



ENGLISH HERITAGE

Transport Buildings Selection Guide

Heritage Protection Department

March 2007

Selection Guide

Transport Buildings

I INTRODUCTION AND DEFINITIONS

The modern age is characterised by speed of physical communication – by road, water, rail and air. Road and water travel was revolutionised by the turnpike and canal systems that made the Industrial Revolution possible. Railways are a British invention and their early remains are of international significance. They gave the Industrial Revolution its impetus and staying power, and transformed the personal lives of millions. Air travel created an exciting 'brave new world' spirit that is reflected in the modernist and art deco styles of the first generation of air terminals. Cars democratised travel and so ubiquitous are they that the distinctive historic environment they have created is often taken for granted and undervalued.

Road surfaces and signs are also covered in the **Street Furniture** Selection Guide. For docks, harbours and ship-related matters see the **Maritime and Naval** selection guide, and for warehouses see **Industrial**.

2 SPECIAL CONSIDERATIONS WHEN SELECTING TRANSPORT BUILDINGS FOR DESIGNATION

As with all building types, transport buildings have first to be assessed in terms of their intrinsic value – special architectural, planning, engineering and technological interest. The explosion in numbers of turnpikes, canals and railways led to considerable standardisation and greater selection is required. But the revolutions these reformed modes of transport represent are of national and in some cases international significance. The key to selection is to assess them in the context of the mode of transport they were built to accommodate - road, water or railway - and the key phases for these are given in the 'History' section below.

As with industrial buildings more generally, completeness can be of over-riding importance especially where important processes can be illustrated on a single site (as, e.g., a railway station or an airport). Single sites in this context can extend to linear sites, such as the lines of significant railway or canal companies or lines that demonstrate exceptional engineering interest.

Transport buildings of the twentieth century, and particularly the post-war period, present particular challenges. In some cases, as with the earliest buildings associated with the motor car, these were ephemeral, are difficult to identify and may have been altered out of recognition: designation is difficult to justify in these circumstances. Others exist in such huge numbers (e.g., multi-storey car parks) that the pervasive poor design standard of the

majority makes it difficult to appreciate the pioneer or innovative examples of the best survivors. This problem is compounded by the current inadequate state of published research and synthesis. Obsolescence too is a factor in this area, but re-use is very often possible which gives buildings of special interest a new lease of life. Designating those transport structures which do deserve this accolade is thus an important task.

3 HISTORY

Up to 1714 The infrastructure for internal communication by land and water remained almost totally undeveloped until the mid seventeenth century and widespread improvements did not occur until the eighteenth. Road transport in the medieval and early modern periods was slow and cumbersome – it was considered fast in the fifteenth century for information to travel by land from Devon to East Anglia in five days; St Albans was a day's travelling distance from London. Road improvement depended upon the initiative of the church, charitable individuals or institutions, and usually took the form of bridges and causeways; some municipalities paved portions of their principal streets. Early improvements in the internal waterways network include the building in 1564-6 of the five-mile long Exeter ship canal; most investment went into drainage rather than navigation.

Georgian The period saw the beginning of a transport revolution. *Turnpike roads*, which levied tolls from travellers to finance road improvements, were a pre-condition of industrialisation and economic development. They were established in the 1660s, but the main period of growth took place in the next century: the principal arterial roads out of London were turnpiked by 1750 and the greater part of the network of main roads by 1780. By 1800, 4,000 turnpike trusts controlled 22,000 out of 105,000 miles of highway, and toll houses were common. By 1835 there were 14,000 regular wagon services nationally and the stagecoach service between London and Birmingham rose from one a week in 1740 to 34 a day by 1829. All of this was facilitated by improvements in bridges and surfacing, notably the graded and cambered stone surfaces pioneered by John Macadam. Many completely new stretches of road were constructed in the early nineteenth century and these are often of considerable engineering interest. From 1862 turnpikes came to be administered by Highways Boards and entered the public domain. Tram or wagonways – early railways - expanded especially in industrial areas, as did packhorse routes, which received many new bridges between 1660 and 1740. Engineer James Brindley's Bridgewater Canal (1759-61), whilst not the first canal in England, sparked off the *canal age* that saw 4,000 miles of canals in place by 1850. Building activity reached its height in the 1790s - canals continued to operate well into the railway era - but the network was mostly complete by the 1830s and underwent little expansion thereafter.

