

# **FAMOUS FOR 15 MINUTES**

## **A HISTORY OF HEATHROW EXPRESS**



**Paul Le Blond**

## **Contents**

**Chapter 1 A Historical Background**

**Chapter 2 The 1960s and 1970s - LT Beats BR**

**Chapter 3 The 1980s - A rail link for expansion**

**Chapter 4 The 1990s - Building and opening**

**Chapter 5 The 2000s - Operating the service**

**Chapter 6 The 2010s - Consolidation and change**

**Chapter 7 Other services at Heathrow**

**Chapter 8 Airport railways around the world**

**References**

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Cover picture: Heathrow Express Units 332003 and 332010 at London Paddington  
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## Chapter 1 A Historical Background

Claims to be the first of anything are always a matter of debate. A station on the Berlin U-Bahn for the city's Templehof Airport was opened in 1927<sup>1</sup>. In the UK, Gatwick Airport's claims to be the first airport directly connected to rail are well established, with the 'Beehive' terminal linked to a station on the London to Brighton main line by a pedestrian tunnel in 1935<sup>2</sup>. It was possible to buy a combined air and rail ticket to get from London to Paris. In the USA, Boston Logan Airport's Blue Line Station opened in 1952. However, the oldest airport railway may have been to Don Muang Airport in Bangkok, Thailand, which opened in 1914.

The prize for the first 'dedicated' airport railway is contested between Gatwick and Brussels. Gatwick Airport was redeveloped, and a new runway, terminal and rail station opened in 1958. Initially the rail service was provided by a part of a through train being detached after arriving from London Victoria and then attached to a train in the reverse direction. A dedicated fleet of trains was used with increased luggage space. This dedicated service was amended over the years but remains today as the Gatwick Express. Brussels Airport Station also opened in 1955, ready for the Brussels World Fair in 1958, and the rail service was also dedicated to the Airport<sup>3</sup>.

Before the Second World War, London's airports had developed in a piecemeal fashion, with several sites being developed by aircraft manufacturers, private companies or the Government. Croydon was the main airport, operated by the Air Ministry, with a new terminal building opened in 1928 and services operated by Imperial Airways and other airlines, but with no rail station at the airport<sup>4</sup>. Various plans were drawn up for different sites, some to include rail access, such as at Fairlop with the Underground<sup>5</sup> and Heston with a spur from the GWR<sup>6</sup>. However, one challenge was that the numbers travelling by air were very small compared with rail and the railways were reluctant to use capacity for such limited demand. For example, the Southern Railway "could not contemplate any interference with the service between London and Brighton for the sake of improving facilities at Gatwick"<sup>7</sup>.

The Second World War stopped the development of civil aviation but saw the construction of many new airfields for military use and the rapid development of aircraft and associated aviation technologies. However, post war planning took place and one of the key studies was conducted by Sir Patrick Abercrombie. There were two published plans, the County of London Plan of 1943 and the Greater London Plan of 1944<sup>8</sup>. The plans were concerned with where the growing and displaced population and industry could be located while preserving agriculture and green spaces. They established the concept of rings around the capital for housing, industry and recreation, and included the Green Belt and satellite towns (which became new towns). Transport was a key element of the plans, and included a series of arterial and ring roads, although rail featured less because it was privately owned. Airports were included in some of the plans (see Figure 1), including Heathrow, and there some key phrases in the plan relating to rail access. In particular "The location of aerodromes has been carefully considered in relation to railway connection. Here is an opportunity from the start to plan a system of new communications adequately related to older forms of road and rail transport." (p10) The plan said that principle care has been to see that they are related to the road and rail system and noted that an outstanding advantage of Gatwick is direct connection

to London Brighton rail line. The plan also noted that Heathrow could be served by a rail services from Waterloo and Victoria and a Tube extension.

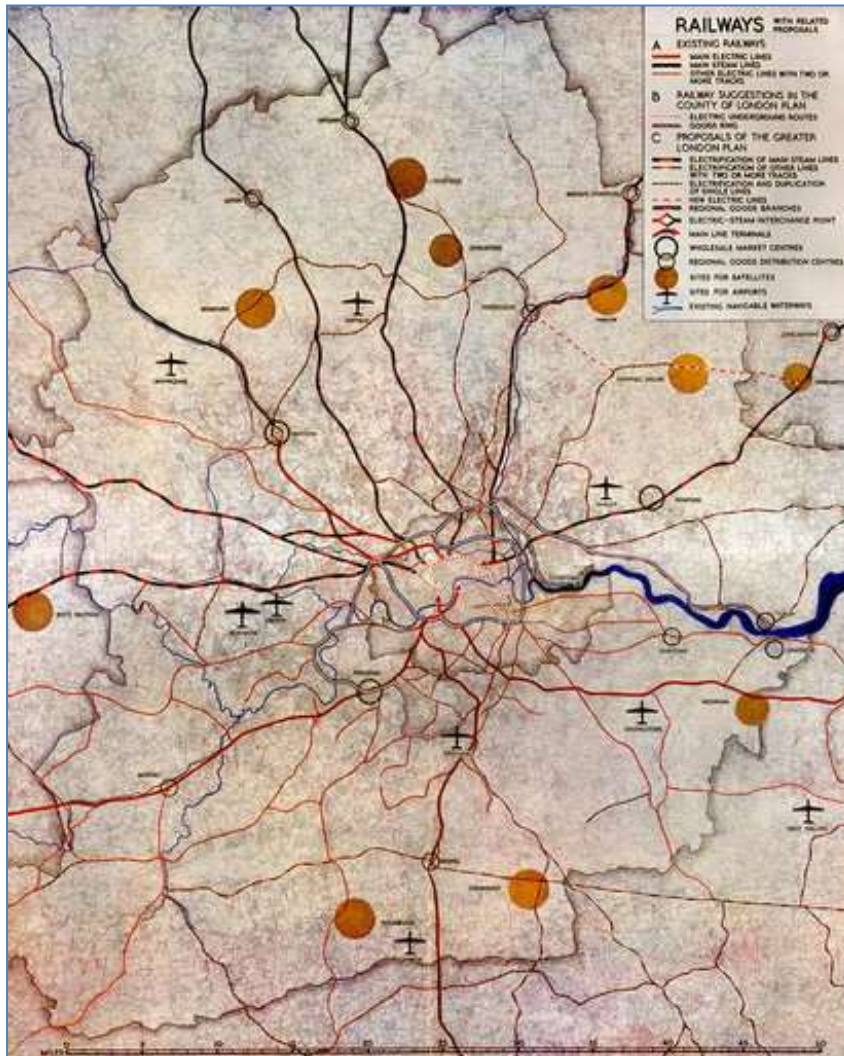


Figure 1 Abercrombie's Greater London plan

The story of Heathrow, including its wartime acquisition, is described in detail in Philip Sherwood's book, referenced above. The land was acquired under wartime powers, but the war ended before it could be used by the military, and plans prepared for its civil use were implemented. However, none of these plans seem to have considered rail access. Heathrow began civil operations in 1946, initially using temporary buildings on the north side of the Airport, accessed directly from the A4 Bath Road. The London Airport Layout Panel reported in 1946<sup>9</sup> and proposed three stages of development. Stage I was effectively what had opened in 1946 and Stage II was to add runways and buildings in what was to become the central area, connected by road tunnel to the A4 Bath Road. Stage III was to include more runways north of the A4 but was never implemented. There was no mention of rail access. However, plans for rail access to Heathrow did appear elsewhere. An express line across London was planned for a proposed World's Fair at Osterley Park in 1951, and it was noted that this could subsequently be used to get to Heathrow. A second report in 1946 looked at a range of routes and London termini and further reports and submissions in the late 1940s contemplated various options<sup>10</sup>.

Despite the various plans for rail access to Heathrow, the post war state of the railways precluded any immediate action. The railways remained privately owned throughout the war but had been in a poor financial position for some years. They played a significant role in wartime but were damaged by bombing and were not upgraded or even fully maintained. The railways were nationalised in 1948 and embarked on a programme of track and station regeneration which was completed by the mid 1950s, following which a programme of replacing steam trains with diesel or electric traction began. However, although there had been a short post war return to rail, passengers and freight declined and British Railways made substantial losses. A major reduction in the rail network followed the report by Dr Beeching in 1963. The London Underground had been a public corporation before the Second World War, but operations and expansion were curtailed during the war, and the Underground was also nationalised in 1948.

The A4 and road tunnel was to be the only way of accessing the airport terminals for over twenty years, the Chiswick Flyover opened in 1959 and the M4 from Junctions 1 to 5 in 1965<sup>11</sup>. The main mode of public transport used by air passengers to Heathrow was organised by the airlines. Imperial Airways had opened the Empire Air Terminal adjacent to Victoria Station in 1938 and passengers were transported to Croydon Airport and Southampton (for the flying boat services) by rail and road. This was taken over by BOAC who continued to operate the buses to Heathrow. BEA opened an Air Terminal at Waterloo in 1953 which offered check in and baggage handling with a regular coach service to Northolt Airport, then being used by BEA. For a short time, there was also a helicopter service to the Airport from the adjacent former Festival of Britain site. In 1957, a new terminal was built for BEA on the Cromwell Road, above London Underground's tracks, but not directly connected to a station. Initially a temporary building was constructed, replaced in 1963 by a permanent building. BEA used specially designed buses for the trip to Heathrow, for which the location was more convenient than Waterloo, and the terminal was known as the West London Air Terminal. Access to both the West London Air Terminal and the Victoria Air Terminal was principally by taxi. As noted above, a dedicated rail service had operated to Gatwick Airport from 1958, and an air terminal above the tracks at Victoria Station opened in 1962, with passengers descending to trains after check in<sup>12</sup>.



Figure 2: London Airport road tunnel<sup>13</sup>

This short historical background will lead into the next chapter which picks up the story in the 1960s. The remaining chapters are also separated by decades, simply because it is convenient to do so, and some key events, such as the Parliamentary Bill and the opening date, did occur at around the turn of a decade. There are two other chapters which cover matters which spread over more than one decade - other services at Heathrow and airport railways around the world.

Finally, in this introductory chapter is an explanation of the title 'Famous for Fifteen Minutes'. A similar phrase was first used by Andy Warhol in 1968, who said "In the future, everyone will be world-famous for 15 minutes"<sup>14</sup>. This was then used by Heathrow Express in its early marketing campaigns because the journey time from Paddington to Heathrow was 15 minutes, significantly less than any other form of journey to the Airport and therefore one of the most striking features of the new service. The story of how 15 minutes was arrived at is dealt with in Chapter 4, and the journey time also noted in subsequent chapters, but it remains one of the key features of Heathrow Express, which is why I chose it as the title of this book.

## Chapter 2 The 1960s and 1970s - LT Beats BR

Heathrow grew rapidly in the 1960s, with a new long-haul terminal opening in 1961 (called Oceanic, later to be Terminal 3) and Terminal 1 in 1968. Public transport was primarily provided by airline coaches, which operated from the West London Air Terminal on Cromwell Road for BEA and short haul flights, and from Victoria for BOAC on long haul flights. Passengers could check in at the air terminals and their baggage would be taken straight to the aircraft at the airport. Michael Schabas<sup>15</sup> describes these terminals in some detail in discussing the background to the Piccadilly line extension to Heathrow and he is right to point out how it clearly influenced decisions, although ironically the airlines discontinued their central London terminals not many years later. Taxis and private cars were the other means of access. Staff used private cars and local buses. The Chiswick flyover had opened in 1959 and Junctions 1 to 5 of the M4, including the M4 Spur to Heathrow, opened in 1965.

Despite the M4, traffic congestion was making access by road increasingly unsatisfactory, and the Transport Co-ordinating Council for London (a body set up by the Minister of Transport, Barbara Castle, to include the MoT, GLC, LT, BR, London boroughs and TUC) reported in 1967 on a study which considered many options, including monorails, and favoured a BR link with Victoria. Victoria was emerging as a possible hub for international passengers with links to airports and the then proposed Channel Tunnel<sup>16</sup>. London Transport had dissented from the study's conclusions and the Government then commissioned a study of rail links which reported in 1970<sup>17</sup>. It was guided by a steering group which included the Board of Trade, MoT, GLC, Westminster City Council, BAA, BEA, BOAC and LT.

The Heathrow Rail Links Study considered three BR options and one LT. Option BR1 as for a link with Victoria where there would be airline check in and coaches would be withdrawn. Option BR2 was similar to BR1 but the airline coaches would remain. Option BR3 was also a link with Victoria, but with no check in and airline coaches remaining. The LT option was an extension of the Piccadilly line, with airline coaches continuing.

The BR options involved a new spur from Feltham to the Central Area at Heathrow, which could provide 6 trains per hour during the day and 4 trains per hour at night, with a journey time of 23 minutes. Fares would be 10 shillings for BR1 and BR2, and 8 shillings for BR3. The LT option would extend the Piccadilly line from Hounslow West to Heathrow with an intermediate station in the maintenance area, with a peak frequency of every 4 minutes, 7.5 minutes off peak, but no night service. The fare would be 5 shillings and the journey time from Hyde Park Corner would be 35 minutes.

An assessment of the quantifiable factors looked at the savings in operating costs, journey time savings and reduced road congestion over 25 years using a 10% discount rate. The LT link had the best benefit cost ratio (3.6) and would result in 24 million passengers (including staff) using public transport (rail, coach and bus) to access the Airport. The best BR scheme was BR3 (which retained the airline coaches) with a BCR of 2.5 but only 15 million passengers using public transport. The study also considered unquantifiable factors and concluded that a choice of either coach or rail was the most important. In straight financial terms, all the options would generate revenues greater than operating costs and the rate of return on the investment was highest for the LT option.



The conclusions said that Option BR1 was dropped because the airlines would be unlikely to withdraw their coach services, its low BCR and the doubtful financial viability. BR2 was also dropped because of the low BCR, so the final choice was between BR3 and the LT option. Unsurprisingly, the LT option was the final choice but, as noted earlier, once it was completed the airlines quickly withdrew their coach services. Would the assessment have been different if this assumption had been applied to all the options? I cannot be definitive, but my guess would be that the LT option would still have performed better than the BR options, given its wider catchment area, including for staff, and its lower costs.

Michael Schabas has provided an excellent description of the development of the Piccadilly Line to Heathrow<sup>18</sup>, and Jonathan Roberts has similarly described the background, Parliamentary Bill progress and funding<sup>19</sup>, to which I can add little. Ben Harding, who later became the Heathrow Express MD, was working for the LT Chief Mechanical Engineer at the time and told me that the Piccadilly line trains were being replaced in any event but the design was perhaps the first to consider air passengers from the start, with 'standbacks' at the doors to make carrying baggage easier. As an aside Ben told me that, at a presentation about the new trains to community groups, there was concern that the new trains would last for at least 25 years. Whereas the designers and operators thought that this was a good thing, the community representatives said that didn't want to be riding in 25-year-old trains in the future - an example of the gap between the perspectives of providers and customers. I simply add that the Piccadilly line extension opened to Hatton Cross in 1976 and to Heathrow Central in 1977 and the fare was 5 shillings. In 2019 the journey time from Hyde Park Corner to Heathrow Terminals 2-3 is 47 minutes and the single fare is £6 (cash), £5.10 (Oyster, peak) or £3.10 (Oyster, off peak). With inflation over 49 years, 5 shillings would now be worth £3.84. It carries about 9 million air passengers a year, a share of about 17%, and about 10% of staff journeys.



Figure 4: The Queen opens the Piccadilly line to Heathrow

The Piccadilly Line extension to Heathrow (and indeed the alternative plans for a BR link) was based on the current and short term growth prospects for the Airport but, after the Roskill Commission reported in 1971 and the Government decided to build a third London Airport at Foulness, later renamed Maplin, it was expected that longer term growth at Heathrow would be limited. But, in 1974, the Government cancelled the Maplin project, and the pressure would come back to Heathrow.

A review of the Maplin project noted that the forecasts of air passengers and aircraft movements which had been used needed to be amended in two ways. First, the economic downturn which followed the events of the early 1970s including the quadrupling of crude oil prices, had resulted in lower growth, and even a decline at Heathrow in 1974, of passenger numbers. Secondly, a growth in the average number of passengers per aircraft movement resulting from the introduction of larger aircraft such as the Boeing 747, Lockheed Tristar and Airbus A300 meant that the forecast of growth of aircraft movements was significantly reduced. In turn this meant that the need for additional runway capacity was deferred and the ability of the existing runways to accommodate more passengers was significantly increased.

