

one hundred years of
transportation

100

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mm Mott
MacDonald



A6 Market Harborough bypass, UK ▪ A20 Dover-Folkestone trunk road, UK ▪ A34 Newbury bypass, UK ▪ A38 Plymouth trunk road, UK ▪ A303 Stonehenge improvement, UK ▪ A406 North Circular road, UK ▪ Accra urban highways, Ghana ▪ Area 3 highway maintenance, UK ▪ Baghdad Expressway, Iraq ▪ Bank Station trav-o-lator, London, UK ▪ Bilbao Metro, Spain ▪ Black Country route, UK ▪ Blackfriars Bridge underpass, UK ▪ Blackwall Tunnel duplication, UK ▪ Boston Central Artery tunnel jacking, USA ▪ Bulgarian highway upgrades ▪ Caracas Metro, Venezuela ▪ Channel Tunnel ▪ Channel Tunnel Rail Link, UK ▪ Copenhagen Metro, Denmark ▪ Dagenham ro-ro terminal upgrade, UK ▪ Dartford Crossing, UK ▪ Delhi Metro, India ▪ Dubai Municipality highways, UAE ▪ East Coast Main Line Upgrade, UK ▪ First Severn Bridge, UK ▪ Forth Road Bridge, UK ▪ Funchal Airport runway, Madeira ▪ George Street Bridge, Newport, UK ▪ Great Belt Eastern Rail Tunnel, Denmark ▪ Green Bridge, Mile End, London, UK ▪ Hams Hall rail terminal, UK ▪ Hartlepool Marina, UK ▪ Heathrow Express, UK ▪ Heathrow Terminal 5, UK ▪ Hong Kong International Airport terminal ▪ Hong Kong multi-berth shipyard ▪ Jack Lynch Tunnel, Ireland ▪ Jiangyin Yangtze Bridge, China ▪ Jubilee Line extension, London ▪ Kaohsiung Metro, Taiwan ▪ Kallang River Bridge, Singapore ▪ Kayang Bridge, South Korea ▪ Kap Shui Mun Bridge, Hong Kong ▪ Kingsferry Bridge, UK ▪ Kuala Lumpur Monorail, Malaysia ▪ Limehouse Link, London, UK ▪ Limpopo Railway upgrade, Mozambique ▪ Linha do Norte rail modernisation, Portugal

from the chairman



Basil Mott

As we celebrate 100 years in transportation and review our achievements it's interesting to see how the company has played a part in so many of the past century's transport developments.

Our founders, Basil Mott and David Hay who formed the company in 1902, were key players in many of the early projects which formed the basis of today's UK transport infrastructure. As engineers on the City and South London Railway, they established a reputation which stretched far and wide and saw clients like London Underground return to them time and time again. In fact we're delighted to be still working for London Underground today on commissions including track replacement as part of a programme of refurbishment and providing project management support to the Chief Engineer's Directorate under a five-year framework.



David Hay

It was in the early 1900s that the Channel Tunnel was first seriously considered. In 1930 Mott, Hay & Anderson submitted a comprehensive report on the engineering aspects of a possible tunnel under the Channel but, as happened on a number of subsequent occasions, the scheme was shelved for political reasons. I'm sure they would have been delighted to know that the company they formed was eventually commissioned to design the tunnel and terminal at Folkestone now ranked among the world's greatest engineering feats.

They would also be amazed at the technology which allows us to operate from offices in over 50 countries from Sydney in Australia to Los Angeles

in the USA. We have engineers working in more than 100 countries on projects including high-speed rail links in the UK and Taiwan, road systems throughout Europe and some of the world's most spectacular bridges including Bangkok's Rama VIII Bridge and Seoul's Kayang Bridge, a major link for the 2002 Football World Cup.

In the USA we're helping programme manage San Jose's rail expansion scheme and have just completed a jacked tunnel scheme as part of the highly complex Central Artery project in Boston. And at Stonehenge in the UK, a designated UNESCO World Heritage Site, we're working to give the past a future, helping implement a transport masterplan that will remove modern features from the area and improve the environment for visitors and local communities.

Whilst we are very proud of the achievements during the past 100 years, the challenges today are perhaps greater than ever. Population growth, environmental issues, climate change and financing are just some of the concerns that we're helping clients face. In our development towards becoming a truly global company we aim to deliver world-class skills on a local basis.

