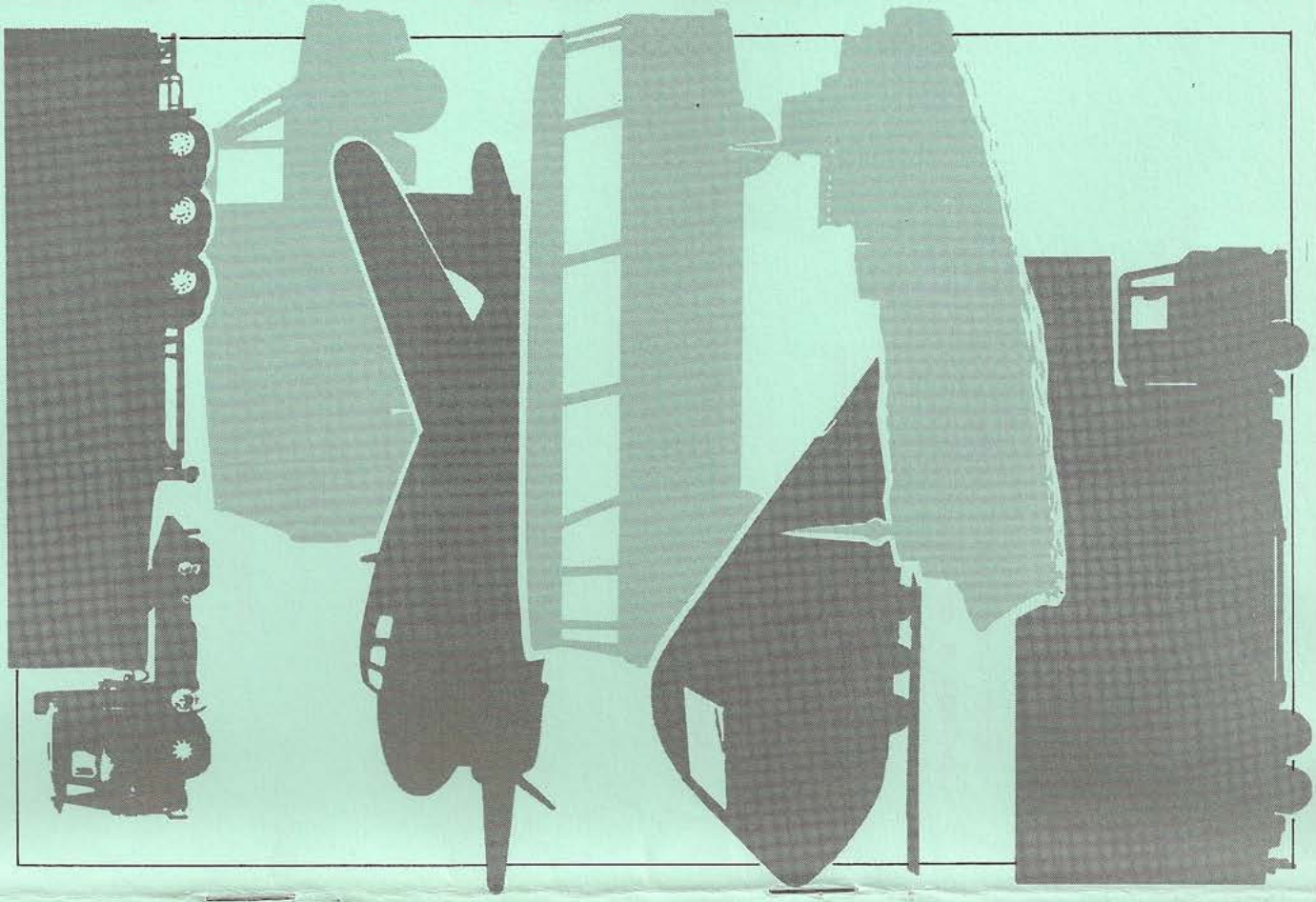
TRANSPORT ECONOMIST

SPRING 88
Vol 15 No3



THE TRANSPORT ECONOMIST

MAGAZINE OF THE TRANSPORT ECONOMISTS GROUP

VOLUME 15 NUMBER 3

EDITOR: Stuart cole, Polytechnic of North London

Contents Page

ARTICLE

TEG NEWS

RECENT MEETINGS

TRANSPORT DEVELOPMENTS IN DOCKLANDS

Sion Haworth, London Docklands Development Corporation
(London, October 1987)

At the October meeting of the Group, Sion Haworth spoke about recent transport developments in London Docklands, with particular reference to the financing and justification of the Docklands Light Railway.