In 1975, following discussions with interested parties, the Government published a consultation document *Airport Strategy for Great Britain, Part 1: The London area*<sup>20</sup>. Part 2, covering the regions, was published a few months later. The documents looked at the options for meeting demand, including the possibility of regional diversion as well as alternatives for expanding the London airports. The Heathrow options included a fourth terminal to the south of the existing central terminal area within the airport boundary and a fifth terminal to the west on what was then the Perry Oaks sludge treatment works. T4 would clearly be possible in a shorter timescale than T5, and the document noted that T5 would also require both an extension to the Piccadilly Line and a BR link. The need for a rail link to T4 was not noted.

In 1978, after the consultation, the Government published a white paper *Airports Policy*<sup>21</sup>, which set out short- and medium-term policies and proposed a way forward for the longer term. For Heathrow, it proposed that T4 should be built, subject to a public inquiry, but that there should be no further expansion, in part because of the difficulties of providing adequate ground access. Gatwick should also have a second terminal, again subject to a public inquiry. For the longer term, the options would be a major development at Stansted, a military airfield or a new site.

It is not clear when the Piccadilly Line link for Heathrow T4 was first planned, but Michael Schabas correctly notes that the loop was sub-optimal in terms of rail operations and passenger time. It is also odd that, despite the 1978 White Paper ruling out expansion at Heathrow beyond four terminals, the loop was planned to extend beneath the Perry Oaks site, where there is a straight section which would have been suitable for a station. In the event, as Michael Schabas also notes, when T5 was re-established as Government policy, the design required the station to be located much further to the west.

After the 1978 White Paper, work began on the long-term options through the Advisory Committee on Airports Policy and the Study Group on South East Airports. Their reports were published in 1979 and the ACAP report<sup>22</sup> repeated the analysis of Heathrow that surface access would be a key constraint on expansion beyond four terminals. The SGSEA report<sup>23</sup> evaluated six shortlisted sites for a third airport, including Stansted. The last act of the 1970s was a statement by the Secretary of State for Trade, John Nott, in the House of Commons on 17 December 1979<sup>24</sup>, in which he confirmed that Heathrow T4 should go ahead following a

public inquiry that had by then been held, and that BAA should be invited to bring forward plans for a major development at Stansted, including the safeguarding of land for a second runway. The statement also confirmed that a Heathrow fifth terminal should not be provided.

In the next chapter we will see how, despite further expansion at Heathrow having been ruled out, it returns to the agenda, and one of the results is the resurrection of the plans for a main line rail link.

## Chapter 3      The 1980s - A rail link for expansion

The Government's decisions announced on 17 December 1979 were debated in the House of Lords on 14 February 1980<sup>25</sup> and the House of Commons on 21 February 1980<sup>26</sup>. The Lords debate noted that the Piccadilly line would be extended to Heathrow T4, and that the second terminal at Gatwick would require improvements to the Victoria to Gatwick rail service. Lord Trefgarne, the Government spokesman, said that a fifth terminal at Heathrow was tempting but would, among other things, strain the ground facilities and the policy would effectively limit the future expansion of the Airport. John Nott in the Commons also said that he was tempted by a fifth terminal at Heathrow, noting that it was the preferred choice of British Airways but that the burden on road and rail facilities would become intolerable. However, he also noted that British Airways were entitled to pursue its own choice, possibly at the forthcoming inquiry into the Stansted plans. There was some support from MPs for the decision to limit Heathrow to four terminals, but there were also pleas to keep the option of a fifth terminal open including from the Liberal Party transport spokesman. There were only a few brief references to rail access in the debate.

BAA's application for a new terminal at Stansted and the safeguarding for a second runway were examined at a public inquiry which became the Airports Inquiries 1981-1983. In addition to BAA's plans, the Inquiries also considered other proposals, including an application by Uttlesford District Council, the local authority for the Stansted area, for a fifth terminal at Heathrow. The application itself was primarily a device to ensure that the proposal could be formally considered at the Inquiries, and it was strongly supported by British Airways.

The Inspector, Graham Eyre, recommended approval for the Stansted new terminal, and against the specific application for Terminal 5, but he left the door wide open for further expansion at Heathrow. In his thorough review of airports policy, Eyre<sup>27</sup> noted that, as early as the Maplin review of 1974, it had been noted that expansion of Heathrow up to 53 million passengers per annum (mppa) would require a BR link but that, at the time, BR thought that such a link was no longer practical. Similarly, the Airport Strategy for Great Britain studies of 1975 and 1976 had noted the need for a BR link with Terminal 5. The 1978 White Paper had ruled out Heathrow expansion beyond four terminals and Eyre was critical of the Advisory Committee on Airports Policy (ACAP) and the Study Group on South East Airports (SGSEA), saying "It was no part of SGSEA's brief to examine the considerations which had caused Government to conclude that the ultimate development of Heathrow should not go beyond four terminals. Perhaps this omission was unfortunate." (para 2.101). Eyre is also critical of the recommendation of the Terminal 4 Inquiry Inspector, Ian Glidewell, and the subsequent decision by the Government to not support further expansion.

The Inspector's report was debated for eight hours in the House of Commons on 30 February 1985<sup>28</sup>. The Labour Party spokesperson, Gwyneth Dunwoody, said that the Labour Party policy was to oppose a fifth terminal at Heathrow, and local Conservative MPs noted that conditions on the roads were unacceptable, although others noted the possibility of a BR link. Toby Jessell, MP for Twickenham, said "Eighty per cent of passengers go to Heathrow by road and, however one may fiddle about with railway lines, that proportion is unlikely to drop substantially." (col.342) John Wilkinson, MP for Ruislip-Northwood, said that proper railway links from Feltham and Iver would be necessary pre-requisites for a fifth terminal, and the

Iver link was supported by Terry Dicks, MP for Hayes and Harlington. The Liberal spokesman said that urgent action should be taken to improve public transport, with particular emphasis on rail.

The decisions on the Airports Inquiries were published along with a White Paper in June 1985<sup>29</sup>. BAA's application for a new terminal at Stansted was approved, but the plan to safeguard for a second runway was rejected. The application for a fifth terminal at Heathrow was rejected, but the White Paper opened the door for future expansion by proposing to remove the limit on aircraft movements and initiating a study on the release of the Perry Oaks site. On surface access, it referred to the calls for a high quality rail service to supplement the Underground, noting that such a link is unlikely to be financially viable, and announced that a study of the options for improving surface access would be urgently commissioned.

The Heathrow Surface Access Study began in 1986 with the commissioning of Howard Humphreys, MVA and Kennedy Henderson. The report was published in 1987<sup>30</sup>. The study considered two scenarios, one with four terminals and 40 mppa, the other with five terminals and 55 mppa. The existing mode share for Greater London was noted as 35% using the Piccadilly line, 10% on buses, 26% in taxis and 29% by private car.

Three families of options were developed: rail based, people movers and road based public transport. There were 40 options initially, with BR options using either Waterloo, Victoria or Paddington as the terminus. There were also options for improving the Underground, including the Piccadilly line, Central line and a new line. There were proposals for people movers, both as internal airport systems and for the line to London. Various road improvements were also considered, as well as minibuses, shared taxis and bus priority measures. A number of options were developed for the southern route (Waterloo or Victoria), some sharing with the Piccadilly line. There were three Paddington/GWML options, one using the freight line from West Drayton, the second with a new spur from west of Hayes and Harlington Station and the third with new station on the GWML linked by coach to the airport.

One important difference from the options considered in the Heathrow Rail Links Study of the late 1960s was that, by the 1980s, Gatwick Express was operating as a dedicated service and was demonstrating the revenue and customer service benefits of such a service. A short history and description of Gatwick Express is provided in a separate section in this chapter. It should also be noted that the Piccadilly line extension to Terminal 4 had opened with the new terminal in 1986.

#### **GATWICK EXPRESS - THE MODEL**

Gatwick Airport had been served by rail from its early days in the 1930s. When the new runway was opened in 1958, a new rail station was an integral part of the new terminal. Up until the 1970s, the rail service had been provided by the regular Brighton Main Line services, some using special trains with more baggage space. Until 1984, the service was provided by trains being split and joined from main line services at Gatwick but, as Gordon Pettit reminded me from his time at BR Southern Region, it became increasingly obvious that the needs of air passengers and commuters were very different, not least in terms of baggage facilities, so the Gatwick Express started as a completely dedicated service from 1984, using Class 73 locomotives attached to adapted Mark 2 coaches, running non-stop between the Airport and London Victoria. Those responsible for day to day operations objected to

dedicating platforms at the stations as they wanted to retain flexibility, but Gordon told me that it worked well as it brought a discipline to these operations. The service ran every 15 minutes and was timetabled for 30 minutes journey time, although the Class 73 sometimes struggled to achieve this. Gordon also told me that, on opening day, a huge bell was presented which his wife rang, very loudly, on the concourse at Victoria, much to the surprise of many passengers.

Commercially, the Gatwick Express was very successful and attracted a good share of air passengers, prepared to pay a premium fare. At around this time, BR was reorganised into business sectors and Gatwick Express was allocated to the Inter City sector which had a particular objective to be profitable, and Gatwick Express contributed to this objective. On privatisation in the 1990s, Gatwick Express was the first franchise, as a stand-alone operation, although it was later merged with Southern.

Thus, Gatwick Express became the model for Heathrow Express, with similar dedicated rolling stock, frequency and marketing. It was also the model in the quantifiable sense, as mathematical models were developed to forecast patronage which included a factor to recognise the particular features of the service. Most transport models predict patronage or mode share by considering the journey time, frequency and fare, often known as the generalised cost. But this didn't work well for the Gatwick Express which attracted more than the share justified by these factors, so an additional factor, called the 'modal constant' was added to the formula. This was controversial, and some experts did not accept it, calling it a 'fiddle factor' but it did provide credible results for existing services, and was the basis of the analysis of the options for Heathrow.

Gatwick Express was not popular with commuters who stood on the platform at East Croydon and watched the Gatwick trains run through with empty seats. There was continual sniping at the Gatwick Express from MPs, commuter groups and some in the railway industry that it was not making best use of the capacity, despite the fact that it actually used capacity overall because air passengers travelled at all times of day and the week and in the counter-peak direction. Nevertheless this eventually led to the removal of many of the features of the dedicated service: conductors on the trains selling tickets, the introduction of gates at the stations, the combination with some commuter services and, for a particularly disastrous period, the use of totally inappropriate rolling stock (Class 442). My old friend Vernon Murphy wrote an article called 'Murder on the Gatwick Express' and criticised the proposals in the early 2000s, noting that the Gatwick Express was a top performing train operator that had achieved international and national recognition but the then Strategic Rail Authority was proposing to 'assassinate' it.<sup>31</sup> Gatwick Express just about hangs on today, but the differential to the regular services (which have improved) is limited. Perhaps it is no different from the view of the Southern Railway in the 1930s that they 'could not contemplate any interference with the service between London and Brighton for the sake of improving facilities at Gatwick'.<sup>32</sup> Perhaps it is also a viewpoint which will eventually see the demise of the Heathrow Express and its absorption into the generality of services on the Great Western Main Line.

Richard Goldson, noted elsewhere for his roles in BR and then on the Heathrow Express Operating Company Board, joined National Express in 1996 when they took on several franchises, including Gatwick Express. In due course National Express took over the West Anglia Great Northern franchise, which included the Stansted Express service. BAA and National Express got together to form the Airport Express joint venture, which was intended

to find synergies but which did not make much progress, possibly because the partners were not prepared to engage in the risks that would be necessary to achieve the rewards.

At the time of writing, the Gatwick Express service is suspended during the 2020 coronavirus pandemic. The future of rail franchising is in doubt, reviews over a number of years having pointed the way towards other methods of running the railways, and Richard Goldson predicts that the Gatwick Express service will not restart when the railways, and indeed the country and the whole world, recover.

The assessment of the options in the Heathrow Surface Access Study was done with the assistance of a detailed nested logit model, segmented by market. Assumed fares were £1.50 on the Underground, £2.80 on BR and £6 on a people mover. Journey times would be 33-38 minutes on the Underground, 28-33 minutes on the southern BR links, 16-33 minutes on the BR GWML routes and 18 minutes on a people mover. A limited extract from the key tables (Tables 15.3 and 15.4) is shown below.

<b>Option</b>	<b>Air passenger rail mode share</b>	<b>Total cost</b>	<b>Net revenue/cost ratio</b>	<b>Net rail return (after revenue loss for Underground)</b>
<b>Piccadilly Line extension (U1-4)</b>	19-28%	£85-269m	Minus 0.18- minus 0.95	Minus £65- 161m
<b>BR R1 (Victoria/Southern)</b>	31%	£138m	1.56	£2m
<b>BR R6 (Paddington/Hayes spur)</b>	31%	£113m	0.98	£41m
<b>People mover</b>	28%	£320m	0.19	Minus £4m

Note: based on 5 terminals, money values are NPVs

Non-quantifiable factors were also assessed, with the BR links generally performing better on capacity and comfort, with the Paddington links noted as having less impact on other travellers.

The conclusion was that Option R6, using Paddington, the GWML and a spur from west of Hayes and Harlington Station, would attract the most rail passengers and give the highest financial return. Note that this was a straightforward financial return on the capital invested and after operating costs, rather than the benefit/cost ratio that takes into account time savings which is more normally used for transport appraisal.

Richard Goldson, a long time career railwayman, who was in the BR Policy Unit at the time which was considering the study, told me that he was surprised at the conclusion, with the choice of Paddington as the London terminus being counter-intuitive, as it is not well located or well served by onward travel modes. The location was a common criticism at the time and has remained so. But the consultants had data which showed a different picture. CAA surveys showed that the London boroughs with the largest numbers of air passenger origins and destinations were Westminster (the borough in which Paddington is located) and Kensington & Chelsea. Admittedly these boroughs are large and parts are some distance from Paddington, but there was clearly a western 'bias' and Paddington was better located for air passengers than other main line termini. The bias is even stronger for foreign residents (who

are about half of Heathrow's total passengers) and have a greater propensity to use public transport (for the simple reason that they tend not to have access to a private car). I also blame the London Underground map for the perception that Paddington is not well located. It shows Paddington at the north west corner of the Circle line whereas it is close to Marble Arch and Hyde Park Corner (major tourist hotel locations). However, the centre of gravity of London has changed significantly in recent years and has certainly moved eastwards, so Paddington's location advantage has waned. Richard was right about the onward travel choices which required some significant enhancements to the taxi operation. The Underground links were not improved and await the completion of the Elizabeth line.

Following the slightly surprising conclusion that a dedicated Heathrow main line rail link could be profitable, BAA and BR got together to develop the Heathrow Express project. I can add some details and different perspectives to Michael Schabas' description of the project in *The Railway Metropolis*<sup>33</sup> as I was appointed Project Manager by BAA plc in 1987.

BAA was by now in the private sector, and one of the freedoms this gave was the ability to become involved in activities other than airports. Some of these other activities were closely related, such as airport hotels, duty free retailing and airport property investment, but BAA went on to have joint ventures for out-of-town shopping centres and other property investments well beyond the airport boundary. Not everyone in BAA was keen to get involved in rail, but Alan Osborne told me that Vernon Murphy, who held several senior positions, worked quietly in the background to persuade the doubters from the beginning right up to the point in 2000 when he became BAA's Rail Director. British Rail, despite some highly competent and imaginative management, was in decline. Rail passengers had fallen from around 1 billion in 1960 to 800 million in the late 1980s, although the downturn had been reversed. BR was a nationalised industry and there were effectively no private train operations. BAA and BR signed a Memorandum of Understanding in 1988, which proposed an express link from Paddington to Heathrow. BAA would build the new branch line and would have lead responsibility for managing the link. BR would electrify the Great Western Main Line, improve Paddington, build the junction with the branch line, buy the trains and operate the service<sup>34</sup>. The paper which sought approval from the BAA Board in April 1988 contains some interesting points. It notes, for example, that the proposed system would be able to accommodate additional services and that the major risk would be obtaining the predicted share of passengers. The Government were keen for the private sector to take most of the risk, but BR wanted the assets to revert to them after 30 years.