In the new millennium we intend to strengthen our project delivery capabilities and retain our position as one of the world's leading transport consultants – so that when my successors review the next 100 years they can look back with as much pride as I do now and look forward with the same confidence.



Current chairman Tim Thirlwall (third from right) celebrates Mott MacDonald's 100 years in transportation with three previous chairmen (from left to right) John Bartlett, Jeff Turnbull and Robert Beresford, current head of transport Ron Williams (far right) and director Noel Bristow (second from right)

first steps

When Basil Mott and David Hay formally entered into partnership under the name of Mott and Hay in July 1902 little could they have imagined they would be the forerunners of an international company with more than 7000 staff and a turnover of over £400 million. They were more concerned with London's underground railway network.

Basil Mott, an experienced mining engineer, and David Hay, specialising in railways and docks, met while working on construction of the City and South London Railway – the first deep level 'tube' railway in the world, now known as London Underground's Northern Line. They went on to help develop the Central London Railway – from Shepherds Bush to the City – which became known as 'The Twopenny Tube' at just 2d (less than 1p today) a journey. The partnership

flourished, designing extensions to the City and South London Railway – including a new station at Bank – and working on commissions such as the reconstruction of Southwark Bridge. In 1912 David Hay visited Australia to advise on a crossing for Sydney harbour and Basil Mott travelled to America to study escalators, which were introduced into the London underground system in some 20 stations between the two world wars.

Following the first world war the firm, now Mott, Hay & Anderson, worked on numerous river crossings including a new rolling lift bridge at Queensferry over the River Dee, the Trent Bridge at Nottingham, the Tyne Bridge between Gateshead and Newcastle upon Tyne – the longest steel arch in Britain in 1928 – and many others throughout the UK. Development of the Tees (Newport)

vertical lifting bridge – the largest of its kind in the world when it opened in 1934 – included the northern approach road which was carried over the London & North Eastern Railway by the first all-welded steel bridge in Britain, the Billingham Branch Bridge. The firm also continued to work on extensions and improvements to the London underground rail system and received many requests for help from other countries. As a result David Anderson, the third partner in the firm, travelled to the former USSR to advise on construction of the Moscow Metro.

Among the many great feats of construction the firm engineered during this period was the Mersey Tunnel between Liverpool and Birkenhead – at the time the largest subaqueous tunnel in the world – which was opened by King George V in 1934.



Both Basil Mott and David Hay worked on the City and South London Railway – seen here under construction at Clapham in 1898 – later to become the Northern Line

• Mott MacDonald highlights
 • technology/engineering milestones
 • world events

1900

- 1900 Central London Railway opened
- 1901 Queen Victoria dies
- 1902 Mott and Hay form partnership
- 1903 First controlled, sustained flight
- 1906 San Francisco earthquake

1910

- 1910 Halley's comet observed
- 1910 Amundsen reaches South Pole
- 1911 Iceberg sinks Titanic
- 1912 David Hay visits Australia
- 1912-18 First World War
- 1918 Global influenza epidemic



The Bank of England was the original terminus for two underground railways at the turn of the 20th century, the City and South London and the Central London



Liverpool's Mersey Queensway Tunnel was officially opened by HM King George V on 18 July 1934



The Tyne Bridge in Newcastle, opened in 1928, was our first major project in the north east of England



The firm's work on the widening of Blackfriars Bridge in 1908 was the start of a long association with the Corporation of London



The Central London Railway, popularised as 'The Twopenny Tube', proved an immediate success when it opened in 1900

1920

- 1924-5 British Empire Exhibition
- 1928 Penicillin discovered
- 1929 Consultant to Channel Tunnel Company
- 1920 Mott, Hay & Anderson formed
- 1927 First solo flight across Atlantic
- 1929 Wall Street crash
- 1921 BBC founded
- 1924 Tutankhamen's tomb discovered
- 1928 Tyne Bridge opens

1930

- 1930 Gas turbine invented
- 1931 Empire State Building completed
- 1930 Planet Pluto discovered
- 1934 Craigavon Bridge opens
- 1934 Mersey Queensway tunnel opens
- 1935 Radar device built
- 1938 Nuclear fission discovered
- 1939 Second World War begins

a new generation

Innovation in tunnelling and tunnelling techniques were at the forefront of much of Mott, Hay & Anderson's work on the London underground rail system at the beginning of the twentieth century. Before the onset of war the firm had been looking into alternative tunnel linings and, with the help of the London Passenger Transport Board, designed and developed a reinforced concrete lining to replace cast iron. The new lining was considerably cheaper, making it a very attractive alternative after the war when cast iron was in short supply. It was used on the north eastern extension of London's Central Line – between Redbridge and Newbury Park – and subsequently the concept was exported to many other countries.