The development of Docklands, often described as the largest redevelopment project in Europe, has been successful to date due in no small measure to the attention paid to transport as a tool for achieving regeneration. This report focuses on the various modes of transport that have been the subject of transport policy and implementation and select a number of projects to illustrate the way in which transport has influenced the development of the area.

The Docklands area of London, an area of 8 square miles on the North and South sides of the River Thames between Tower Bridge and Gallions Reach, was beset by industrial and economic decline between the end of World War II and the early 1980's. The closure of many of the Docks and associated ancillary industries led to relatively high levels of unemployment. Housing, the majority of which is in public ownership, was often run down and characterised by 'hard to let' teancies. The spatial areas themselves, Wapping, Surrey Commercial Docks, the Isle of Dogs and the Royal Group of docks are essentially peninsular with poor accessibility by public transport and by road. Accessibility within these areas because of the large dock basins is often also poor.

These problems were addressed by the statutory authorities for the area such as the London Boroughs, the Greater London Council and the Department of the Environment. Plans were drawn up for transport infrastructure projects to serve the area, notably an extension of the Jubilee Line, (previously known as the Fleet Line), through the Surrey Docks, Isle of Dogs, Blackwall Peninsular, Royal Docks and to Thamesmead, and the Docklands Northern and Southern relief roads. This line, also known as the River Line, was proposed on the basis that the area could only be successfully redeveloped as a single entity and that individually its constituent parts were too small to sustain economic independence from each other. The road proposals were brought forward partly to redress the historic lack of investment in highways in inner East London and partly to access the declining areas. Despite much planning the nett result by the end of the 1970's was very little physical change to the area. This was partly because the authorities themselves were not given specific additional resources to deal with the problem and also due to the fact that no one single authority was able to take responsibility for the whole area.

The LDDC was set up in 1981 as a result of legislation contained in the 1980 Local Government Planning and Land Act. The Corporation was set up with the objective of achieving the long term redevelopment and reuse of land and buildings within its area. An Urban Development Area was delineated for this purpose and within this area the Corporation has development control powers for planning. It does not have strategic plan making powers. These remain with the relevant planning authorities (now the London Boroughs). The Corporation was given powers to vest land into its ownership and to compulsorily purchase land for the purpose of achieving its objectives. The LDDC is NOT a property developer, nor is it a housing authority. It does not have powers to build or to let houses for rent. Its function is to act as an agent of regeneration and to involve the

private sector, most particularly, in fulfilling the objectives laid down by the Act. As an agent of regeneration the Corporation has powers to use its budget to fund projects which will contribute to, accelerate, or reinforce the regeneration within its area.

The LDDC is NOT a transport authority. It is not a highway authority - these powers lie within existing highway authorities in the area, currently the London Boroughs and the Department of Transport. Nor is the Corporation a public transport authority. these powers lie with London Regional Transport and responsibility for the operation of transport services in London with the various operators: London Buses, London Underground and some private bus operators.

Thus whilst the LDDC was created with wide ranging planning and land powers, it does not have any statutory responsibilities for transport within its area.

Mr. Haworth reported that the Corporation had always taken the view that no mode of transport should enjoy, or suffer from, any pre-eminence amongst its transport policies. The objective at the start therefore is to improve all transport modes to and from the Docklands area. Because the Corporation is not a plan-making authority these policies have never been so rigid as to not be responsive to the needs of the development industry.

Mr. Haworth then concentrated on the Docklands Light Railway; its history and justification.

The cost of constructing a full underground line in the form of an extended Jubilee Line, or River Line, had militated against its selection as a viable public transport means of serving Docklands. In 1980 the Government, GLC, the Boroughs and London Transport received a report on lower cost alternatives to the

Jubilee Line which first introduced the idea of light rail in Docklands. In the context of a much lower budget that was likely to be available than the cost of the Jubilee Line it was felt necessary to link together existing railway rights within the docks and feed them as near as possible to Central London. Such a strategy was not immediately felt to be viable however as the alternative mode of public transport, that is improved bus services, could have dealt with the passenger demand just as adequately. The bus option however did not offer the level of accessibility to Docklands, particularly the Isle of Dogs, that the light rail solution did. Moreover the bus solution would not have offered the concrete commitment to investment in Docklands than would have any rail based solution.

