in the 1830's



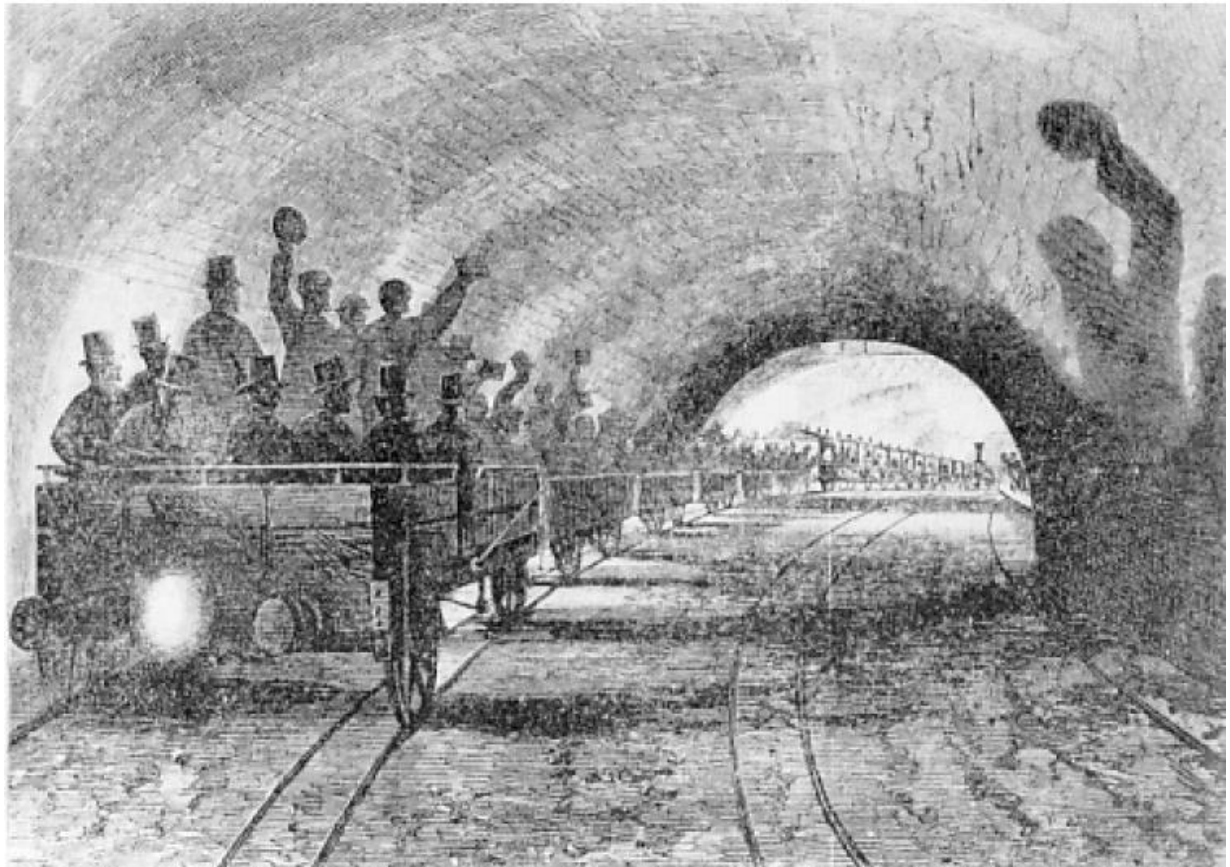
Conscious of the ever growing traffic congestion in London during the 1830's the great railway engineers of those days looked to see how they could resolve the problem. Both Robert Stephenson and Isambard Kingdom Brunel were interested in the problem as their new termini of Euston and Paddington were then on the outskirts of central London. In 1836 Robert Stephenson had prepared plans to extend his newly completed main line beyond the Euston terminus in tunnel under Gower Street and Covent Garden to the Savoy Wharf on the River Thames.

Transport schemes under London met with serious objection for it was feared that the weight of the traffic overhead would crush any tunnels beneath, and the houses above the proposed routes would collapse from the vibrations. This, coupled with the problem of operating steam locomotives underground and how best to ensure passengers in open top wagons, let alone the driver and fireman, survived and were not asphyxiated by smoke. As a consequence the Stephenson plan did not come to fruition.

The Metropolitan Railway Commission in 1846 however effectively put a stop to any surface routes through London by decreeing that all lines should stop north of the New Road – Marylebone Road, hence the location of St Pancras, Euston, etc.

This decree caused the planners to look again at the proposals for underground railways in London. The Metropolitan Railway Company appeared to overcome the concerns of collapsing roads and the problems of using steam traction underground when on 10 January 1863 it opened the World's first underground railway. This was in reality an extension of the Great Western Railway running from a junction at Paddington to Farringdon using 7' 0" broad gauge locomotives and stock. Crossrail is to link these same two stations as well as going underground just outside Paddington.

Opening of the Metropolitan Railway



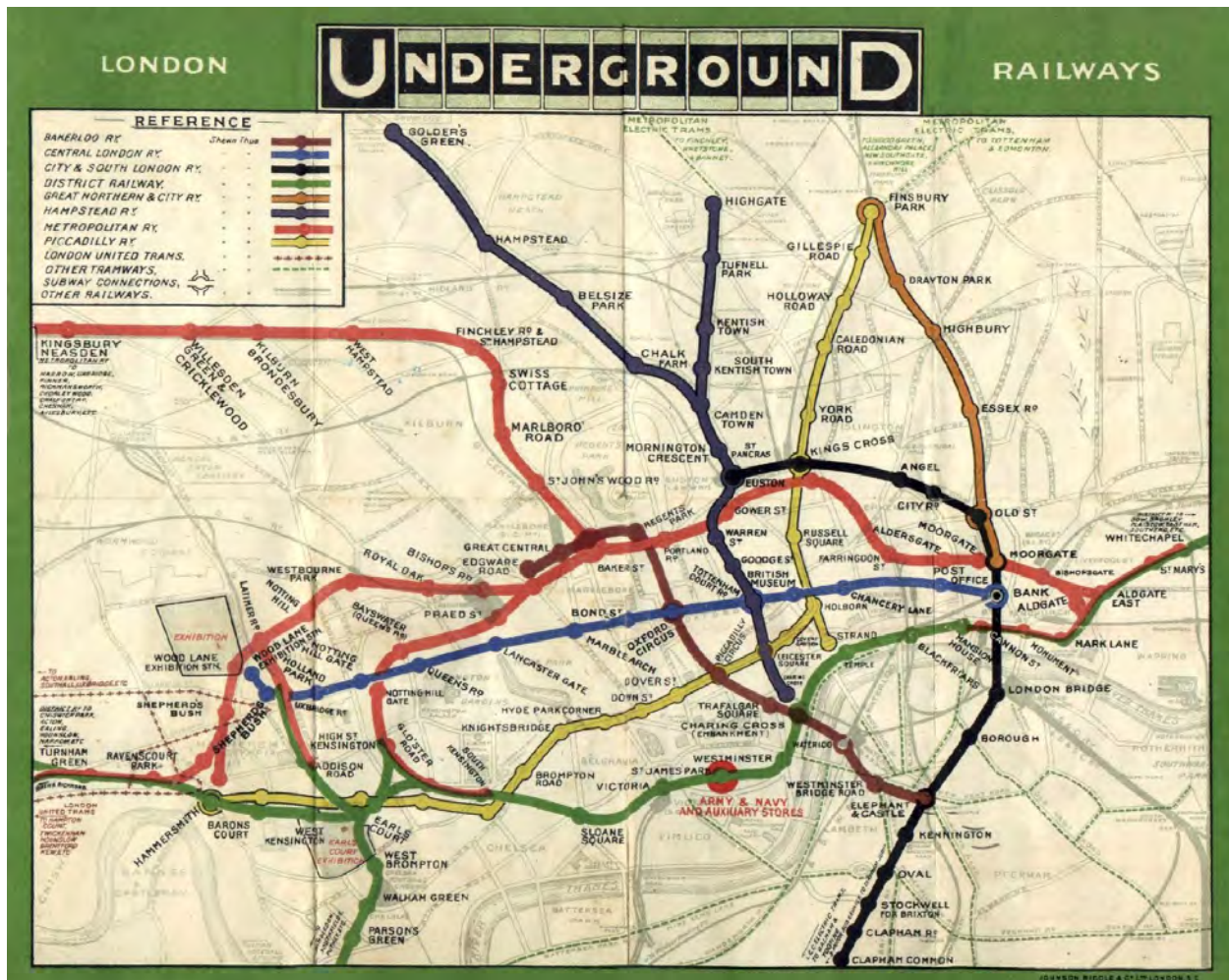
London North Western and Charing Cross Junction Railway

Notwithstanding the decree of the Metropolitan Railway Commission, other people were however still looking at alternative solutions. A glance at a map of London of about this date will show that the idea of a cross London route was still alive. The proposed route of the London North Western and Charing Cross Junction Railway is shown running from just north of Euston down what is now Tottenham Court Road to Charing Cross station. This overground railway even obtained approval in 1864 but no further action was taken and has also faded into the mists of time. It was eventually formally abandoned in 1868

Real solutions to London's traffic considered.

The next milestone in the history leading towards Crossrail was the 1905 Royal Commission Report on Transport in London. This realised the increasing problems of travel across the city and among many other things it recommended two new avenues be constructed on the Paris plan, each 140 feet wide, one from Bayswater Road to Whitechapel, basically doubling the width of Oxford Street, and the other from Holloway to Elephant & Castle, more or less along the line of Farringdon Road. Each was to have a four-track tramway on the surface and a four-track railway in tunnel beneath. Had this proposal been adopted in full I am sure London's transport problems of today would not have emerged.

This of course came in the early days of railway electrification, when long tunnels without frequent ventilation shafts first became possible. The opening of The City and South London Railway in 1890, had heralded this new era by being the first Tube and electrified railway in London. This was quickly followed by the Central Line in 1900, Bakerloo and Piccadilly in 1906 and the Northern in 1907. London's Underground had arrived and remains with us today.

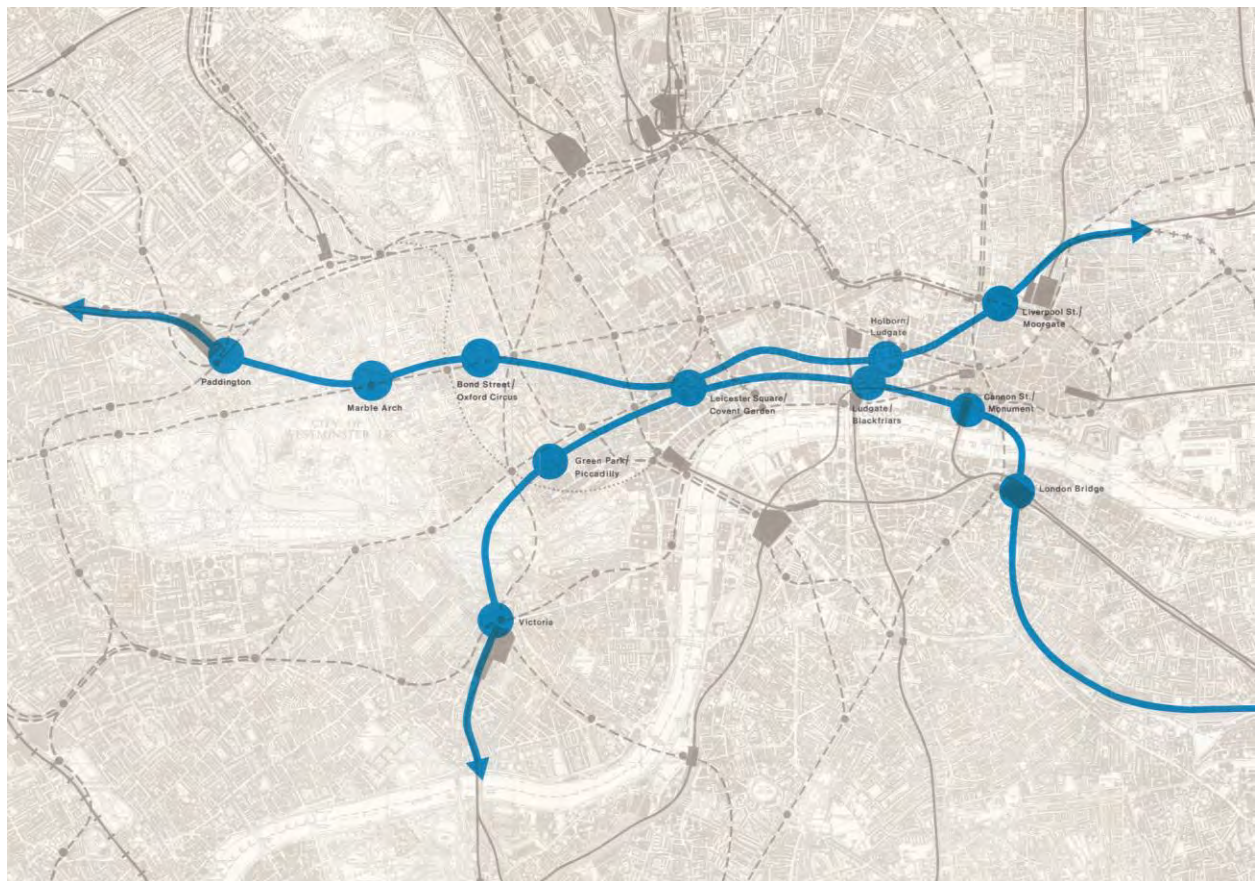


Crossrail begins to emerge.

