THE LONDON AIRPORTS

WITH PARTICULAR REFERENCE TO THEIR TRANSPORT LINKS WITH LONDON

(WORKING DRAFT)

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THE PRE-WORLD WAR 2 AIRPORTS

Powered flight had been possible since the beginning of the twentieth century but it was some years before the commercial possibilities came to be realized. In September 1911 an experimental airmail service operated for 2½ weeks between Hendon aerodrome and a field in Windsor. The purpose was to commemorate the coronation of King George V, raise money for charity and demonstrate the possibilities of the aeroplane as a means of transport. It succeeded, but with reservations. On 4th July 1911 a Mr Barber of the Hendon Aviation Grounds flew what was described as a 'record' load of electric light bulbs from Shoreham to Hove, the load weighing 38 pounds. This prompted speculation about longer distance freight, eliciting that between Hendon and Liverpool the maximum load was around ten stone and the cost around £100. While this did not immediately look promising, it was observed that an aeroplane had travelled between London and Scotland faster than the fastest express train—the die was cast.

Hendon aerodrome shares with Brooklands the distinction of being the oldest and most famous of London's original flying grounds, though neither was to emerge as a permanent civil airport. Hendon was used during the First World War by the Royal Flying Corps (absorbed into the new RAF in 1918) and did feature, late in 1918, in the first scheduled transport flying by the RAF. Regular RAF transport services were later operated from Hendon to Paris to provide rapid access to the peace conference; these services operated from January to September 1919 although from May the London terminal was transferred to Kenley, near Caterham. Both Kenley and Hendon remained as RAF aerodromes until the 1960s, with Hendon closing for flying (although the RAF still remain on site and the RAF museum has been built there).

On 25 August 1919 Hounslow entered aviation history. It was on that morning, in a converted de Havilland DH4 bomber, that a Captain Bill Lawford took off for Paris. He was accompanied by just one passenger and a small cargo that included some newspapers, a consignment of leather, several brace of grouse and a few jars of Devonshire cream. This historic flight is commonly regarded as the World's first international passenger air service and the aeroplane was in the hands of the pioneer 'airline', Air Transport and Travel Ltd. The airline operated daily flights to Paris for a further sixteen months when financial difficulties unfortunately closed the firm down. Thus began the association with flying of what is now the south-western branch of the Piccadilly Line.

The very flat nature of the land near Hounslow, and its proximity to London, has made it an ideal area to sponsor flying. Hounslow Heath was (with Cricklewood) the first of London's commercial 'airports' and embodied customs and other facilities, albeit in a somewhat primitive form. The land had once been used as a cavalry training ground but some flying had taken place from 1910. In 1914 it came into regular use by the Royal Flying Corps, being used by the end of the war by No. 1 (Communication) Squadron. At the beginning of May 1919 the airfield was transferred to the Controller-General of Civil Aviation and was destined to become London's terminal aerodrome; it had not been possible for commercial flying to commence until wartime restrictions on such activities had been lifted. The ground was large for the day, the maximum run being around 3,500 feet; the customs shed was converted from one of the hangars towards the north side.

Hounslow Heath did not survive for long, even though a French airline also used it. From March 1920 the site reverted to the War Office, and was not again used as an airport.

The other international airport serving London in these early days was next to Handley Page's factory at Cricklewood, on what is now the Cricklewood trading estate. This also came into use in 1919 though at first it was not strictly an airport as flights had to call at Hounslow to clear customs. Flying was operated by Handley Page Transport Ltd on several routes to the continent, though not necessarily continuously. Commercial flying ceased in 1921, although the Handley Page parent company used it as their works aerodrome until operations were transferred to Radlett in 1929.

There was a very brief period of commercial passenger use at Hendon too. The landing ground was the works aerodrome of *AIRCO*, the parent of Aircraft Transport & Travel Ltd (already referred to), and provided a base for their services, though not the terminal. From October 1919 to the end of that year a weekly service to Amsterdam did operate from Hendon, though even this had to call at Hounslow (hardly on the way) to clear customs.

Both Hounslow and Cricklewood were effectively replaced by a 'new' commercial Airport at Croydon, which had opened on 29 March 1920. Croydon Airport combined the facilities of two ex RFC aerodromes, Waddon and Wallington, which dated back to 1915. The terminal area comprised the former buildings of Wallington aerodrome, and the buildings and airfield of Waddon. The terminal was not only far from purpose-built but was also distributed either side of Plough Lane, which road had separated the two earlier airfields. The landing area was initially around 2,900 feet by 2,700 feet.

Although Croydon proved adequate at first, the amalgamation of small concerns into the State sponsored *Imperial Airways* in 1924 resulted in more rapid development of air transport. Croydon was to be the base for the new airline and new facilities would clearly be needed. Major development started in 1925 with the construction of a new, purpose built airline terminal alongside the new Purley Way. Facilities included a main terminal building, aircraft hangars and an hotel—for its day considered to be the finest such facilities in the World. Just as importantly other facilities were improved too. Plough Lane was closed and the old buildings were demolished. The landing area was then extended across to the old Wallington site, together with further additional land, resulting in a new landing ground 4,350 feet by 4,050 feet.

The enlarged Croydon was more than adequate for over ten years, but by the end of that time it was clear that even larger (and hard surfaced) landing areas would be needed both for the increasingly more efficient (but larger) aircraft, together with the need to accommodate more air traffic during poor visibility. The ability to put off decisions on these matters was possible when Croydon was evacuated by civil operators at the beginning of the Second World War, the site being taken over by the RAF.

An aerodrome was opened at Northolt in 1915 for use by the Royal Flying Corps. After the war it saw brief use for civil purposes but soon reverted to the RAF. During the later 1930s the aerodrome assumed some importance to the RAF in Fighter Command, but the later story is best dealt with in the post war chapter.

There was a small aerodrome near Romford (called Maylands) which was opened in 1932 by Essex bus operator Edward Hillman. He operated air services initially to Clacton, following up later with Margate. From 1 April 1933 he operated a twice-daily service to Paris, in competition with Imperial Airways' services from Croydon. At 2,550 feet by 1,095 feet the aerodrome was too small for further development and Hillman moved to Stapleford Abbot; Mayland was used for club flying until 1939.

Stapleford opened in 1934. It was considerably bigger than Mayland, at 3,780 feet by 2,790 feet. Hillman airways operated several services there for some time, including a mail service to Belfast on behalf of the Post Office. But amalgamation with other small airlines followed Hillman's death at the end of 1934, and by 1936 what had become *British Airways* consolidated its operations at Croydon and Gatwick (BA became part of BOAC in 1942). Stapleford effectively ceased to be an airport in 1936, reverting to private flying. During the war it was commandeered by the RAF (as Stapleford Tawney), but after post war disuse was revived and continues operations as a private aerodrome.