During the war most major civil engineering projects were halted and our efforts concentrated on schemes associated with air-raid protection, deep-level shelters, introducing flood safety precautions and repairing extensive bomb damage on London's underground railways. But by the mid 1950s projects that had been deferred were being reconsidered. One such project was the Forth Road Bridge in Scotland – the UK's first major suspension bridge and the longest in Europe at the time of construction. We were first appointed to report on a road crossing for the Firth of Forth in 1926 but it was not until 1958 that funds were made available and construction could start.

Located just over half a mile upstream from the Forth Railway Bridge, this ambitious road crossing comprised a centre span of 3300 ft and over 2800 ft of viaducts plus nine miles of road works involving 24 bridges. We worked in partnership with Freeman Fox on this and the Severn suspension bridge, a crossing of the River Severn linking the industrial areas of south Wales to the southern counties of England and opened by HM The Queen in 1966. Meanwhile in England we were also designing the Tamar Bridge – the first modern long span suspension bridge – which opened in 1961 to provide a new cross-river link between Devon and Cornwall.

As road transport increased it became apparent that a road crossing of the Thames downstream of London was required to keep traffic out of the city and provide a convenient connection between Kent and Essex. The Dartford Tunnel – 4688 ft long with three and a half miles of dual carriage-way approaches – was begun in 1956 and was later duplicated on an adjoining site. At about the same time we were also working on a scheme to replace a transporter bridge over the River Mersey and the Manchester Ship Canal. The Runcorn-Widnes Bridge was designed as an arch bridge which saw one of the last applications of riveted steel and incorporated welded high strength steel, a technique at the leading edge of bridge construction.



The Bridge over the River Kwai is known the world over. For the film starring William Holden, Jack Hawkins and Alec Guinness we helped design a replica bridge in Sri Lanka



During the war the company was busy repairing bomb damage on underground railways in London and on various schemes associated with air-raid protection and deep-level shelters



Our pioneering work on reinforced concrete tunnel linings was put to the test on the final section of the Central Line extension between Redbridge and Newbury Park. The technique was later used world-wide



Located alongside Brunel's railway bridge, which opened in 1859, the Tamar suspension bridge, constructed 100 years later, has a main span of 1100 ft and carries a 33 ft carriageway with two 6 ft footpaths over the River Tamar. Sections weighing some 80 tons were floated out on the river and raised into position using winches connected to the main cables



The 4688 ft long Dartford Tunnel under the River Thames near London had a road deck formed by pre-cast reinforced concrete units weighing 37 tonnes each



Caulking the cast iron lining of the Dartford Tunnel

1950

- 1951 Festival of Britain
- 1951 Experiments with colour television
- 1953 Mount Everest conquered
- 1953 Elizabeth II crowned
- 1954 London's Central Line extensions
- 1956 First Dartford Tunnel construction begins
- 1956 Oral polio vaccine developed
- 1956 Britain plans motorway network
- 1956 Replica bridge over the River Kwai built
- 1956 Oral polio vaccine developed
- 1957 Sputnik satellite launched
- 1958 EEC formed
- 1958 Forth Road Bridge works begin
- 1958 Toronto Subway work begins
- 1959 Construction begins on Tamar Bridge

1960 - 1979

"One small step for man, one giant leap for mankind"
Neil Armstrong

broader horizons

Until now most of our work had been UK based with only occasional forays overseas. The late 1960s and early 1970s saw major expansion geographically and diversification into new business areas including mass rapid transit systems and maritime engineering.