As the end of the Second World War seemed in sight in 1943, the Abercrombie Plan considered what needed to be done to reconstruct the Capital. The report recommended electrification of all rail routes and proposed a highly ambitious system of two-track bored rail tunnels in loop-shaped routes beneath the city, large enough to handle main-line trains. These tunnels would provide a tube-like service but without the need to change from a main-line train to an underground train. One of the routes, the Northern Arc, would connect Paddington, Marylebone, Kings Cross and Liverpool Street. Yet again these plans were not followed up as post-war Britain had more pressing issues to address.

No further thought to a scheme similar to Crossrail appears to have been given until "*Movement in London*" was published by the Greater London Council (GLC) in 1969 which brought together a range of work done over the previous six years led by the GLC and the Ministry of Transport. One of the scenarios this report examined, referred to as G/B, was very similar to the scheme included in the later "London Rail Study" published in November 1974, which has some similarities to the Abercrombie ideas.

London Rail Study 1974



For the first time the route was referred to as Crossrail. This study had been commissioned by the Minister for Transport and the Greater London Council in February 1973. The report examined many schemes put forward by both British Rail and London Transport. A northern tunnel would join British Rail's Western Region lines

west of Paddington to the Eastern Region lines east of Bethnal Green. There would be new stations at Paddington, Marble Arch, Bond Street, Leicester Square, Holborn and Liverpool Street. A southern tunnel would connect the Southern Region's Central Division services via stations at Victoria, Piccadilly, Leicester Square, Blackfriars, Monument and London Bridge

The report's epilogue opens with the following statement:

“This is not, and cannot hope to be, a study to end all studies. We doubt whether there will ever be a complete solution to London’s rail problems, and this report certainly does not provide one. Indeed it does not even provide final answers on all of the major investment projects which we have examined.”

Crucially though, the study was almost certainly the first time that it was acknowledged that Crossrail needed to be *more* than just another Tube line. For London – and areas beyond - to get the most benefit from the scheme it needed to be a mainline railway that just happened to spend a good deal of time underground.

“Crossrail would be similar to solutions which are being increasingly adopted throughout the world, eg, the Réseau Express Régional [RER] in Paris, and the German S-Bahn systems in Berlin, Hamburg and Munich.”

“This proposal seemed to us an imaginative and exciting solution to the problems of overcrowded public transport in central London.”

The report recommended that further studies be carried out for the Crossrail scheme and notes that “...if the findings support the proposal it is likely to change the priority for further transport investment”. In the 1969 report the cost of Crossrail was estimated at £175 million. In the 1974 Study this had risen to approximately £300 million. Nothing happened for another 14 years until the publication of the “Central London Rail Study” in 1988. Further reports under the same title appeared in 1989 and again in 1990.

Central London Rail Study 1989

By the late 1980s, it had become clear that existing Tube and rail capacity was approaching its limits. The Government therefore commissioned and published the Central London Rail Study in 1989 - a report which took many of the schemes highlighted in the 1974 study and developed them into more concrete schemes: East-West Crossrail, a line from Wimbledon to Hackney via Chelsea (now safeguarded as Crossrail 2) and Thameslink. In addition to all this, the Jubilee line Extension was proposed in the East London Rail Study published a few months later.

The first attempt to develop Crossrail

These reports led to a Private Bill sponsored by London Underground and British Railways going before Parliament in 1991. The cost of the Crossrail scheme was given as just over £2bn at 1993 prices. A Private Bill requires that the promoters must be able to demonstrate that the funds to build the scheme are in place or at least that there is a realistic prospect that such funds will be available. HM Treasury was unwilling to give the necessary commitment, and the recession in the early 1990's temporarily depressing passenger journeys into and through London resulted that in the end the project was voted out in the Commons Committee and Crossrail was dead.

Crossrail in the doldrums.

Notwithstanding opposition, there was still support at high level in government for Crossrail and strongly backed by both London Transport and British Rail. Thought was given to raising a Transport and Works Act order to authorise construction and work started on preparation of the order, but before much progress could be made the decision was taken to privatise British Rail and the project was again mothballed.

Fortunately a small team was kept in place to safeguard the alignment of Crossrail together with that for Crossrail 2, the Chelsea – Hackney line. This was almost certainly the most important single act in Crossrail's long history for it saved the scheme and ensured it continued to have a future.

Without this work the corridor could have been built on, including some very large buildings with deep foundations. A notable example is the Paddington Central development where a corridor was left through the piles to accommodate the railway.

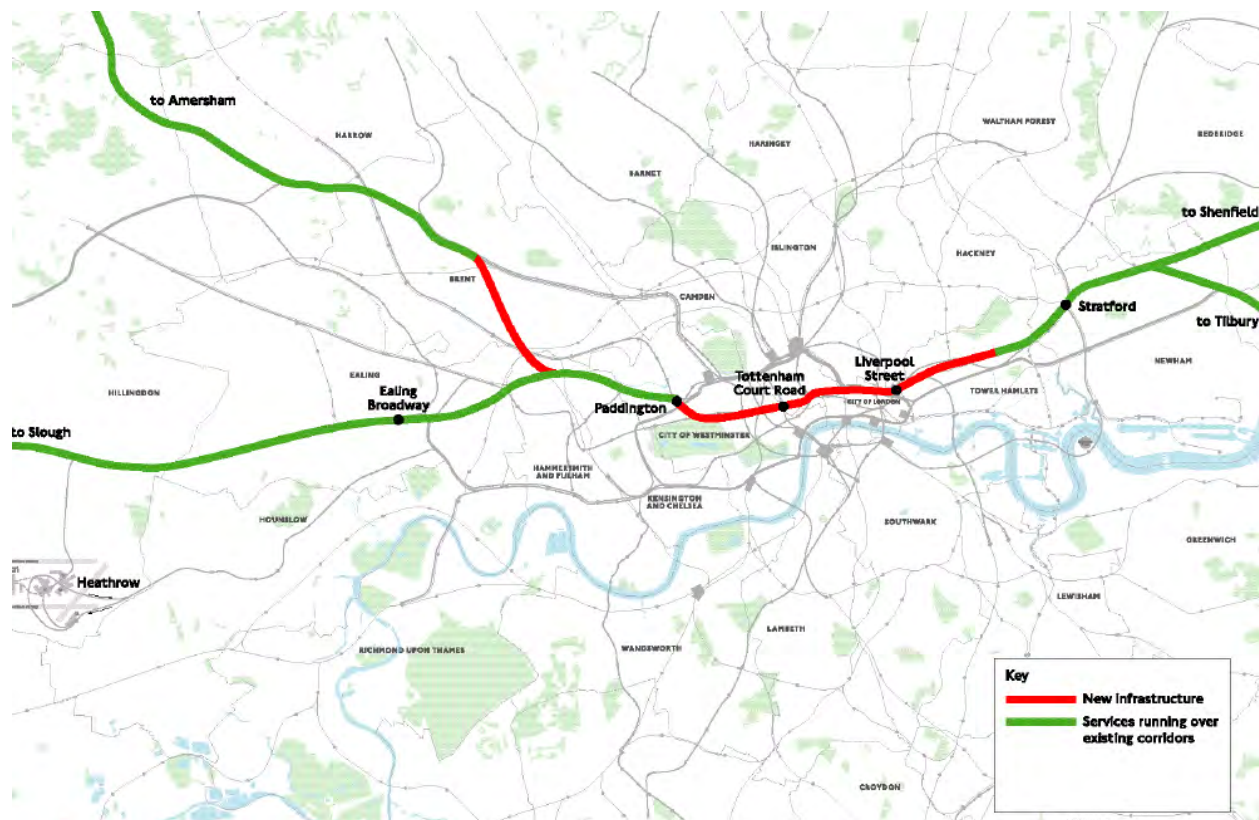
Defining London's Rail needs

In 1997 the new Labour Government created the Department for the Environment, Transport and the Regions (DETR) and the Strategic Rail Authority (SRA). The SRA took over the functions previously undertaken by the Office of Rail Franchising and the British Railways Board and a number of other government activities. One of the DETR's first acts was to commission a 10 year transport plan which was delivered in late 1999 and set out a number of very ambitious targets for development of the transport system over the period.

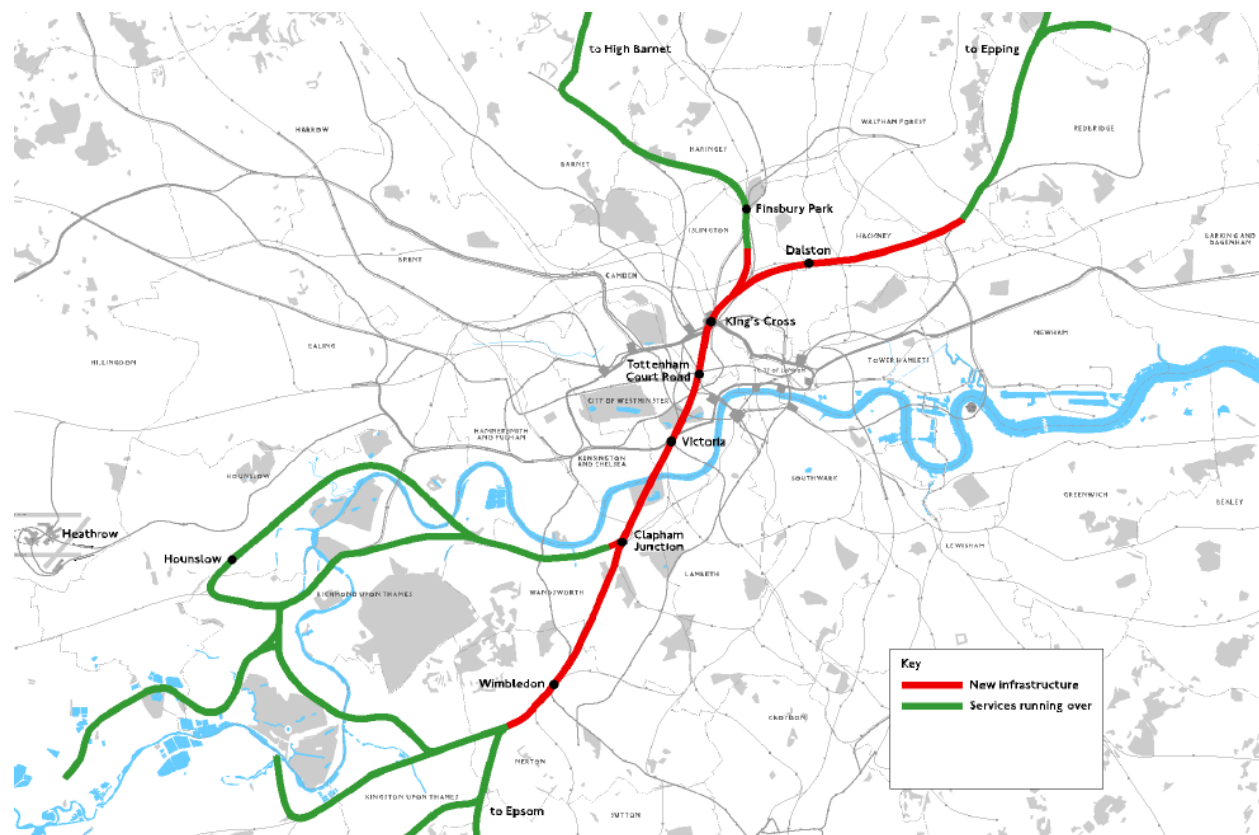
In January 2000 the SRA was asked to review the report on North-South and East-West links across London. The North-South study reported in June. It recommended the implementation of the Thameslink scheme, which had been in preparation for some time, and also suggested taking over the East London Line and its northern extension, for which powers had already been obtained, extending it to the south and incorporating it into the national rail network. The recommendations were accepted very quickly.