The aerodrome at Gatwick was opened by Airports Ltd in 1931 but despite licensing as a public airport in 1934 did not attract much traffic. Things changed in 1936 when an airport terminal of advanced design, connected by pedestrian tunnel to its own station on the nearby Southern Railway, gave it the stamp of an international airport. Unfortunately immediate success was short-lived. The main user was *British Airways* who found the disadvantages of regular winter flooding of the landing area too troublesome, removing their base to Heston in 1938. Gatwick remained in only limited use until requisitioned by the RAF in 1939. It is ironic that such a fate befell the only rail served airport in London.

Gravesend Airport was also owned by *Airports Ltd* and opened in 1933; it is not understood to

have had more than a very small number of scheduled services and was not an important part of the jigsaw.

Heston Air Park was to have a significant part to play in London's airport scene. It opened in 1929 for private, instructional and club flying, and undertook some charter work. The development in the early 1930s of private airlines in competition with *Imperial Airways* presented new opportunities, and Heston took advantage. The first airline to use Heston was Spartan Airways in April 1933 with a twice-daily service to Cowes. After that, internal and continental traffic grew rapidly. In 1937 Heston Airport was purchased by the Air Ministry and developed on a scale very similar to that at Croydon. Heston's landing ground was 3,540 feet by 2,700 feet. The arrival of *British Airways* in 1938 confirmed the airport as London's number two, the only larger facility being Croydon. It was to and from Heston that Chamberlain flew to Munich in 1938 to receive his 'peace in our time' message. Again, Heston was abandoned for Civil flying during the war, and in the changed circumstances afterwards never recovered, being too near to Heathrow to allow its continued operation.

In addition to the recognised airports around London there were also many others used for private or test flying, or for military use. One of these in particular deserves further study, for reasons explained later.

In 1930 Richard Fairey established a small private airfield at Cains Lane, close to the Hamlet of Heathrow, the land being purchased by the Fairey Aviation Company the previous year. This airfield was initially called 'Harmondsworth', but was thereafter usually referred to as the 'Great West Aerodrome', after the road of that name which passed to the north. Fairey Aviation had been formed in 1915 and was test flying at Northolt from 1917, but the Air Ministry now required them to move out. Fairey's factory was at North Hyde (Hayes), and the new site had preferably to be as conveniently situated as Northolt had been. The company went to some effort to find good land for flying, and purchased the freehold from the prevailing market gardeners. The opportunity to combine construction and test flying at the same site did not escape them, and with this view in mind the site was gradually expanded to around 200 acres, though the factory never was actually relocated. Civil flying was never the forte of the Great West aerodrome, though occasional air displays were held there. Nearby Hanworth also sported an aerodrome, though this was not intended for commercial flights either.

The pre-war scene was therefore portrayed by the existence of major airports at Croydon and Heston, with a third, but little-used airport at Gatwick. Both Croydon and Heston latterly sported high intensity lighting and instrument landing systems, greatly improving service reliability.

NEW AIRPORTS FOR LONDON

By the end of the 1930s the burgeoning demand for commercial flying was threatening capacity at both Croydon and Heston. If Croydon were to expand it was going to be a very difficult task; room for expansion was limited and its location was proving increasingly inconvenient, with worsening traffic congestion increasing journey times significantly along the major roads from central London. Further expansion at Heston also required more land, but ultimate capacity was nevertheless still within view and risked proving insufficient. With these constraints in mind the view was taken that additional airports would be needed.

A study was made of large numbers of possible sites, most of which were gradually eliminated for one reason or another. In addition to the development of new sites the expansion and development of existing aerodromes was considered. The latter was an attractive option in that several were located on very suitable ground, the main constraint was usually the impossibility of sufficient expansion. The options included (amongst many others) the expansion of the relatively new airport at Gatwick, which was already rail connected, and expansion of the Great West aerodrome at Heathrow, which was particularly close to London.

As war broke out, matters had resolved themselves to the provision of four civil Airports for London. Not only were they under active public consideration, but indeed some progress had been made in each case.

It was the intention to retain Croydon and Heston and to supplement these with new airports at Fairlop and Lullingstone. By March 1939 a number of improvements were already in hand at Heston, where it was intended to bring the airport into line with the most modern in Europe by enlargement and installation of new facilities. This

initially included drainage work and removal of large trees near the flight path, and the addition of runway lighting and a radio landing system. For the necessary expansion work an act of parliament was required, emerging as the Air Ministry (Heston and Kenley) Act 1939. This authorized the land take and road closures required. A three-year timescale was envisaged for developing Heston, caused partly by the need for the existing facilities to continue without interruption, and partly by the need for the new ground to be properly consolidated and the substantial new buildings erected.

Not everyone was in favour of developing Heston, notably the Heston Aircraft Co Ltd, which had a production factory on the site and who had been told the factory would have to come down in December 1939. The Air Ministry intended to purchase the existing aerodrome from Airwork Ltd, who were to hand it over in September. Of course, September 1939 was famous for other events and the grandiose plans for Heston were never implemented, despite some land purchase. In mid 1940 Heston ceased to be used as a civil airport, and the main services still operating from there were transferred to Gatwick. Some of the land remained in government ownership when it was realized that the proposed 'South Wales motorway' (as the M4 motorway was originally called) would need land in the vicinity; part of the site thus became the home of Heston Services.

The pre-war strategy was to wait until Heston and Fairlop airports were fully functioning and then to deal with Croydon, which would be closed temporarily to enable it to be brought into line with modern requirements. This was impossible before the war, and it was then handed over to the RAF, so no development took place then either. After the war the absence of new facilities put pressure on Croydon to re-open for civil use, and it entered the post war flying era in a singularly unmodernized state of health.

The first of the new airports was to be at Lullingstone near Dartford in Kent, a site identified for a while previously as a potential aerodrome outside the fog belt (until the 1960s fog was a significant problem for the air operators). By mid 1939 the Air Ministry was in the process of negotiating the land purchase, although physical work had not yet begun. At this airport a direct high capacity transport access was contemplated via a new Southern Railway branch line. Once again the outbreak of war scotched development.

London's second new airport was to be at Fairlop, in Essex. The City of London understood the need for good transport communications and had begun to acquire land at Fairlop for a major airport in 1936. It was well situated for good public transport and road access, and direct trains from Liverpool Street would do the journey in around 30 minutes. In the 1935-40 railway new works programme the Central Line would take over the Fairlop loop line from the LNER and an airport station was proposed. Virtually all the required land was purchased for the airport, the increasing size and weight of aircrafts requiring a scaling up of original plans, with some form of consolidated runway regarded as necessary (at substantial additional cost). As with Heston, the major work was expected to begin at about the time war broke out, and a two to three year timescale was anticipated. In the event little work was done. (RAF ?).

Whatever might have been, the war caused two things to happen. Firstly the near abandonment of civil flying in 1940 provided some breathing space for those with civil airport planning responsibilities. Secondly, the development of aircraft technology increased rapidly, with the result that within a couple of years it was obvious that new civil airports would have to be considerably larger than had perhaps been realized hitherto.