The proposal to jointly build the Heathrow Express was accepted by Government in July 1988. The first task was to prepare a Parliamentary Bill. I had in part been appointed because of my previous experience in public inquiries, but BAA had no expertise in Parliamentary Bills, which was the procedure by which railways had been authorised for many years. My opposite number in BR was David Beynon, and he had access to many people who knew much more about authorising and building railways. However, it was also the case that BR had not built a new main line railway for some years, apart from the Selby Diversion on the East Coast Main Line, so their expertise on major projects was limited, whereas BAA had built or was building new terminals at its airports and had knowledge of the underground conditions at Heathrow from building the cargo tunnel in the late 1960s and the underground pedestrian subways in the 1970s.

The Heathrow Express Bill was deposited in the House of Lords in November 1988. It is usual for bills to go to the Commons first, but not essential and, in this case, it was decided to



go to the Lords first and they would scrutinise it thoroughly. The Second Reading of the Bill took place on 28 February 1989<sup>35</sup> with Lord Jenkin of Roding moving the motion. Patrick Jenkin had been the Conservative MP for Wanstead and Woodford until 1987 during which time he held several Cabinet posts including Secretary of State for the Environment, after which he was made a life peer. Lord Jenkin introduced the Bill and noted that the plans had attracted some comment and criticism, about road traffic at Paddington, the lack of intermediate stations, alternative routes, fares, environmental impacts and the safeguarding of future extensions. I am proud to note that my name is mentioned in the Hansard record (col.1018) of this debate, by Lord Mountevans referring to an article I wrote for Modern Railways. Speakers in the debate all supported the Bill in principle, but several mentioned potential petitioners who wished to protect their interests. Government also supported the Bill.

Given this almost universal support for the Bill, it came as a bit of a surprise that it did not proceed as quickly as had been planned. The Lords Committee sat in April and May of 1989 but there were a number of petitioners who were not satisfied and the Committee themselves had strong views. The City of Westminster, supported by a local campaign group, Paddington Residents Active Concern on Transport (PRACT) wanted better arrangements for taxis and other road traffic at Paddington. The London Borough of Hillingdon sought to protect the interests of residents in Hayes from the noise of passing Heathrow Express trains, even though these would be much less noisy than the then existing trains and much cleaner than the steam trains that had been passing for well over 100 years, well before the houses had been built. I was invited to tea in one of the houses in Denbigh Drive, which backs on to the Great Western Main Line, and we listened to the nearby trains. We had made estimates of the noise levels but nothing beats direct experience. We agreed to build a 'green wall' of earth contained in gabions which would shield the lower area of the trains where the wheels generate noise.

One of the alternative routes proposed would have left the main line at Southall, with a much longer tunnel to the Airport. On the proposed route there would be environmental impacts on the old gravel pits which would be crossed by the new line curving south from the main line. These old workings had become the habitat for several species, including kingfishers. As protected species, we had to be very careful of the works in this area and, proud of our plans, we publicised them. Unfortunately, we used a picture of the wrong species of bird, a mistake soon picked up by the experts!

There were petitions from property owners, for example from Trusthouse Forte who owned a hotel under which the tunnel would pass, and who were concerned that noise and vibration from the trains would wake their guests. They withdrew their petition when we agreed to add rubber track mountings. Petitions from electricity, gas and water undertakers, concerned about their underground utilities, were dealt with by protective provisions in the Act and, in particular, London Underground were given protection as the Heathrow Express tunnel would pass very closely beneath the Piccadilly Line tunnels in the Central Terminal Area (CTA).

The trickiest design element which the Lords focused on was the section between the junction with the main line and the airport boundary. Our initial plan was for this to be at ground level or above, crossing the M4 on a long viaduct. We were so keen on the viaduct that we commissioned an artist's impression, with a beautiful (in the eyes of bridge engineers) seven span bridge sweeping across the M4. We had visions of people stuck in traffic on the road

below watching the train glide over the bridge above them and vowing to use it next time. Their Lordships had a different perspective. The land across which the line would run is green belt and, although it was surrounded by roads and built up areas, the claim was that a ground level route would sever small areas and make them vulnerable to development. We tried to argue against this, on the grounds that a tunnelled route would be expensive and challenging, but we lost the argument and had to bury the line. One of the challenges was that much of the route was across an old refuse tip, for which there were limited records and there was clearly methane being emitted. We speculated that an electric train entering a tunnel in which there had been a build up of methane gas would spark from the pantograph and cause an explosion. However, the challenge was met by our excellent team of design engineers who designed the cut and cover tunnel with a gas proof membrane and a water-preventing clay lining, together with ongoing methane monitoring. It cost £11 million extra but, as far as I know, there have not been any explosions.

To meet the Lords' Committee's requirements, we had to submit an 'Additional Provision' to the Bill which is, in effect, a revision to the route. This meant that the Bill could not be passed in one session and had to be carried over to the next. Our initial hope of gaining Royal Assent in one session was not realised, and in fact it took a further two years. The third reading of the Bill in the Lords took place on 21 March 1990<sup>36</sup>. Lord Jenkin noted the additional provision and the methane issue. Westminster City Council's concerns would be addressed more fully in the House of Commons. Finally, he noted that there was a possibility of Heathrow trains using what became the Crossrail route, although at that time that project was in its early stages and was subsequently deferred before the current version of the scheme was brought forward in the late 2000s.

The Bill then passed to the Commons, but pressure of business meant that it had to be carried over again and the Second Reading did not take place until 18 December 1990. The Bill was introduced in the Commons by Neil Thorne, MP for Ilford South. New points raised were the possibilities of additional links, to the west and south, which various parties had put forward. Westminster City Council's concerns about road traffic at Paddington had not been resolved and there were a number of other major developments being proposed around the Station. My BR opposite number David Beynon was quoted in this debate, as he had written to MPs saying that a western link was not precluded, but not currently proposed. The MP for Hayes and Harlington, Terry Dicks, noted the effect on his constituents but was pleased that the promoters had included some mitigation in the scheme.

The Bill went to a Commons Committee, chaired by Bernie Grant MP. Bernie Grant was the MP for Tottenham and, to put it mildly, had a reputation as a bit of a firebrand. However, in the Committee he was very businesslike, polite and kind to the participants. Usually, the second house deals with Bills in fairly short time, given that most of the concerns have already been dealt with in the first house. However, the City of Westminster's concerns remained outstanding and required several days to resolve. The issue of safeguarding for a southern link also took some time. The London Borough of Hounslow wanted us to actively safeguard for a Southern link by including step plate junctions at key locations. Step plate junctions are significant underground structures that would have added significant cost to the project, and we were not at all convinced that a southern link would ever be built or, even if it was, the design would be that proposed by Hounslow. Their proposed southern link route would have approached the Heathrow Terminals 123 station from the east. This would mean a junction just to the east of the station and we agreed to build the tunnel to a larger diameter

in this area to enable a junction to be built later. This cost an extra £1 million but it is unlikely that such a junction will ever be built.

The third reading took place on 8 May 1991 and Royal Assent was granted the next day.

As noted earlier, the Parliamentary Bill process was not something we were familiar with in BAA, and our BR colleagues had not promoted such a large project for some time, so the time taken turned out to be much longer than expected. The process was also interesting, with ancient procedures and language, documents tied with pink ribbon, and the hearings taking place in the Palace of Westminster. We published an environmental impact statement, which was common practice in planning applications, but which was an innovation for Parliament. Nevertheless, it was, in some ways, an efficient process that dealt properly with the matters at hand. It was also an inherently political process and required me and colleagues to persuade MPs of its merits. I attended several political events, including party conferences, of which two stand out in my memory. At a Labour conference, I was pinned to the wall of a meeting room by the formidable Gwyneth Dunwoody, MP for Crewe, chair of the Transport Select Committee and very knowledgeable of all railway matters. At a Conservative conference, I helped explain some of the details of the project to Margaret Thatcher and her colleagues (see Figure 4).



Figure 4: The author (second from left) explaining the Heathrow Express project to Margaret Thatcher and senior cabinet members at the 1990 Conservative Party conference.

Apart from the Parliamentary Bill, my other main responsibility as Project Manager was to appoint the initial design team. With our limited experience, we needed engineers who knew about tunnelling and we appointed Halcrow as consultants, given their work on the Channel

Tunnel and in London. Tunnelling is very specialised and knowledge of working in London Clay was essential. There are a limited number of tunnel engineers and they move around the world as projects begin and end. The Parliamentary Bill required input from the engineers to determine a feasible route as well as a cost estimate. But the project team included significant input from BR and BAA and the route beneath Heathrow evolved to meet future requirements. I pay particular tribute to one of my colleagues, Ralph Goodwin, who masterminded the route shown on Figure 5. The most obvious route would have been directly north-south via the CTA and then on to Terminal 4. But tunnelling beneath buildings is better if the tunnel is aligned with the buildings' foundations, and most of the buildings were on a northeast-southwest alignment. The route of Option R6 in the 1987 Heathrow Surface Access Study had been to enter the CTA from the north west, but we were aware that Terminal 5 would probably be built to the west of the CTA and wanted to safeguard a westerly extension from the CTA. Hence the inverted question mark shape of the route. Most of the route would be twin tunnel, but we value engineered the route between the CTA and Terminal 4 to be a single tunnel, albeit with twin platforms at T4.

Tunnel design may seem straightforward, given that it just a circular cross section, but the details are far more complex. The stations include cross passages, a central passenger throughway and shafts for lifts and escalators at both ends. And, of course the station tunnels are much larger diameter than the running tunnels. The special design of the cut and cover section through the old refuse tip was noted earlier, and there were also emergency and ventilation shafts to be designed.

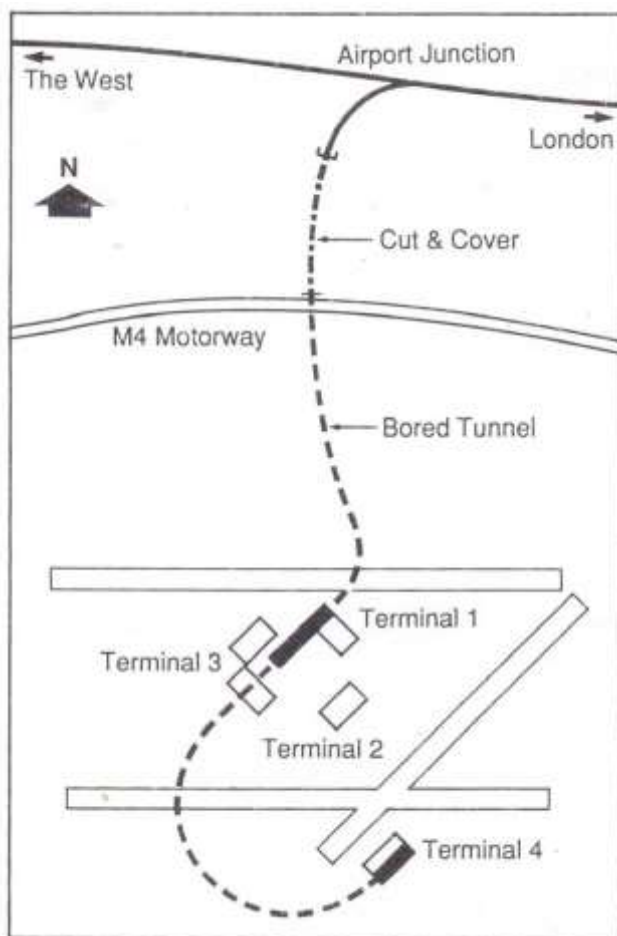


Figure 5: The Heathrow Express route at the Airport

Airport Junction was designed by BR, with long leads to the points such that the Heathrow trains could leave or join the main line at 95 mph and avoid the loss of capacity that would come from a slower change, although the track, signalling and rolling stock parameters were not fully synchronised. BR had also designed the approaches to Paddington as part of a larger project based on much higher speeds than previously, such that trains could use their full speed potential. BR also designed that electrification and resignalling of the main line.

This chapter has strayed into the 1990s as did the Parliamentary process, and also into some of the early stages of design that were discussed in the Bill. But, once Royal Assent was granted, the way was open to complete the joint venture and start the design and construction stage, which was completed in the 1990s, as described in the next chapter.

## Chapter 4      The 1990s - Building and opening

Soon after the Heathrow Express Railway Act was passed, I moved on to other tasks in BAA, although I returned to BAA's Rail Division in 1995 as Director of Strategy. However, I was involved with the Terminal 5 planning team from 1993, where a key element of the plans was rail access. However, it was for various colleagues to take on the task of designing and building the initial Heathrow Express project, as it had then become, and taking it through to commissioning. Rod Hoare was appointed as Managing Director of the Heathrow Express project in 1993, a position he held until 2000. Prior to this he worked for BOAC, P&O, Sally Ferries, British Caledonian and British Airways. Rod was a larger than life character and had a huge influence on Heathrow Express, in particular on the customer service strategy. Ben Harding was appointed as MD of the Heathrow Express Operating Company in 1996, coming from LT. Ben reminded me that, at a team meeting, he and I, knowing the signs, lifted our coffee cups just before Rod banged the table hard with his fist, spilling everyone else's drinks.



Figure 6: Rod Hoare

But first there was the task of turning the Joint Venture between BAA and BR into a working project and I am grateful to Richard Goldson and Andrew Sharp for information on this. Richard was given the task of implementing the Joint Venture by the BR Board and he told me that BAA and BR worked together well, collaboratively, and supportive. There was much more going on at the time with BR privatisation and their role in Heathrow Express was relatively minor. As an example, when it came to agreeing a price for the transfer of the final parts of the JV to BAA, a simple sum was estimated and agreed directly between the BR and

BAA Boards, without any reference to the Department of Transport. Also, because there were many bigger fish to fry, there was little objection at the top of BR to the loss of the Heathrow Express service from the national network.

Andrew was in the BRB Finance Department and had a key liaison role in the mid 1990s. The financial arrangements were complex (although not relatively in comparison with many in the current rail industry) and changed significantly during the project, mainly because of the BR privatisation, which had been enabled by the 1993 Railways Act. The project had been a 70/30 BAA/BR JV, but even then some of BR's works were to be funded by BAA. Heathrow Airport was to be responsible for the new branch line in tunnel, including two new stations, and the rolling stock. BR would build Airport Junction, electrify the Great Western Main Line from Paddington to the Junction and make changes at Paddington Station. BR would also resignal the Great Western Main Line, and the project contributed part of the cost of this. As BR was being privatised there was concern that liabilities, particularly for cost overruns, would fall to Railtrack and eventually it was agreed that BAA would acquire the whole project. Echoing Richard Goldson's comment, Andrew told me that the negotiations were relatively straightforward, and a price was agreed. Costs did grow, not least because of the tunnel collapse, but also in other areas, in some cases because of the addition of items, such as more rolling stock. Nevertheless, papers from around the time show that the project would be profitable, providing a reasonable return to BAA and a higher one to BR. But of course, such estimates of profitability depended totally on projected costs and revenues, neither of which were borne out in the event.

I have little direct knowledge of the construction phase and, in particular, of the tunnel collapse in 1994. Much has been written about it in the technical and legal press and I could not do the subject, or the individuals involved, justice by attempting to cover it in this book. What appears to me to be a good summary is contained in a paper from Tunnel Talk<sup>37</sup>. Not many organisations come out of the event unscathed, and the contractors and designers were heavily fined in a subsequent court case. However, there were also positives, in particular the way that the organisations worked together after the collapse to stabilise and then recover the situation. One example was that Denis Tunnicliffe of London Underground immediately agreed with Rod Hoare's request for documents when Heathrow Express's copies were lost in the collapse. We should also be grateful that no one was killed or injured. From my knowledge, I will pick up a few consequences for the Heathrow Express project. Of course, there were also consequences for the tunnelling industry and for other projects.

The most obvious consequence for the Heathrow Express project was a delay and cost increase. The delay was probably a year and the cost increase has been estimated at £150 million. However, there was no real choice but to continue as the works were already significantly under way.

One consequence of the collapse was that it necessitated a redesign of that part of the station where the collapse took place (see Figure 7). The original vertical shaft for the lifts was to be 25 metres diameter, and there would be separate inclined shafts for the escalators. Once the ground had collapsed, it was necessary to dig it out to restore stability. It was decided that a 60 metre diameter shaft would be built which could then house both the lifts and escalators. This much larger and more open space provided a much better entrance and exit for the station giving a better sense of arrival to and from Terminal 3, noticeably different from the route to Terminal 1 (now closed).