Work on the East West study took longer and discarded many of the schemes as unrealistic or too remote from centre of town to be of much benefit. This effectively left three possible corridors relatively free from underground obstructions running across central London roughly in an east west direction. These were the original Crossrail proposal, the Chelsea Hackney corridor and a line reserved for the original Jubilee Line (then called the Fleet Line) running from Charing Cross, along Fleet Street to St Paul's, which had been kept clear of deep foundations.

East West Study



Chelsea Hackney Corridor



The next decision to be made was what kind of railway it should be recognising the policy that no totally new lines should be built at tube structure gauge but rather the national rail or sub-surface line gauge be used. Next, should it be a self contained line or linked to existing railways as the RER in Paris? The most economic solution found was to have the central section underground and surfacing as soon as practical to link with the existing surface railway network.

The extent of the railway was the next issue and the proposals were wide ranging with the longest suggestion being from Southampton to Ipswich. However, it was obvious that if the line was to effectively distribute passengers through central London several stations at key locations would be required and served by a high frequency train service similar to the Underground. Whereas, trains serving the outer destinations would require less frequent services as they attract fewer passengers. This would necessitate traffic from a larger number of remote origins being combined close to the central section to meet the increased frequency. Whilst tests showed a marginal increase in the fare-box the benefits were outweighed by operational consideration and hence this approach was dropped.

Alternatives for the western section

Six western corridors were considered for inclusion in the project. Five of these had been identified early on, and were the subject of discussions with interested parties and a comprehensive assessment and sifting process. The sixth option, Corridor F, was added later.

The corridors were:

- Corridor A - Watford Junction Line
- Corridor B - Aylesbury Line via Amersham
- Corridor C - High Wycombe Line
- Corridor D - Uxbridge and Watford Metropolitan Line
- Corridor E - Great Western Line
- Corridor F - Kingston Line via Richmond

The Great Western Line was selected as the preferred route, with services to both Heathrow and Maidenhead. This route was found to provide significant journey time savings to the City and Canary Wharf, as well as crowding relief to London Underground lines in west London.

Alternatives for the eastern section

Five eastern corridors were considered during the development of Crossrail. These were discussed with interested parties and were the subject of a comprehensive assessment and sifting process. The corridors were:

- Corridor A - Great Eastern Line
- Corridor B - Tilbury Line via Forest Gate
- Corridor C - Tilbury Line via Royal Docks
- Corridor D - North Kent Line via Royal Docks
- Corridor E - North Kent Line via Charlton

Two corridors have been included in the preferred project. The first was the Great Eastern Line from Shenfield. Selection of this corridor was based on its contribution to crowding relief on the National Rail and London Underground networks, and its ability to free up capacity at Liverpool Street station to allow other train services to be expanded. The North Kent Line via Royal Docks corridor was selected on the basis of its role in assisting regeneration and economic development in the Thames Gateway, including Canary Wharf and Royal Docks.

Further examination of the abandoned Fleet Line corridor demonstrated that it would be difficult to access the West End and also was too far away from the strongest traffic potential. This left the original Crossrail alignment and the Chelsea Hackney Line. Three possible options were worked up; one for each of these two routes and one for a combination of the eastern half of Cross Rail and the south western part of the Chelsea – Hackney Line. In each case long and short distance options were tested. Crossrail and the composite SW to E option came up to about the same benefit cost ratio but the E-W route was more affordable and provided a link to Heathrow, for which there had been considerable agitation by the City of London.

The report was presented to the SRA Board and following its adoption to Deputy Prime Minister, John Prescott, on 22 December 2000.

Cross London Rail Links Limited comes into being.

In June 2001 Cross London Rail Links Limited was established the shareholding being held equally by the SRA and TfL.

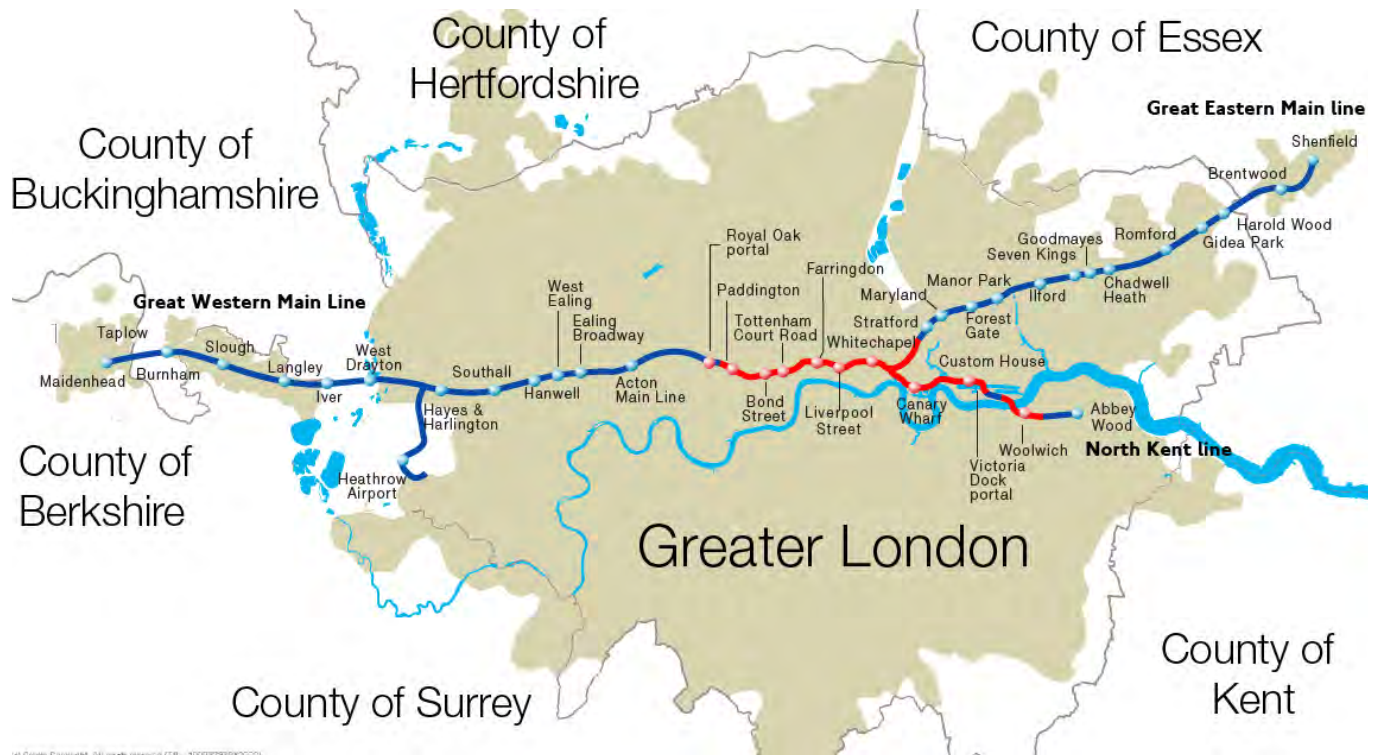
Refinement of the scheme together with the evaluation of the final destinations beyond the central section continued. One key change which had to be recognised was the importance of Canary Wharf, which hadn't really existed when the original Crossrail route was selected. Detailed analysis of the many options was brought to a close and by November 2002 a scheme broadly similar to the final route had been worked up and 'The Case for Crossrail' had been produced. The cost of the scheme was estimated at £10bn.

Consultation 2002-2004

On being presented with the proposal, the newly formed CLRL Board suggested radical changes to improve the business case. As a consequence the then Secretary for State for Transport Alistair Darling ordered a review to be carried out by Adrian Montague. At the same time CLRL were tasked to undertake a consultation on the proposals. This presented the original proposed routes and the short listed options.

Crossrail the Final Agreed Route

The route for Crossrail was now agreed. The route would extend from Maidenhead in the west to Paddington and on through the West End and City to Stepney Green in East London where it splits with one leg going North East to Shenfield in Essex and the other going out through Canary Wharf beneath the River Thames to Abbey Wood in the London Borough of Greenwich. Crossrail trains would also connect to Heathrow Airport using the existing spur. In 2014 the Government announced that Crossrail services would be extended in the west to Reading.



Adrian Montague reported in early 2004 and on the last day of parliament, in July 2004, the Minister announced that a Hybrid Bill would be brought forward as quickly as possible.

Parliament and the Hybrid Bill

A herculean effort now followed which managed to complete hundreds of sets of documents, each weighing 40kg, in time to enable the Bill to be deposited and given its first reading in February 2005.

The parliamentary process through both Houses to Royal Assent took three and half years, the longest in the history of Parliament.

Towards the end of the Parliamentary marathon, pressure was applied to the process from within government to ensure that matters were concluded before the Summer Recess of 2008. Royal Assent was received on the evening of 22 July 2008, the last day of the Parliamentary year, after the Bill entered Parliament on the 22 February 2005. The hybrid Crossrail Bill was no longer - for after many years the Crossrail Act was in being providing the legal right to build the railway.

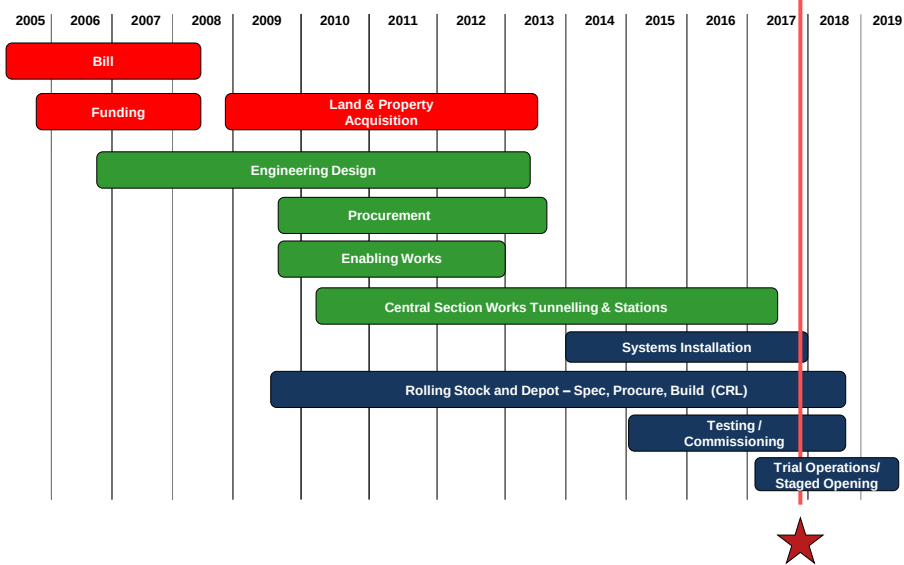
Royal Assent 22 July 2008



Construction of Crossrail Starts - 15 May 2009



Crossrail Overall Programme





◀ Funding

Department for
Transport

GREATER
LONDON
AUTHORITY

 **Transport
for London**



£14.8 billion

NetworkRail

Berkeley
HOMES

CANARY WHARF

GROUP PLC

Heathrow
Making every journey better

Following Royal Assent some 48 funding agreements were set up. These covered:

- City of London– £350m – £200m contribution plus a further £150m 'sought' from London businesses
- Canary Wharf Group - £150m – This will be part of the cost of Canary Wharf Station constructed by Canary Wharf Contractors
- Heathrow Airports Ltd (formerly BAA) - £230m towards the cost of construction of an extension to the Stockley viaduct to provide more capacity on the link to Heathrow
- Berkeley Homes – agreed to construct the station box at Woolwich as part of the Royal Arsenal Development. Costs of the fitting were to be agreed at a later date – shared between RB Greenwich and Crossrail
- Network Rail - £2.3bn out of own funding for all works on the surface section of the railway.