Following the creation of the LDDC the light rail options were examined further and two choices emerged: an East/West route from the edge of the City to the North side of the Isle of Dogs; and a North/South route from Mile End through to the South of the Isle of Dogs. This latter scheme included about one mile of street running on the A11, one of the main radial routes into London from the East. As with all the previous proposals for rail schemes in Docklands neither of the two routes could be justified on transport criteria alone. Indeed their final justification rested upon the development benefits that would ensue. Examination of the two routes revealed that they would be likely to have different effects. The East/West link could attract employment based development into Docklands with consequent commuters on the railway. The North/South link, however, would link the Isle of Dogs to other residential areas in inner North East London. It was finally decided to combine the two routes into one whose Northern terminus was Stratford. As an interchange Stratford is potentially slightly less attractive than Mile End, lying as it does on only one Underground line. However it proved a cheaper and less contentious terminus than Mile End. At that time it was part of

the Corporation's strategy to later extend the railway eastwards across the River Lea to the Royal Docks.

The cost of the initial system of the DLR is £77M at out-turn prices. It is funded jointly by the Department of the Environment (through the LDDC) and the Department of Transport (through LRT). Parliamentary powers for the railway's construction were gained in 1984 and work on site began in 1985. The contract let was a 'Design and Build' project undertaken by GEC and John Mowlem. LRT and the LDDC jointly set up the Docklands Light Railway Company to oversee the contract and to operate the railway. DLR is now an operating subsidiary of LRT.

The construction of the railway coincided with a dramatic effect on the development potential of Docklands, and in particular the Isle of Dogs. The railway represented a physical manifestation of the Corporation's commitment to better public transport in the area and to public investment in the area in general. In 1982 when the investment case for the railway was prepared it was forecast that there would be around 17,500 jobs when the Isle of Dogs was fully developed. During the construction of the railway, which had a high physical as well as marketing profile, land values rose and development aspirations rose with them.

Early in 1985, when the large financial services sector development proposal was made for Canary Wharf, the aspiration for the number of end state jobs on the Isle of Dogs had quadrupled. Even before it opened it appeared that the railway had more than done its job as a tool for the regeneration of Docklands. However the emergence of the Canary Wharf project and a number of other large scale developments on the Island created an even greater forecast demand for public transport use. Furthermore it appeared that the success of the regeneration on the Isle of Dogs depended on a greater level of accessibility for

the Island, particularly to the City of London and also to destinations in the South and South West. The proposal to extend the DLR into Bank, which had previously been rejected on cost grounds, was resurrected. The consortia involved in Canary Wharf were prepared to commit a considerable proportion of the capital expenditure of this extension. It now appears that the developers of Canary Wharf, Olympia and York, will be committing in excess of £60M towards the capital cost of the Bank extension.

Also in 1985 attention turned toward the extension of the railway eastwards to the Royal Docks. Detailed alignments were begun to be drawn up. As this focus of interest for the railway moved eastwards, so did some of the development interest. During 1985 large scale development proposals for the Royal Docks were brought forward by three developer consortia. It was explicit from the outset that the success of these proposals rested upon the extension of the railway eastwards. Equally, the success of gaining the powers and the finance for the eastern extension rested upon these development proposals coming to fruition. The case for the railway, submitted to Parliament in November 1986, included a detailed exposition of the benefits to be obtained. These were calculated by considering the incremental changes in land value that would occur directly as a result of the construction and operation of the railway in the Royal Docks. Much of the gain in land value could be recouped by the Corporation as a land owner in the area. This enabled the Corporation, along with the development consortia, to be able to make explicit commitments to the funding of the Eastern extension, calculated to cost around £130M.

Mr Haworth then briefly considered recent developments for other transport modes. the implementation of the Corporation's highways policies could be split into two parts: internal and distributor roads serving development sites directly; and external highway works aimed at improving the general level of

accessibility by private car to the area.

The development of distributor and local roads is best exemplified in the Surrey Docks area and the Isle of Dogs. In the Surrey Docks where most of the commercial docks were filled in the 1960's a large area of land was vested into the Corporation's ownership. This land was divided into sites, mainly earmarked for housing development, and a suitable local road network drawn up to serve these sites. This was constructed in block work and connected to the existing highway system at a limited number of points. The success of this infrastructure is easily demonstrated. Sites that were previously inaccessible by private car became accessible and were able to be marketed accordingly. A similar path was followed on the Isle of Dogs where access to the West India and Millwall Docks was opened up through the provision of a block work road (red brick road) to serve areas designated for industrial and office development. Again the result was successful and small scale industry and low rise offices were attracted to the marketed sites. The new roads were generally small scale in nature - the largest in capacity terms being the 7.3 metre local distributor roads.

