

# Fantastic feats of engineering



As part of the Year of Engineering, MetroTravel celebrates some of London's structural achievements.

THE initiative aims to encourage young people to join the profession. Here are five of the capital's best examples.

## The Tube

When it opened in 1863, the Metropolitan Railway was the world's first underground. It ran between Paddington and Farringdon, serving six stations in between.

Now in its 155th year, the total length of the Tube network is 402km and serves 270 stations across 11 lines, 45 per cent of which runs in tunnels. The deepest station is Hampstead on the Northern line, which runs down to 58.5m.

The first major extension to a line since the Jubilee line in the late 1990s will be on the Northern line. Its two 3.2km tunnels (pictured left), from Battersea to Kennington, via Nine Elms, were completed in November, with the extension opening in 2020.

## Crossrail

Europe's largest civil engineering project, Crossrail, will deliver the new Elizabeth line later this year.

This incredible engineering achievement runs up to 40m deep through the heart of London. The tunnelling work, which took three years, used eight enormous machines to create 42km of tunnels. There are also 14km of station and interchange tunnels.

This year, more than 15,000km of cable will be laid to deliver power, lighting and communications systems. The Elizabeth line opens in December and when fully complete in December 2019, it will serve 41 stations.

## London's traffic lights

December will see the 150th anniversary of the world's first traffic light, which was installed outside the Houses of Parliament.

Designed by John Peake Knight, a railway signalling engineer, the gas-powered device had moving arms, but was abandoned after it exploded. It wasn't until 1925 that modern-day signals were installed in London, operated using switches.

By the 1960s, advancing computer technology meant the lights could be changed using software to control the flow. These systems can now track traffic volumes across the day to identify peak hours.

The capital's traffic lights now include bus priority signals and pedestrian countdown timers, which were first installed in 2012. There are more than 6,000 sets of traffic signals in London.

## Tower Bridge

Opened in 1894, this is the only bridge over the Thames that must allow ships through. The design, by Horace Jones and John Wolfe Barry, is a combination of suspension bridge, using trusses and metal plates instead of wire cables, and bascule bridge to allow the central part of the deck to lift.

It took eight years, five major contractors and 432 construction workers to build. Two massive piers were sunk into the river bed to support the construction, with more than 11,000 tonnes of steel providing the framework for the towers and walkways.

The bascules were operated by hydraulics, using steam to power the pumping engines. These engines can

still be seen in their original location, but since 1976 the bascules have been driven by oil and electricity.

## Emirates Air Line

Built for the London 2012 Olympics, this is the capital's only cable car. Soaring up to 90m above the Thames, it uses a single cable for both propulsion and support.

Royal Victoria Dock station on the northern side of the river houses the electric motor; and Greenwich Peninsula by the O2 Arena is also the garage for its 34 cabins.

Since opening on June 28 2012, the Emirates Air Line has had more than 7.9million passenger journeys.

The Emirates Air Line has been shortlisted for Project of the Decade by Ground Engineering Awards. You can vote at [geplus.co.uk](http://geplus.co.uk).

■ For more information, visit [dft.gov.uk/year-of-engineering-2018](http://dft.gov.uk/year-of-engineering-2018)



## Get involved at London Transport Museum

The museum is bringing the Year of Engineering to life with exhibitions opening in March and a summer of events. To find out more, go to [ltmuseum.co.uk](http://ltmuseum.co.uk).

From Thursday 18 to Sunday 21 January, thousands will see the city in a new light.

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There will be road closures, busier stations and bus service changes from 16:00 to 23:30, particularly in the West End, South Bank and King's Cross.

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