In April 2010, the Mayor introduced a levy of 2p on non-domestic properties with a rateable value of over £55,000 in London. In addition The GLA is expected to contribute around £4.1bn of its agreed contribution using income generated from a new business rates supplement (BRS). Powers were granted to the GLA to introduce this under the 2009 Business Rates Supplements Act.

The Crossrail BRS is collected on behalf of the GLA by the 32 London boroughs and the City of London Corporation on the same bills as general business rates (NNDR).

Tunnelling

To construct the 21km of twin-bore tunnel required for Crossrail, eight tunnel boring machines (TBMs) have been used undertaking ten individual tunnel drives to construct the Crossrail running tunnels. Each TBM is 7m in diameter and up to 120m in length. The TBMs have been manufactured by Herrenknecht in Germany, one of the world's leading TBM manufacturers.

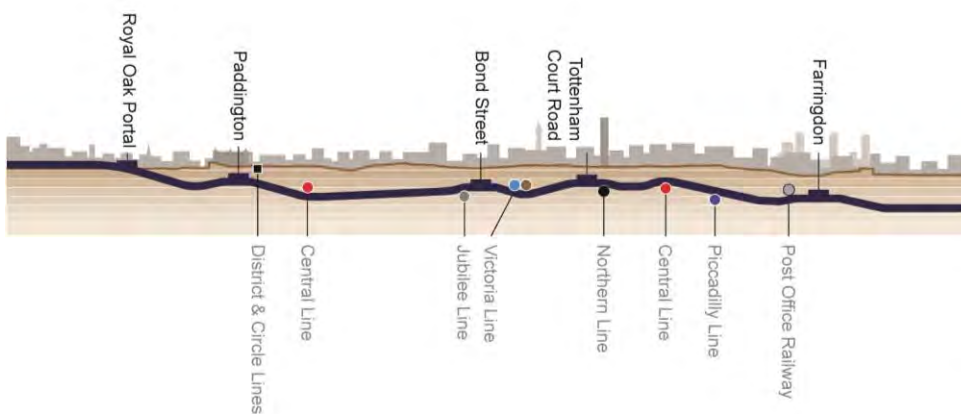
The first two TBMs, Phyllis and Ada, started on their journey from Royal Oak portal towards Farringdon in the spring of 2012. They were followed later in the year by Elizabeth and Victoria from the Limmo peninsular site near Canning Town. Phyllis completed her journey in November 2013 and a time capsule was buried with the head of the TBM adjacent to Farringdon Station. Ada followed and reached Farringdon in January 2014. Elizabeth and Victoria traversed through Canary Wharf, the Stepney Green junction, and Whitechapel completing their journey at Farringdon. Jessica and Ellie finished their drives from Pudding Mill Lane to Stepney Green, and were then re-launched at the shaft at Limmo to complete the short drive to the Victoria Dock Portal. Sophia and Mary completed their drives under the Thames from Plumstead to North Woolwich. .



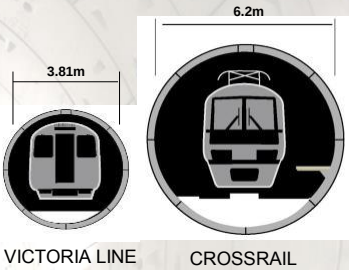
The tunnelling teams worked around the clock to complete the tunnels for Europe's largest infrastructure project with thousands of others employed to upgrade the existing rail network and build major new stations along the central section of the route.



Tunnel Vertical Section

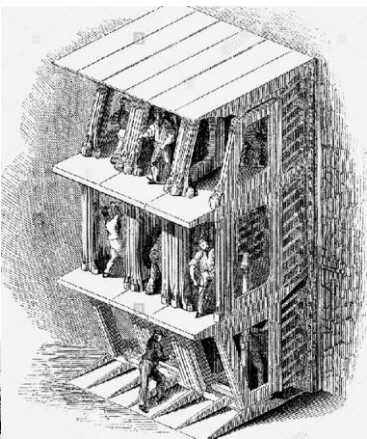
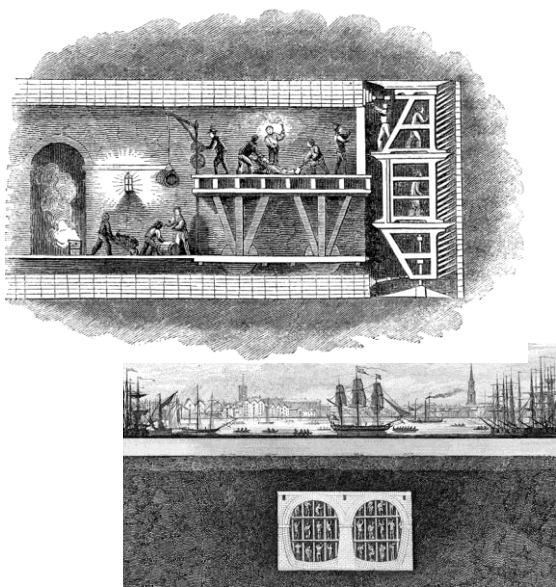


Crossrail Tunnel Size Comparison



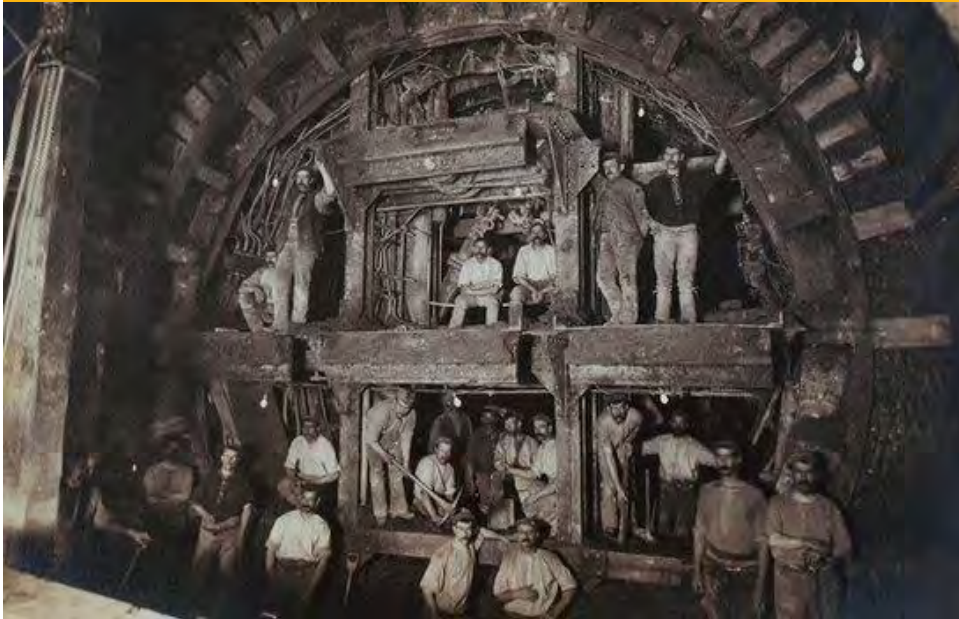
London Underground infrastructure	Crossrail
125m (average)	250m long platforms
120m (six car trains)	200m long trains
800 passengers per train (average)	1500 passengers per train

Brunel's Thames Tunnel – first tunnel under a river



Tunnel Shield

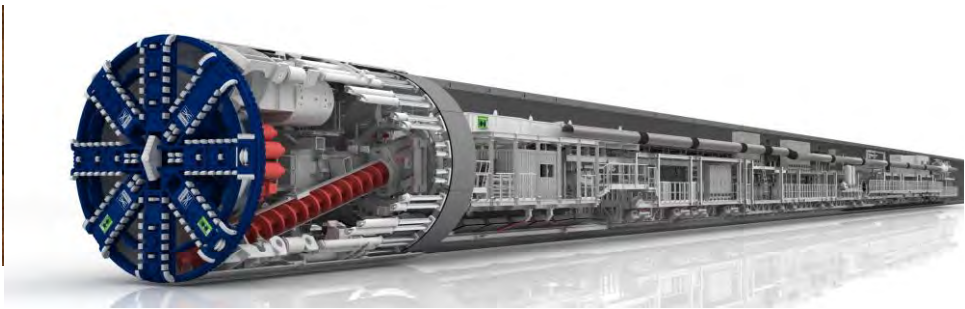
Tunnel Shield 20th Century



Tunnel Boring Machine (TBM) 2015



TBM Factory – 100m long



Bridge of the “Starship Ellie”