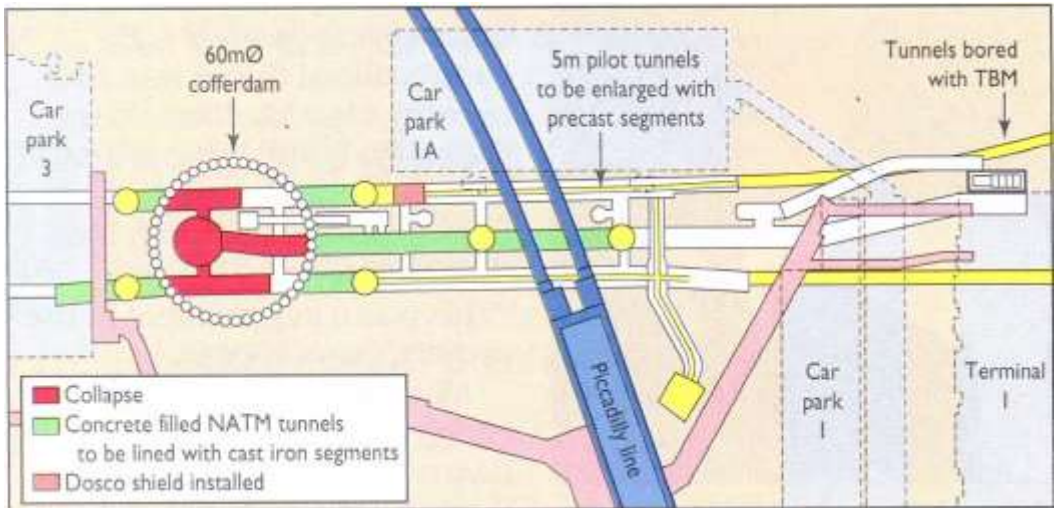


Figure 7: CTA tunnels

As the infrastructure was being built, the trains were designed and built. A separate section below covers their story.

## THE TRAINS

Although they accounted for only about 20% of the total project cost, the trains would be the most visible part of the service and therefore particular attention was paid to their acquisition. Mike Noakes was particularly involved in the procurement for BAA and Gordon Pettit, after he retired from BR, also advised BAA on rolling stock, and they have provided me with much of the information for this section.

The basic specification which had arisen from the HSAS studies was for an electric train capable of 100 mph. Electric traction was needed, despite the fact that the Great Western Main Line was not then electrified, because it was clear that we could not operate diesels in the tunnels, particularly the stations. The top speed was required to achieve the quick journey time but the trains also had to accelerate such that they would take up no more capacity than an Intercity 125 (which had a higher top speed but lower acceleration).

There was significant pressure from our BR partners to buy a UK train, and Chris Green who was running Network South East at the time had placed a large order for Networkers in several different forms from British Rail Engineering Ltd (BREL). BREL was sold to ABB in 1989 and subsequently became part of Bombardier Transportation. Chris took us to York where the trains were being built and they were clearly suitable. We hired Minale Tattersfield to do some initial design on the finishes and trains. Sadly, as is often the case, these designs did not progress to the final project but were nevertheless interesting and innovative. Some of our early design images clearly were based on the Networker (Figure 8). We had a bit of an obsession with a 'Concorde nose' with the blue and white livery and it was branded as a joint BAA/NSE service.





Figure 8: Early versions of the train design

When it came to procurement, we had to open the competition to the EU and the short list of bidders included ABB, the Anglo-French GEC Alstom, Firema of Italy and Siemens/CAF of Germany and Spain. It is fairly clear that Siemens/CAF were not the cheapest, but BAA was particularly impressed by their supply chain arrangements, which was based on long term relationships. Siemens also had a good reputation for quality. It was also clear that Siemens wanted to get a foot in the door in the UK and so worked very hard on the bid. Other manufacturers saw it as a relatively small order (eventually 61 carriages) and perhaps were not so keen. I did not visit myself, but reports coming back from the production line in Zaragoza in Spain were that the factory floor was spotless and the quality of build was very high, and certainly different from the rather more old fashioned techniques then being employed in the UK.

We spent a lot of time thinking about the internal layout of the trains, to ensure that they were suited for air passengers. Along with a colleague from Minale Tattersfield, we toured Europe to see and ride on a range of trains, looking for the best ideas. At that time, (the early 1980s) railways were still very much in the style of their countries, so German trains were efficient and militaristic, French trains were stylish and dirty, Dutch trains were colourful and relaxed, while Swiss trains were just all round good! In the end we adopted a seating layout that was relatively conventional, with 2 plus 2 seats with generous aisles but all facing towards the large baggage stacks. It was clear from our research that passengers were most concerned about losing sight of their bags and baggage manoeuvring was likely to be on the critical path for station dwell time.

As the design progressed, several features of the trains raised concerns. The initial specification was for 3 car units, to be operated in pairs at busier times, but with no interconnections. The relatively small fleet of meant that 6 car trains had to be split to enable maintenance to be carried out, but the lack of an interconnection required two on-board staff to collect fares. Later the trains were extended to 4 car and some to 5 car to accommodate all passengers seated. Technically the trains had a novel form of traction control equipment which was to cause a challenge for the safety case. The Siemens engineers were somewhat taken aback by the requirement that it should not interfere with any system 'on or about the railway', in particular when they discovered that there was no meaningful asset register of such systems.

No customer ever complained about the traction control equipment, but they did comment on the toilets. The plumbing included some right-angled bends which blocked with smelly consequences. It is an interesting lesson that the engineers were capable of dealing with new complex systems but could not get the basic plumbing right.

By the time the Class 332 trains were ordered and built, the design had changed to a predominantly silver livery with a Heathrow Express brand which was entirely separate from BAA and BR. One cause of conflict was the yellow front end required on main line trains (but not on the Underground). HEx argued that the three lights on the front made the train more visible than a yellow front, but the answer came back that, under the As Low As Reasonably Practicable (ALARP) risk strategy, you should have both. Never mind that no other trains at the time had such bright lights, although new trains now do, an example of the ratchet which is applied to safety, which is then difficult to undo.



Figure 9: Class 332 train

Gordon Pettit retired from BR in 1992 and was asked to help the Heathrow Express team to look forward to commissioning the initial service. Gordon told me that his advice on the new trains was to ensure that they were reliable, previous experience (and subsequent) having been that new trains do not always work 'out of the box'. The choice of Siemens as the main supplier and maintenance contractor was partly in response to this advice, albeit that they would be new to the UK. There was also a small fleet, so the number of spare trains was higher than normal. In the event, there was time to build reliability through the operation of Fast Train (see below), but even so, it took some time before an acceptable level of time between failure was achieved. There was also a rather embarrassing situation during the roll-out, ahead of the start of service. Dignitaries and journalists were invited to the Old Oak Common depot and after the dry-ice reveal, we all climbed aboard for a short ride in the depot. We rode for a couple of hundred yards and came to a halt. Nobody had told the signallers to power the overhead line beyond a gap. A few frantic calls to the control centre were required and, after a short time, we rode back to the depot. Fortunately, nobody took it badly and most of the reports were about the impressive new interiors.

A consequence of the delay caused by the tunnel collapse was that the rest of the project and in particular the electrification of the Great Western Main Line, Airport Junction, the platforms at Paddington and the new trains were completed well before the airport station. This led to the Fast Train operation, with the new trains operating to a temporary station just after Airport Junction with buses linking to the terminals. Rod Hoare drove this project, and I think he was well advised by several people who thought it would be a good way of testing the market and some of the systems. In particular, Gordon Pettit advised that it would be necessary to accumulate some mileage on the trains before they would be reliable. My advice to Rod had been that it would not be worth it, but fortunately he ignored me! Mike Noakes was particularly involved in Fast Train, which not only required a temporary station, but also a bus lane on the M4 Spur, the first time a bus lane had been established on a motorway. The key to the bus lane was the use of number plate recognition for enforcement, one of the first applications of this technology which is now commonplace. The temporary station had a particularly nice feature as the platform was level with the train floor and also with the bus floor, a feature not all that common at the time. Also the train carriages were labelled by terminal and stopped opposite the respective bus, enabling direct train-bus interchange (see Figure 10). Fast Train ran for just a year, from 1997 to 1998. Ben Harding told me that one little challenge was that the station was intended to be for bus passengers only, but some BAA senior managers thought that it would be a good place to park their car for a trip into London, a practice which he had to stop.



Figure 10: Fast Train temporary station

There are many other features of the construction of which I have only scant knowledge but which deserve a mention, such as at Paddington, the GWML, Airport Junction, the cut and cover tunnels, the bored tunnels and the stations.

Paddington is a Grade 1 listed building, as Graham King, Chief Planner at Westminster City Council, often reminded us. Railtrack, as it then was, was redeveloping the station but the coming of the Heathrow Express helped to push it forward. A direct link to Heathrow would obviously help to regenerate the area, but it also meant that BAA would be asked to contribute to the necessary road improvement schemes. Westminster City Council were active in the original Heathrow Express Bill stages in Parliament in 1988-91 and at the Terminal 5 Inquiry where the Heathrow Express extension was being considered, and they were able to negotiate from a strong position. BAA eventually paid a significant contribution

towards the widening of Bishops Bridge Road to accommodate taxis and additional traffic. Widening Bishops Bridge Road was a major undertaking involving raising and lowering with only night time suspensions of rail operations, The taxi situation was particularly challenging, given that many London cabbies live to the east of the city of often start their day in the City. There is also a Heathrow cohort of cabbies, but they were naturally reluctant to service Heathrow Express, the competition, and would prefer to take their passengers all the way to the airport. After the opening of Heathrow Express, there was often a shortage of taxis at the morning peak (about half of HEx passengers used taxis for onward travel) and so we initiated a taxi share scheme and also experimented with a hotel shuttle bus (as in Hong Kong). In later years the taxi rank was moved from Eastbourne Terrace to the raft to the east of the station and Eastbourne Terrace was redeveloped as the Crossrail station.

Another key project at Paddington was check in. Gatwick Express had operated a check in terminal at Victoria and it was part of the specification for Heathrow Express, especially as the airlines had closed their town terminals after the Piccadilly line had opened. The area to the rear of the station, called the Lawn, seemed an ideal place and, together with Railtrack, we put in 25 check in desks, a baggage sorting area and a tunnel with a baggage conveyor to the country end of Platforms 6 and 7, where there was a small loading area. The front half of the first carriage of the train was configured for baggage containers. After building the tunnel beneath Platforms 6 and 7, we reinstated the platform such that it would be at the same height as the train floor. This was not easy, as the normal UK specification for main lines was for a height difference, in part to reduce the risk of slippage between the train and the platform. However, it is normal on metros, and particularly appropriate for passengers with luggage, as well as those in wheelchairs. The platform was also widened by cutting back the face of Platform 8 and moving the tracks. Check in opened some time after the main Heathrow Express service and seemed to be popular with some passenger types, for example long haul leisure. However, although we guaranteed a minimum check in time of 2 hours before departure, it was less popular with short haul, hand-baggage-only passengers who valued time (which was why they were using Heathrow Express). The location also turned out to be suboptimal, as it was behind the passenger routes from taxis or the Underground, and not obvious. However, it was the events of 11 September 2001 that did for check in, after which the US airlines enhanced their security rules and would not accept check in at Paddington. Other airlines hung of for a while, but the costs of the operation, particularly in terms of the check in staff who were less productive than their airport-based colleagues (simply because there were fewer passengers to handle), resulted in the airlines withdrawing. Gatwick's Victoria check in also ended and, although there are some such operations worldwide, they are few and far between.

On the Great Western Main Line, there were three key projects, all undertaken by Railtrack. On the Paddington approaches, the track layout was redeveloped to enable higher speeds to be achieved. This meant reconstructing the junctions with longer leads and re-siting the signalling. This was a project which was taking place in any event, as with similar projects at many terminus stations, but it was conveniently timed for Heathrow Express. An essential project for Heathrow Express was electrification. This went well, in contrast to a number of more recent electrification schemes, despite the challenges of putting wires up not only in the Grade 1 listed building at Paddington but also across the Grade 1 listed Wharncliffe Viaduct at Hanwell. The wires had to serve the complex new approaches at Paddington and then the mostly four track railway to Airport Junction. Although the Heathrow Express trains would mainly use the Main (fast) lines on the south side, it was decided to electrify all four lines to enable running on the Relief (slow) lines, and it would clearly not be twice as expensive

although it would be much more costly later to add. Brunel's Great Western Main Line had been built to the Broad Gauge, which was generous in width but not in height, so installing overhead wires meant careful checking of clearances, in particular under bridges. On such bridge, carrying the A437 Dawley Road, consisted of five arches, and in this location the leads to Airport Junction would mean a total of seven tracks. So this bridge had to be demolished and replaced with a single span, also on a much better alignment for the road.

Airport Junction was a major piece of infrastructure with several interesting features. First, the leads to and from the junction were designed for 95 mph, so were very long. The Down Airport line runs immediately south of the Down Main and curves through 90 degrees at approximately the same level as the Main line. The Up Airport line rises from the branch and curves 90 degrees, crossing the Down and Up Main lines and descending to a connection with the Up Main and Down Relief lines. The flyover was designed with brick and concrete facing with arches as an acknowledgement to some of the styles used by Brunel. It also used a construction technique called reinforced earth for some of the vertical retaining walls. Airport Junction was later significantly modified for the Crossrail project, with a new steel bridge across all five lines, a very different style from the original.

Airport Junction also raised some environmental concerns. I noted in an earlier chapter that we had agreed to build a 'green wall' to mitigate noise for houses in Denbigh Drive, and that we also had to protect the nests of kingfishers in the old gravel pits. I also noted earlier the cut and cover section between Airport Junction and the bored tunnel, which required careful construction to ensure the integrity of the barriers between the refuse tip and the tunnel.

Most of the branch line was built in bored tunnel and this proceeded without any particular hitches, using two tunnel boring machines. In addition, there are emergency and ventilation shafts at Shepiston Lane, Custom House and Sanctuary Road. The stations were much more complex and were built using the New Austrian Tunnelling Method (NATM) and hand dug, and the story of the CTA tunnel collapse is referred to above. The CTA station is essentially three tunnels of about 5.8 metres diameter, the outer two containing the platforms and the central tunnel linking with the shafts containing the lifts and escalators to the terminals.

My experience of tunnelling is limited to a few visits, but it is clear to me that tunnellers really earn their money in the conditions they work. Most of us who use them day after day at Heathrow, in London or elsewhere in the world do so without any concerns, but they really are astonishing feats of engineering, on a par with the best skyscrapers and bridges.

I have jumped a few years to describe some of the construction issues, but a key aspect of the project in the mid 1990s was the setting up of the operation. Rod Hoare's responsibilities included both construction and operations and this helped to resolve the inevitable conflict between project managers, who want to get the project completed on time, within budget and with the right quality, and the prospective operator who wants all sorts of changes to make it work better. Ben Harding said that Rod was perhaps less concerned with the money side and would often accept changes asked for by the operator. Rod also had interesting views about the railways and thought that they were very conservative and unwilling to consider the particular needs of an airport service. An example was the requirement for a clockface timetable (trains departing Paddington at 10, 25, 40 and 55 minutes past the hour) and a train always waiting in the platform. This required extensive reworking of the timetable and very significant trackwork on the approach to Paddington. This was at around the time of rail privatisation, and it was clear that the best people in the railways had gone to the TOCs,

FOCs and ROSCOs, leaving the rest with Railtrack. Rod also was adamant that, at the time, the railways could not provide the quality of customer service that he wanted. In any event, the railway management were so heavily involved in privatisation that it became convenient to leave the development of the Heathrow Express to BAA, and gradually the project moved from a 50/50 joint venture towards a 100% BAA-owned operation, with the railways providing contracted services, such as through the Track Access Agreement.

Richard Goldson, who is noted earlier as a key BR Executive during the setting up of the Joint Venture, was invited to join the Heathrow Express Operating Company Board once the operation moved to 100% BAA owned. Richard confirmed Rod's views about the customer-service driven strategy and accepts that, at the time, the railways could not provide the quality of service aspired to. However, although there were inevitable tensions between pragmatism and vision, Rod accepted Richard's advice on some occasions when it became necessary to have a practical working solution.

One area where Rod did not accept normal railway practice was gating. Gordon Pettit's advice was that, in order to protect revenue, it would be necessary to have gates at the stations. Rod was strongly against this, wanting to ensure a smooth flow of passengers at the stations and then highest level of customer service. Gates were not installed but, initially, it was a challenge for the on board staff to get through the train at busy times, and many passengers travelled without paying (not deliberately, but simply because no one had asked them!). After pressure from BAA's main board, this was quickly remedied by the employment of more on-board staff, and additional trains were ordered to meet the demand. Eventually, gates have been installed at the stations, mainly to accommodate the additional services now running on the Heathrow Express infrastructure.