Victorian and Edwardian The key development in land communication in this period was the *railway*. This was the culmination of the transport revolution, and was to have major consequences in economic, social and cultural terms. Its origins lay in the Georgian period, but the railway system's development was one of the greatest achievements of the Victorians. Its history falls into four distinct phases. The pioneering first phase extends from the opening of the Stockton to Darlington (1825) and Liverpool and Manchester (1830) Railways (both George Stephenson) to the completion of the Great Western Railway from

London to Bristol in 1841. The second phase runs from 1841 to 1850, and marks the heroic age of railway building and the period of 'railway mania' in which commercial speculation and the competition for routes led to the frantic construction of lines, including the Great North Railway and the laying of many of the main trunk lines that form the basis of today's Inter-City network. The third phase, from the 1850s to the 1870s, saw the consolidation of the network including the opening in 1876 of the dramatic Settle to Carlisle line, carrying the Midland Railway into Scotland. The fourth period runs up to 1914, and saw the completion of the network. Railway stations emerged as a distinct building category, and combined engineering audacity with architectural sophistication to produce monuments to a new age.

London was the first city in the world to have an *underground railway*: the Metropolitan Railway (opened 1863, Sir John Fowler, engineer) was of cut and cover construction. The first underground electric 'tube' train service opened in 1890 (now part of the Northern Line) but a variant of the technology that made this possible - the tunnelling shield - had previously been used by Marc and I.K. Brunel when constructing a foot tunnel under the Thames at Rotherhithe in 1825-43. Tunnels were an essential component of the railway network from the beginning: the Severn Tunnel (1873-86, T.A. Walker) remains one of the outstanding feats of railway engineering. Some, e.g., on the Great Western and the London and Birmingham had elaborate portals, creating architectural statements of great power.

Twentieth Century The twentieth century saw revolutionary strides in the area of road and air transport. Motor cars appeared in the 1880s, but it was not until the lifting of the 4 mph speed limit in 1896 that the age of the car got underway. In response to the increasing use of the motor car, spending on roads in England increased by 85 per cent between 1890 and 1902. The growth of the national road network in the 1920s saw the creation of arterial roads to carry heavy traffic and a new system of road classification: the Dover Road thus became the A2. Garages emerged as a new building type, as did multi-storey car parks. Stabling, once a common building type, declined rapidly as horses left the street scene. Dual carriageways were slow to spread and Britain remained well behind the USA and Germany in the inter-war years. The really major up-grading did not come until the motorway programme of the 1950s: an eight mile stretch of the M6 at Preston opened in 1958, and part of the M1 opened in November 1959.

The first powered flight took place in England in 1908, when Samuel Cody flew his British Army Aeroplane No 1 at Farnborough, Hants. The First World War saw huge strides in aircraft technology, and established air travel for good. Alcock and Brown's crossing of the Atlantic in 1919 heralded a new epoch for global travel. There was great public interest in flight between the wars, and 'air-mindedness' – a forward-looking embracing of the potential of this new form of travel - was widespread. The first regular international service operated between London and Paris from 1919 and Croydon became the capital's main airport (1920) with the first integrated passenger terminal and control tower designed in an old-fashioned classical revival style. Although funding was to remain precarious, air travel and airports came to represent the brave new world: municipalities clamoured to possess a terminal - Wythenshawe for Manchester, 1930, was the first - and they adopted a futuristic art deco or modernist vocabulary to convey the excitement of flight, replete with viewing

terraces for those who did not actually fly. Airships too enjoyed a short period of prominence up to the R.101 disaster of 1931. Post-war developments saw the arrival of jet aircraft (requiring longer runways and larger servicing facilities) and the huge rise in passenger traffic from the 1970s onwards. More than most building types, airports are subject to constant and radical change, and some terminals have now found new uses.