◀ Thames Tunnel – Sophia December 2012



◀ Sophia at North Woolwich Portal January 2014



Breakthrough Farringdon 23 May 2015



Farringdon Station 4 June 2015



End of the TBMs August 2015



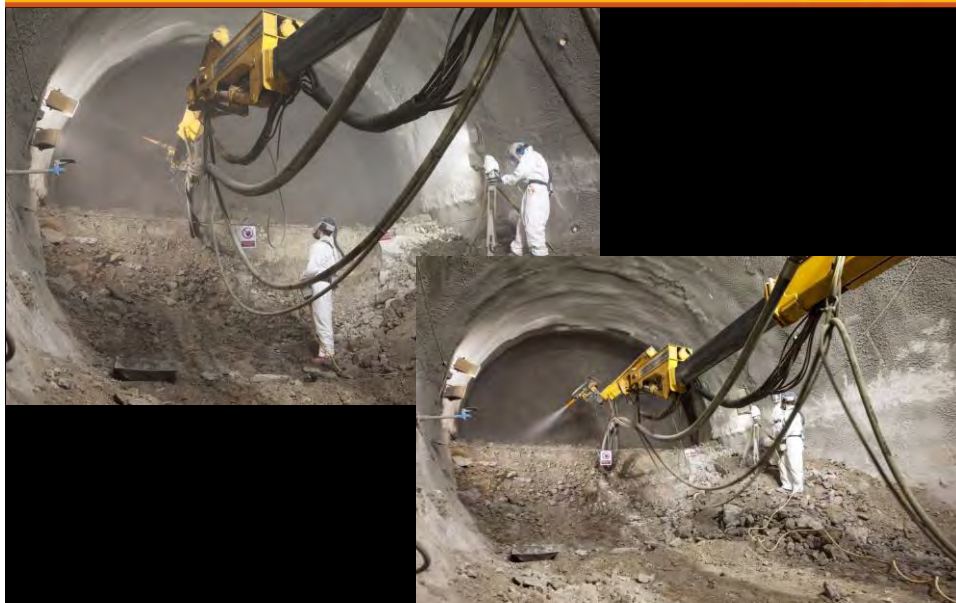
Thames Tunnel Open Day 7 June 2015



Sprayed Concrete Lining



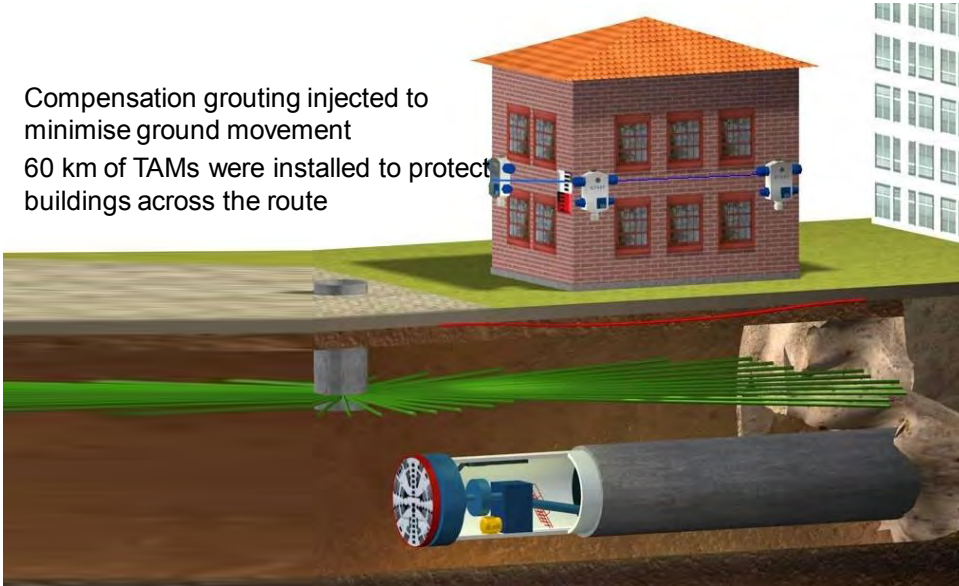
Sprayed Concrete Lining



Ground Movement



Compensation grouting injected to minimise ground movement
60 km of TAMs were installed to protect buildings across the route



Considerations: heritage buildings



e.g. St Patrick's Soho Square
above Tottenham Court Road
Station



◀ Excavated Material – fills 3 times!





► Wallasea Island yesterday



◀ Wallasea Island – the future



Station Designs

Eight new underground stations are being constructed at:

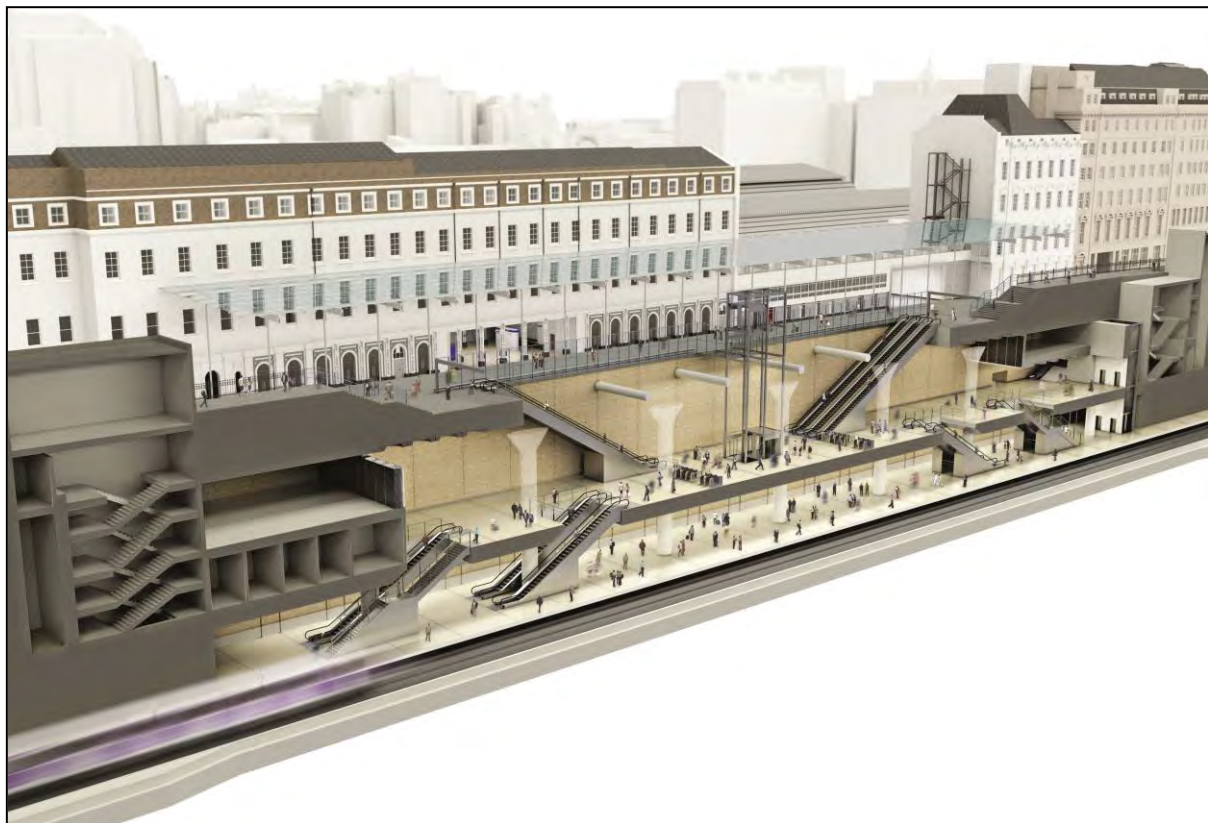
- Paddington
- Bond Street
- Tottenham Court Road
- Farringdon
- Liverpool Street
- Whitechapel
- Canary Wharf
- Woolwich

A new surface level station is also being built at Custom House near the Excel Trade Centre which will be shared with the DLR.

Some of the UK's best known architects have worked with world-class engineering firms on the designs for the new Crossrail stations. The results are stunning, sustainable and world-class designs of which London can be proud. The new stations will take inspiration from the past and from their own localities but have a fresh modern twist. The work at these new stations will be on a scale not seen since the Jubilee Line Extension opened in 1999.

Each of the new Crossrail stations will have a distinctive but consistent design. Designers have also been appointed to incorporate architectural components that will be used throughout the platform and tunnel environments in each station to create an integrated line-wide identity.

Paddington

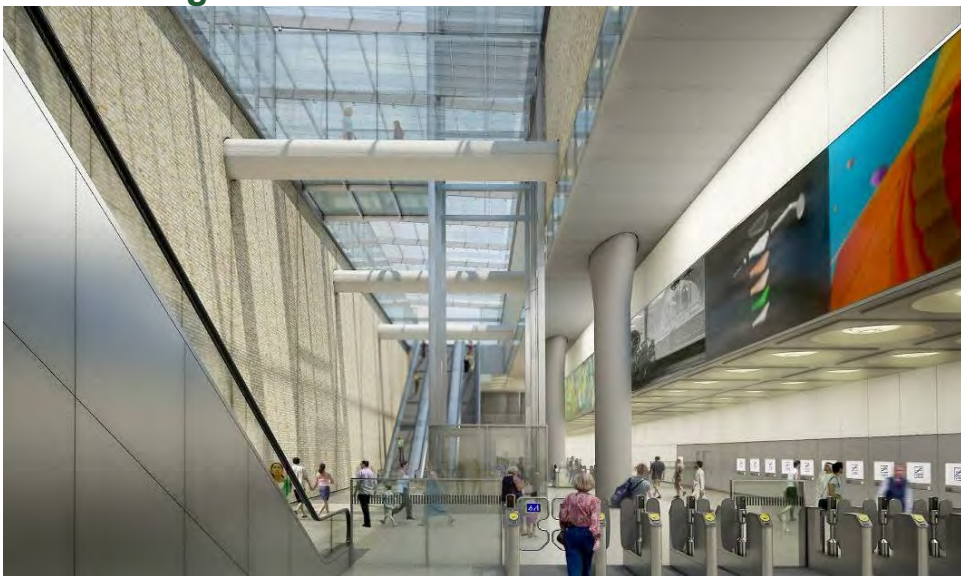




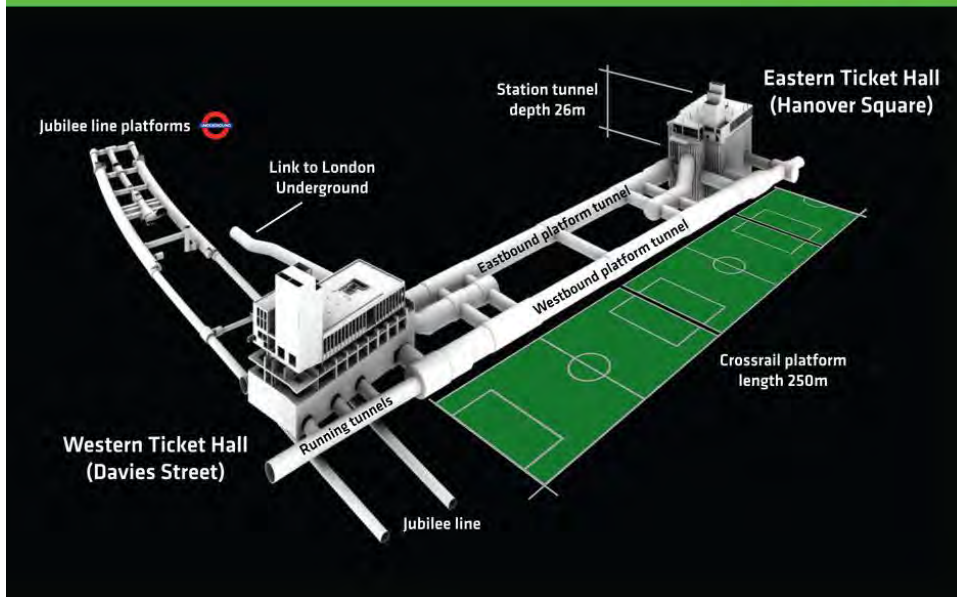
◀ Paddington Station - Departures Road 2018



◀ Paddington Station – Ticket Hall



Bond Street Station



Working in the heart of Central London





◀ Bond Street East Ticket Hall -2018



◀ Bond Street East Ticket Hall Hanover Square urban realm



Canary Wharf Station – Architects Design



Canary Wharf Station – Today



Station paying It's Way



Rooftop Garden

Retail ground level

Retail promenade level

Retail

Retail

Station Ticket hall level

Station Platform level



Roof Garden – Opened 1 May 2015



Surface Sections

Network Rail is responsible for the design, development and delivery of the parts of Crossrail that are on the existing network, covering 110km of track and 29 stations from Reading in the west to Abbey Wood and Shenfield in the east.

Its work will integrate Crossrail with the national rail network, delivering more frequent trains into central London from the east and west. Network Rail will do all of this on an active operational railway, delivering vital upgrade works whilst minimising disruption to train services.

- **Step free access** - there will be step-free access at the majority of the surface stations on the route
- **Longer trains, more passengers** - platform extensions will allow longer, higher capacity trains to be used
- **London links** - when it opens from 2018, Crossrail will provide new transport links with the Tube, Thameslink, National Rail, DLR and London Overground

◀ Ealing Broadway Station today



◀ Ealing Broadway Station tomorrow



Crossrail plans substantial remodelling of the station. It is proposed that the current cramped entrance and ticket hall be replaced by a new glass structure that will let in much more natural light and be significantly more spacious.

In addition, new lifts and staircases will make it much easier for passengers to get around the station.

Major changes to the front of the station, replacing the current dated façade with a glass structure that will allow natural light into the station entrance and ticket hall and installing a new canopy over the station forecourt

A new entrance, twice the size of the existing one, with level access to a significantly more spacious and brighter ticket hall at street level, and offering a gateline capacity that is nearly doubled

New lifts to provide step free access from street level to all platforms

Redesigned staircases for platforms 1 and 2/3

A redesigned waiting room for platform 4

A new footbridge to provide a secondary means of escape at the eastern end of the Crossrail platforms

Platform extensions for the new high capacity 200 metre long Crossrail trains

New canopies for platforms 2/3 and 4

New information screens and communications systems

Crossrail has also been working with the London Borough of Ealing on proposals for improving the area around the station, including improvements to the station forecourt.