Rod Hoare also dealt with his bosses at BAA a bit lightly. Noted above was his relatively lesser concern for money, and he would often put an increased cost to the Board as a fait accompli. For one BAA senior management meeting, his progress report was delivered by a barber shop quartet singing 'Chattanooga choo-choo', as if to say, 'what do you lot know about it?' Sir John Egan (BAA Chief Executive) and others tolerated him but also kept a watchful eye through Russell Walls (BAA Finance Director) on the Heathrow Express board. Gordon Pettit and Bill Clarke (ex LT) were also on the board and provided different perspectives with Gordon focusing on operations and Bill on being customer-driven.

Ben Harding set up the Operating Company with Brian Raven (ex LT) as Engineering Director and Paul Neal (ex DLR) as Operations Director. The ex-LT contingent also led to some conflict with the main line railway people. The Heathrow Express safety case had to be signed off by Railtrack, who claimed that nobody in HEx had the required 5 years of experience on the main line railway. However, this objection was quickly withdrawn when it was pointed out that Brian Mellitt had recently moved from London Underground to be Railtrack's Director of Engineering.

As the start of operations approached, several key issues had to be resolved and Andrew Sharp, noted above, was involved in some of these. First of all was the nitty gritty of Byelaws and Conditions of Carriage. Undoubtedly tedious and bureaucratic to some, these are vital elements of a working operation, and essential to have in place before the start of operations. Andrew was also involved in commercial matters, in particular the setting of the fares. At the time, the cost of using the Piccadilly line to Heathrow was £3.20, the Airbus £6 and a taxi around £35. Market research was undertaken which indicated that potential customers were

relatively price insensitive and the standard single fare was set at £10. This was then (and subsequently) portrayed as 'the most expensive train fare in Britain'. My favourite counter to this was that the Heathrow Express fare per mile (about 70 pence) compared with about twice this between St James Park (the London Transport HQ) and Westminster on the Underground. Of course, it was a premium fare, for a premium service, and it enabled the project to be funded without any public sector contribution.

A paper from this time also considered the option of first class. Initially, we had considered that the service was good enough that first class would not be required, but after market research, it was clear that some customers would be willing to pay more, in particular for a guaranteed seat (and also, I suspect, for the exclusivity of a separate compartment). First class would add significantly to the bottom line with little adverse impact and was therefore implemented.

In the original studies and joint venture agreement, the journey time from Paddington to Heathrow Terminals 123 was set as 16 minutes. It is not clear when this changed to 15 minutes, but documents from 1995 show it as 16 minutes, but by the opening in 1998 it was 15 minutes. My recollection is that Rod Hoare and the early marketing team realised that '15 minutes every 15 minutes' would be a fantastic headline and so sought to get the timetable adapted. Although the track access agreement had specified 16 minutes down and 17 minutes up, and longer at certain times to allow for engineering possessions, Class 332 train could easily do the journey in 15 minutes, the infrastructure would also allow it and, although it is always wise to include some recovery time, 15 minutes was agreed for advertising purposes and remains in the timetable today. This also enabled the 'Famous for Fifteen Minutes' line to be used in the marketing campaign, and in the title of this book.

Rod Hoare was particularly concerned to set up an operation with high quality customer service and Ben Harding was tasked with this. Alan Osborne told me that his view is that Ben's role in the stunning success of the operation should not be underestimated. The basic recruitment strategy was to employ staff with high customer service skills and then select from them those with potential as drivers and other operational roles. The early cadre were mostly from the service sector and the recruitment media were deliberately gender neutral so as to attract more females than was then the average for the rail industry. The selection process involved interviews, psychometric testing, and role-playing, and it was the latter that proved to be the best indicator of future performance. After a few months, staff were tested for driver training, where the bar is high in railway Group Standards, and there was a six-month long training period. A few ex-BR senior drivers were recruited to help with training. Several of the early cadre of drivers, half of whom were female, went on to be high flyers in the railway industry. All staff, including drivers, were expected, and rostered, to undertake customer-facing duties for some of their time, as part of the culture. There is no doubt that, at the time, this was a radical approach that not everyone in the industry embraced.

The full service opened on 23 June 1998, in the presence of Tony Blair and John Prescott, Prime Minister and Deputy PM respectively. The opening ceremony generally went well, and Ben Harding noted (slightly unfairly, in my view) that many BAA senior managers were present (Stage 6 of the project management cycle: 'praise for the uninvolved'). However, behind the scenes there were a few challenges. Ben told me that, inevitably, they weren't quite ready, as all the contingency time had been used up in completing the works, and was now negative with very limited trial running having taken place. A train got stuck between

Terminals 123 and Terminal 4 on opening day because of a track circuit failure. However, the media reaction was generally positive.

Once opened, passenger numbers built up quickly, but the operation had a torrid time because of technical failures, staff shortages etc. The novel traction control equipment was the main rolling stock technical issue, but the smelly toilets were what customers complained about. The roof at Paddington leaked and the new floor tiles became dangerously slippery. There was also an infrastructure problem in the Heathrow tunnels. A dry water main system failed and the fire service threatened to close the service, but instead issued an improvement notice on the basis that closure would result in passengers choosing demonstrably less safe modes.

A serious fatal rail crash between an Intercity and freight train had occurred in September 1997 which affected the Fast Train service. Then, on 5 October 1999, another crash occurred at Ladbroke Grove, one of the worst rail accidents in Britain. A Heathrow Express train was nearby but not involved. Heathrow Express trains and most Great Western HSTs were fitted with an Automatic Train Protection system, but other trains on the Great Western Main Line were not, with other systems and rules in place which did not prevent these crashes. The subsequent inquiries made many recommendations and new systems were installed, signals modified, and procedures changed.

So, by the end of the decade (and millennium), Heathrow Express was up and running and providing an excellent service and removing one of the main obstacles to the expansion of the Airport with a fifth terminal. In the next chapters we will see how the operation developed over the next twenty years.



## Chapter 5      The 2000s - Operating the service

As the new decade started, Heathrow Express had been operating for 18 months and was performing well. It quickly established a reputation for service quality and was consistently the top rated train operator in the National Rail Passenger Survey. A market share of around 10% of terminating Heathrow passengers had been quickly achieved.

Ben Harding had moved on from the role of Managing Director at the end of 1999 but had been retained as a Non-Executive Director on the Heathrow Express Operating Company Board. Ben told me that the Board worked tactically, rather than strategically but it only met every three months. The strategic decisions were made at main BAA Board level, to whom the Heathrow Express Board reported. An example of this was that there was never an opportunity to discuss the budget at the Heathrow Express Board. Instead, discussion focused on safety and operational performance, relationships with Railtrack/Network Rail, staffing and management issues.

The events of 11 September 2001 caused a significant downturn in air traffic, in particular at Heathrow, with total passengers in 2001 down to 60.5 million from 64.3 million the year before and it was another three years before the 2000 total was exceeded. Heathrow Express passenger numbers did not decline, but did not grow for three years. Check in at Paddington was a casualty of 9/11. To be fair, it had not met expectations from the start, but increased security requirements, especially for American airlines, meant their withdrawal. Other airlines continued for some time, but the costs could not be borne and check in closed. The area was converted to retail and catering.

Although the service had bedded in and was generally working well, it was not perfect, and there were occasional delays and cancellations, in particular associated with track relaying after the Ladbroke Grove collision. One such period in 2002 led to a complaint to the Advertising Standards Authority that the claim was wrong as a number of journeys had taken between 20 and 25 minutes<sup>38</sup>. While the statistics showed that punctuality was always at the top of the league table of train operators, it is fair to say that passengers paying a premium fare expected the very highest levels of service, in particular, those whose time was so valuable that they wished to minimise the unproductive travelling time.

In June 2005, the Heathrow Connect service was launched. One of the potential other services that had been identified in the 1990s studies was Heathrow-St Pancras and, although this had not proved possible, one of its features would have been serving a number of intermediate stations between Paddington and Heathrow. Heathrow Connect did this, had a journey time of about 25 minutes from Paddington to Heathrow and ran every 30 minutes. Fares were less than Heathrow Express, but more than the Piccadilly Line. Heathrow Connect was a joint venture between Heathrow and First Group, the franchised train operator on the Great Western Main Line. Heathrow Connect partly replaced some existing GWR services with GWR providing the drivers and Heathrow the on-board staff. Revenue was divided according to whether the passenger travelled to Heathrow or not. The trains, five Siemens Class 360s, were acquired by Heathrow. Initially, the operation was complicated by the inability to operate to T4, which required the train to terminate at Terminals 123 and reverse using the stub tunnel to T5 equipped with a rising buffer stop which was not reliable.

In its first full year, Heathrow Connect carried 140,000 passengers to and from Heathrow (and many more on the non-Heathrow segments) rising to 620,000 by 2009.

In November 2001, the Government had published the Terminal 5 Inquiry Inspector's Report and gave approval to the project, with conditions which required the completion of the Heathrow Express and Piccadilly line extensions by the time the new terminal opened. The approvals also included the Transport and Works Act Orders for the extensions. Construction of the extensions was relatively straightforward as most of the works were below ground. The extensions from just west of the Terminals 123 stations were by bored tunnel, and the station box at the new terminal was constructed by excavating a basement and building the new terminal above it.

The Terminal 5 Extension was a worthwhile project for the Heathrow Express Board and management to get their teeth into. Heathrow Express is a relatively small operation (14 trains, 160 staff, 4 stations, 140 trains per day) and was inevitably organisationally top heavy. Ben Harding told me that one design issue which disappointed him was the relative locations of the escalators and lifts at the T5 station. Escalators provide one of the major risks for passengers and Ben would have preferred to have none, such that all passengers used the lifts, or at least to have the lifts visible before the escalators (as is the case at the Terminals 123 and Terminal 4 stations).



Figure 11: Terminal 5 station

Gordon Pettit's remit for the Terminal 5 extension, which became known as HExEx, was to advise on the operations and also on the potential for additional services. For the operation, the proposed layout was a two track extension from the Heathrow Terminals 123 Station to Terminal 5, with 2 terminus platforms (the Piccadilly line extension is also two track and two platforms at T5, but there is an overrun siding enabling one platform to be used for arrivals and the other for departures, as is normal London Underground practice). It was necessary to

demonstrate that the timetable could operate over the flat junction to the south west of Terminals 123 with the single track T4 spur. Gordon confirmed that the timetable would work and that a grade separated junction was not needed.

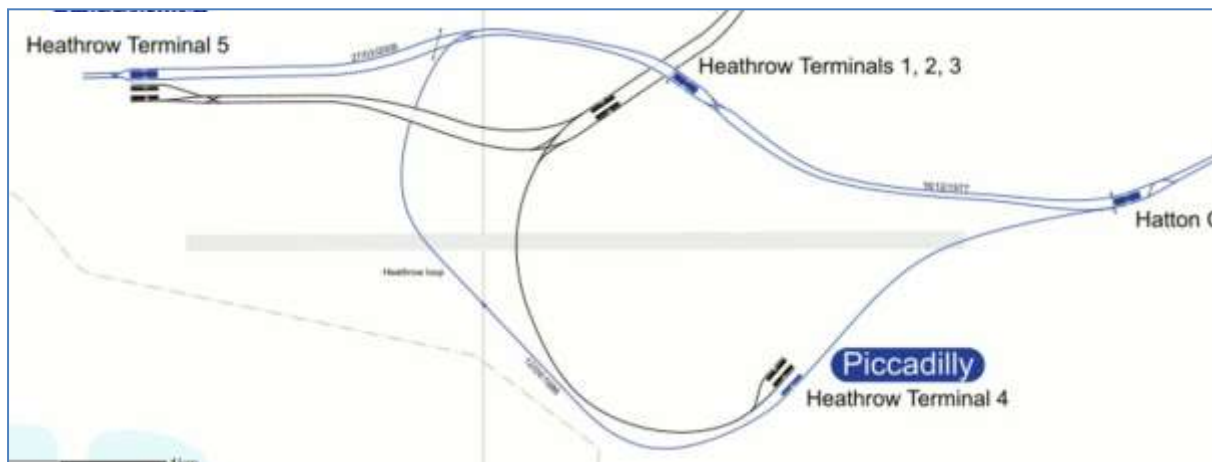


Figure 12: Heathrow Express and Piccadilly line track layout (Picture: The Anonymous Widower)

The initial plan was for the trains to split and join at Terminals 123. After splitting, the front section of the train would go to T5, and the rear to T4. In the London direction, the T4 section would arrive at T123 first and be joined by the T5 section. Split and join was common practice on the Southern Region and also in Holland and Japan, and the environment of a straight, flat and dry platform was felt to be ideal for splitting and joining. The T4 and T5 spurs were also only a few minutes journey time from T123 which would minimise perturbations. The trains were designed for splitting and joining (this was part of the reason for having each train made up of two units), with Scharfenberg couplers but, in the event, three risks were considered unacceptable. First, it was not possible to guarantee that the joining of the multiple electrical connections would be totally reliable. Secondly, it would require a second driver to always be available. Third, after a collision at Moorgate in 1993, such movements in tunnels were prohibited. The joining also has to take place with the doors closed, which added time and which is was believed customers would find frustrating.

The second part of Gordon Pettit's remit was to advise on additional services, and I was also involved in this in the Terminal 5 Inquiry of 1995-1999. Gordon had noted that many European airport rail links were based on a through line (eg, Frankfurt and Amsterdam) and this enabled better operations and a wide range of destinations could be served. The initial Heathrow Express infrastructure, even including HExEx, was a spur to a terminus. His advice was to plan for a through route by safeguarding for additional platforms and for extensions to the west and south from Terminal 5. The permission for Terminal 5 did not include conditions relating to additional services (because they would be outside BAA's control) but the Secretary of State required BAA to use their best endeavours. In the event, the design of Terminal 5 not only safeguarded the additional platforms, but the boxes for additional platforms were constructed beneath the terminal, and remain available for additional services.

Terminal 5 opened in March 2008. Although there were several glitches in the new terminal, the Heathrow Express and Piccadilly line extensions to the new terminal opened without any major problems. The stations beneath the main terminal were constructed in large cut and cover boxes below ground and are much larger in volume than the stations at Terminals 123

and Terminal 4. Access to and from the terminals departures and arrivals areas is direct by lift and escalator. The opening of Terminal 5 required a major change in the method of operating Heathrow Express. Instead of all trains going to and from Terminal 4, the trains now went to Terminal 5. A shuttle service was provided between Terminals 123 and Terminal 4 by the combination of the Heathrow Connect service, which continued to Terminal 4, and a Heathrow Express unit, to give a 15 minute frequency, again a complicated timetable to plan and implement. Because the terminal was constructed from the bottom upwards the rail tunnels and stations were commissioned long before the terminal above. This facilitated an intensive programme of route learning and familiarising of on-train and station staff, mainly at night during the Airport curfew, so that all staff were used to working to and from T5 by the opening date. Alan Winn told me that the change was also made seamlessly mid-week, unlike most timetable changes and confounding established views.

After a long period of studies and consultations, the Government published The Future of Air Transport white paper in December 2003. The long-term policy would include new runways at Stansted and Heathrow. For Heathrow, there was a recognition that public transport would have to be enhanced, not least to improve air quality (which was mainly affected by road traffic), but no specific reference to Heathrow Express. Nevertheless, this gave a spur to the plans for Airtrack, which is covered in Chapter 7. The plans for a new Heathrow runway were progressed during the 2000s in what became known as the Project for the Sustainable Development of Heathrow (PSDH). Despite increasing concerns about the policy, in particular about the environmental issues, in January 2009 the Government announced that the Heathrow additional runway would go ahead, along with High Speed 2 and other transport improvements. Crossrail had by this time received approval. However, as we will see in the next chapter, the policy did not survive the 2010 General Election.

Passenger numbers on Heathrow Express fluctuated in the 2000s, from 4.9 million in 2000 up to 5.3 million in 2006 and then down to 4.8 million in 2009. Even with the addition of Heathrow Connect, total passengers by heavy rail grew only modestly. Of course, by 2009 we were into economic recession and Heathrow's total passenger numbers declined in that year. However, Heathrow Express's market share had reached a plateau (at around 11% of non transfer passengers) and showed no prospect of growth.