Our maritime work started when North Sea oil exploration was at its peak and we were involved with platform design. This later led to commercial port design which took us to the Middle East where in Jordan we were responsible for a new



The Forth Road Bridge, Europe's longest suspension bridge when it was completed in 1964, has a centre span of some 1000 m. The scheme included nine miles of roads incorporating 14 bridges and one 180 m viaduct



Malaysia's Kuala Lepar Bridge across the Pahang River was one of several bridges we designed in the 1970s using the balanced cantilever method of construction



Our work on the 55 km Tyne and Wear Metro in the UK included feasibility study, parliamentary plans, design, project management and construction supervision

1960

- 1960 Laser device developed
- 1961 J F Kennedy inaugurated president of USA
- 1961 Berlin wall constructed
- 1964 Forth Road Bridge and George Street Bridge open
- 1963 First Dartford Tunnel completed
- 1965 Winston Churchill dies
- 1966 Colour TV becomes popular
- 1968 Aswan Dam completed
- 1961 Tamar Bridge opens
- 1961 First man in space
- 1964 Kenya becomes republic
- 1965 First space walk
- 1966 Severn Road Bridge opens
- 1969 Concorde's first test flight
- 1967 First heart transplant
- 1969 Man lands on moon

cargo port, two floating pontoon cargo terminals and a combined potash and fertiliser export terminal. In Iraq we designed port facilities at Khor Al Zubair, which included a 1.25 km long berth, rail and road facilities, storage sheds and a conveyor system from the terminals to the berths.

Singapore was the location for one of the company's first major international offices. It was initially opened to service Singapore Mass Rapid Transit Corporation's plans for a 47 km transit system – including elevated, at-grade and underground sections – with 34 stations and interchange facilities for both passengers and rolling stock. Many other cities were also looking to rapid transit systems to serve major population centres. In the UK we carried out feasibility studies and prepared preliminary designs for a system that would link Newcastle and Gateshead. Around the same time we were working in Australia on a scheme to relieve commuter congestion in the centre of Melbourne, while helping Finland to implement a system aimed at meeting Helsinki's traffic needs to the end of the century.

As projects progressed our engineers were always looking for more efficient and cost effective ways of working. While on a visit to a project in Milan,

John Bartlett – later to become company chairman – identified the need for a new method of drilling through gravels, sands and silts below the water table. Known as the bentonite shield, his invention was first used in 1971 at New Cross in south London on an experimental drive where it proved its efficiency and demonstrated how tunnellers would benefit from no longer being exposed to compressed air. It was soon being employed world-wide – by 1979 thirty five bentonite shields were at work in Japan alone. Meanwhile a 'flexible' cast iron lining requiring no bolting or grouting – designed and patented by the company – was being used on tunnels on the Victoria Line, the first entirely new underground railway to be constructed in London for fifty years.

Designing a new bridge to replace an existing structure was the sort of commission we'd done many times before. Transferring the old structure to a site some 5000 miles across the Atlantic was not, but that's exactly what we were asked to do at London Bridge. When we designed the present prestressed concrete bridge in the late 1960s, the old masonry arch structure – which spanned the River Thames for 148 years – was purchased at a cost of US\$2.5 million. The bridge was dismantled and moved to Arizona where we helped re-build it.



Britannia Bridge, linking Anglesey and mainland Wales, was originally designed by Robert Stephenson as a rail link. When it was damaged by fire we redesigned it as a twin deck bridge carrying both road and rail



Each year an estimated 1.5 million tourists from all over the world flock to view the old granite London Bridge which we helped to construct across a man-made channel at Lake Havasu in Arizona, USA



Following on from the Mersey Queensway tunnel, we were commissioned to plan and design the twin Kingsway road tunnels completed in 1974



To relieve commuter congestion in central Melbourne we were part of a team which carried out a planning study followed by detailed design and construction supervision of four 3 km rail tunnels, 730 m of two-track viaduct and three stations for the city's underground rail loop



The George Street Bridge over the River Usk, the first modern cable stayed bridge in the UK, opened in 1964

1980 - 1989

"It is difficult to say what is impossible, for the dream of yesterday is the hope of today and the reality of tomorrow"
Robert Goddard

realising the dream



We worked on various phases of the M25, London's orbital motorway, designing viaducts, bridges and sections of highway as well as in-tunnel services such as lighting, ventilation and emergency communication systems



Caracas Metro served an estimated 1.2 million passengers a day when it was completed in 1983. We provided design, project management and construction supervision services on many sections of the scheme



The 100 km Surabaya-Malang highway in east Java has a dual two-lane highway and 55 new bridges, including the 266 m long Surabaya River Bridge and a new crossing of the Porong River

In 1751 talk of a tunnel between Britain and France was first mooted, but it was some 235 years later in 1986 before construction began. Our involvement in schemes to build a tunnel under the English Channel goes back to a feasibility study undertaken in 1929. The alignment and configuration of today's tunnel echo a 1975 proposal for which we were principal designer. At 50 km long and comprising a complex of three separate tunnels, many regard the Channel Tunnel as the world's foremost engineering achievement. Certainly for Mott MacDonald, principal design consultant for all civil and geotechnical engineering on the UK section, it required a major commitment of resources and engineering expertise.