Initially the wartime government gave little serious consideration to the issue of post-war civil flying. By around 1942, when the fortunes of war were changing, a pressing need was emerging for RAF long distance heavy transport facilities to be provided, with the aim of servicing hundreds of thousands of expeditionary troops in the soon to be conquered war zone territories in Europe and Asia. The aerodrome to serve these purposes would need to be substantial. It appears that with this end in mind the opportunity was taken to revisit the possible pre-war civil airport locations, as well as suitable existing RAF stations which could be adapted.

While some RAF stations could have been extended, it seems that the most favoured site was that at Heathrow—one dismissed as a possible civil airport before the war. The main advantage of Heathrow was its possible use post war as London's principle civil airport, both the physical and geographical location being virtually ideal. One of the problems in using the site was in its existing use as prime market garden territory, highly valued in war and likely to be contentious even in peacetime. It appears that the authorities at the Air Ministry were heavily swayed towards the use of Heathrow as a civil airport, knowing that wartime powers could be used to requisition the land for RAF purposes whilst peacetime planning processes post war would almost certainly fail. Authority for the RAF to requisition the Great West aerodrome and surrounding land was therefore

sought, no mention being made at the time of possible post war use lest awkward questions were asked. Cabinet approval was sought, and despite fierce opposition authority was granted.

HEATHROW - THE BEGINNINGS

The aerodrome construction plan was to be executed in two stages. The first stage involved provision of the three main runways; these were to be of the usual RAF triangular pattern, with the triangle inverted. The South West to North East runway would bisect the original Great West aerodrome. This plan inevitably required the diversion of some roads, the extinguishment of the Heathrow hamlet itself, and absorption of the Fairey site. Stage two would involve extension of the runways, and this posed a problem. The proposed easterly extension would bring two runways across the site of the new Perry Oaks sludge disposal works of the Middlesex County Council. Correspondence took place about possible relocation of the works; this was not only fraught with engineering difficulty but resiting would inevitably require a public inquiry into the new site, and with it some awkward questions about the purpose of it all. As a result the plans were somewhat modified to take the Perry Oaks site out of the aerodrome operational area altogether, the main practical effect being to bring the East - West runway much nearer to the bath road. Another scheme was considered to move the site much further north, centring it along the Bath Road. The Ministry wisely considered it unlikely that any government would consider razing the three old world villages of Sipson, Harlington and Harmondsworth to the ground, and the idea was dropped—at least for five years.

As finalised, the aerodrome was still intended to be of the standard RAF design based on a 'triangle' of runways; the east-west 'base' was to run parallel to the Bath Road (A4), with the apex (pointing towards the south) in the middle of the Fairey Great West Aerodrome. The majority of the 70-acre site, while theoretically flat, was in fact peppered with ponds and flooded gravel workings, some filled to a depth of up to 22 feet. Construction was not to be easy and the disadvantages of the site were only outweighed by its ability to be expanded later.

Work began in May 1944 and was put in the hands of George Wimpey & Co. The initial work consisted of pumping out and infilling the ponds and levelling the area to be occupied by the main runway and its perimeter track (the main runway crossed two gravel pits). It was also necessary to begin the huge drainage works; the initial work included disposing of 100 million gallons of water and half a million cubic yards of silt. Some of the water was pumped temporarily into pits that could be tackled later. The next phase involved the laying of some 13 miles of large concrete pipes. Excess rainwater was to be drained by four 54' pipes to a reservoir adapted from a gravel pit about half a mile away. An additional difficulty was to ensure that the elasticity and resilience of the filled ground was similar to the natural surrounding ground, in order to ensure the runway could satisfactorily absorb the shocks transmitted by aircraft wheels as they landed.

During the first summer and winter about two million tons of earth and gravel were excavated, 36,000 feet of multiple ducting laid and 60 miles of wire installed in the ducts. In April 1945 work began on the laying of the mass concrete for the main runway, which was to be 9000 feet long, 300 feet wide and 12 inches thick, most of which work was completed in three and a half months. The adjacent 100 ft wide taxiway and apron was also no small task. The plant required was the largest and most modern hitherto used on airport construction. The site of a Celtic shrine was crossed near the east end of the runway. The airport site did embrace land on which people lived, though they were not displaced during this phase of construction.

The ending of the war in 1945 meant that Heathrow became superfluous to RAF requirements, but work continued with civil use in mind. On 1 January 1946, the Heathrow site was handed over to the Ministry of Civil Aviation. By this time the main runway was operational and a few temporary buildings had appeared. Work on the two 2000 yard secondary runways was in hand, the anticipated dates for completion of the north-west to south-east runway being given as the end of February, and that from north-east to south-west mid May. The control tower (nearly opposite 'the Magpie' public house) was ready, though 'Modern Transport' asserted that the design was 'thoroughly bad, and the best thing the Ministry could do would be to pull it down'. Others described the four square mile airport as 'a sea of mud'. Although the airport was not yet available for commercial use, BSAA made arrangements with the Ministry to operate occasional proving flights to South American destinations in passenger service, the first leaving Heathrow on 1 January as part of the handover ceremony.

When the Civil authorities took charge it was intended that reasonable initial facilities at Heath-

row would be completed in May 1946 and that the airport would concentrate on trans-Oceanic traffic. For the foreseeable future it was considered that Northolt would be able to handle the bulk of the European traffic, while Croydon would be retained for internal services (Croydon had no hard runways and was unsuitable by modern aircraft). Despite handling only one class of traffic it was still believed that Heathrow would be largest airport in World. At that time the principle carriers included not only BOAC and BSAA, but also the RAF transport Command, which was still conveying civil traffic.

By March 1946 the 'final' design of new Heathrow Airport had been agreed, and a five-year timescale adopted for its completion. A parliamentary visit on 25 March was told that the design embodied pairs of parallel runways surrounding a central terminal linked to the Bath Road perimeter by means of a tunnel.

The tentative initial services to and from Heathrow by BSAA were supplemented by other occasional services, including a weekly visit by Panair de Brasil. BOAC also flew an isolated trip on 28 May, when the 'Lancastrian' flight to Sydney started from Heathrow. It appears that these airlines had access to the few temporary buildings on the site.

However the 'official' opening date for regular international services was 31 May 1946. So desperate were the international airlines to reduce the tediously long surface access times to and from Hurn Airport (near Bournemouth) that American Overseas Airways and Pan American asked to use Heathrow immediately, instead of waiting for a pre-arranged date later in the year. The Ministry of Civil Aviation obliged by arranging temporary accommodation for them in the shape of tents, which were ready for the arrival of the first aircraft. This was Pan American 'Clipper London', which landed just after 1 pm, followed soon afterwards by American Overseas 'Flagship London'. A description of the event refers to the simultaneous torrential rain, and the fact of there being 'a lot of water about', the effect of which was partly mitigated by 'loads of ashes' having been strategically spread about the mud. Nevertheless the customs procedures went smoothly, the tents were deemed 'well furnished, with regard to the circumstances', and the airline officials expressed gratitude on finding so much had been done.