## Chapter 6 The 2010s - Consolidation and change

The May 2010 General Election resulted in a Conservative/Liberal Democrat Coalition Government. Both parties had made manifesto commitments to cancel the new runways proposed at Stansted and Heathrow and did so immediately on forming a government. The rest of the decade then saw short term policies in the Aviation Policy Framework of 2011, the longer term considered by the Airports Commission (2012-2015) and a third runway at Heathrow approved by Parliament in the Airports National Policy Statement of 2018. However, this policy was undone by the decision of the Appeal Court in February 2020. Rail links to Heathrow in general and Heathrow Express in particular appeared in many of the studies, consultations and statements.

Meanwhile, Heathrow Express was getting on with the job of carrying passengers. But it was soon interrupted, as was all airport activity, by the Eyjafjallajökull volcano eruption in Iceland in April 2010. For six days most flights were cancelled and consequently nobody was travelling to or from Heathrow.

To address the sluggish growth seen in previous years, Mobile Sales Agents were introduced in the terminals at Heathrow. Research had shown that many passengers did not choose their onward mode of transport until arriving at the terminal. The location of the sales point was sensitive as it could not interfere with the Border controls of Immigration and Customs, but the cost of the operation was quickly recouped in additional sales, with market share growing by about 10%. The presence of Heathrow Express in the terminals has been a matter of debate from time to time, given the common ownership. Other transport operators, primarily London Underground and the coach operators, complained of unfair competition if Heathrow Express signs were given preference. Heathrow Express then bought advertising space, but again the competitors were suspicious that they were given preferential treatment. Mobile Sales Operators were seen in the same light but other operators were given similar opportunities but have chosen not to use them, and the situation has now settled.



Figure 13: Heathrow Express Mobile Sales Agents in the Arrivals areas were introduced in 2010 (Picture: Heathrow Express)

Heathrow passengers were now growing again after the recession and Heathrow Express maintained its market share and hence grew steadily. 2012 was the year of the London Olympic and Paralympic Games and Heathrow Express played its part in welcoming athletes and visitors from all over the world.

By 2013, the service had been operating for 15 years and the trains were due a facelift. However, just as the rolling stock refresh was coming to an end, Railcare, the company doing the work, went out of business. This left a number of snagging items which were not addressed and returned later to disrupt operations, and which also had a long term effect on the life of the trains, as we will see later.

The Heathrow Express brand was refreshed, without losing the 'X' symbol, but with a change in many of the branding features. The 15 years had also been financially successful, with rail operations in BAA's accounts showing an excess of revenue over expenditure of around £50 million per year. This is not the same as profit, but nevertheless was considered to be a satisfactory return on the investment of £1 billion.



Figure 14: Brand changes after 15 years of operations

It is also worth noting the organisational structure of Heathrow Express at this point. The operation had always been wholly owned by Heathrow Airport Limited, which in turn was a subsidiary of BAAplc. As BAA sold off its other airports, the holding company changed its name to Heathrow Airport Holdings, but Heathrow Express remained wholly owned. The Chairman of Heathrow Express was the Commercial Director of the Airport, and the Board consisted of a number of Heathrow Airport and Heathrow Express Executives, plus Bob Smallwood and Chris Green as non-Executives. Bob Smallwood's remit was related to safety and risk, while Chris Green oversaw industry and DfT relationships and operations. Fraser Brown became Commercial Director in 2014 and rose to be Business Lead (effectively Managing Director) of Heathrow Express, and I am grateful to him for information about this period.

So, by 2014, passenger numbers were growing steadily but market share was static, if not declining. Revenue was growing, generally by implementing a £1 fare increase in each year, although this brought with it the adverse media interest in 'the UK's most expensive rail journey'. By this time the Airports Commission was actively considering options for additional runway capacity and a third runway at Heathrow was on the short list. The Airport realised that it would need to do more to obtain a 'licence to grow' and, together with straightforward commercial advice that there were opportunities to grow passenger numbers through segmenting the market, a new strategy was created. The overall load factor was 30% although some peak trains were full, showing that there were opportunities to grow off peak

traffic. With fundamentally fixed costs, the service was an ideal candidate for seeking incremental revenue, which would also grow passenger numbers and market share. The Airport had by this time introduced market segmentation into its car parking products and transferred this expertise to Heathrow Express. The first measures were relatively simple and aimed at the leisure market, with 90-day, 30-day and 7-day advance fares for weekdays and weekends, with a headline lowest fare of £5.99. There was some concern among staff that the brand might be tarnished, but a comparison with airlines showed that the quality reputation could be retained alongside low fares, as with Easyjet and British Airways. In the National Rail Passenger Survey, overall passenger satisfaction with the service remained high, and value for money scores, which had been relatively low (although around the average for London and South East operators), rose by about 25%<sup>39</sup>. The market segmentation and fare options became more sophisticated as time progressed and continue to adjust to peaks and troughs in demand.

2014 also saw industrial action on Heathrow Express, with seven days of strikes from April to July by staff represented by the RMT. Wages and terms and conditions had advanced beyond comparable jobs outside the railway industry and management tried to rein these back. The impact of the strikes was mitigated by the use of office staff in non safety critical roles and the continued working by drivers represented by the ASLEF union, which enabled a 30-minute frequency to be operated. Agreement was eventually reached which included driver responsibility for dispatch at the Heathrow stations. Heathrow Express trains had operated under Driver only regulations since opening in 1998 and, given more recent problems on many other UK train operators, this was a fortunate early resolution of this issue.

Even when the 15-minute frequency was restored, a problem arose when a passenger complained that the service reverted to 30 minutes later in the evening, and the Advertising Standards Authority upheld a claim in 2015<sup>40</sup>. There were particular circumstances for the situation including possessions required for future Elizabeth line services, but these were not sufficient to prevent the ASA from ruling that the claim was misleading. Subsequently, the advertisements were always careful to note the times of day when the 15-minute frequency applied.

While passenger satisfaction with the service remained high, there were problems with the operational performance. Network Rail were electrifying the Great Western Main Line beyond Airport Junction and readying the route for new trains and Crossrail. There were many weekend closures and restrictions and the performance measures (PPM and right time arrivals) were declining. It culminated in an accident in December 2015 when a train collided with a piece of engineering equipment, although fortunately no one was injured. This led to discussions with senior executives in Network Rail and the setting up of a Route Supervisory Board, after which the situation improved. However, soon after, problems started showing on the trains, partly related to the incomplete refurbishment mentioned earlier. Cracks were found in the bolster and the whole fleet was withdrawn temporarily for inspections. One unit never went back into service and the situation has been managed but has subsequently led to a decision to retire the fleet. For three or four weeks while the Class 332s were inspected, a reduced service was operated using the Class 360s from the Heathrow Connect service, which was cancelled for the period.

The long-term problems with the maintenance of the Class 332 fleet was one of the factors in what became known as Project Hermes - the replacement of the fleet by Class 387s operated by Great Western Railway. There were several other factors, related to the depot and the

track access agreement, all coming at a time when Heathrow Airport's expansion plans were being scrutinised by the Airports Commission, the Government, and Parliament.

The Heathrow Express depot at Old Oak Common was occupied on a long lease from Network Rail but was required for the proposed HS2 station. A plan was drawn up to relocate the depot to Langley, but this would have been very expensive, and the costs would have to be met from the HS2 budget. Heathrow Express therefore held a very strong negotiation position on this aspect. On the other hand, the track access agreement which had begun in 1998 was for 25 years and would therefore run out in 2023. There was no provision for extension, although normal commercial practice would be to continue under new terms. Discussions with Network Rail, Great Western Railway, Porterbrook Rolling Stock Leasing Company and the Government led to a proposition that resolved a number of issues. The Class 332 fleet would be replaced by a sub-fleet of Class 387 electric multiple units which had been provided to Great Western Railway and which would be leased to Heathrow Express. Twelve four-car Class 387s have been modified and will enter service in 2020, with the 332's last day of service on 30 December. GWR will operate the trains and maintain them at their Reading depot, thus avoiding the need to replace the depot at Old Oak Common when the land was given over to HS2. Some Heathrow Express staff transferred (under TUPE terms) in 2018 when the agreement was reached and staff at the Heathrow stations have transferred to the Airport, a recognition that the stations now serve more than one operator (Heathrow Express and currently TfL Rail, to become the Elizabeth line). The Track Access Agreement was extended to 2028.



Figure 15: Class 387 in Heathrow Express livery (Picture: Darren Ford)

The agreement also facilitated an increase in the frequency of Elizabeth line trains. The original agreement was for four trains per hour to Terminal 4. The new agreement provides for two additional trains per hour to Terminal 5, with a commitment to investigate an option of two further trains per hour to Terminal 5.

Heathrow Express celebrated its 20th birthday in 2018, having carried its 100 millionth passenger in 2017. The new operation with new trains from 2020, plus the full opening of the



Elizabeth line will mark a big change, but for some years the Heathrow Express will continue to provide the high quality dedicated service that has given such high levels of satisfaction to its customers and been a strategically and financially valuable asset for the Airport.

Will the operation survive another 20 years? A number of factors suggest that it may not. First the full opening of the Elizabeth line in the next couple of years will provide intense competition, not least in terms of price, so revenues may be difficult to sustain. Secondly, the expansion of Heathrow and, in particular, the provision of a third runway, is now on hold following a successful legal challenge to the Government policy on which it was based. Thirdly, the coronavirus pandemic, current at the time of writing, has thrown all expansion plans into limbo and the priority is now on survival and recovery in the aviation industry. The railways may recover more quickly but organisational changes which were being contemplated before the current emergency may well be implemented more rapidly, putting further pressure on Heathrow Express. In the medium term the Great Western Railway operation lasts until 2028, and HS2 services at Old Oak Common are planned to start between 2028 and 2031, signalling a further change in the pattern of supply which will impact on Heathrow Express.

The remaining chapters in this book move away from the Heathrow Express service to consider first the various additional services that have been considered in the Heathrow rail infrastructure, some of which have been implemented, and then a brief review of airport rail links around the world, a few of which were established at around the same time as Heathrow Express.

## Chapter 7      Other services at Heathrow

One of the features of the Heathrow Express infrastructure is that it has a capacity for much more than the four trains per hour of the Heathrow Express service. A two track railway with signals capable of controlling trains every three minutes has a theoretical capacity of 20 trains per hour in each direction. Of course, there are many pinch points which reduce this, such as junctions, speed restrictions, stations (particular the termini) and the mix of trains on the line but, even so, the two track line between Airport Junction and Terminal 5 can and does accommodate more than the initial service.

Additional services were being considered even before the initial service was commissioned. In particular, the Parliamentary Bill process considered a proposal for a southern link and the Terminal 5 Inquiry saw discussion about a range of services, and the decision to safeguard additional platforms at the Terminal 5 station eased one of the restrictions on capacity.

One of my key roles as Strategy Director for BAA Rail in the second half of the 1990s was to study the potential for additional services which could use the Heathrow rail infrastructure. I was given a £500,000 budget for studies and commissioned several consultants. BAA also participated in the London Airports Surface Access Study (LASAS) commissioned by Government in 1996.

The Government set up LASAS in 1996, possibly partly as a follow up to the rather inconclusive Runway Capacity to serve the South East (RUCATSE) study of 1993, which had not found an immediate need for new runway capacity. As its name implies, LASAS was wide-ranging both in airports and modes. For Heathrow, it considered southern and western rail links, bus links to 'gateway' stations on the GWML and the Southern network, bus lanes on motorways, a rail service to St Pancras, and connections to the West Coast Main Line. LASAS was never published but its work was discussed in the House of Commons<sup>41</sup>.

### **St Pancras/Heathrow Connect/Crossrail**

The first route looked at was between Heathrow and St Pancras. Virgin Trains, which had just been set up to run the Inter City West Coast franchise, advised by Steer Davies Gleave, had come up with the idea of a Heathrow-St Pancras service and wanted to operate it. BAA was also keen to operate such a service as a 'sister' service to Heathrow-Paddington and, for a while, there was some conflict (noted in the Sunday Times of 17 November 1996 as 'BAA and Virgin in rail link war'<sup>42</sup>) which was eventually settled. Such a service would be possible with the Heathrow rail infrastructure, but there were several constraints elsewhere which would need to be overcome. Airport Junction provided a connection with the Great Western Relief Lines and, with the then current timetable, additional trains could be accommodated. There was more of a challenge at Acton, where flat crossings would be required in a busy area which also served a freight depot. The route would then use the Dudding Hill line, a much underused section of line which would need significant upgrading. The Dudding Hill branch line (see Figure 16) is a remarkable piece of railway that has remained as a key orbital route in north west London despite being used only occasionally by freight and other non passenger trains, and having a 20 mph speed limit and old semaphore signals. The junction of the Dudding Hill line with the Midland Main Line at Crickelwood was again a flat junction, but considered acceptable. Perhaps the most difficult element of the plan was platform

capacity at St Pancras, which by then was being redeveloped for Eurostar. The new station would have three platforms for Midland Main Line trains and it would not be possible for an additional 15 minute frequency service to fit into this. The initial cost estimate for the works had led to a view that it would be a financially viable proposition, but inevitable cost increases and the inability to solve the St Pancras platform challenge led to the plan being abandoned.



Figure 16: The Dudding Hill branch line (Image: carto.metro.free.fr)

One alternative option to avoid the St Pancras platform issue was to use the Thameslink route and continue the Heathrow service through, even linking to Gatwick. However, this was even more complex in terms of timetabling and, as the Thameslink redevelopment evolved, a link to Heathrow was not pursued.

One of the elements of the St Pancras plan was that it would serve intermediate stations on the Great West Main Line, including Ealing Broadway, Southall and Hayes & Harlington. In the event, these stations were served by the Heathrow Connect service, which ran from 2005 to 2018. This was two trains per hour and was a joint venture with First Great Western which partly replaced some existing services on the main line and used new Siemens trains (see Figure 17) supplied by BAA who also provided the on-board staff. The revenue was shared with FGW taking it from Paddington to Hayes & Harlington and BAA for journeys between Hayes & Harlington and the Airport. While a useful supplement to Heathrow Express and also providing part of the shuttle service to T4, it was not particularly successful in attracting air passengers.



Figure 17: Heathrow Connect Siemens Class 360 train (Image: Andrew Butcher CC BY-SA 3.0)

It should be remembered that Crossrail had been rejected by Parliament in 1994 and Heathrow was not part of the original Crossrail route. A new Crossrail Bill was not put to Parliament until 2005, receiving Royal Assent in 2008. The 2005 Crossrail Bill would have facilitated the takeover of the Heathrow Express infrastructure and so BAA petitioned against it. This led to negotiations and an agreement which enables Crossrail trains to use the Heathrow Express infrastructure and for BAA to contribute towards the cost of a major extension to Airport Junction which was completed in 2014. Subsequently, the ORR decided that Heathrow Airport would not be permitted to charge for access on the basis of the historic costs of its infrastructure<sup>43</sup>, even though such a charge was supported by the Airport's regulator, the CAA. This was challenged in court, who came down on the side of the ORR, but this enabled the Airport to defend its charges to airlines which must make up the shortfall. Only time will tell whether this affects the private sector's (and, in particular, Heathrow Airport's) willingness to invest in further rail links. In 2018 the Heathrow Connect service was absorbed into the TfL Rail operation, ahead of becoming part of the Elizabeth line. The Siemens trains are gradually being replaced by the Class 345 Elizabeth line trains and there is a phased transition to the full Elizabeth line service, which is planned to be six trains per hour, four to T4 and two to T5.

The Elizabeth line, as it will be when fully operational, will be an excellent additional rail service at Heathrow (and, indeed, for all of London). But there remains a question about the patronage which has been a matter of dispute for many years. In an earlier chapter I noted that nested hierarchical logit models were used to forecast Heathrow Express patronage in the 1987 HSAS study. The authors of those models included a factor, called the 'modal constant' (noted as  $\Theta$  in the equations). This was intended to reflect the unquantifiable factors, such as branding, on board staff and dedication, but was criticised by some as being a 'fiddle factor'

to make the models work. On the one hand, supporters of the modal constant note that users value these unquantifiable factors and choose a dedicated express over other public transport modes and even instead of taxis or private cars. On the other hand, it is argued that patronage is determined only by the combination of fares, journey time and frequency. The split between Heathrow Express, the Elizabeth line and the Piccadilly line will be a classic test of these views. Heathrow Express is the fastest service and is dedicated to the Airport with special rolling stock and branding, but it is also the most expensive, by some margin. The Piccadilly line is relatively slow, not dedicated to Heathrow, with less space for seating and baggage, but is high frequency and cheap and serves a large area of London. The Elizabeth line is somewhere in between, faster than the Piccadilly line but slower than Heathrow Express, serving more stations than HEx. Its brand new trains will give a much better ride than the Piccadilly line, but will be busy with other passengers, particularly in the central London sections, and will have few seats, and no toilets. The fare will be more than the Piccadilly line but less than Heathrow Express. Passengers to and from places not close to Paddington will be able to continue on the Elizabeth line, but, for example, a passenger waiting at Canary Wharf may see several non-Heathrow trains passing through ahead of a Heathrow train. Would he or she choose to wait, or catch the first train and change?