During the project's peak, we were leading over 500 technical staff in the design, requiring over 1.3 million man hours input. On completion, recognition came from many quarters including the British construction industry which awarded it the 1991 Civil Engineering Award. It also won the 1992 Concrete Society award for its precast concrete tunnel linings.

With our history dating back to the turn of the century, it wasn't surprising by the 1980s to find ourselves reworking some of our earliest projects. In London we were appointed to design and supervise the refurbishment of the old northbound Blackwall Tunnel which David Hay first worked on back in 1891. Now carrying nearly 40 000 vehicles per day the tunnel required a new vitreous enamel and stainless steel secondary lining, a new elevated walkway and upgrading of all tunnel services.

It was at this time too that our highways work took a major step forward both in the UK and internationally. In addition to completing sections of the M27 south coast motorway, we were busy designing key stretches of the M25 and extending the M3 motorway to Winchester and Southampton. In Jordan we designed the Sweleh-Salt highway, a 10 km scheme in a mountainous region, while in Indonesia we were working on the Surabaya-Malang Highway, a dual carriageway including a crossing of the Surabaya River on a post-tensioned concrete bridge, the first of its type to be constructed in the region.

1980

- 1980 Second Dartford Tunnel
- 1980 Tyne and Wear Metro opens
- 1981 First IBM PC
- 1983 A12-A13 M25 motorway completed
- 1980 Smallpox eradicated world-wide
- 1981 First launch of space shuttle
- 1982 First AM stereo broadcast
- 1983 Camcorders introduced
- 1984 AIDS virus discovered
- 1980 Singapore's Kallang River bridge completed
- 1981 French TGV world's fastest train
- 1983 Caracas Metro opens



We were principal design consultant for all civil and geotechnical engineering on the UK section of the Channel Tunnel. This included the award-winning 156 m long, 18 m wide and 10 m high cross-over cavern – the world's largest subsea excavation – constructed using the New Austrian Tunnelling Method



On the M3 London to Southampton motorway we designed a 24 km section between Basingstoke and Winchester featuring two river crossings



Together with Hatch Associates of Canada we designed the 1800 m long St Clair River Tunnel in Ontario, driven by a 9.52 m diameter earth pressure balance machine – at the time the largest ever used in North America



Our role on the Singapore MRT System began with preliminary engineering design. We were subsequently involved in a number of the elevated, at-grade and underground section contracts



We designed the deepwater berth and ro-ro terminal at Ringaskiddy in Ireland

1985

- 1985 Titanic wreckage found
- 1985 Sony credit card size radio launched
- 1986 Surabaya Malang Highway opens
- 1986 MIR space station launched
- 1987 Gorbachev launches 'Glasnost' and 'Perestroika'
- 1987 World population reaches 5 billion
- 1989 Mott, Hay & Anderson/Sir Murdoch MacDonal merge
- 1989 Berlin Wall demolished
- 1988 Singapore MRT opened

1990 - 1999

"The art of progress is to preserve order amid change and to preserve change amid order"
Alfred North Whitehead

spreading our wings



We conceived, planned, designed and managed the record-breaking Lantau Link – a strategic connection in Hong Kong's road and rail transport network



As part of a joint venture we were appointed to manage construction of the North Hollywood extension to the Los Angeles Metro Red Line



On the world's biggest tunnel jacking scheme – part of Boston's Central Artery project in the USA – three huge concrete tunnels carrying Interstate Highway 190 under eight live rail lines were built without any interference to rail services

1990

• 1990 Nelson Mandela freed

• 1990 Hubble telescope launched

• 1990 German reunification

• 1992 Consumer digital compact disc launched

• 1994 First use of NATM on UK road tunnels

• 1994 Queen and President Mitterrand open Channel Tunnel

By the early 1990s the company was expanding at a rapid rate. We now had over 3000 staff working in Europe, Asia, the Americas and Australasia on projects associated with land, sea and air. Our Hong Kong office alone was handling two huge projects which would transform the transport infrastructure in the region.