BOAC were, of course, equally anxious to withdraw from Hurn, where its long-haul Empire and Atlantic services were concentrated. It had already transferred some Middle East and West African services to Northolt from 27 May, where they operated alongside its European Division services. It started transferring remaining services to Heathrow from 1 June 1946 and the last BOAC flight from Hurn was on 14 June 1946.

Fortunately the tents were not required for too long, and during late August 1946 a range of semi-permanent buildings became available—these would have to do until decisions had been made about the permanent arrangements. By this time the Ministry of Civil Aviation had decided to utilize Bovingdon (then in use by the US Army Air Transport Command) as a temporary fourth airport for London, and BOAC were already making some use of it for maintenance purposes. It remained, of course, the intention to concentrate facilities at Heathrow when it was fully developed. Other operators gradually moved services into Heathrow as its convenience was seen to outweigh that of provincial centres—for example some Trans Canada services transferred to Heathrow from Prestwick on 15 September 1946.

At about the same time some major changes occurred to the airline industry. On 1 August 1946 BSAA was transferred to government control, becoming a second British state airline. More significantly, British European Airways (BEA) was established as a new nationalized airline corporation. As part of the package BOAC was relieved of the shorter European services and arrangements were made for BEA to absorb the services of some other operators too. A major transfer took place on 1 February 1947, when BEA assumed control of the routes operated by the Associated Airways Joint Committee. This gave BEA a significant introduction to the development of Britain's internal air services. BEA was to establish its operating base at Northolt, though for some years it shared its London terminal with BOAC.

Early in 1947 the London Airport Advisory Layout Plan was published. The panel considered several arrangements, giving particular attention to a 'tangential' layout with 12 runways. What was actually recommended was a three stage development of the airport, based on stage one being more or less complete or in hand. This took the existing layout but recommended 1500 feet 'overruns' at each end of the main runway and 1200 feet overruns on the others. The 'diagonal' runways were to increase from 6000 feet to 8000.

Stage 2 involved the superimposition of a second triangular layout of runways upon the first, this time with the apex at the top, resulting in a sort of 'star of David' layout with parallel pairs of runways in each of three directions. The space in the middle of this arrangement was to be utilized as the main airport terminal area, to which access would be gained by means of a tunnel from the Bath Road. In fact the arrangement required the

repositioning of runway 3, the North-West to South-East runway, further west (it became new runway 6). The new layout would include three major maintenance areas and completion was expected in 1949 and would increase the size of the airport to 5 square miles.

Stage 3 was even more ambitious and was intended to bring the number of runways up to nine. It envisaged the provision of three more runways, one parallel to each of the intended three pairs, ranging from 5300 to 6600 feet. The only available land was to the north of the Bath Road, and construction was to involve diversion of that road and the engulfment of the village of Sipson and some of Harlington. The result would be the ability to operate three parallel runways simultaneously, with minimum separation between them of 2500 feet. Stage 3 was to be completed in 1953. An interesting feature resulting from the adoption of this plan was the influence it had on the emergent 'South Wales Motorway' scheme, better known as the M4. Planning of this motorway was first taking place in the late 1940s and the routeing near Heathrow was careful to follow the northern boundary of the projected airport extension, rather than a more convenient route nearer the Bath road.

Reports in August 1948 indicate that the airport development work was not going according to plan. Traffic at Heathrow in June amounted to 35,652 (contrasting with Northolt where it had had its busiest month with 48,740 passengers passing through). Indeed Northolt services were still expanding, with Aer Lingus moving FROM Heathrow TO Northolt.

The Select Committee on Estimates found that manpower and materials restrictions had considerably slowed down the work and that a few elements of phase one were still in hand with phase two falling badly behind. The Committee wondered if work could be accelerated without causing too much difficulty. It was considered as a matter of importance, since a concentration of air services at Heathrow was believed likely to save about £1m per annum. The costs, however, were enormous. The provisional total cost of airport was £26m, of which £6.6m had been spent and a further £1.6m was to be spent by end of 1948. To complete the work south of the Bath Road about £15m was required, and a further £3m would be needed for the area north of Bath Road.

Work was proceeding on the new terminal area at the centre of the airport, although it had been decided to erect 'semi-permanent' buildings there in order to gain experience. It was intended that these facilities would be ready in 1950, but they could not be opened to the public without the cut-and-cover access tunnel between the central area and Bath Road, where completion was expected in 1951; this was to include cycle track lanes as well as main carriageways. Unfortunately the tunnel work could not be completed without closing the east-west runway for a while, and this, in turn, required the second such runway to be operational first. All this proved over optimistic. Nevertheless consideration was being given to the design of the permanent buildings in the central complex, although it was unlikely that physical work would begin on the permanent buildings before 1954.

In fact it was necessary to employ 'temporary' terminal facilities along the Bath Road for some time (a two storey terminal building—later called terminal 1—was being built in 1950). The first central buildings came into use in April 1955; these consisted of terminal 2, the Queens Building, and the control tower block; by the following year total annual airport usage had reached 3 million. In 1961, terminal 3 opened and completed the transfer of passenger facilities away from the airport perimeter. A new terminal 1 (on two levels) was officially opened in the central area in 1969, and within a year or two airline traffic had reached about 20 million annually—in addition to accompanying friends, 900,000 other visitors and 50,000 staff.

The decision to concentrate non-goods facilities in the central area meant the access tunnel from the Bath Road was a vital lifeline. Through this tunnel everyone had to come, and everyone had to go. Even London Transport had to establish or re-organize a number of bus routes to take in the tunnel. Nevertheless, most people came by taxi or car, making use of the ever-growing car parking facilities. A spur road from the M4 motorway was built direct to the tunnel entrance and was opened in 1964.

Northolt was retained as a purely military airport from 1956 and Croydon was closed on 30 September 1959.

THE IN-TOWN TERMINALS AND AIRLINE COACH SERVICES

It is perhaps no surprise that efficient public transport services to the airport were not planned as an integral part of the airport development process. The need for good transport facilities were well understood by the time the airport opened, but with money and resources scarce, and second-best facilities somehow coping, the urgency to do something was simply not there. The astonishing thing is more that it took thirty years to get any form of mass-transit link in place, and that by then the annual airport traffic was around thirty million users—plus staff and other visitors.

In the meantime road access had to cope as best it could. Before the war the airlines had realized that their business was essentially one of getting passengers between city centres—the very places where airports could not, of course, be located. They therefore took upon themselves the task of getting passengers between a city centre air terminal and the aeroplane. The result was a city centre to city centre service during which some of the time was spent on coaches and some in an aircraft. Imperial Airways, for example, started a luxury coach service between their Victoria terminal and Croydon Airport in 1936 (the journey took 45 minutes). Even then they realized that the quality of the road portion of the journey was important—the buses they had been using until then had presented a poor image of the airline, bearing in mind that the road portion occupied a not insignificant portion of the overall journey time.

