



Tunnels

Why do we need to tunnel?

Crossrail is about creating new rail services into, out of and through London. To do this, we need to construct a new route running from west to east through the capital.

London's densely developed centre means that the best way to provide this route is to build a pair of new tunnels with new Crossrail stations below ground along the length of the tunnels. These would be designed to allow people to reach the surrounding streets or change to existing London Underground routes simply and efficiently.

Crossrail trains would run through the new tunnels between Paddington in the west and the Isle of Dogs and Stratford in the east and in a tunnel under the Thames from North Woolwich to Plumstead.

Outside the central tunnelled section, Crossrail would make use of existing track and facilities to reduce the amount of new building work required.

What would the tunnels look like?

Crossrail trains would be wider and longer than those that currently run on the London Underground. This means that they would be able to carry more passengers. The Crossrail tunnels would need to be larger than those used on the London Underground to take these larger trains. The tunnels would be circular and between the stations would be 6 metres wide. The stations require larger tunnels for the platforms and would be approximately 10 metres wide. At stations, other tunnels would also be required for escalators, lifts, stairs and to provide ventilation and emergency escape.

The pair of tunnels would be built at depths ranging from 10 metres to 30 metres below the surface. They would follow a smooth route and avoid existing tunnels used by London Underground and other apparatus such as water and gas mains. It is also important that the tunnels follow a route which avoids conflict with the foundations of any buildings or areas of specific interest.

For most of their length, the tunnels would be built in London's clay. This is good ground in which to build tunnels and helps to prevent water from the ground entering the finished tunnels. In most areas, the tunnels would lie beneath the water table (ground which is saturated with water). Where this is the case, the tunnels would be sealed to make them more durable and to make sure we are creating a sound and reliable environment for the trains to run.

Thames borehole drilling rig in operation earlier in 2004 at North Woolwich.



How would you build the tunnels?

Tunnel engineering is highly sophisticated and the Crossrail team has been working with leading engineers and construction experts to develop the designs and a programme for building the new tunnels. Co-ordination of the tunnel construction work with the station construction work is important so that the entire Crossrail network could be built and brought into service promptly.

The tunnels would be built using specialist equipment called Tunnel Boring Machines (TBM's). These machines combine the ability both to drill and remove earth, along with construction facilities for putting the tunnel walls, known as linings, in place. The tunnel linings themselves would be made from pre-made concrete segments.

At stations other methods would be used to build the platform tunnels and the accesses to and from the surface. These would include sprayed concrete to line the larger platform tunnels and cast iron for the escalator tunnels.

The TBM's are able to monitor and allow for changing ground conditions as they advance and counteract any potential ground movements, as they bore through the soil. Computer technology would be used to keep TBM's on course and ensure that the tunnels follow the designed route.

Access, ventilation and maintenance

As well as provisions for ventilation and access at stations, we would also provide a series of shafts at intermediate points along the route for emergency access, escape and ventilation.

On average, there would be access to the tunnels from stations or shafts at every kilometre along the tunnel route. The shaft sizes would vary in width from 8m to 15m depending on the specific facilities required. Some shafts, for example, would have lifts and staircases as well as ventilation facilities and would need to be larger to house fans and other equipment.

Within the tunnels along the route, we would be building two crossovers. These connections would enable trains to be diverted from one tunnel to the other so that, for example, maintenance can be carried out on a specific section whilst a reasonable level of service is maintained.

Further information

If you would like further information, please contact the Crossrail team. You can either phone the help desk on 0845 602 3813, e-mail us on helpdesk@crossrail.co.uk, send a message through our web site at www.Crossrail.co.uk or write to us at, Consultation Team, FREEPOST NAT6945, London SW1 0BR.

Crossrail's Round 2 Public Consultation ends on 27 October, 2004.



Tunnelling information

- The twin Crossrail tunnels from west of Paddington to the east of Whitechapel and the Isle of Dogs are over 22.5 kilometres long.
- About eight million cubic metres of material would be excavated. Controlling the impact of construction traffic on the local road network would be a priority and so where practical we plan to use trains and barges to remove the excavated material.
- As with the Channel Tunnel Rail Link, Crossrail trains would take their power from overhead electricity lines. This means that Crossrail stations below ground would be very different from London Underground stations and would have more in common with stations in France.
- The tunnels would be built in four main sections with eight or more TBM's in use at any one time to ensure that work can proceed quickly, safely and efficiently.

Tunnel construction plan