As the Hong Kong Government's engineer for the Lantau Link – a strategic part of the road and rail connections between Hong Kong Island and the new airport at Chek Lap Kok – our role spanned the entire project cycle. Formed of two spectacular bridges, the 1377 m main span Tsing Ma suspension

bridge and the 430 m main span Kap Shui Mun cable-stayed bridge, the Lantau Link carries a six-lane highway on its top deck and twin rail tracks plus two emergency road lanes on its sheltered lower level, making it the largest fixed link of its kind in the world – and the first designed to withstand typhoon winds.

At the same time we were working with Foster and Partners on Hong Kong's new airport terminal, the largest enclosed public space ever created and one of few manmade structures visible from space. Taking just five years from masterplan to reality, the terminal set new benchmarks in design techniques,

construction logistics and quality management. Among our most prolific prize-winners, both projects feature in the 'Ten Engineering Wonders of Hong Kong' – as chosen by Hong Kong residents.

With such rapid change taking place the world over, concern was turning to the effects this was having on our environment. For the final section of the M3 near Winchester and the A34 Newbury Bypass we met the challenge of new UK government and EU regulations by teaming up with English Nature, English Heritage and the Environment Agency to introduce innovative measures to preserve wildlife, control pollution, recycle materials and protect Sites of Special Scientific Interest.

In the railway sector it was safety and the need to improve infrastructure which topped everyone's agenda. On the two main north-south rail links between Scotland and England, the West Coast Main Line and the East Coast Main Line, we won contracts to provide engineering and programme management services on a whole range of schemes aimed at upgrading and refurbishing track and associated infrastructure. For the Heathrow Express, a high-speed rail link between Heathrow Airport and London's Paddington Station – designed to accommodate specially commissioned trains every 15 minutes in both directions – our role as lead designer for the overall link was expanded by commissions to design the trackwork and all mechanical and electrical installations. Elsewhere we won appointments for Bangkok's £2 billion underground metro, a £0.8 billion section of the Los Angeles metro and Taiwan's £10 billion high-speed rail link.



For the A34 Newbury Bypass we were involved in all phases of development including provision of full engineering support to the government during the public consultation and public inquiries

We were appointed route-wide multi-functional consultant for all railway engineering disciplines to help Railtrack modernise the UK's West Coast Main Line, running between London and Glasgow



At 1.3 km long and covering over 550 000 m², the Hong Kong International Airport passenger terminal with its Y-shaped concourse is the world's largest single airport building. A Mott MacDonald led consortium was responsible for project management and engineering design of the award-winning terminal



Our cost-effective and innovative design for the Medway Tunnel in Kent, UK, comprised cut-and-cover approaches and a 370 m long twin-bore immersed tube tunnel designed to be watertight without an external membrane

1995

- 1997 Mars Pathfinder sends images to earth
- 1997 UK's Highways Agency awards first road maintenance contract
- 1999 China's Jiangyin Bridge opens
- 1997 Lantau Link opens
- 1997 Lamb cloned from adult sheep DNA
- 1998 Heathrow Express Rail Link opened
- 1995 584 900 000 radio receivers in use
- 1997 Britain's first motorway bus lane
- 1998 Explosive growth of Internet
- 1998 New Hong Kong airport opens

2000...

*"The real voyage of discovery consists not in seeking new landscapes,
but in having new eyes"*
Marcel Proust

the new millennium



As a key member of BAA's integrated team set up to design and construct the planned new interchange at Heathrow known as T5, we're providing design services for substructures and tunnels plus guidance and construction support for the fifth terminal's design, along with systems integration and assurance services for the Heathrow Express and Piccadilly Line extensions

As we move into the 21st century, society faces new challenges. Congestion and pollution are problems for towns and capital cities around the world and financing new infrastructure projects is an issue facing many governments. People and businesses meanwhile are seeking the seamless journey – fast, efficient and stress-free.

Integrated transport solutions present the key to some of these goals. They not only provide interchange between transport modes, they also embrace the environment, sustainability and social objectives, not forgetting people's aspirations for frequent, safe and fairly priced transport choices. At London's Heathrow Airport the new Terminal 5, which owner BAA has named the world's most refreshing interchange, is well underway with spring 2008 the target date for opening. The partnering ethos, which saw early involvement of all members of the supply chain and co-location of the whole team, represents a radical new approach to major project delivery.

Managing traffic and transport and providing travellers with alternatives is the task facing local

transport authorities world-wide. We're delivering innovative solutions to help them, exploiting advances in information technology and telecommunications to monitor network congestion, provide dynamic driver information and evaluate traffic management options. And in central London, we're involved in a scheme that could see congestion charging introduced in the near future. Our role includes producing traffic regulation orders, modelling traffic functions and developing plans for complementary traffic management and parking schemes.