4 SPECIAL INTEREST OF TRANSPORT BUILDINGS

Bridges

Most pre-1840 bridges, where intact, will warrant serious consideration for listing. Monumental bridges, or bridges that display significant technological innovation, may warrant designation in a higher grade. The explosion of transport projects for turnpikes, canals and railways created the need for standardised and less spectacular bridges: for these, greater selection will be required. Broadly speaking, bridges that fall into the second category need to be assessed in the context of the mode of transport they were built to accommodate - road, water or railway - and the key phases for these are given below. Regarding bridge technology it is worth remembering that the eighteenth century marked the high point in the theory and practice of masonry bridge construction: Robert Mylne's Blackfriars Bridge of 1760-69 (demolished) represented its acme. But increasing demand required quicker solutions. Timber bridges and viaducts, once quite common, are now extremely rare. Arched iron bridges (the first at Ironbridge, Shropshire, 1777-81, by the ironmaster Abraham Darby) were widely adopted in the early nineteenth century but a series of failures rendered cast iron risky for major spans after 1847 (although many smaller and ornamental bridges continued to be built). Engineers turned more to metal truss bridges from the 1820s (combining small interconnecting members, some in compression, others in tension) and suspension bridges (Telford's over the Menai Straits of 1826 was among the earliest). Concrete for bridges was used from the late nineteenth century (mass concrete first used in 1877, reinforced in 1901). The first major use of steel in British bridges is the Forth Bridge (1890) and it came to predominate in the twentieth century in the form of box girder and suspension bridges. The general availability of pre-stressed steel and arc welding allowed for more elegant and slender bridges from the 1950s – some of the best are small footbridges in sensitive settings, such as the Garret Hostel bridge at Cambridge of 1960 by Guy and Timothy Morgan - and some post-war bridges are outstanding in their use of high-quality detailed concrete finishes. Some 3,000 motorway bridges were constructed in the 1950s and 1960s, and certain exceptional designs (such as the Kent County Council's footbridge at Swanscombe, Kent of 1963 have been listed. So too has the Severn Bridge (Freeman Fox and Partners, 1961-66), with its elegant towers and innovative welded deck. Structural and aesthetic considerations will determine their listability.

Specialised Canal Structures

The canal network was largely in place by the 1830s and most canal buildings surviving in anything like their original form will be listable. Because of the lack of modernization the

survival rate is remarkably high although bridges and locks, the structures most frequently found, have often been subject to radical repair or rebuilding. There are two essential divisions regarding *canal bridges*: one is whether they are fixed or movable – the latter can be swing bridges or bascule bridges (drawbridges) - the second is whether they carry public roads or provide access between private estates divided by a canal (*accommodation bridges*). The latter were quite often movable. *Aqueducts* are the most spectacular of all canal structures, displaying both high architectural quality and technological innovation in the form of cast-iron troughs: Longdon Aqueduct (Shrops.) (by Thomas Telford, 1795-6) is among the earliest in England. Almost all are protected. *Locks*, usually of the pound type (the first in England was on the Exeter Canal, 1564-6), are listable if appreciable parts of the original stone pound walls (and associated surfaces) survive; lock gates will rarely be early as they require regular renewal. The same emphasis on authenticity of fabric applies to *tunnels*: the first, near Preston, was opened in 1775. *Inclined planes* to lift vessels out of the water usually by means of caissons (also associated with early railways) were introduced on the canal system in the 1780s but most are late nineteenth-century and tended to be short-lived. *Boat lifts* (that at Anderton, Greater Manchester, completed 1872-5, being the first) proved similarly uneconomic and accordingly are rare. Some of the more monumental structures, and some lengths of relict canals, are scheduled as ancient monuments.

Canal warehouses range from massive complexes like Ellesmere Port to small individual warehouses such as those along the Grand Union Canal. Settlements like Stourport (Worcs.) grew up, with new sorts of canal-related buildings. *Repair and maintenance yards*, often linked to canal company offices, seem more susceptible than other canal structures to unsympathetic development: intact examples should be carefully assessed. *Stables* were a necessary adjunct to these yards and warehouse complexes. *Lock keeper* and *bridgeman's cottages* were distinctive, sometimes quite sophisticated pieces of 'polite' architecture (cf. tollhouses) and sometimes share a company style. *Mileposts, tunnel portals* and *toll offices* are normally eligible for listing.