The second half - Delivering a World Class Railway



Tunnel Ventilation



Tunnel Logistics Supply Hub

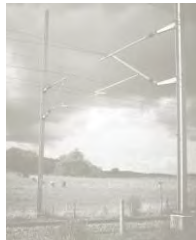


Track and Signalling Systems

► Now for the tricky bit



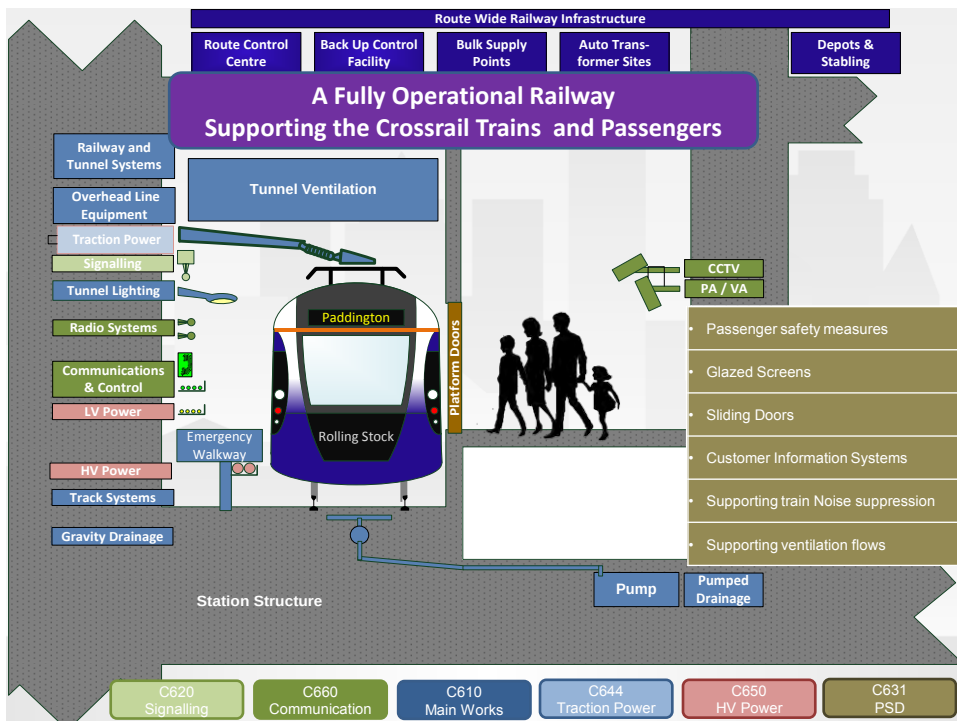
Tunnel Electrical/Mechanical and Services



Overhead Line Equipment



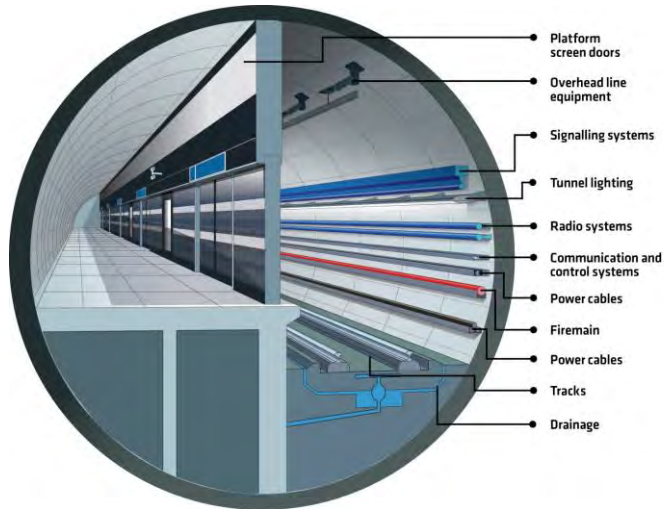
Communication & Control Systems



Tunnel fit out – 23 Interfacing Contracts



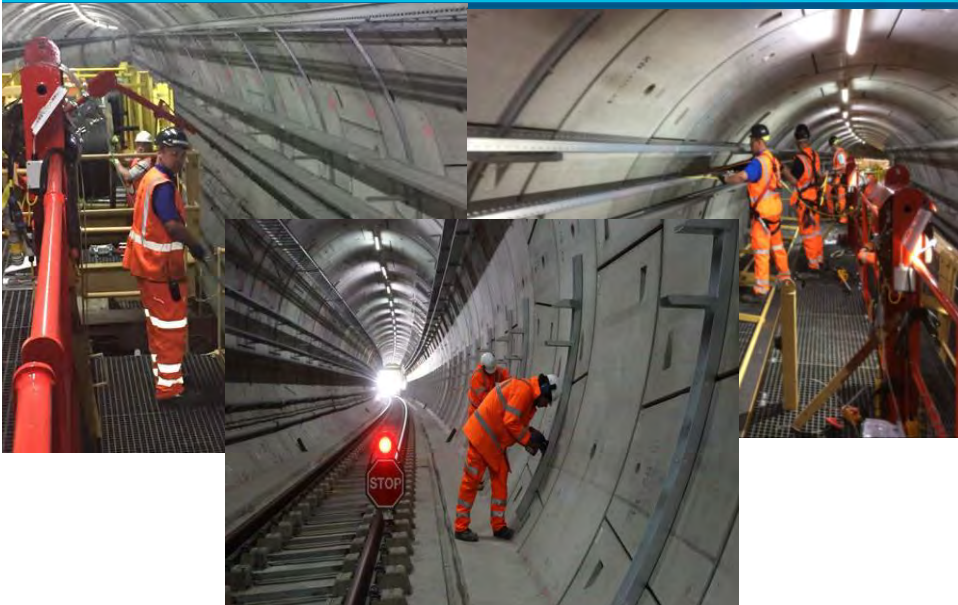
- ▶ 60 drainage pumps
- ▶ 250,000 holes to drill
- ▶ 42km of track
- ▶ 52 ventilation fans at 18 locations
- ▶ 4,000 luminaries to light tunnels
- ▶ 499km cable management system
- ▶ 42km of fire mains
- ▶ 40km of walkways
- ▶ 52 transformers
- ▶ Platform Screen Doors



Drilling all those holes!