In the Royal Docks the very size of the area has presented a slightly different problem. A whole spine road complex is being proposed with the major elements comprising dual two-lane carriageways and four-land roads. The provision of this highway infrastructure is not always an easy task. The Corporation can only build roads on land it owns as it has no highway powers. In addition it can only connect its roads to the existing highway network with the agreement of the highway authority. It has not always been possible to immediately reconcile the objectives of the Corporation with the objectives of the Local Highway Authorities.

With regard to external roads the problem referred to above is magnified. Nevertheless the pace and scale of development has led the Corporation to realise that large scale investment in highways serving the Docklands area is necessary to both meet the needs of the development industry and to reinforce the success that the Corporation has already achieved. Thus the Corporation is proposing a large scale investment programme (around £180M) for road improvements and new roads in North Docklands. Negotiations with the relevant Local Highway Authorities (the Borough Councils and the Department of Transport) will be necessary to achieve these proposals. Currently the proposals provide for a new stretch of highway at dual two-lane standard from The Highway in the West through Limehouse and the North side of the West India Docks with connections to access the Isle of Dogs at Westferry Road, Canary Wharf and Prestons Road and a link across East India Dock to Canning Town with connections to the development area in East India Dock and Brunswick. The proposals also provide for a new crossing of the River Lea downstream of the existing Iron Bridge on the A13. In addition to the above the Corporation is committed to the support of the East London River Crossing as it believes that this will enhance the accessibility of Docklands, and the Royal Docks in particular from South East London and the South East. The Corporation is also supportive of improvements on line on the existing A13 particularly within the Docklands area but also outside of it.

Early on in the Corporation's existence the possibility of a short takeoff and landing airport within the Docklands area was proposed by Brymon Airways. The Corporation gave careful consideration to the idea and held a referendum amongst local residents, the majority of whom were in favour of a project of this kind. Permission for the airport was given by the Secretary of State for the Environment following a public inquiry in 1985. The permission limits the number of flights per day, includes a moratorium on night flying, and specifies the noise levels of the

aeroplanes allowed to use the airport. The Corporation took the view that although the project contributed to the accessibility of Docklands, it more importantly heightened the perception of Docklands, and the Royal Docks in particular, as a potential development area. The airport is situated less than six miles from the City of London and on its opening, in October 1987, a shuttle mini-bus began operation between the airport and Victoria. Two airlines have been licensed to fly from London City Airport: Brymon Airways; and Euro City Express. Destinations within the range of the planes to be operated, De Haviland Dash 7's, include Paris, Rotterdam, Dusseldorf, Manchester and Jersey.

The River Thames bisects Docklands and creates a considerable barrier to movement both by public and private transport. Between Tower Bridge and the proposed East London River Crossing (road bridge) there are only three private vehicular crossings: Rotherhithe Tunnel; Blackwall Tunnel; and the Woolwich Ferry. There is only one rail crossing - the East London Line and two pedestrian tunnels - one at Woolwich and one at Greenwich. As part of its policies for improving the accessibility of Docklands the Corporation has long felt that the river offers an unrivalled opportunity. A number of Riverbus proposals for the Thames had started and failed in the past and the Corporation felt that a considerable amount of planning was required in order that the failures of the past were not repeated. Furthermore, as with the development of the railway, the development of the Riverbus proposal is tied in with riparian development proposals and each has an effect on the other. Along with the statutory authorities responsible for the river and transport in London (TWA, PLA and LRT) the Corporation has appointed Thamesline Plc as its contractor for the Riverbus service. From the Summer of 1988 they will run a 15 minute service between Chelsea Harbour and Greenwich calling at around half a dozen intermediate piers. Within Docklands these are

likely to be at Greenland Dock and Cherry Garden (in the Surrey Docks), West India Dock Pier and London Bridge City. The 50 seater craft proposed for the service is capable of journey times of 12 minutes between Charing Cross Pier and West India Dock Pier. Clearly such a service is not capable of contributing to mass transit in the public transport sector, nevertheless it offers a high profile opportunity for fast journey times to, from and within, the Docklands area. Further extensions of the service is likely to be intimately related to the development of riverside sites.

Because of the LDDC's regeneration responsibilities, the Corporation's transport policies are interwoven with its development aspirations. At present the transport planning process to stimulate and meet the needs of the development industry is still continuing. For the development aspirations of the Corporation to be realised much planning and a great deal of implementation is required. However, the examples referred to above demonstrate, in brief, the way in which the process is operating and the extent to which some conventions of transport planning are being changed. Indeed, it was felt that the development of the Docklands Light Railway illustrates a shift in the application of transport economics for the justification of large scale public transport investment.

Report prepared by Stuart Cole, Senior Lecturer, Transport Economics & Policy, Polytechnic of North London.
He is very grateful for the assistance with its preparation provided by Sion Haworth.