Specialised Railway Structures

Railway buildings and structures fall into three broad categories. First, there are the new building types, invented specifically for the railways (see below). Second, there are engineering works such as tunnels with their portals, cuttings and their retaining walls, bridges and viaducts. Third, there are building types that were adapted for railway use: these include warehouses, offices, engine and goods sheds, carriage works, stables and railway workers' housing.

Normal considerations apply when assessing buildings that are of outstanding architectural or technological importance, or exceptionally early in the history of the railways. Pre-1840 buildings will be of international significance as being among the earliest railway structures in the world, and even partial survivals need to be assessed carefully. The 1840s saw a massive expansion in the network and while the Italianate style was favoured, many designs were eclectic. Great care should be taken in seeking out work of this date because, although much survives, it is often hidden by later alterations and extensions. Rigorous

selection is required for buildings after c.1860: this reflects both the quantity of what remains and the standardisation of design. A number of factors should be taken into account when assessing buildings of the latter half of the nineteenth century. Railway companies had different approaches to construction and different house styles and, where possible, a representative sample of structures from each company should be designated if the architecture is distinctive; rarity of survivals by company may be a factor here. Also, as with industrial buildings generally, group value can be a key determinant. Some stations and goods yards need to be assessed as a whole, especially where they demonstrate the phased evolution of the railway system, through alteration and extension.

Stations are among the icons of the modern industrial age. The first in the world is at Manchester (1830) and looks like a smart town house. The great termini and city stations were elaborate structures with massive train sheds that spanned several platforms and were fronted by prestigious hotels (see the **Commercial** selection guide). Most are listed, sometimes in a high grade. Multi-phased stations can be of special interest as well, but judgment will be needed as to the coherence of the ensemble, the claims of the component elements. Architecture, technical or construction interest, date, and extent of alteration will be key issues. Twentieth-century stations can sometimes possess considerable architectural presence: Ramsgate, Kent (1926) represents the classical approach; Surbiton, Surrey (1937) the streamlined inter-war style; while Oxford Road, Manchester (1959-60) demonstrates that the structural boldness of Victorian stations continued to be an aspiration in the post-war period. Smaller stations comprising the main station building sometimes with staff accommodation, canopies, waiting shelters, footbridge, signal box and goods shed, survived in vast numbers at the beginning of the twentieth century but have suffered grievously from attrition and clearance. Reasonably complete ensembles may well be eligible for listing since they are now so rare.

Signal and crossing boxes were built from the 1860s, are usually of two storeys (control levers above, locking mechanisms below) and have declined in numbers from 10,000 to 700: designation has attempted to protect a representative sample of the principal types and preference is given to examples that have minimum impact on rail safety (e.g., those on preserved sites or lines). Retention of signal frames and levers will strengthen the case for designation. *Coal drops, water tanks and columns, turntables* and early *footbridges* are now rare.

The London Underground is a development of world importance, and its surviving fabric is correspondingly worthy of designation. This applies not to the earliest generation of buildings from the 1860s, but also to the Edwardian and inter-war phases as well. The 1930s stations, many designed by Charles Holden, were part of a concerted effort on the part of Frank Pick to create a mass transit system that was efficient, humane and beautiful, and remain greatly admired. Architectural quality, date and rarity of the type, and the degree of subsequent alteration will be key considerations; so is authenticity - reinstatement of replica features can be an issue to watch.

Specialised Road Structures

These include *tollhouses* that are often distinguished by half polygonal ends giving views in each direction. Although cottagey in scale, they come in a variety of styles and have more in common with polite than vernacular architecture. Bridges are dealt with separately (above); horizontal **surfaces and street furniture are covered in the Street Furniture selection guide.**

Stables were once very common: mews buildings stood behind larger houses, and commercial stabling for transport horses was a common inclusion on industrial sites and at inns. The disappearance of horse transport from the street scene has been one of the most marked changes of the post-First World War period. They are rare survivals, especially in urban contexts, and judgment as to their special interest has to take into account their architectural interest, and the survival of horse-related features like stalls and sloped ramps (more information on stables in a farming context can be found in the **Agricultural selection guide**).