Systems Installation



Under Platform Service Duct



Crossrail Track – 5 Types



Standard Track Installation



Floating Slab Track



Golden Spike Moment



Platform Screen Doors - installed



Platform Screen Doors - installation



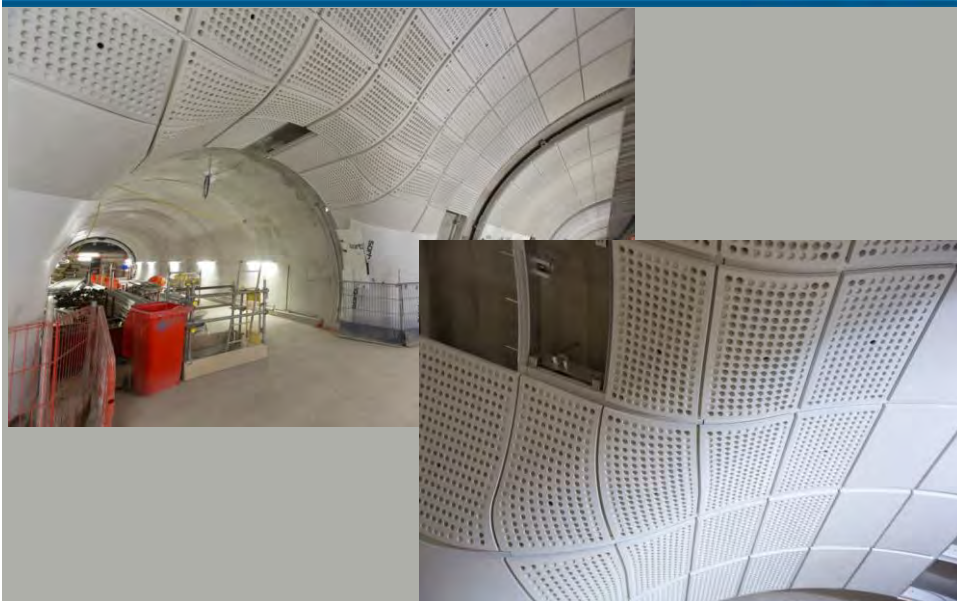
Tottenham Court Road Platform Cladding



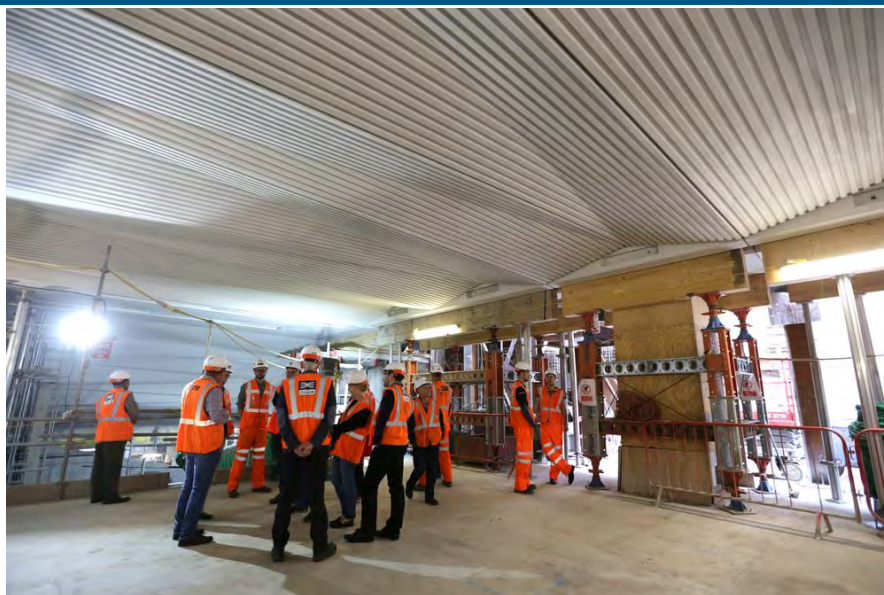
Tottenham Court Road Platform Cladding



Tottenham Court Road Platform Cladding



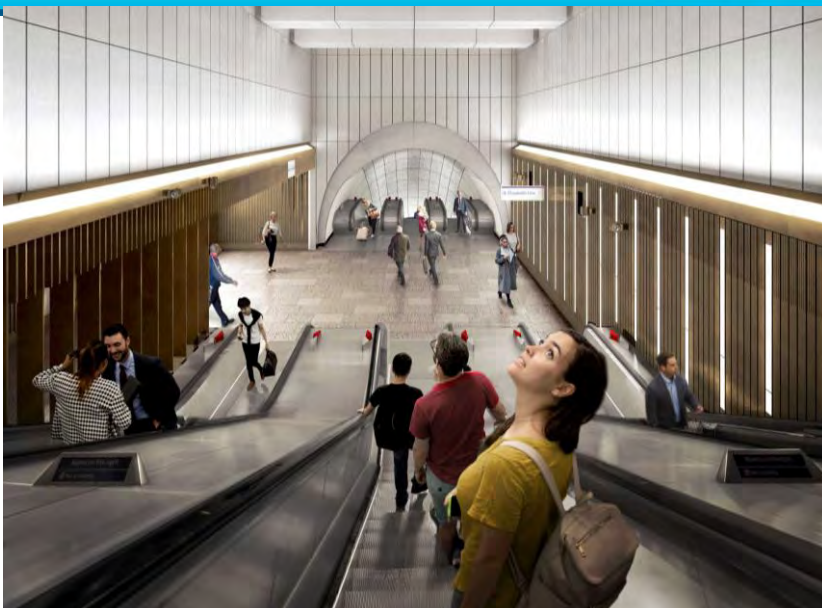
Liverpool Street Ticket Hall



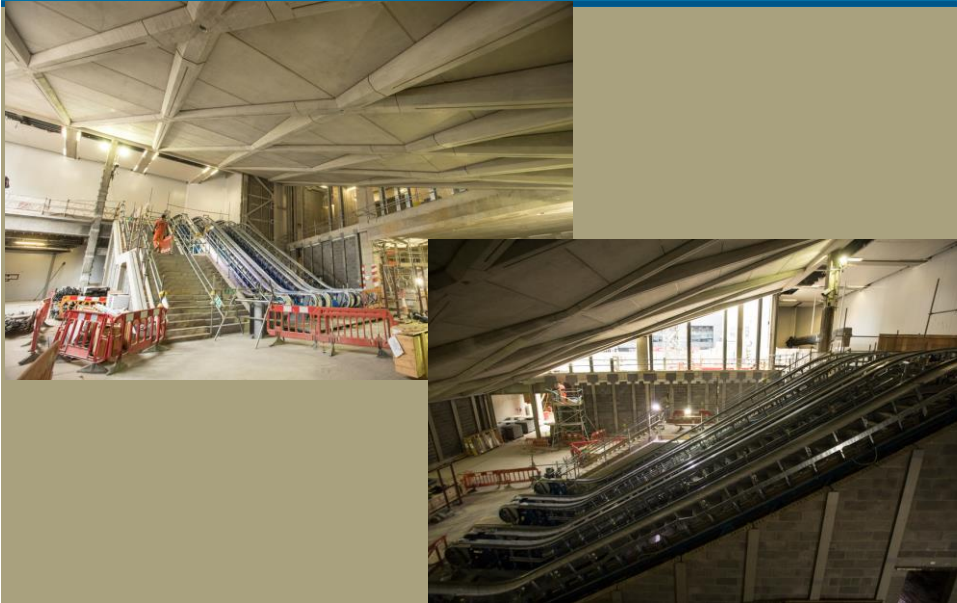
Bond Street Escalator Decline



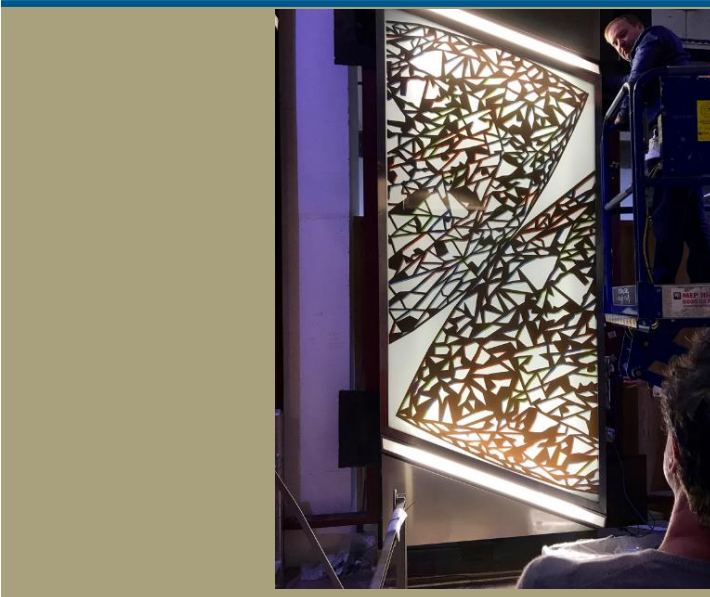
Bond Street Escalator Decline

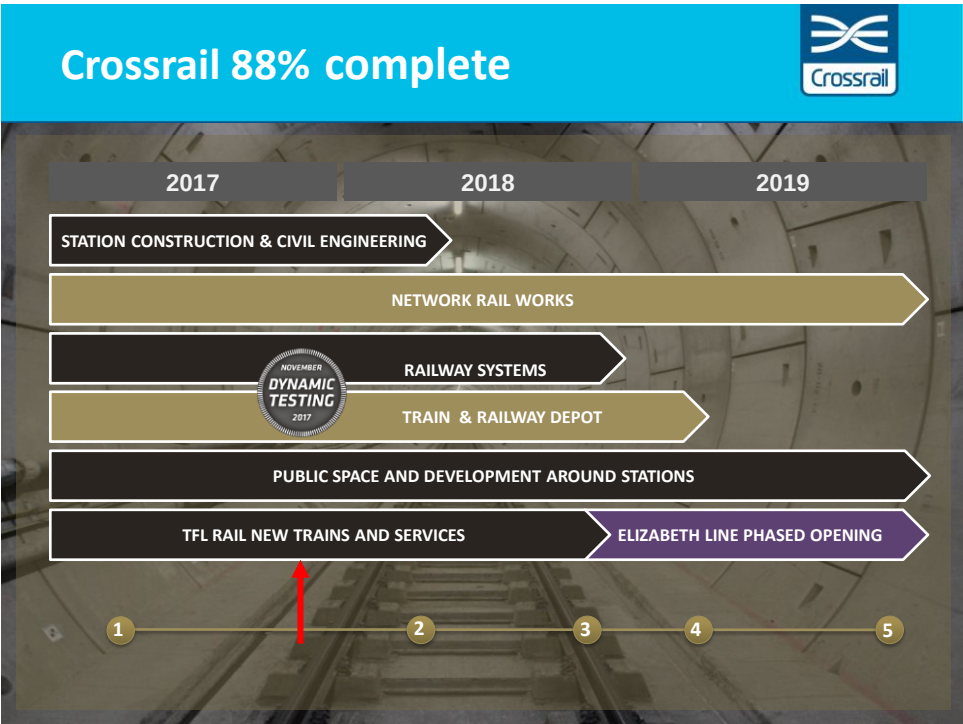


Farringdon Station – Entrance to Ticket Hall



Farringdon Western Ticket Hall – Station Art





The Billion Pound Train



The Billion Pound Train



Key features:

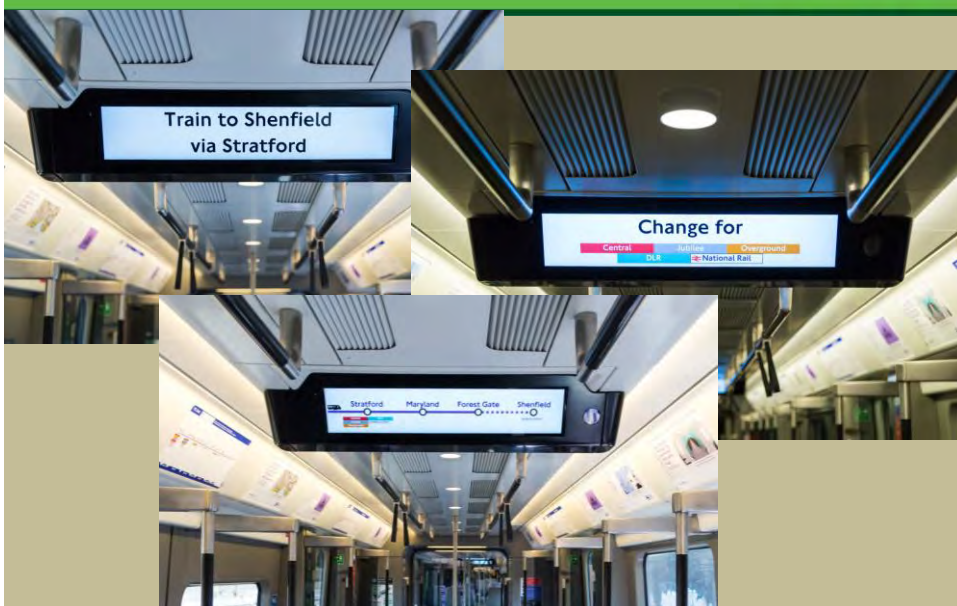
- 66 lightweight trains each 204.7 metres long
- Maximum Speed 90mph on outer sections of route
- 9 cars per train - walk-through carriages with Wi-Fi and 4G
- Space for 1,500 passengers capacity with 454 seats
- Air Conditioning
- Real time information on-train
- Energy efficient and intelligent on-train energy management systems
- 4 dedicated wheelchair spaces
- 10 multi-use spaces, can be used for bicycles, pushchairs, large luggage or additional wheelchairs
- Supporting 760 UK jobs plus 80 apprenticeships in Derby