Richard Goldson is clearly of the view that Heathrow Express patronage will fall significantly once the Elizabeth line is in full operation, in part because of his views about Paddington. I have put a different view elsewhere but, in some respects, it might become a self-fulfilling prophecy as the operation is moved to Great Western Railway and other unique aspects of the Heathrow Express dedicated operation are either lost or the rest of the railway has caught up.

In 2018, 11.4% of departing air passengers used rail (Heathrow Express and TfL Rail) and 17.4% used the Piccadilly line<sup>44</sup>. Heathrow Airport forecasts that the use of public transport will increase with the Elizabeth line and other public transport improvements, but only time will tell what share the Elizabeth line will capture. In any event, there are likely to be changes to the services and fares charged by Heathrow Express to meet the competition, further complicating the changes.

### **Southern Links**

Attempts to link Heathrow with the Southern rail network had been made previously, in particular with the options considered in the Heathrow Rail Links study of 1970, the Heathrow Surface Access Study of 1986, and at the HEx Parliamentary Bill stage, when the London Borough of Hounslow had sought safeguarding within the proposed Heathrow Express infrastructure, as noted in Chapter 4. A common feature was a spur from the line near Feltham, heading northwards towards the Airport. Such a link could connect with either Victoria or Waterloo, and also connect with services to the south and west.

At the Terminal 5 Inquiry, when the extension of Heathrow Express to the new terminal was being considered, the idea emerged of a southern link from the west end of Heathrow. This would connect with the Terminal 5 station and turn south, parallel with the M25 and across Staines Moor, partly on the old alignment of the West Drayton-Staines branch (some of which still exists from West Drayton to Colnbrook, and which has been used for aviation fuel and for construction materials). This would then join the Staines-Windsor line just north of Staines, enabling trains to operate both towards London and also to the south and west. Services would be provided to Waterloo via Richmond and Clapham Junction, and to

Woking and Guildford, linking to important catchment areas for Heathrow air passengers and staff, not currently served by rail from the Airport, and the business case showed a very good benefit cost ratio. BAA was quite keen on this and considered participation as an investor. We set up a group of stakeholders and chose the name 'Airtrack'. Figure 18 shows somewhat posed Gwillam Rees-Jones of British Airways, Janet Goodland of Railtrack and myself walking down the route. Airtrack seemed to be a good proposition, with significant support from local stakeholders, but there were some key issues to be resolved. First, it would be necessary to find train paths on the already very busy lines into London and also across key junctions such as at Woking. Second, there are numerous level crossings on the network and additional trains would cause the gates to be closed for road traffic for longer. Third, there was a particular issue in Staines, where the reinstatement of a north-south chord would impact on the car parks in the town centre. I left BAA in 2001, but my colleague Mike Noakes took over the project and the key issues were being addressed, although it is fair to say that the level crossing issue was never fully resolved. It is somewhat ironic that objections on behalf of local road users came from the Liberal Democrat MP for Richmond, despite general support for public transport<sup>45</sup>.



Figure 18: Gwillam Rees-Jones, Janet Goodland and the author walking the Airtrack route.

Mike took the Airtrack project as far as an application under the Transport and Works Act for the scheme, having agreed with the airlines that BAA should part fund it, but he told me that Network Rail were not really supportive and the application was subsequently withdrawn. In 2011, there was an attempt by some stakeholders to come up with a scheme called 'Airtrack Lite' which would meet some of the concerns, but this did not make progress.

More recently, the idea of a southern rail link has been progressed by a private sector group called Heathrow Southern Railway (HSR). This was initiated by Steve Costello, who had been part of the team which had proposed the Heathrow Hub scheme. Heathrow Hub was an

option put forward for Heathrow Expansion which involved extending the Airport's northern runway which got as far as the Airports Commission's short list. Early versions of this plan also suggested that a major rail station should be built on the Great Western Main Line at Iver, next to the M25, which should then be connected to the Airport by a people mover. Heathrow Southern Railway proposes more extensive new infrastructure than Airtrack, as shown on Figure 19, which would then avoid some of the level crossing problems. However, the HSR project has been caught up in Government debates about financing rail investments which led to a call for market-led proposals in 2018<sup>46</sup>. The Government has been unable to make a decision on HSR's submission, along with a number of other proposals, and most recently published strategic objectives for Southern Access to Heathrow<sup>47</sup>.

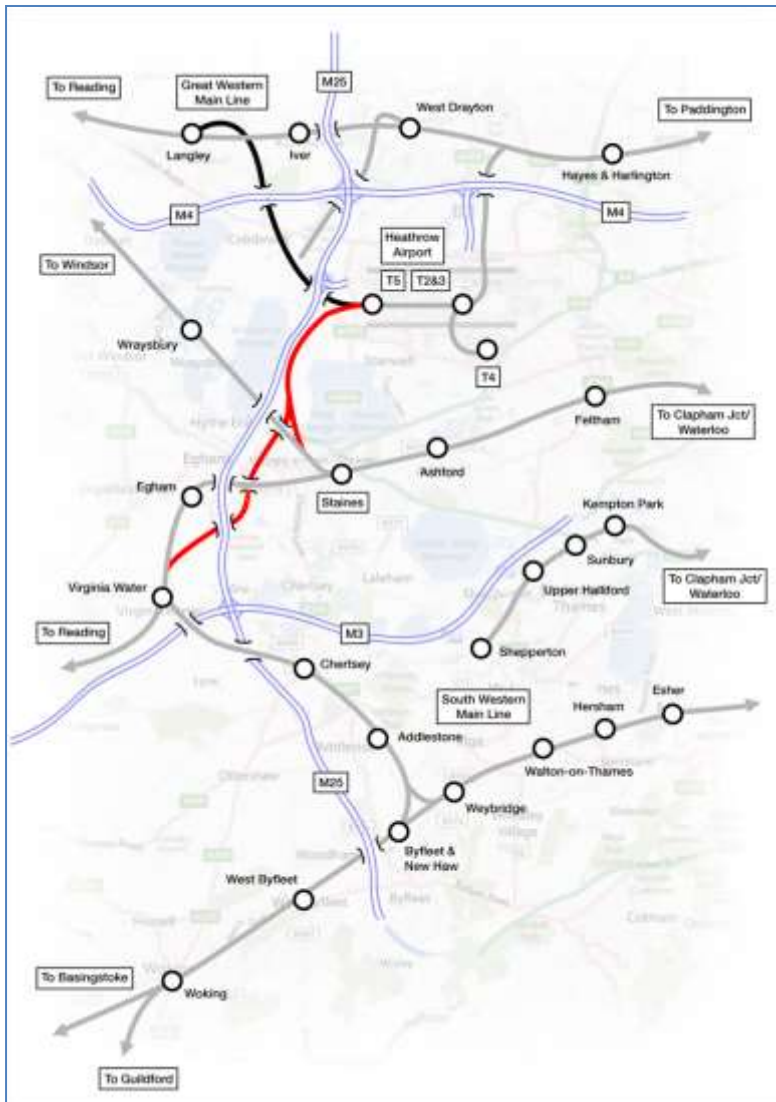


Figure 19: Heathrow Southern Railway (red) and the Western link (black)

As noted above, Airtrack and subsequently Heathrow Southern Railway are not the only schemes that have been put forward for accessing Heathrow from the south. One suggestion is that a first stage could be the link between Terminal 5 and Staines, with Heathrow Express or Crossrail trains continuing through Terminal 5 and terminating at Staines, where interchange with other South Western Railway services would be available. Another idea, put forward by Spelthorne Borough Council, is for a light rail link between Staines and Heathrow<sup>48</sup>. Thirdly, Hounslow Council is still pushing the original idea of a link from

Feltham, although in the latest version (as of 2019) it would run westwards from Feltham to Terminal 5, mostly below ground<sup>49</sup>.

One other proposal for a southern link came as part of a proposal to link Heathrow and Gatwick. The idea of linking London's two main airports has been considered in many forms. Prior to the completion of the M25 in the mid 1980s, a helicopter service was operated by BAA, British Caledonian and British Airways for connecting passengers. After the M25 was completed, the helicopter was withdrawn, with the link being provided by a dedicated express coach service under the brand name 'Speedlink'. With increasing congestion on the M25, it became impossible to guarantee minimum connect times and the Speedlink service was withdrawn. Multiple coach services remain between Heathrow and Gatwick, many as extensions of routes from other cities. The idea of a rail link between the two airports has arisen on several occasions. 'Heathwick' was initially proposed as a high speed, airside link and subsequently by a group called Interlinking Transit Solutions for a light rail line running alongside the M25 and other motorways (it would also link to Luton Airport), connecting with several radial rail lines. The 'HS4Air' proposal was put to the Airports Commission for a link around the south of London from HS1 to HS2 via Gatwick and Heathrow. In both cases the link between Heathrow and Gatwick was partly proposed to enable passengers to transfer between the two airports. In fact, very few air passengers choose this route, preferring instead to transfer within one terminal (for example using the airline alliances) or at least at the same airport. For this reason, these ideas received little support from the aviation industry.

Partly arising from the LASAS study was the idea of a 'gateway' station at Feltham. This would provide a low cost link which could be implemented quickly. Coach links to Reading and Woking have been established for many years and the LASAS study had indicated that a Feltham link would be worthwhile. BAA, together with Network Rail, the London Borough of Hounslow and Transport for London got together to develop the scheme, which consisted of a new bus terminus at Feltham Station, new bus routes serving the terminals directly and new bus lanes on some of the roads. BAA contributed £1 million towards the scheme, Network Rail built the station facilities, Hounslow installed the bus lanes and TfL franchised the new bus routes. Unfortunately, South West Trains did not participate in any meaningful way (for example, with through ticketing) and there was little to indicate that the service was available via their trains. Ridership was not up to forecast and the buses were withdrawn after a few years, to be replaced by an improved 285 service, which continues to this day. Important lessons to learn are that off-airport interchange is often perceived as an inferior service to either a direct link or even an on-airport interchange, and the journey must be seen as complete and not in parts.

### **Western Link**

In my time at BAA (until 2001), a western rail link to Heathrow was not seen as attractive. Although the new line would be relatively short, it would be more expensive than a southern link, direct trains would only serve Reading and few intermediate stations (and crucially, not another London destination), and there was already a very successful coach link to Reading Station. The business case was therefore not as good as a southern link. However, there is support from Slough Borough and other stakeholders in the Thames Valley and there would not be the same issues with level crossings or capacity and, after the demise of Airtrack, a western link project was brought forward. It was included in the High Level Output Statement in 2012 and Network Rail were invited to take it through their project process, in particular after it was recommended by the Airports Commission. The route (also shown on



Figure 19) leaves the GWML between Iver and Langley and runs mostly in tunnel to Terminal 5. A draft Development Consent Order (DCO) is due to be published in 2020 and, if approved and subject to agreement on funding, the link could be complete by around 2028. Details of the services have not yet been decided, but a key component will be four trains per hour between Reading and Heathrow, with stops at Slough and Maidenhead. As with other airport rail projects, the question of a contribution to the funding by the Airport has arisen with a western link. The CAA published a paper in October 2019 setting out its policy<sup>50</sup>, with a specific mention of the western link. The CAA seeks to protect the Airport's airline customers from excessive charges resulting from funding of non essential infrastructure and it remains to be seen if the CAA and ORR are able to reconcile their differences such that an agreement can be reached.

A western link to Heathrow would provide an opportunity for through services between Paddington and the west, and this may be an option for operations. From time to time it has been suggested that long distance trains could also be routed via Heathrow. However, until recently this has not been possible because such long-distance trains have been diesel powered, which would not be acceptable in the tunnels. However, there is also the question of the additional journey time that would be required, and the disbenefit for non-airport passengers would far outweigh any benefit for air passengers.

The Heathrow Hub proposal noted above would also have provided a link with the GWML, for both long distance and regional services, with a very small journey time penalty for non airport passengers. However, this idea failed because the distance of the proposed Hub from the Airport's terminals (about 4km) was considered to be too great to make it appear that the Hub was an inherent part of the Airport.

An alternative option for a western link has been put forward as the 'Windsor link'<sup>51</sup>. The first phase of this would be a connection between the Southern and Great Western networks at Windsor, between stations that are only a few hundred metres apart, which would then allow through services between these two networks. Phase 2 would be similar to a first phase of a southern link, with connections to the Staines-Windsor line that would enable both eastbound and westbound services to operate. It is not clear how much support this proposal has from stakeholders.

### **Iver Parkway/Heathrow Hub**

The possibility of a parkway station where the M25 crosses the Great Western Main Line near Iver was considered even before Heathrow Express. Parkway stations such as Bristol and Didcot had been developed and the location with access to the M25 looks interesting, as it could provide access to Heathrow as well as the M25. It was part of a BR Intercity strategy in the 1980s but was not pursued.

A similar idea was proposed by Mark Bostok, who had been instrumental in proposing the route of HS1 through Kent to St Pancras. It is not clear when it first appeared, but it became part of a plan for Heathrow expansion considered by the Airports Commission (2012-2015). The Heathrow Hub also included the idea of extending the existing northern runway instead of building a separate third runway, and this element was included in the Airports Commission's short list of proposals, then rejected in their final recommendations. Apart from the extended runway, the Heathrow Hub included a station on the Great Western Main Line with a people mover connected to the airport terminals, with a suggestion that the station

could include check in and security facilities. The benefits of this arrangement would be that a great many more rail services would serve the airport, but the distance for the people mover was significant and trains directly to the terminals would be preferable.

A challenge for both schemes was the ability to provide link roads to the M25, as the site is very close to the existing major M25/M4 junction.

### **West Coast Main Line/Eurostar/HS2**

Finally, in this discussion of other services, the idea of links with long distance rail routes arose on occasions. Several major airports around the world are connected to long distance routes (see Chapter 8) and various suggestions have been made for Heathrow. One of the first was a connection to the West Coast Main Line at Old Oak Common and Willesden. Such a link already exists, but a similar challenge as for other projects is to find train paths that cross between networks. It is also very difficult to predict the level of patronage, given that Heathrow's main catchment area is London and South East England. There are sometimes suggestions that domestic flights can be replaced by rail for those air passengers that want to connect with a long haul flight, but through ticketing and other cross modal challenges remain (although these have been mostly resolved elsewhere). However, the WCML is as busy as any main line and it was simply not possible to find a viable solution. High Speed 2 (HS2), the proposed new line between London, the Midlands and the North, could also have served Heathrow directly. Some of the initial route options went via Heathrow, but this would have added to the length and journey time. A 2010 study led by Lord Mawhinney recommended that a direct link (in effect a spur) should not be built in the first phase of HS2 and a review<sup>52</sup> as part of the Airports Commission's work concluded that it would not have a material impact on passenger numbers at Heathrow or be good use of HS2 capacity. Such a direct link is not part of the current plans for either Heathrow or HS2 (although there is passive safeguarding), instead the proposed station at Old Oak Common will act as an interchange between HS2 and Heathrow services. Of course, HS2 will divert many passengers from domestic air services between London and other UK cities, but these will mainly use the HS2 stations in the cities. Nevertheless, aspirations remain for Heathrow to be linked to a national network of long-distance high-speed lines (see, for example, Greengauge 21's report 'Beyond HS2'<sup>53</sup>).

At one point we also toyed with the idea of Eurostar services at Heathrow. There were slow speed connections at Old Oak Common, and the possibility of a Heathrow-Paris/Brussels was considered. Indeed, we even tested a Eurostar train in the tunnels (one of the regional sets, hauled very slowly one night by a pair Class 37 diesels). However, the journey time would not be competitive and, as with other long-distance markets, the city centre-city centre service is much more attractive.