The proliferation of the motor car spawned a number of specialist building types. Surviving car-related buildings from the earliest decades, such as the first car sales showrooms, are very rare and are likely to be serious candidates for listing.

Showrooms were incorporated into car factories, but they emerged as a specific type of commercial premise in the Edwardian period. The Michelin building on London's Fulham Road (1909-11, Francois Espinasse), with its painted tiles depicting early grands prix, reflects its function and is the finest survival of car-related architecture from this period. Purpose-built *car showrooms* began to proliferate in the 1930s along with the mass-production of cars.

Repair and maintenance garages were a necessity for the pioneer motorist, for whom breakdowns were an everyday occurrence. The early repair garage was most likely to be adapted from an existing building; otherwise they were built of corrugated iron, with a barrel roof and large sliding doors. Larger examples comprised offices, stores and a large working area with hydraulic ramps and pits, and a lubrication bay. The earliest purpose-built *petrol filling stations* were formed of a lay-by or pull in, pumps, sometimes on an island, with an attendant's hut or kiosk. Petrol storage was in an underground tank, as today. Legislation in the 1920s, reacting against the spoliation of the countryside, led to designs that were consciously vernacular or locally sympathetic, like the 1930 example at Clovelly Cross (Devon); urban garages, such as the oriental-styled Park Langley Garage in Beckenham (London Borough of Bromley, 1928 by Edmund Clarke) could be more attention-grabbing. By the mid 1930s the use of concrete for filling station construction was common, with neon-lit towers or canopies over the pump island to draw the attention of the passing motorist. In the 1950s oil companies began to purchase increasing numbers of stations and develop corporate station designs. While older petrol stations are increasingly rare, special architectural interest would have to be present for designation to be

warranted.

Motorway service stations came with the motorways. As a result of tight budgets most service stations were cheaply built, of concrete, and are stylistically bland but there were exceptions. Some incorporated a number of visually striking features, such as eating areas on bridges spanning the carriageways (Leicester Forest east on the M1 for example), or in towers (as at Forton on the M6, of 1965). However, by the late 1960s, service stations had assumed the form they take today: two self-contained low-rise developments on either side of the motorway. Clear levels of architectural interest will be required for listing to be appropriate.

Multi-storey car parks originated in the Edwardian period, and relied on lifts to transport vehicles up to the upper decks. The ramped car park arrived in the 1920s and a number were built in London; they remained rare outside the capital. To be listed, they should combine architectural interest - initially classical, latterly modernist - with technical novelty. Examples include J.J. Joass's Lex Garage of 1929 in Brewer Street, Soho, and the dramatically ramped Daimler garage in Herbrand St, Bloomsbury, of 1931 by Wallis, Gilbert & Partners. Increased congestion and legislation designed to raise revenue from parking resulted from c.1960 in vast numbers of multi-storey car parks: exceptionally, they may be listable if they combine innovative planning with architectural panache.

Public road transport The first horse-drawn buses appeared in London in 1829 and by 1890 there were around 25,000 in England. Motor buses were proving profitable as early as c.1900 and some services were run by the railway companies. Electric tramways appear at beginning of the twentieth century in the main urban centres and many municipalities built large *depots*, often with ornate frontages that reflect municipal pride. Electric generating stations are rare. Many depots survived as bus garages until recent years but are now very vulnerable. Purpose built *bus garages* or depots usually combined offices and a covered parking area, the latter generally top lit, single-storey and spanned by steel-framed roofs without intermediate support to facilitate vehicle movement and storage. A few important garages with concrete roofs were built in the late 1930s and early 1950s, partly following continental models, and partly responding to restrictions in the use of steel after the Second World War; they can be architecturally distinguished, e.g., Stockwell in London. *Bus stations* tend to be conveniently located in town centres. Bus stations would have a covered parking area or open-air island platforms, with or without shelters, along with offices waiting room, booking hall, and luggage store. Saw-tooth platforms were widely adopted in the late 1950s. For depots, garages and stations, architectural quality and structural interest are the key considerations.