The first of the big London airline terminals was that of Imperial Airways, which opened its doors officially on Monday 5th June 1939. Its huge facade (surmounted by a square tower) was situated in Buckingham Palace Road, just south of Elizabeth Bridge on the site of the Grosvenor Canal and some wharves. It housed the headquarters of Imperial Airways and replaced a much smaller terminal near Victoria station, and several outlying offices. It included facilities for mail and freight as well as passengers, and had accommodation for the airline coaches as well as taxis. The building was transferred to the British Overseas Airways Corporation (BOAC) in 1940, and for some years was the headquarters of British Airways.

Until this terminal opened European passengers were brought from Croydon by coach to the Airways office near Victoria Station. At this time most long-distance flying was conducted by 'Empire Flying Boats' which took off near Southampton, to which point passengers were conveyed from Victoria by the Southern Railway. Reflecting this need the new terminal was built with direct passenger access to platform 17 at Victoria, a separate goods tunnel and lift enabled luggage or freight to be brought by small trucks and placed on the trains too. It was said to be the first occasion when air passengers travelled from a private station attached to an air terminal to be taken by special train. At about the time reference was made to a special evening train to Southampton on which a meal was served; passengers stayed overnight at the South Western Hotel at Southampton ready to face the flight first thing the following morning.

After the war the same philosophies prevailed. By early 1946 it was clear that air traffic would expand very rapidly, and there was an urgent need for vehicles to link airports with the airlines' town offices throughout the country. A joint order placed by the RAF Transport Command and by BOAC for 375 Commer 'Commando' 20-seat coaches many of which were delivered by April 1946 and were in use both in Britain and abroad, having been designed to be suitable in all climates. These vehicles were fitted with purpose built Park Royal bodywork of the 'observation type' with the rear portion raised. An essential requirement was for a 180 cu ft luggage compartment, with provision made for a customs seal. The RAF vehicles were sand coloured, while those of BOAC were royal blue with a gold waistband.

When BEA was formed road services were operated initially between Northolt and the Victoria Airways terminal, presumably using Commer Commandos transferred from BOAC or Transport Command. From 1 May 1947 responsibility for the maintenance and operation of the BEA road services in the London area was subcontracted to London Transport, who used the existing BEA Commer vehicles, which remained in airline ownership.

The Commer Commandos were not by any means exclusive to all the airlines operating between the Airways Terminal and the Airport. By mid 1947 BSAA, for example, were using vehicles consisting of a Duple 'Vista' body mounted on a Bedford OB chassis—this arrangement seated 25 passengers and had 100 cu ft of luggage room. Similar vehicles were in use by the three British Airlines for the ferrying of aircrews to, from and around airports; these were mainly 7-seaters with baggage room, but convertible to 11-seaters.

By August 1947 it was clear that intolerable pressure was mounting on the ground handling arrangements of airlines serving London. It was increasingly realized that the Victoria airways

terminal was too small to accommodate european and internal services as well as those of BOAC. It appears that moves had been made to locate air terminal facilities in central London, where they would have been most convenient for airline passengers. The Metropolitan Traffic Commissioner and the Metropolitan Police Commissioner took a different view, and refused to sanction central London facilities, obviously mindful of the difficulties in handling the number of vehicle movements in already congested streets. The airlines viewed this as an 'undeserved handicap', permanently depriving them of the ability to establish a really convenient terminal.

Nevertheless BEA announced it was to establish its own air terminal, and had leased about 30,000 sq ft of the ground floor and basement of Stafford Court, a modern block of shops and flats at 108 Kensington High Street. It hoped to bring the accommodation into use within a year. The site consisted of two units. The larger, ground floor, was to contain ten bays, capable of handling 40-50 aircraft departures per hour, while there were to be waiting halls and a buffet in basement. The smaller unit was to deal with arrivals.

BEA's new terminal and ticket office were called Kensington Air Station, and opened on 31 May 1948, serving coaches for BEA and Air France. The booking and enquiry offices previously located at the Victoria Airways Terminal, and the Channel Islands unit at Victoria Coach station, were transferred to new accommodation at Dorland Hall, lower Regent Street. London Transport continued to operate the BEA airport coach link following the move, including coaches for services operating in association with BEA. The BOAC coach services and terminal arrangements were not affected.

By September 1949 LT was operating services between the in-town air terminals and the various London airports using a fleet of 68 special coaches; although the vehicles were actually owned by BEA, they were maintained and serviced from Victoria Bus Garage, which was convenient for the air terminals and exploited otherwise difficult-to-use facilities. The participating airlines now included BEA, BOAC, BSAA (which merged with BOAC in 1949), and various international airlines for whom the British companies acted as agents in this country. The latter category included Pan Am, Qantas, Air India and Trans Canada.

By this time the majority of air traffic flowed via Heathrow and Northolt, but in an emergency planes often switched to other aerodromes and the coaches had occasionally to travel to Croydon, Blackbushe or Bovingdon. A few years later BOAC began to operate single-deck coaches between Victoria and Heathrow on their own account (?), leaving LT to concentrate on the BEA services.

On 27 March 1953 a new BEA terminal opened at Waterloo, on part of the Festival of Britain site. There was still no real passenger-handling equivalent at Heathrow, though at this time about three quarters of BEA/BOAC's 1.75 million passengers passed through Northolt (BOAC 290,000, BEA 1,400,000). It was not until 30 October 1955 that all BEA flights were concentrated on Heathrow. An experimental helicopter service was introduced between Waterloo and Heathrow on 25 July 1955, but as the fare was thirty five shillings and the passenger load could not exceed five, it was not a development which had any great practical effect.

A large new BEA air terminal opened at Cromwell Road (near Gloucester Road), in 1957, and the airline coaches (still operated by London Transport) were switched there. Other than in occasionally modernizing vehicles, the airline coaches provided the major source of access to Heathrow for about thirty years. In 1955, for example, some sixty per cent of airline travellers used the coaches; the tickets cost five shillings and were obtainable from the BEA terminal at Waterloo and from special conductors outside Heathrow terminal.

A special built of 65 new coaches superseded the older vehicles from around 1953. These were also one-and-a-half deck vehicles based on LT's RF type bus and were styled 4RF4; chassis and engine were by AEC and bodies were designed by LT but built by Park Royal Vehicles. They were also owned by BEA and maintained by LT, and replaced the earlier vehicles.

In Summer 1966 maintenance of the BEA fleet had transferred to the former London United tram depot at Chiswick, and the 64 remaining 4RF4 coaches had been joined by eight 48-seater Executive Express coaches which provided a terminal-tarmac service for businessmen; the vehicles were based on the AEC Reliance design with a Duple body, and were also owned and badged by BEA. The fare was 10 shillings (4 shillings more than the regular coach); these coaches had evidently replaced nine ex-Green Line RFs which had been undertaking that duty previously. From the end of 1966 the one-and-a-half deck vehicles were replaced by a special build of 65 'Routemaster' buses, also owned by BEA; these continued in operation until closure on the Cromwell Road terminal (though some were bought by LT for its own use in 1976). The BOAC vehicles were replaced by double-deck 'Atlantean' vehicles.