Innovation continues to be at the heart of our work. In the US construction of multi-lane highway tunnels, designed to remove heavy traffic congestion from Boston's city centre, was completed in 2002. On this the most complex project of its kind in the world, the award-winning tunnel jacking system harnessed innovations such as general ground freezing and a special anti-drag system above and beneath the tunnels. A similar approach is being used on a highly challenging project taking a road under an operational runway at Taipei's Sungshan airport.

100 years ago few would have imagined that it would one day be possible to travel by plane to the other side of the world or that three and four lane motorways would criss-cross whole continents. But we're now looking at a number of schemes that will further revolutionise transport. We're part of a team developing a sustainable transport masterplan for London which involves creating a radially oriented tunnel system with subterranean car parks removing traffic from central London. The vacated road space could then be re-allocated to cycle lanes and public transport.

Looking further forward the future for personal transportation is yet more radical. Computer aided guidance technology could well provide more efficient inter-urban motorway networks. Imagine being slotted into a guidance system where vehicles are controlled by wire and transported automatically by electric power at very high speeds between urban areas. Capacity would be increased, individual propulsion would only be necessary on the secondary road network and pollution greatly reduced. Perhaps only the stuff of dreams today but 100 years on it may well be a reality.

2000

- 2001 London's Green Bridge opens
- 2002 Bangkok's Rama VIII Bridge opens
- 2002 HM The Queen's Golden Jubilee
- 2007 Kaohsiung Metro, Taiwan
- 2008 Stonehenge A303 improvement, UK
- 2000 Los Angeles Metro Red Line opens
- 2002 HM The Queen Mother dies
- 2002 Seoul's Kayang Bridge opens
- 2002 Evidence of water on Mars found
- 2008 Terminal 5 Heathrow, UK
- 2001 Dublin's Southern Cross Route opens
- 2001 MIR space station re-enters earth's atmosphere
- 2002 Boston Big Dig jacked tunnels completed
- 2010 Crossrail, London



London Bridge, UK ▪ Los Angeles Metro Red Line extension, USA ▪ LUAS light rail system, Dublin, Ireland ▪ M3, M25, M27 motorways, UK ▪ M4 approaches to Severn Bridge, UK ▪ M4 Heathrow Airport bus lane, UK ▪ M90 Edinburgh-Perth motorway, UK ▪ Manchester Metrolink, UK ▪ Medway immersed tube tunnel, UK ▪ Mersey Tunnels, UK ▪ Midlands Metro, UK ▪ New Scotswood Bridge, UK ▪ New Whitby Bridge, UK ▪ Newark Dyke Bridge, UK ▪ North Lantau Expressway, Hong Kong ▪ PATHE Highway, Greece ▪ Portsmouth highway maintenance PFI, UK ▪ Portsmouth jetties reconstruction, UK ▪ Porto Metro, Portugal ▪ Putrajaya light rail transit, Malaysia ▪ Queensferry bypass Bridge, UK ▪ Rama VIII Bridge, Thailand ▪ Road improvement scheme, Nevis, West Indies ▪ Road rehabilitation, Trinidad & Tobago ▪ Route 5 tunnels, Hong Kong ▪ Salt Lake City light rail transit extension, USA ▪ San Francisco-Oakland Bay Bridge refurbishment, USA ▪ San Jose light rail expansion programme, USA ▪ Silver Jubilee Bridge, UK ▪ Singapore Mass Rapid Transit System ▪ Southern Cross Route Motorway, Ireland ▪ St Clair River Tunnel, Canada/USA ▪ Sungai Perak Bridge, Malaysia ▪ Sungshan Airport jacked tunnel, Taiwan ▪ Surabaya-Malang Highway, Indonesia ▪ Tai Lam Chung Bridge, Route 10, Hong Kong ▪ Taiwan high-speed rail link ▪ Tamar Bridge, UK ▪ Toronto Subway, Canada ▪ Tsing Ma Bridge, Hong Kong ▪ Tyne and Wear Metro, UK ▪ Tyne Tunnel, UK ▪ Victoria Line, London, UK ▪ Warwick Parkway Station, UK ▪ West Coast Main Line modernisation, UK ▪ Whittier Tunnel, Alaska

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