## Chapter 8 Airport railways around the world

As we approached the opening of Heathrow Express in the late 1990s, it was clear that we were seeking to create a different type of airport rail link. Gatwick Express had been the basic model but had mostly been operated in the public sector (until its franchising in 1996). Rod Hoare, then Chairman of the Heathrow Express company, decided to explore co-operation with a number of similar rail links worldwide and the International Air Rail Organisation (IARO) was set up. Andrew Sharp had been with BR and became IARO's Director General. Patrick Hicks had run a number of conferences on air rail links and later became IARO's Administrative Director. I was associated with IARO for many years as a member even after I left BAA, and was President in 2012-14.

Although IARO was established by several Airport Express operators, its membership also included a number of operators of metro or network services, including what is now Transport for London. Over the years, IARO has held conferences and meetings in many locations and been able to visit airport rail links. It has an extensive database and technical library, and I am indebted to Andrew Sharp and Patrick Hicks for their knowledge and permission to use IARO material for this chapter of this book.

There is a range of different types of air rail link and sometimes these have been categorised as:

- Airport Express
- Metro/Urban
- Network/Regional
- Light Rail/Tram
- High Speed
- People movers
- Cargo

In reality, each link is different and some display characteristics from more than one category. As of 2016, there were over 200 existing rail links in IARO's data base at over 150 airports, with another 80 under construction or planned. In this chapter I cover only a small proportion of these, looking at those that perhaps have a particular connection, or comparison, with Heathrow Express.

I will start with Airport Expresses, as these are similar in many ways to Heathrow Express. Of course the first of these is Gatwick Express, which has been described in Chapter 3. Gatwick Express was established by British Rail and then became the first train operator to be franchised in 1996. National Express was the franchisee and Gatwick Express was a founder member of IARO and, at one stage, had a commercial agreement with Heathrow Express which looked to a future even closer relationship, although this did not survive. Gatwick Express was subsequently absorbed into the Southern and then the combined Thameslink and Southern franchise. Stansted Express was never a separate franchise but at one time it was part of the West Anglia Great Northern franchise, which was also run by National Express, so a tie between the three London airport expresses seemed a natural development.

Three other airport expresses began operations around the same time as Heathrow Express, Hong Kong's Airport Express Line, Oslo's Flytoget and Stockholm's Arlanda Express, and were founder members of IARO. Hong Kong's Airport Express Line opened in 1998 along with the new airport at Chep Lap Kok. The opening date was therefore tied completely to the Airport opening. It was a completely new line, albeit part of the Mass Transit Railway (MTR) network. The new railway included new Airport Express stations at Hong Kong (on reclaimed land off Victoria Island), Kowloon, Tsing Yi and the Airport. The Tung Chung Line was also established using the same tracks but with additional stations and a different terminus at Tung Chung to serve the Airport service areas. IARO members met in Hong Kong shortly before the official opening and rode the train on a test run. There is no doubt that the Hong Kong AEL is one of the best airport rail links in the world and it includes many features that can be shown as best practice. It currently operates at 6 trains per hour and takes 24 minutes. Passengers can check their baggage in at Hong Kong Station, unlike Heathrow Express where this service is no longer available. It carries 17 million passengers a year, around 22% of the airport throughput.



Figure 20: Hong Kong Airport Express Line (Picture: Baycrest CC-BY-SA-2.5)

Oslo Flytoget also opened in 1998, again coinciding with the new airport at Gardemoen. Flytoget is part of the national rail system in Norway but operated as a separate brand. The key requirement of the new service was to achieve as quick a journey time as would be the case to the old airport at Fornebu which was only 8 km from the city. Gardemoen Airport is 50 km north of the city and so the train had to run at 210 kph to achieve a 19 minute journey time. The new line to the Airport included a tunnel which, like Heathrow Express, was challenging when there was extensive leakage from a lake above. The service also passes

through Oslo city to the south west near the old airport to serve passengers and staff who had previously located near to the old airport. The service now operates every 10 minutes and carries over 6 million passengers a year. Like Heathrow Express, there are now also competing stopping services on the line and, also like Heathrow Express, new trains have been supplied although not as replacements but rather to provide additional capacity.



Figure 21: Oslo Flytoget Class 71 at the Airport station (Picture: Martin Rotler CC BY-SA 2.0)

Stockholm's Arlanda Express opened in 1999 and was initially a Public Private Partnership and still operates as a private sector concession, although the operating arrangements are complex. Arlanda Airport had been operating since the 1960s, but a condition of a third runway was that a rail link had to be provided. The line is a branch from the existing East Coast Line and includes three stations at Arlanda Airport, two for the Express service and one for other trains. Like Heathrow Express, there have been criticisms that the premium service is too expensive, but passengers now have a choice of cheaper but slower services. Arlanda Express carries over 3 million passengers and has very high customer satisfaction ratings. Four to six trains per hour take 18 minutes for the journey to Stockholm Central Station.



Figure 22: Arlanda Express at Stockholm Central Station

Other examples of the Airport Express service can be found in Kuala Lumpur, Tokyo, Osaka, Seoul, Beijing, Delhi, Bangkok, Vienna, Moscow (3 airports), Rome, Milan and Toronto. An Airport Express for Paris Charles de Gaulle Airport is planned for completion in the mid 2020s.

The second category of airport rail link noted above is metro or urban links and these are probably the most numerous in terms of type. The Piccadilly line at Heathrow is a good example of the type and its development and operation has already been referred to and described in summary. The great advantage of metros, and the Piccadilly line is a perfect example, is their place as part of a network, which means that they serve, either directly or by interchange, a very large part of the city, usually with high frequency services at a modest, integrated fare. They tend to be designed for short journeys and so the downside is that they may have limited seating (or space for baggage) and may become crowded in the city centres at peak times. The Elizabeth line at Heathrow is also noted in other chapters and, as a completely modern example of an airport metro, it will be interesting to see how attractive it is compared with the dedicated Heathrow Express and the existing Piccadilly line.

Paris's RER line B to Charles de Gaulle is an interesting example of a metro. Since the Airport opened in 1974 it has been the only rail link from the city and has had mixed fortunes. It initially suffered by not serving Terminal 1 directly and has a longish journey time because of the stopping pattern. Like Heathrow, a dedicated express service is to be added several decades after the metro.



Figure 23: RER Line B at Paris Charles de Gaulle Airport (Picture: Paris by Train)

Continental Europe also boasts several good examples of metro airport rail services. In Germany, Frankfurt, Hamburg, Munich, Dusseldorf, Berlin, Cologne, Stuttgart, and Hanover are all served by branches of the cities' S Bahn networks. Frequencies range between 2 and 10 per hour and the networks are generally well integrated. A number of airports in Germany also have long distance or high-speed train services.

In the US, some of the largest airports have metro links, including Atlanta, Boston, Chicago O'Hare, San Francisco and Washington National. Public transport is not particularly well used for airport access in the US, with air passengers traditionally choosing private cars or taxis. Washington National is probably the best example and captures around 16% of air passenger trips. Washington's other airport, Dulles, is to be connected with the Silver line of the metro in the next few years.



Figure 24: Washington Metro

There are also a significant number of metro type airport railways in Asia, in particular a growing number in China. Beijing's Capital Airport is on the Subway network, as is the new Daxing Airport which opened in 2019, and the main airports at Guangzhou, Kunming, Nanjing, both of Shanghai's airports, Shenzhen and Zhengzhou are all served by metro links. Many of Japan's airport are served by metros, including Fukuoka, Osaka and Tokyo Haneda. Singapore's Changi Airport is served by the city's MRT service.

The third category of airport rail link is the regional or network type. There is an overlap with metro services as many regional types also serve the city centres. However, the regional airport rail link also serves places outside the main city. Gatwick's other services, such as the Southern, Thameslink and Great Western networks, are prime examples of this type. Like metros, their advantage is being part of a network. However, because they serve generally smaller places than the city centre, they tend to be lower frequency. Manchester Airport's links with the Northern and TransPennine networks are good examples. These types of links are also found in Europe, such as at Amsterdam Schiphol and as supplementary services at larger airports such as Frankfurt, Brussels, Copenhagen, and Milan Malpensa.



Figure 25: Manchester Airport station

Light rail or tram links are found in significant numbers in the North America, for example at Baltimore Washington, Dallas Fort Worth, Minneapolis St Paul, Portland, Salt Lake City, Seattle and Vancouver. As with all the categories, there is an overlap with the metro type and also with people movers. Like metros, light rail links tend to be part of a network, although in the US the number of lines in most of the networks is quite small. Light rail tends to be relatively slow, especially if there is significant street running, but they can be very frequent.



Europe also has a number of tram networks, some quite well established and large. Copenhagen's metro has served the Airport since 2007 and contributes significantly to the very high share of air passengers (59%) using public transport. In France, Bordeaux, Lyon and Toulouse are served by trams. Lyon's Rhônexpress is an interesting example, as it was developed as a PPP, a fairly rare model in France, but uses the city's tram network infrastructure for part of its route. It is also interesting because a significant part of the route enables relatively high speed to be achieved and the service is dedicated to the Airport, as with the Airport Expresses. Trains operate every 15 minutes and the journey time is 29 minutes. The Rhônexpress team has spent some time with other airport expresses (through IARO) to learn how to market this unique service.



Figure 26: Lyon's Rhônexpress

There are three tram/light rail airport links in the UK, in Edinburgh, Manchester and at London City. Edinburgh's tram was opened in 2014 as the first line of a new tram network. The journey time is 30 minutes and trams run every 7 minutes. Manchester's Metrolink is the most extensive network in the UK and the first line opened in 1991. A line was extended to the Airport in 2014 and it complements the mostly regional rail services at the station. It is particularly valuable in serving nearby residential areas where many airport employees live. The Docklands Light Railway in London is different in being fully automated and having no street running. The first DLR line opened in 1987 and the Airport station opened in 2005. The unique nature of London City Airport results in a high propensity to use rail and the DLR at London City achieves the highest rail share in the UK, at around 50%.

High-speed rail lines are at the other end of the spectrum from trams. As noted in Chapter 7, studies of high-speed rail access at Heathrow have not led to any definitive schemes, and it seems unlikely that there will be any in the future. The UK's HS2 plan includes airport stations at Birmingham in Phase 1 and Manchester in Phase 2, but Heathrow will have to rely on other services to link it with HS2 at Old Oak Common.

High speed rail lines at airports were pioneered in Europe, in particular at Paris, Frankfurt and Amsterdam. The high-speed line was diverted to serve the Airport at Frankfurt (unlike at Heathrow, where this was considered to result in an adverse journey time penalty for non-airport passengers). In Paris, part of the Interconnection line circling around Paris was routed via CDG Airport. At Schiphol, the new high-speed line was built under the Airport en route from Amsterdam to the south. High-speed lines also serve Lyon St Exupery. In China, the newer airports are planned to operate as major transport hubs, with a complete range of rail services, nowhere better illustrated than at the Shanghai Hongqiao Airport, with its 16 platform rail station. However, it is interesting to note that there are no stations at airports on the Japanese Shinkansen network. The ideal of an integrated system of airports and high-speed rail lines is perhaps one of those dreams that, in reality, does not deliver what it promises and it may be better to keep the two systems separate.

The next category is people movers, and these are different from the previous types in that they are short distance links, often between a rail station and airport terminal. Some are based on steel rail technology, others are rubber-tyred on concrete tracks, while others are monorails, and they are almost all automatic operations. There is a large range of types in various locations around the world. Some are entirely within the airport and are free to use, such as at Gatwick, some are entirely airside, connecting terminals to gates, while others link to off-airport locations and charge a fare. One of the largest is the Airtrain network at New York JFK Airport, which has three elements, a circular inter-terminal service and two branches to remote parking lots and main line or subway rail stations. There is also an Airtrain service at New York Newark, and one is planned for New York La Guardia. People movers are generally considered to be automatic systems operating on fixed tracks, but the humble bus often provides a similar link to rail stations on remote parking areas. People movers are only in limited use at Heathrow. An underground airside people movers links Terminals 5A, 5B and 5C and an innovative 'Pod' system links Terminal 5 to a remote car park. There will be scope for more people movers if the airport continues to expand with a third runway.

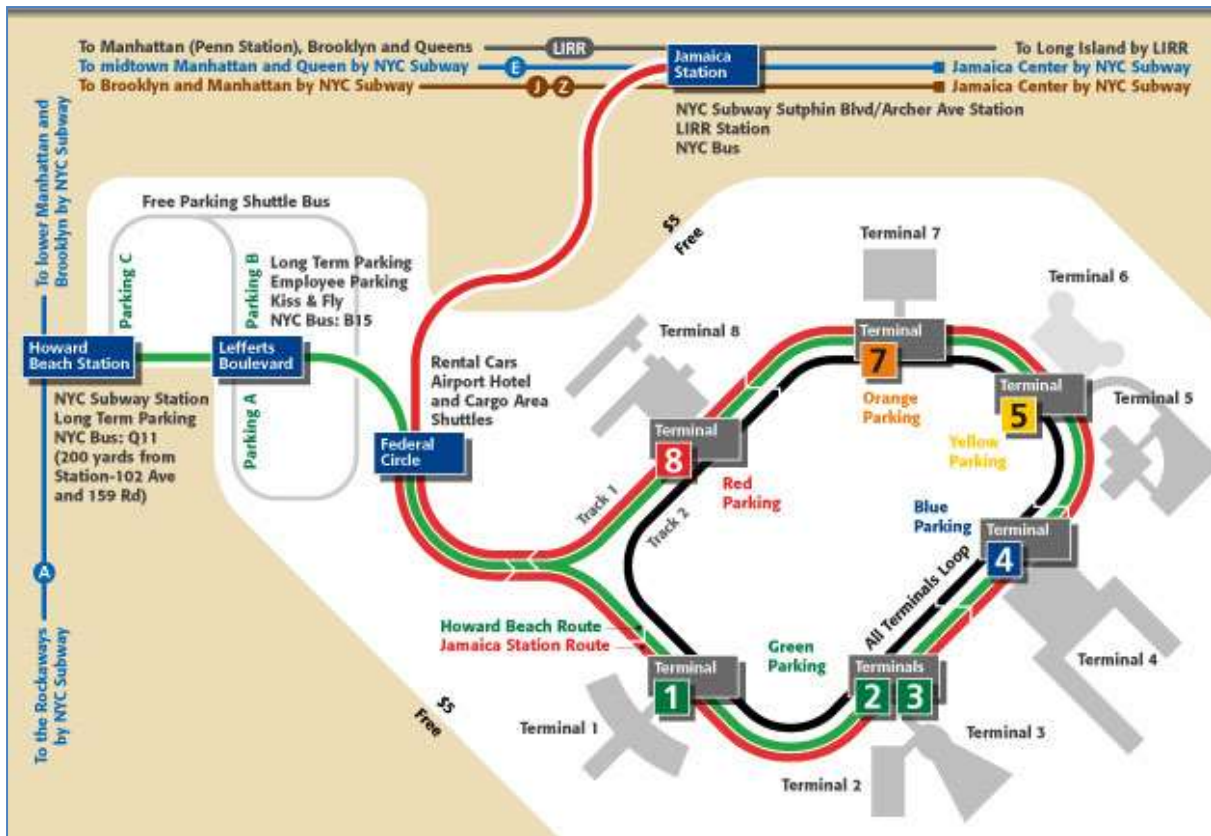


Figure 27: New York JFK Airtrain

The final category is cargo rail links. There are very few of these around the world, not surprising given the fundamental difference between air freight (high value, low bulk) and the types of freight that rail is good at carrying. Various attempts have been made to enable rail to be an onward option for air cargo, without any real success. At one stage aviation fuel was moved by rail, but this has now largely been replaced by pipeline. One area that has worked is the delivery of construction materials, and a dept near to Heathrow has been used extensively for Terminal 5 construction and will be used for a third runway.

Finally, it is worth noting that, in addition to the categories noted above related to their function, there are also a range of technologies used by airport rail links. Steel wheel on steel rail is the most common, as for Heathrow Express, but there is a range of power types, although electricity is clearly the most common but there are also cable hauled and even one example of pneumatic power, and control systems, including automatic, cab-based and conventionally driven. Rubber tyred on concrete track is a common people mover system, and there are examples of monorails in Japan, Germany and the US. Maglevs operate to airports in China and Korea. Heathrow's Pods are currently unique in terms of technology, but have obvious benefits in certain situations. Monorails have been considered in the past for Heathrow and are one of the options for a future southern link.

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