ROAD TRANSPORT TO HEATHROW

When the airport terminal was on the Great West Road it was served by the occasional passing bus from the Hounslow direction. When the central terminal was opened it sparked off the first deliberate process of transport provision for airport staff and others for whom the airline coaches were not suitable. The first bus route was the 81B, linking the central terminal with Hounslow West Station from early in 1955.[1] The 140 to Hayes and Harrow was next. A feature that lasted for some years was the extension to the airport on Sundays of a number of routes which did not otherwise go there—route 83 from Golders Green, for example. These doubtless catered for a burgeoning traffic of aircraft enthusiasts—or perhaps just the curious seeking a day out. Visitors were becoming big business (Even in 1950 those visiting to watch take offs and landings numbered 340,000). Sunday bus outings to Heathrow were also a feature for a while. The introduction of through road-rail tickets to the airport in 1955 was a benefit for airport staff, the tickets being issued from a number of Underground stations on the Hounslow and Uxbridge branches.

It was not until August 1969 that London Transport seemed to acknowledge (let alone promote) the Hounslow branch of the Piccadilly Line in being an instrument in some way capable of serving the airport. In that month began bus route A1 which provided an express bus service between Hounslow West station and the bus station at Heathrow Airport. This was heavily promoted and an immediate success. It was clear that there was a demand by airline users for convenient access to the airport itself, this being no more difficult (and perhaps rather easier) than travel to the airline's terminals, neither of which was actually very conveniently located.

In fact the story is more complicated. Firstly traffic to Heathrow was growing at an alarming rate and the capacity of the airline coaches was soon likely to be reached. Secondly, wide-bodied, high capacity aircrafts were to make their debut soon, putting further strain on the airline coaches. Thirdly, traffic congestion was worsening and the coaches were sometimes rather unreliable. Fourthly, the non BEA/BOAC airlines were doing rapidly increasing business and had to convey passengers to a variety of central London terminals, many of which had very poor facilities for their own coaches.

Although the timing was just right for heavily marketing the Hounslow branch and the A1 link, the new bus route itself was more a creation of the bus reshaping plan which re-organized many of the Hounslow local services and introduced several one-man operated services. The A1 was a sort of out of town Red Arrow service, and replaced the 91 between Hounslow West and the Airport.

It was not just the central bus network which served Heathrow. Green Line coaches along the Bath Road (704/5) half-heartedly served the airport from the day it opened, but they failed to serve the central terminal buildings when facilities transferred from 1955 and the coaches were therefore not a very convenient means of access. The first Green Line service to run to the airport centre was the 727 from 13 May 1967, this route operating between Luton, Watford and Uxbridge to Crawley via Heathrow Central and Gatwick Airport.

The 724 was extended to Staines in 1972, running via Heathrow Central and the new cargo tunnel, which connected the central area to the cargo handling facilities to the south side of the airport. Both the 724 and 727 were orbital routes, avoiding central London. By 1977 a southern orbital Green Line (726 to Gravesend) was also operating via the Cargo tunnel, and routes 704/5 had been diverted via the bus station, considerably increasing their utility as a link to the airport from central London. By now, of course, Green Line coaches were no longer operated by London Transport and the services were becoming competitive. Since 1977 Green Line services have undergone drastic reshaping, but there has consistently been between eight and nine relatively long distance routes serving the central area bus station.

British Rail endeavoured to capture the Heathrow travel market despite the absence of direct rail lines. Even in the early 1960s a road link existed between Feltham and Heathrow, providing BR 'facilities' from Waterloo and Clapham Junction. In later years this was replaced by 'Railair' coaches to Heathrow from Watford, Reading, Woking, Luton and Stevenage, through ticket facilities being a key feature.

Following the running down of the airline coach links from Victoria and Cromwell Road, London Transport introduced its own 'limited stop' road links known as 'AIRBUS' services. Airbuses A1 and A2 were introduced 15 November

[1] See LT Magazine May 1955

1980, the A1 starting at Victoria and the A2 from Paddington. The A1 effectively replaced the old BOAC service, and in fact employed some of the British Airways drivers. Route A3 introduced an airbus from Euston on ???????.

RAIL SERVICES

The rate of growth of traffic to the airport was phenomenal. In 1953 the annual traffic handled at Heathrow exceeded one million for the first time. By 1973 the annual traffic exceeded twenty million passengers, an average rise of a million passengers each year. To this heavy traffic must be added the stream of visitors and friends who visit the airport (nearly another million), and an ever–growing number of airport staff (over 50,000). Virtually all this traffic came by road.

Even in the mid 1970s the transport philosophy had not in principle changed from its pre-war view that air travel was a between city-centre activity, and airline passengers were still booked in at air terminals near central London and transported to the airport in buses run by the airlines (in 1948 only 25 per cent of passengers made their own way to the airport).

But airline coaches became an increasing problem. Firstly, the Police and Traffic Commissioners were antagonistic towards airline terminals in the heart of the West End or City, and while the BOAC terminal at Victoria was not entirely inconvenient the new BEA terminal at Cromwell Road was not particularly well located. If public transport (and then a difficult walk if one had luggage) had to be used to get to the terminals, it was not much more difficult to get straight to Heathrow by changing onto a bus at, for example, Hounslow. Secondly, the nature of airline travel was changing with increasing business and leisure traffic creating an enlarging body of customers not anxious to pass through central London. Thirdly, the need to meet increasingly large aircraft meant that it was becoming logistically more difficult to manage the coach link operation, and in any case traffic congestion was making the airline coach links very much more unreliable.

For these reasons it is possible during the 1960s and 1970s not only to identify a huge increase in airport traffic, but also to note a distinct shift towards booking in at the airport rather than a town terminal, requiring airport facilities to be improved accordingly (to an extent duplicating the work of the in town terminals).

Until 1969 only the airline coaches provided dedicated air-passenger access to Heathrow, though a number of London Transport bus routes had always served the airport in one way or another. In August 1969 bus services in the Hounslow area were re-organized and a new route (the A1 Express) was established between the Airport bus station (reasonably near all three terminals) and Hounslow West Piccadilly Line station. This operated at a flat fare and vehicles had some luggage space. Through fares were not available from the Underground, although joint marketing of the service became a feature, and the bus stop was convenient for the station.

At first site it is surprising that rail access seemed to command such little priority post-war when it was deemed such a key feature pre-war. Even Gatwick, which was rail served, was slow to re-emerge after the war (though it might not have done at all had it not had good rail access).