Buildings for Flight

Civilian aviation buildings are rare and always worth careful consideration. Older termini tended to be small in scale, and many are relegated to the edge of airports still in use (as at Birmingham), as runways have expanded with the arrival of jet aircraft. Contexts have sometimes changed dramatically: Croydon terminus is now surrounded by industrial buildings, but its special interest remains strong. Perhaps the finest survival of municipal

airport buildings occurs at Liverpool's Speke Airport. There the curved terminal with beacon control tower is flanked by imposing hangars creating a fine group, but one again now divorced from the original flying field, which has proved too small for modern jets. Much aviation architecture was influenced by military structures, but *terminal buildings* (for freight and passengers), as at Gatwick (Surrey), Shoreham (W. Sussex) and Birmingham could display great architectural panache, making them among the most characteristic buildings of their age. This very much applies to the outstanding Dunstable Gliding Club premises in Bedfordshire of 1935-6, designed by Kit Nicholson. Flight was for the few, but many came to watch from viewing terraces. Control towers only became compulsory from 1944 but earlier examples survive, as at Brooklands, in Surrey. The oldest surviving *hangars* pre-date the First World War. Originally concrete or timber framed, most are of steel construction and may be important for engineering reasons. The airship hangars at Cardington (Beds.) of 1917 and 1927 represent the extremes of the colossal scale that such buildings could attain. Some aircraft manufacturers created premises of note, such as the Bristol Company's at Filton, outside Bristol. Post-war aviation buildings have grown in scale and complexity, and have often undergone extensive change (if not outright replacement). Certain key structures, such as the Comet Hangar at Hatfield (Herts.) (James M Munro & Son, 1954), have been listed for historical, architectural and structural engineering interest.

5 SELECT BIBLIOGRAPHY

General

- Buchanan, A., *Industrial Archaeology in Britain* (1972)
Cossons, N., *The BP Book of Industrial Archaeology* (1975)
Holder, J. and Parissien, S., (eds.), *The Architecture of British Transport in the Twentieth Century* (2004)
Stratton, M. and Trinder, B., *Twentieth Century Industrial Archaeology* (2000) Trinder, B., (ed.), *The Blackwell Encyclopedia of Industrial Archaeology* (1992)

Railways

- Biddle, G., *Victorian Stations* (1973)
Biddle, G., *Great Railway Stations of Britain* (1986)
Biddle, G., *Britain's Historic Railway Buildings* (2003)
Lawrence, D., *Underground Architecture* (1994)
Parissien, S., *Station to Station* (1997)
Simmonds, J., *The Railways of Britain* (1986)
Stamp, G., 'Early Twentieth Century Stations' in Holder and Parissien (eds.), *The Architecture of British Transport in the Twentieth Century* (2004)
The Signalling Study Group, *The Signal Box* (1986)

Canals

- Hadfield, C., *British Canals* (1969)
Harris, R., *Canals and their Architecture* (1980)
McKnight, H., *The Shell Book of Inland Waterways* (1981)

Rolt, L., *Navigable Waterways* (1969)

Flight

Bingham, N., 'Arrivals and Departures: Civil Airport Architecture in Britain during the Interwar Period' in Holder and Parissien (eds.), *The Architecture of British Transport in the Twentieth Century* (2004)

Zukovsky, J., (ed.), *Buildings for Air Travel : Architecture and Design for Commercial Aviation* (1996)

Road transport

Holder, J., 'From Chaos to Control: The Architecture of the Bus and Coach Station in Inter-war Britain' in Holder and Parissien (eds.), *The Architecture of British Transport in the Twentieth Century* (2004)

Jeremiah, D., 'Architecture for the Motor Car' in Holder and Parissien (eds.), *The Architecture of British Transport in the Twentieth Century* (2004)

Morriss, R.K., *Roads: Archaeology & Architecture* (2005)

See *The Motorway Archive* website.