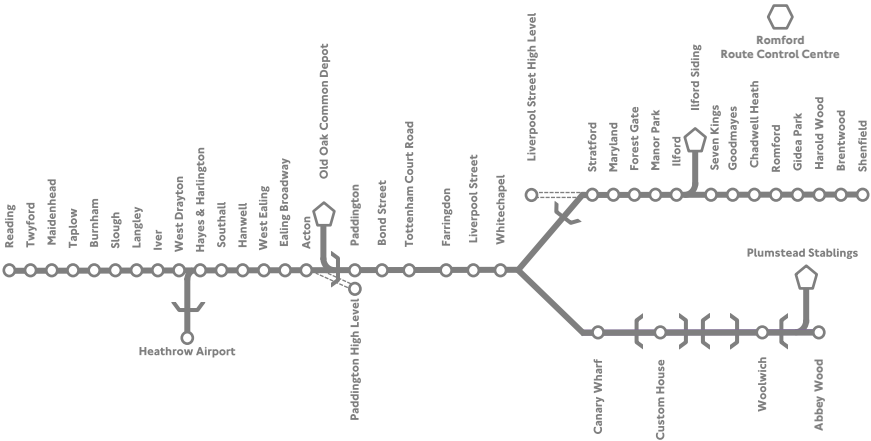
Interior Design and Train Information



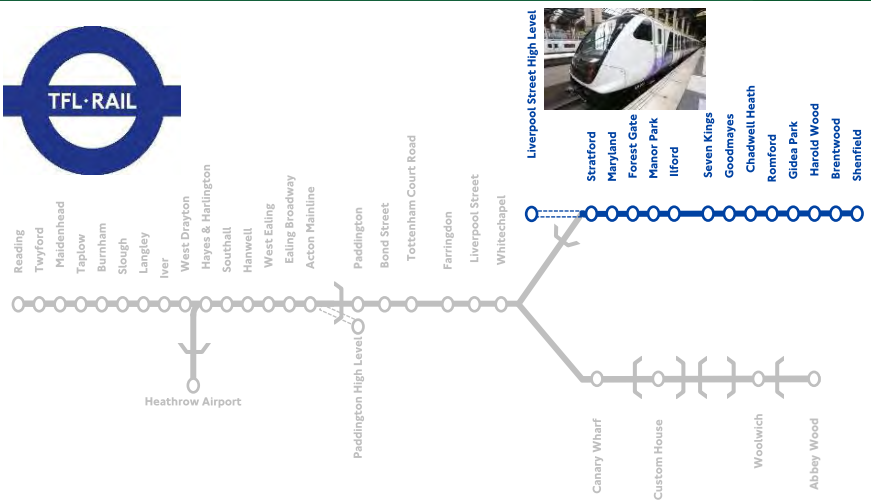
Real Time Train Information



Crossrail Train Operating Concession

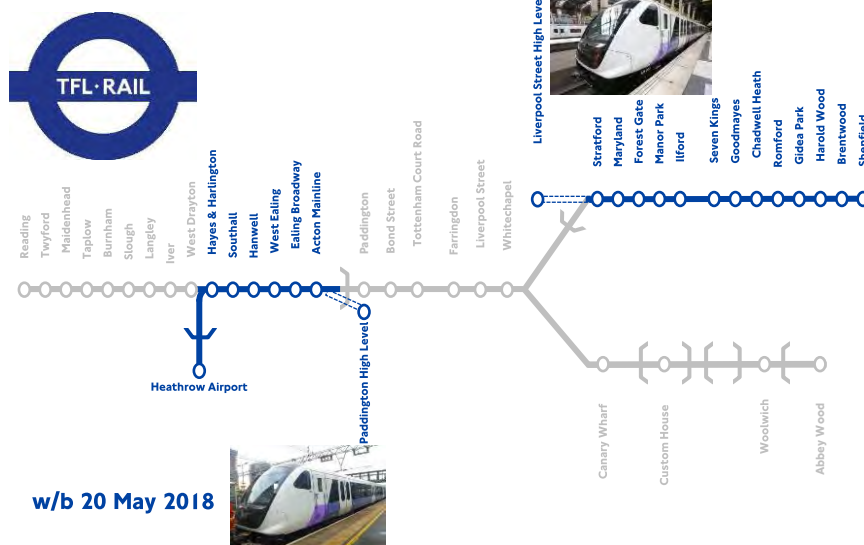


Service Integration - Stage 1

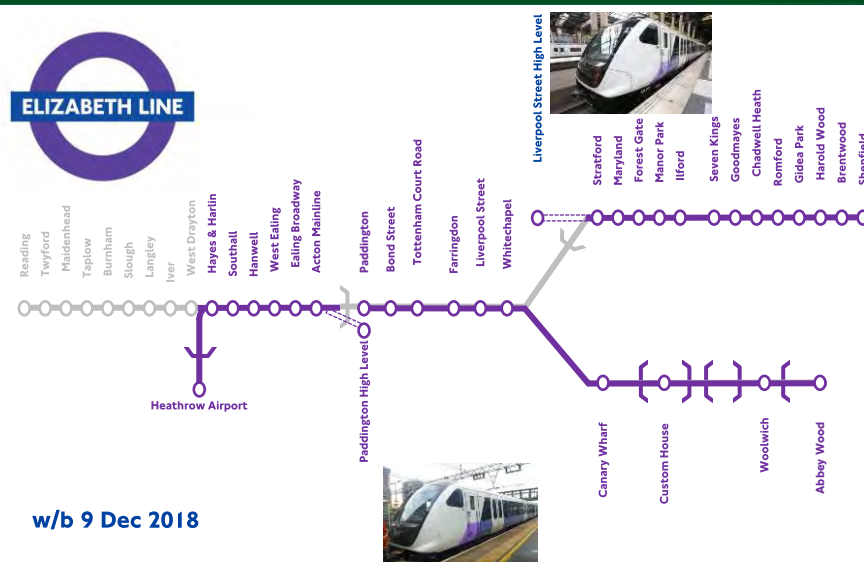


22 June 2017

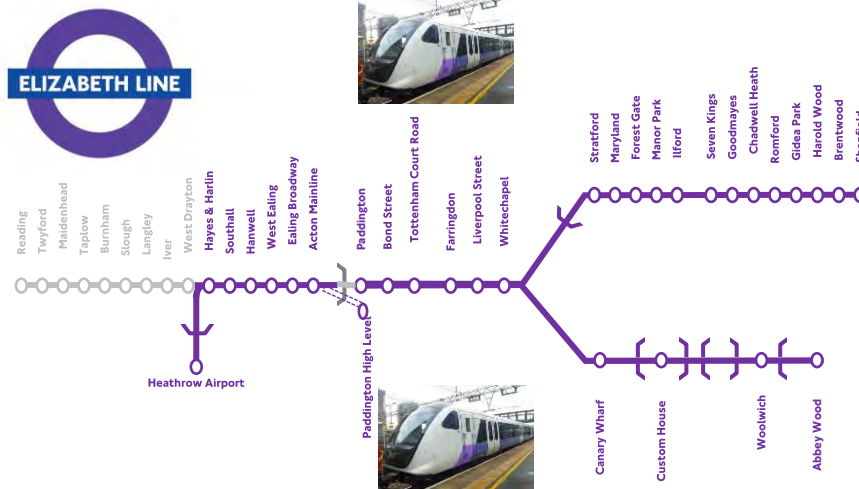
Service Integration - Stage 2



Service Integration - Stage 3

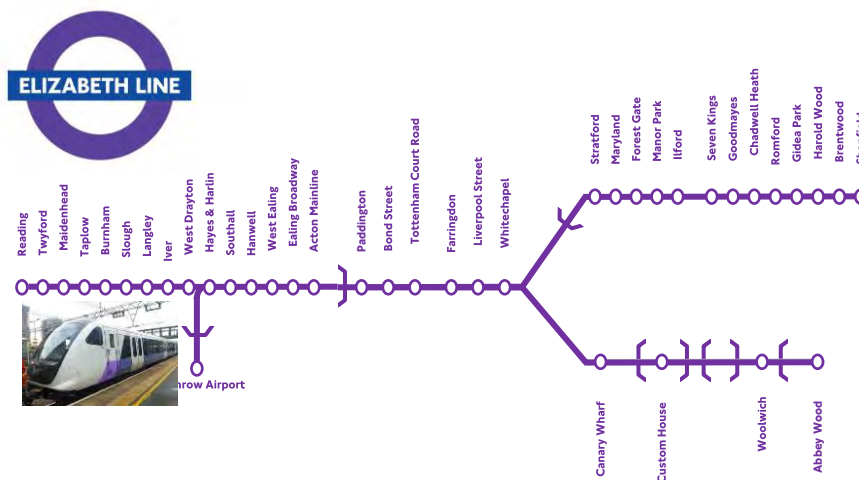


Service Integration - Stage 4



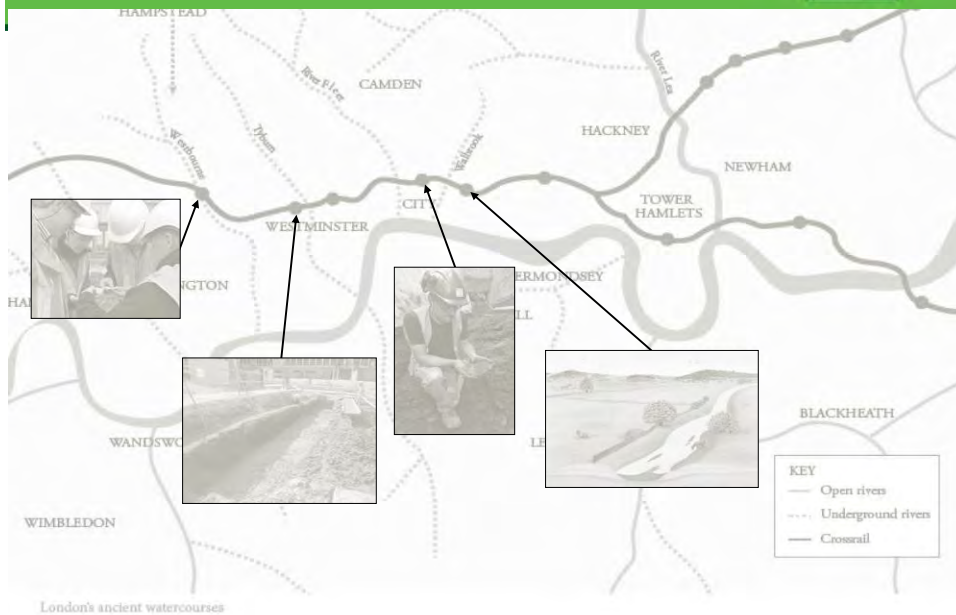
w/b 19 May 2019

Service Integration - Stage 5

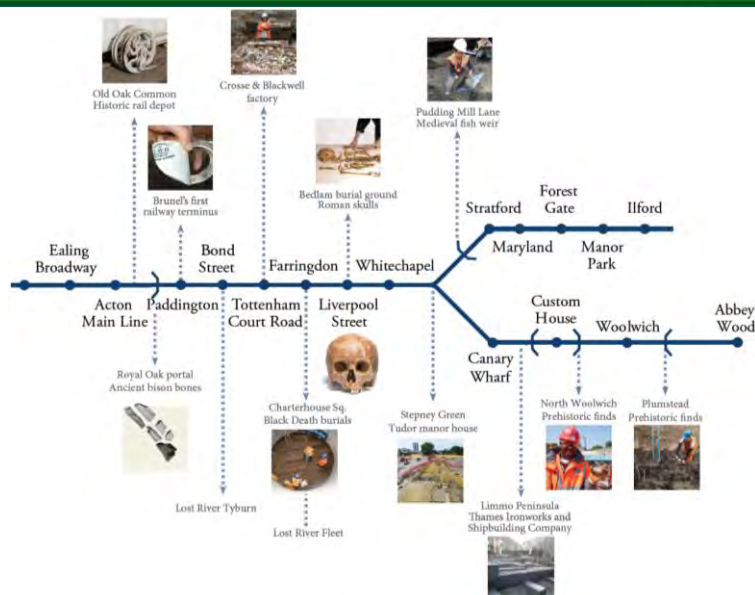


December 2019

What we have found on the way



Archaeology



Brunel Engine Shed Paddington New Yard



Brunel Engine Shed Paddington New Yard



Brunel Engine Shed Paddington New Yard



Broadway Station - GWSR



Crosse and Blackwell Factory



- ▶ Tottenham Court Road – Goslett Yard
- ▶ Largest collection found in Britain



Charterhouse Square – the Black Death Burial Ground



Archaeology at Liverpool Street



ARCHAEOLOGY AT CROSSRAIL'S LIVERPOOL STREET STATION



3000+
skeletons to be
excavated by
Crossrail

60
archaeologists
working on the site

1
known Roman
road running
through the site

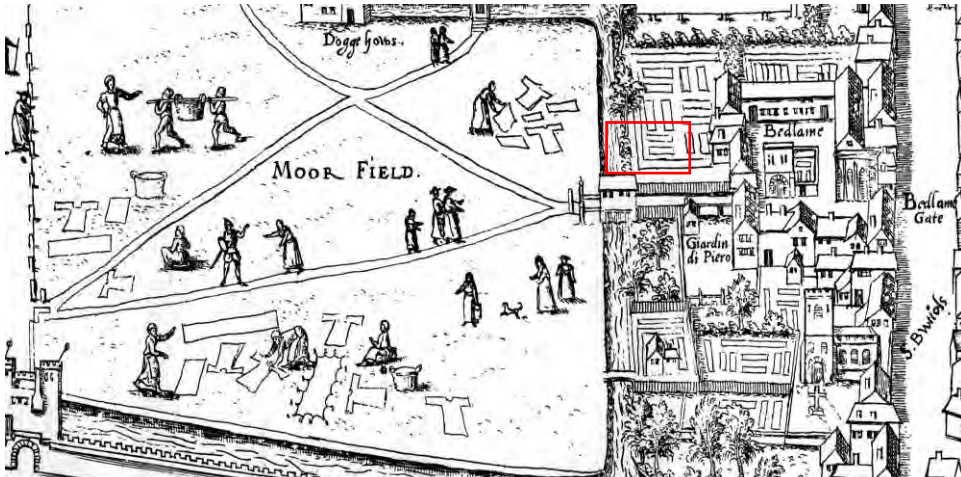
Roman finds



Burials and Bedlam, Post-medieval



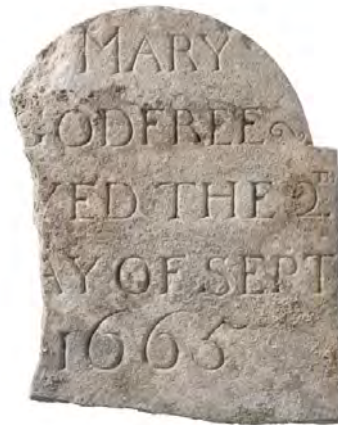
► The New Churchyard, 1568 to c 1720



Bedlam Burials



Archaeology at Liverpool Street



Mass Plague Burial



Thames Ironworks Limmo



Thames Ironworks - Limmo



The Elizabeth Line



"Crossrail is already proving a huge success for the UK economy and, as we move closer to bringing this transformative new railway into service, I think it's truly wonderful that such a significant line for our capital will carry such a significant name from our country. As well as radically improving travel right across our city, the Elizabeth line will provide a lasting tribute to our longest-serving monarch."

Boris Johnson
Mayor of London



MOVING LONDON FORWARD