In fact rail access to Heathrow had been contemplated from its earliest civilian days. Schemes included a Southern Railway spur from Feltham, a dedicated deep level tube line, and a Piccadilly Line extension from Hounslow West. The appalling shortage of capital, labour and materials, coupled with initially slow development at the airport itself, and the apparently adequate road services (using the new Cromwell Road, and later the M4 motorway), all served to lower the priority of direct rail access. Why was it not until the nineteen sixties that the long term inevitability of a high capacity transport access system was seriously addressed? It is worth examining the emergence of the final scheme.

The first report in which one might have expected to see a Heathrow rail link proposed was that of the 'Railway (London Plan) Committee', intended to define the transport infrastructure required for the County of London Plan (published in 1943). Its report of January 1946—the very month Heathrow became a civil airport—is curiously silent on the subject of airport transport access, preferring to dwell upon the need to get rid of the cross-river railway bridges. The nearest of the proposed new lines was 'Route 5', which would run from Marble Arch via Paddington and over the Great Western Railway to Ealing, Slough and perhaps Maidenhead—and even this commanded the lowest priority.

But others foresaw the value of a direct rail link to the airport, and during the summer of 1946 there was some discussion in the press suggesting a railway line from the airport to the London–Staines line of the Southern. A year later Twickenham Corporation was informed by the Ministry of Town and Country Planning that it

was proposed to construct a rail link to London Airport; the new line was to join the Southern about 300 yards west of Feltham station.

London Transport's view was inconsistent. Towards the end of 1946 it had reviewed possible direct rail access between the airport and a new terminal at one of two sites: Cromwell Road (near Earls Court) or another site north of Hyde Park. The provision of such an express railway would cost between £5 million and £12 million, it was said, but would offer journey times of 15–20 minutes. Its 'official' stance was that on such a railway it would be 'impossible' to accommodate both airline users and ordinary passengers. For ordinary use there would be conflicting requirements for additional intermediate stations and the problems of rush hour crowding to contend with, and this would destroy its benefit to airline users. On the other hand an express tube would be difficult to justify financially if it were to rely on airline users alone. Cheaper alternatives such as a form of overhead railway were dismissed as 'a retrograde step from the standpoint of good town planning' (a matter which was later ignored when the M4 motorway access from Central London to Heathrow was being developed). London Transport's link to Heathrow was therefore accepted as being confined to the supply of contract coaches—an operation lasting for nearly thirty years more.

However, by March 1947 London Transport had developed its own tentative plan in an attempt to take a more realistic planning view. Of several new routes suggested Route K (a variation of the London Plan Route 5) proposed a new tube line making a junction with the Central Line at Marble Arch. It would then run as a high speed tube to North Acton, making another interchange with the Central Line to Ruislip, and then take over the Ealing branch, extending to Southall and Windsor over the GWR. A branch would be built from Southall to London Airport, and the proposed service level was 16 trains per hour.

At around the same time the Standing Joint Committee of the main line railways and the LPTB were, at the government's request, also contemplating London's transport requirements, again choosing to ignore the more doctrinaire constraints of the London Plan Committee. This body put forward some 22 railway schemes, including two main line tube railways designed both to ease London traffic and serve the site of the proposed World Fair at Osterley Park in 1951, at a combined cost of £45 million. Enormous cost, and quite unrealistic demands on scarce construction materials, characterised many schemes of this period.

Of these proposals, tube route 'A' was to run to Osterley from Liverpool Street, largely shadowing the Central Line, while tube route 'B' would run from Kings Cross via Victoria and Cromwell Road (which was one of the proposed sites for a new air terminal, though it would make rearrangement of tracks between South Kensington and Earls Court a priority, at a further cost of £2 million). It was noted that both new lines would improve access to Heathrow Airport, and that route 'B' could be extended to the airport itself for a further £6 million or so. The World Fair did not, of course, take place at Osterley, and was absorbed into what became the Festival of Britain, focusing on Waterloo. There were no new tube lines, but of the little transport infrastructure actually provided for the festival were included a pair of escalators at Waterloo, later to be used, with perhaps some irony, to serve the Waterloo BEA air terminal from where passengers were taken by bus to the airport.

An internal London Transport report of 1948 noted the importance both of the proposed express tube schemes, and of the need to serve the airport, but preferred a more realistic option. An extension of the Hounslow branch to London Airport was seen as the solution. However the point was made that the Airport was 'too far out to suffer at the hands of an 'all stations' service', and suggested that airport trains should run substantially 'non stop', which could be achieved by extending the four tracking from Northfields to Hounslow East. The observation was made that the District Line trains had a higher capacity and rode somewhat better than those of the Piccadilly Line, and proposed that it be the District Line which was extended to the airport.

The nationalization of transport in 1948 saw the end of the Standing Joint Committee (and its main line tube proposals) but introduced the British Transport Commission, to whom London Transport reported and who might reasonably be expected to have a view. Another committee was thus set up, reporting the BTC's view in 1949. This proposed a range of transport options for London but failed to attribute a link to the airport as requiring high priority, though noting that its proposed 'route D' required an outlet in west London, 'the exact route to be determined in relationship with western branches of District Line and London Airport'. The low priority and heavy investment demands were to see this scheme die completely in 1955.

The absence of a sound proposal from the nationalized transport system evidently caused others to contemplate schemes. For example there was a 1958 proposal for a privately sponsored

rapid transport system to link London and Heathrow called Air-Rail. This was a scheme for a high speed monorail broadly spanning the Southern Region route to Feltham. The monorail cars (described as being similar to Green Line coaches) were to have the ability to leave the monorail system at the airport and manoeuvre around the terminals by road. Perhaps unsurprisingly this came to nought, but it is indicative of the frustration at the lack of 'official' initiative.

By the early 1960s both LT and BR were considering firm schemes; any element of competition between their proposals was heightened by the abolition of the BTC in 1963 and the establishment of BR and LT as separate nationalised boards. LT pressed for their (now Piccadilly Line) extension from Hounslow; earlier concerns about the incompatible nature of the traffics, or the preference for the larger District-style rolling stock, being publicly overlooked (indeed the District service to Hounslow was abandoned in 1964). The scheme emerging from the Southern Region of BR had originally envisaged dedicated tracks to Victoria but this had been revised (to keep costs down) such that only the airport spur would be dedicated and the trains would interwork with the normal service east of Feltham—though they would be exclusive to air passengers and airport visitors. Even so the notional cost would be £14 million, and this sum would be hard to find in the middle of the BR modernization programme.

By June 1964 the Ministry of Civil Aviation was expressing interest in establishing Victoria as a central in-town terminal for Gatwick and Stansted (as well as Heathrow) and was increasingly interested in a direct rail link to Heathrow. This tended to favour the Southern Region alternative, though by then two firms of industrialists were submitting separate monorail schemes. By the end of the year London Transport had reaffirmed that if they extended to Heathrow from Hounslow, the branch would become part of the normal Underground system.