PROGRESS ON THE CHANNEL TUNNEL

Tony Harrison, Alastair Dick & Associates
(London, December 1987)

Introduction

A well attended meeting on Wednesday, 16 December 1987 listened attentively to Mr Tony Harrison's lecture. Initially the speaker introduced his organisation Alastair Dick & Associates (ADA) as being one of the members of the Transport Research Consortium. This was established in 1985 prior to the submission of the four rival Channel Tunnel schemes to the Government. Their task was to produce revenue forecasts and market studies essentially for the banks to whom they were answerable. The other members of the consortium are SETEC Economie, a French team and Wilbur Smith & Associates from the United States.

The lecture covered two major themes:

1. major aspects of the Channel Tunnel project itself namely legal, financial and physical;

2. traffic and revenue forecasts/procedures.

The Channel Tunnel Project

After nearly 200 years of ideas, proposals, discussions and even false starts by individuals and governments alike (some passing reference was made to early pioneering efforts following Colonel Beaumont in 1802 etc.) to construct a fixed channel link. The Euro Tunnel proposal (a private Anglo-French Group) was formally selected in January 1986 by both the British and French Governments to be the favoured scheme for a direct link between the two countries. (Incidentally this had been one of the least cost proposals).

Subsequently important and essential legislation, treaties and agreements were undertaken namely:

1. The 1987 Channel Tunnel Act (enacted 23 July) permits the acquisition of land to build the system on the British side (i.e. the equivalent of planning permission for the works required).

2. The 1987 treaty between Britain and France (ratified 24 July 1987) provides for the system to be constructed and opersated by private concessionaries. The concession is for 55 years, during which time the Eurotunnel Group will finance, construct and operate the system. The group is free to develop its commercial policy and the respective Governments will not intervene in the operation, but would pay compensation if they did so, or if they interrupt during construction.

The Governments also agreed to "use reasonable endeavours to provide supporting infrastructure for a satisfactory flow of traffic. After the 55 years the Channel Tunnel will become the property of the respective Governments. In 1987 the Rail Agreement (also dated 29 July) established how the railways will use the tunnel:

a. entitled to half the capacity

b. obliged to start regular services on opening

c. agreed to provide a London-Paris service between 2 hours 55 minutes and 3 hours 05 minutes within 12 months of opening

d. agreed to provide infrastructure to accommodate forecast traffic on opening

e. minimum usage charges agreed on a per month basis for the first 12 years of operation; this amount, coincidentally, underwrites all the Tunnel operating costs.

The funding includes around £1 billion of standby finance to cover unexpected increases in the cost of finance, construction or inflation.

In 1987 the financial costs looked as follows:

Estimated Channel Tunnel Costs:

	£1,000M	Standby bank and loans
	£3,696M	Bank loans
	£ 40M	Interest on received cash
	£1,000M	Equity
Total	£5,736M	

The physical aspects of the system represent a constructed link that will be 50 kilometres long, of which 38 kilometres will be under the sea bed. It will be built between Folkestone and Calais. The geology is considered to be generally very favourable, especially on the British side and the Tunnel will be built through a 20 to 30 metre seam of chalkmarl, which is some 40 meters below the seabed.

The actual shuttle train terminals will be at Folkestone and Coguelles (France), while the passenger terminals will be located further inland at Ashford and Frethun respectively.

The construction will consist of two outer tunnels each 7.6 metres in diameter, which will accommodate the standard Euro-gauge rail track. These tunnels will be linked to a central smaller tunnel, diameter 4.8 metres, at 375 metre intervals, to

provide access for maintenance, fresh air, and an emergency exit. Necessary piston relief ducts at every 250 metres will also form a part of the physical construction.

A mixture of shuttle train types are planned; both double and single decker trains for cars and coaches up to 350 metres in length, a passenger tourist shuttle 750 metres long and large single decker freight shuttles 4.2 metres high, 2.6 metres wide and 185 metres long.

Peak train frequencies are planned to be five passenger/tourist trains per hour and four freight trains per hour each way. The fact that when the tunnel is completed it will:

1. enable fast rail services to operate from Waterloo, Ashford to Lille, Paris, Brussels and beyond;

2. link with the electrified rail routes to the north via Kensington Olympia;

3. connect to the strategic motorway network of the UK via an extended M20.

These future fixed connections are predicted to give a major competitive edge to the project.

Forecasting Procedures

The Consultants adopted a procedure which consisted of six main stages:

1. the qualification of the potential market
2. an estimation of future growth
3. the application of a least route allocation model
4. the application of allocated future traffic to routes (including the Tunnel)

5. make allowances for odd generated traffic
6. calculate revenue.

They admit, however, that this rather 'classic' procedure assumes no change in industrial, structural and consequent train behaviour over time. They anticipate that trips will be diverted from elsewhere and that consumer expenditure, especially on leisure travel, will increase.

The most important influencing factors considered by the consultants are:

1. Eurotunnel characteristics (faster, more reliable, price)
2. single European market (SEM) (reduction in frontier effect)
3. leisure opportunities (EuroDisney)
4. job opportunities (patterns of employment)
5. catchment area (attraction of deep-sea transhipment).

Each factor could create a most significant to marginal change. For example, a SEM in 1992 could provide Europe with the role of an economic unit in a world context (and help fulfil a fundamental market principle). "The free movement of people, goods, capital and services" would represent a significant change while price induced changes could have marginal effects on increasing passenger and freight use for the Tunnel.

Standard variables were used in the consultant's forecasting, such as:

1. gross domestic product
2. consumer expenditure
3. relative purchasing power
4. population levels
5. car ownership.

Two decades of time series analysis has shown the stability of the relationships of these variables.

The actual forecasts which were shown in a series of slides (rather too quickly unfortunately!) indicated that the consultants would seem to aimed on the side of caution in their projections.

They suggest that by 2003 there will be a 9% increase in passengers as a result of price inducement, and a further 5% increase as a result of other factors. Freight growth projections were much smaller.

Slides of past trends indicated that passenger growth in 1975-85 was 6.5%, while freight growth was 6.9% over the same period. The actual numbers of passengers in 1985 was given as 48.1 million (27.7 million by air), the remainder travelled by car, coach and on foot in roughly equal proportions.

The final remarks stressed that the consultants would continue to review the forecasts and monitor markets and competition and then report to the leading banks on a regular basis.

The discussion tended to be dominated by observations, mainly in respect of just how much 'traffic' was likely to be diverted and the final question was in respect of Central London. Clearly no-one in the audience, including this writer, was prepared to stick his or her neck out at this time and predict that the tunnel was destined to take the lion's share of the passenger and freight market to Europe in the early part of the 21st century.

Report by Mervyn Jones, Land Use & Transport Consultant, City University

DEVELOPMENT OF STANSTED AIRPORT

Douglas Turner, BAA
(London, February 1988)

Douglas Turner joined BAA as a civil engineer 22 years ago to build Stansted as the third London Airport at that time. Two weeks ago the 'topping out' of the new terminal building was in the news.

Planning

After many false starts a promise to Parliament in 1979 gave rise to a public enquiry which decided in favour of Stansted for the Third Airport. Despite resistance to this, now the scheme is well advanced, a lot of objectors (e.g. local authorities) now appreciate it and co-operate with it. BAA was privatised last summer but this has not affected progress.

The Government White Paper (1985) on airports' policy stated for Stansted:-

1. Approved development up to 15 million passengers per annum (ppa).

2. Initial development up to 7 - 8 million ppa.

3. Air traffic management services limit of 78,000 movements pa (governs 2).

The only increase will be if there is no alternative and it is needed. (All subsequent planning and infrastructures relates to 2.)

Transport Links and Location

Stansted is correct in the geographical context, spreading

flights more evenly round London with good surface access. It directly serves about 5 million population in East Anglia and the North East Home Counties, providing regional transport where needed. It is in the north east corner of the crossroads of the M11 and Barking Relief Road, A120, from where the road link has been constructed.

The rail link, started late in 1987, will have a dedicated half hourly service taking 40 minutes to the redeveloped Liverpool Street terminal. A triangular junction off the main line will allow services to the north also (i.e. Cambridge and beyond). It will be underground within airport limits and the two platform station will have escalators, ramps for trolleys, and lifts for the disabled, to the check-in. Coaches will serve a mezzanine floor with similar methods of access.

Airside Infrastructure

In 1942 USAF built the runway and used it until 1956. It will only need resurfacing until after 2000 and is 3,050 metres long, comparable with Gatwick. In 1966 a prefab terminal building was constructed. The existing building is simple and basic but gives a limited service to up to 1.5 - 2 million ppa, which should suffice until 1991, when the new facilities will be opened. It will continue to function for general aviation, e.g. private flights and offices.

The existing runway, northern taxiway and terminal will stay. New southern taxiways will lead to the new development area. BAA own 2,400 acres (Heathrow has 2,900 acres), not enough for a second runway. Some land previously purchased has been sold. With a later, second terminal the airport could handle 25 million paa. Above 8 million ppa an emergency runway would be needed, by upgrading new taxiways, but it would be too close to the main runway for normal use.