By February 1965 it had become known that there were proposals (not the first) for connections to the airport by monorail from the Cromwell Road terminal, or by rubber tyred cars from Paddington using a route via the Grand Union canal. Costs and merits were to be studied in comparison with the Southern Region and LT schemes by a special working party under aegis of the Ministry of Aviation—progress was characteristically slow, but concluded that Great Britain was not yet ready for monorails.

By February 1966 not only were the new Greater London Council and British Airports Authority both taking a keen interest in an airport rail link, but the airlines themselves (saddled with the supply of existing transport) were actively lobbying. BEA in particular was interested in the LT scheme—despite a threatened journey time of 43 minutes from Piccadilly to Heathrow. LT, for its part, felt an extension would only be viable if the existing coach services were abandoned. The Southern Region continued to nurse its own scheme. Later that year the BAA also adopted the LT scheme, but optimistically added that they felt the Southern Region scheme would be required as well (it didn't have to pay for it). It was, of course, recognized that funding for both schemes was unlikely, but the government allowed a Bill for both proposals to be introduced that November for consideration in the next parliamentary session. Both received the Royal Assent on 27th July 1967.

The issue was now passed to the 'Transport Co-ordinating Council for London' who discussed the matter on 31st July 1967. This time a comparative report came out in favour of the Southern Region scheme, but the advantages of the LT proposal were noted (and the BAA still wanted both extensions). The matter, once again, awaited government decision.

Matters were not helped by a sudden resurgence of interest by the airlines in the proposed central terminal at Victoria (which would have further favoured the Southern Region link). The BAA were also expressing concern at the disruption the LT link might cause during construction (and the cost to BAA of the necessary ancillary works). These factors might have clinched a decision had it not been for LT in January 1968 unexpectedly telling the ministry that it had dropped its construction estimate by £1 million to £12·3 million 'as a result of more detailed examination'. LT was becoming positively enthusiastic.

Other factors were now becoming significant, not the least of which was the imminent transfer of London Transport from government control to that of the Greater London Council, effective from January 1970. Government consent had still not been given by the time that the transfer had been effected, by which time yet more studies had been undertaken into the respective viability of the two schemes. This time the LT proposal was favoured, though with continuance of the dedicated airport coach links from the existing terminals. The GLC were quickly convinced, and authorized the Piccadilly Line extension on 7th July 1970, together with a quarter of the relevant funding. The matter still required the government go-ahead, which emerged on 6th November 1970, though without any financial contribution on the grounds that the works were expected to be profitable; LT had to

fund the difference itself, although considerable pressure later resulted in a 25 per cent government contribution, authorized in April 1972.

Physical work on the Heathrow extension officially began on 27th April 1971 with a ceremony at which 'the first sod' was cut (with a bulldozer) by the leader of the Greater London Council, Sir Desmond Plummer (there is a rumour that a piqued Airport authority required the sod to be put back again afterwards to await a more convenient start of works).

There were to be only two stations on the 3·5 mile extension. The terminus was in the vicinity of the airline terminals in the centre of the airport complex. The intermediate station was to be at Hatton Cross, at the eastern perimeter and was intended primarily to serve airport maintenance workers—though a bus station would provide handy bus-rail interchange. However, the existing 3-platform open-air station at Hounslow West was badly located for the Line's projection and it was decided to construct a new pair of platforms (this time sub-surface) slightly to the north, but linked to the 1931 ticket hall. The name of the airport station caused some controversy, but in the event 'Heathrow Central' was settled upon in preference to 'Heathrow Airport', though an aircraft symbol was usually incorporated as part of the name.

The 2-mile section between Hounslow West and Hatton Cross was built 'cut and cover', largely alongside or beneath the verges of the Bath Road and the Great South West Road. In contrast to the cut and cover type of construction a century previously, disruption was kept to a minimum using new methods. After excavating only a shallow trench, it was then possible to construct the tunnel walls and roof, subsequently removing the spoil from within the new shell through periodic access points. The walls consisted of a continuous run of intersecting concrete piles which proved a fast and effective method of construction. Near the River Crane (just east of Hatton Cross) the line rose briefly to the surface to cross it by bridge. The station at Hatton Cross was to be a single story building with steps down to the platforms.

The section between Hatton Cross and Heathrow Central was constructed by traditional deep tube methods in twin tunnels. The station itself was built within a huge concrete box, excavated from the surface. This had walls over three feet thick, and was around 400 feet long, 80 feet wide and 50 feet deep. The box was designed to support future BAA construction at ground level. Within the box the platforms occupied the lowest level, station plant and staff rooms the next, and the upper level housed separate entry and exit flows through the ticket hall. Beyond the station the over-run tunnels pointed towards the West Middlesex sludge disposal works at Perry Oaks, then considered the most likely site for a fourth airline terminal, to which serious attention was beginning to turn.

At Hounslow West both the old District Railway signal box and the eastern end of Platform 3 (the northernmost platform) obstructed the line of the extension, and in particular the temporary access track which was required. The platform was taken out of service on 22nd October 1971 whilst a temporary signal box was commissioned adjacent to platform 1 on 26th March 1972, allowing demolition of the offending structures. The turnout to platform 3 was retained and linked to the temporary track connection used to provide access for tracklaying and materials trains. This link was removed about six weeks before the extension was commissioned to allow further excavation and other preparatory work to be undertaken, including track simplification.

The work required at the Heathrow end of the extension took much longer than that at the Hounslow end, and a phased opening was opportune. The extension was therefore commissioned as far as Hatton Cross on Monday 14th July 1975, though trains ran empty between Hounslow West and Hatton Cross until Saturday 19th July when it opened to the public. Although the A1 express service continued to run between Hounslow West and the airport, a number of other bus services were adjusted to run through a new bus station at Hatton Cross, alongside the single story station building which led down to the island platform beneath.

The work of commissioning the extension was complicated in that at Hounslow West the desired route of the permanent track leading to the new platforms was still obstructed by the track and formation at the east end of the old station, which was also at a higher level. It was therefore necessary to suspend the train service between Hounslow Central and Hounslow West from 8pm on Friday 11th July, whence there was frantic activity demolishing the ends of the old platforms and removing track and spoil, levelling the new route, and laying in the new trackwork. Subsequently, much of the remainder of the former platform area was filled in and used for enlarging the car park.

The section between Hatton Cross and Heathrow Central was opened by the Queen on Friday 16th December 1977 shortly before midday, the section becoming available for the public from 3pm. In fact a service of empty trains had been operating since the previous Monday. The A1 express service was now withdrawn. Heathrow

Central station was provided with an island platform layout, with escalators linking to the ticket hall area alongside (but below) the bus station and linked to the three terminal buildings with BAA-built moving walkways. Beyond the east end of the station a high-speed scissors crossover layout was provided, the diamond crossing including moveable angles to provide a better ride (these were later removed as a maintenance liability). Hatton Cross had separate facing and trailing crossovers at the eastern end. Power supply for trains on the Heathrow extension was augmented by new remote controlled substations at Hatton Cross and Heathrow Central, both being fed from Lots Road power station.

THE END FOR NOW