The new terminal building to the south east will be joined to two satellites on the apron, by an underground tracked transit shuttle, as at Gatwick. There is a large cargo area, also a maintenance area with a Qualitair hangar, able to house two 747s, which will be complete by the end of 1988.

Roads

The primary access road was started two years ago and is now complete, and in use for construction traffic, to the new terminal, from the enlarged M11/A120 Birchhangar Roundabout. An expensive bridleway bridge has had to be built over the road. A halfway roundabout with links to the new facilities, will also connect directly with the A120. The old, very inadequate entrance road has been closed.

Short term car parking with 2,300 spaces will be adjacent to the terminal. long term parking with 10,000 spaces, near the existing north west terminal, will be served by a coach shuttle to the new terminal. It is being completed in stages to allow immediate use for construction and airport workers. 4,000 spaces will be ready by the end of March 1988. Each park will have an adjacent hotel, the latter's opening by 1991.

Ancillaries

A large ancillary zone includes flight catering units, a police station and component manufacturers, providing aircraft spares.

Services

Most main trunk drainage, costing £7-8 million is complete, with over 7 km of pipes of more than 1 metre in diameter and some much larger.

A very large balancing pond takes all the surface run-off, including de-icing fluid from planes, which is separated and

pumped to a sewage works beyond Bishops Stortford, which is being enlarged to cope. For incoming services, new water storage and a pumping station supplied from the reservoir at Sibley are being provided, also an electricity substation with power lines and a gas main from Harlow.

Terminal Building

This will be as simple as possible for users. All passengers will be at one level, progressing through the check-in, security, immigration and departure lounge with an airside coach station to remote stands. Arrivals will go through immigration, luggage reclaim and customs in a similar, direct route. The domestic sction will have a high security area for Northern Ireland flights.

The building is laid out with a 36 metre grid of support columns, or structural 'trees'. Each supports 18 metre square domes and a smaller intermediate dome directly overhead. This gives large clear areas on the concourse, with plant in the basement and feeds inside the 'trees' for air conditioning and other services. It is 12 metres from the concourse to the springing point and 14.5 metres to the crests of the large domes. These have some translucent panels, allowing natural light in, but polished lining panels reflecting artificial light back from the ceiling they form.

Each dome weighs 14 tons and a special crane had to be hired for the combination of span and weight required, costing £1,000 a day. Each 'tree' has had to be erected with cantilever struts temporarily secured and forces balanced, before a massive hexagonal nut and bolt keys them in and domes placed on top. One year ago the first tree was erected. Although the roof is now complete, it will take three years to finish the building.

The walls are glazed with opaque ends, but clear sides, so

passengers can see planes through the building. At night the building will glow, looking very effective. Similar landscaping to Gatwick's will help it blend in. It has been designed by the architects Norman Foster Associates and costs £85 million.

Environment

An artificial hollow has been created for the terminal and aprons. Two years ago 1.5 million cubic feet of spoil was moved in 8 weeks. Wet weather caused difficulties with working in the clay soil. 15 months ago the foundations were laid, all spoil has to stay on the site on a 'cut and fill' basis and a 12 metre high landscaped earth bank to the north east will protect a nearby village from noise and visual intrusion.

A lot of environmental concern was expressed at the public enquiry, so £4 million has been spent on landscaping with 250,000 trees and shrubs being planted. Over 200 inhabitants on 3 caravan sites have been relocated to a new site, constructed to the south. Six listed buildings have been re-erected elsewhere. Site archaelogists found a hoard of Roman coins amongst other finds. A consultant ecologist has organised the removal of rare grasses, orchids, etc. from the new terminal area to the south.

Conclusion

The current project for 8 million ppa has a total cost of £300 million with £1.25 million/week being spent at present, rising later to a peak of £1.50 million. Douglas Turner described his assignment as one of exciting variety, including the revolutionary terminal building.

Reviewed by Geoff Mileham, InterCity Europe

FREIGHT: ROAD V. RAIL - THE RAIL PERSPECTIVE

Aidan Nelson, British Railways Board
(Leeds, February 1988)

Since the Second World War, much of the freight that used to be carried by rail has transferred to road. Railfreight was particularly hard hit by the recession in the early 1980's. It has now been given a target for 1989-90 to achieve a 5% return on current cost valuation of assets. The talk of Aidan Nelson highlighted the ways in which Railfreight aim to meet this target, whilst at the same time improving the service given to the customers.

He started by showing a table (Table 1) of Railfreight's financial performance from the end of 1983 to March 1987.

TABLE 1

Period	Gross Income £m	Surplus/Loss £m
15 months to 31/3/85	432.4	-263.7 (miners' strike)
12 months to 31/3/86	547.1	- 13.1
12 months to 31/3/87	556.1	+ 14.7

This is a dramatic turnaround, brought about via the usual method of cost cutting, productivity improvements and the search for new business. However, of fundamental importance, it was argued, was the introduction of sectorisation. Within freight, by 1984 each of the major areas of business had their own sub-

sector. Each sub-sector now organises the whole of its business, with the mind concentrated by the fact that each sub-sector manager is now fully accountable for his results.

The core of Railfreight remains coal, chemicals, construction, petroleum products, and metals by the trainload supplemented by the Speedlink wagonload services; mostly bulk products, but, with the increase in lorry weight to 38 tonnes, products which may be moved readily by road. British Rail's response has been to cut costs and develop new business. Using index numbers, and taking 1982 as equal to 100, in 1986-7 Railfreight's costs were cut to 88. Measures taken include the reduction in the loco fleet by one-third between 1982 and 1987, dedication of locos to particular flows, a driver only operation. The largest cost reductions, in terms of the index though, came about via the reorganisation of terminals. Again using index numbers and taking 1982 as 100, by 1986-7, the index had fallen to just 51. Concurrent with the drive to cut costs has been a determined move to attract new business. Thus record tonnages of aggregates are now being carried, the metals sub-sector is benefitting from the upturn in steel output, the movement of refuse is becoming increasingly important and coal has recovered from the miners' strike.

It has now been realised by BR that most of the costs that could be cut have been cut, and that further improvements will only result from new investment. Thus future investment plans include new motive power, in the shape of the Class 60 loco, which should be cheaper to run and maintain, and have higher availability, and new developments in wagon design.

Aidan Nelson ended his talk on this optimistic note, and invited questions from the audience. Not surprisingly, one the first questions was on the impact of the Channel Tunnel on Railfreight, given the limited UK loading gauge and the large

scale closure of freightliner depots. On the former, we were told that experiments with new designs of wagon (including those designed by Tiphook) were progressing well, and should be able to maximise the volume available for payload. It was mentioned that the axle loading was heavier than on the continent. On the closure of the freightliner depots, it was said that given that most of the UK freightliner market is now based on maritime trade the rationalisation of terminals was appropriate.

The discussion then turned to the question of accounting methods, and in particular how relevant were the values in Table 1. Whilst it was admitted that the absolute values of costs depended on the accounting conventions used, it was stressed that they do give an accurate indication of how Railfreight has been turned around since 1984.

Finally, questions were asked about the future of Railfreight, given its dependence still on heavy industry which is characterised by booms and lumps, and is a declining area of activity in the UK. We were told that this was fully appreciated by Railfreight, who had drawn up a robust plan for the next five years which should be able to cope with most eventualities.

Clearly the message from this talk was that Railfreight remains a serious contender for the movement of freight in the UK. Whether Railfreight's impressive statistics still persuade hard-bitten freight forwarders to switch in large numbers from road to rail, though, only time will tell.

Report by Philip Catherall, Institute of Transport Studies, University of Leeds

ARTICLE

ECONOMIES OF SCALE FOR TRANSPORT OPERATORS

by Nigel Harris, London Underground Ltd

As public transport attempts to become more competitive and profitable, there is an increasing desire to match demand to capacity more closely. Moreover, the greater demands of accountancy in isolating cost centres for charging purposes (e.g. the requirement in the British bus industry to separate out subsidized from commercial services) also tends to mean that specific vehicles often become allocated to specific services.

However, both of these trends reduce operational flexibility and can even lead to poorer resource utilization. Operational flexibility is reduced because smaller vehicles (minibuses in the bus environment, and lightweight Diesel Multiple Units in the rail environment) are completely unsuitable for longer-distance higher-volume demands. For example, the minibus operator cannot bid for party travel in the inter-peak period because of the increased crewing requirements incurred in running, say, three minibuses instead of one larger vehicle. Similarly, British Airways cannot substitute 30 ten-seater planes when a Jumbo Jet fails before take-off.

A second type of operational inflexibility occurs where LRT systems replace conventional rail; problems can arise with respect to demands for railway freight traffic incompatible with LRT vehicles, and separate tracks (neither of them fully used) may be required. This, however, does not mean that all buses, trains and ships should be the same, but merely that the merits of standardization are considerable.

Poorer resource utilization can also result from attempts to match supply too closely to demand. Assuming that mechanical failures occur at random, then greater spare capacity is needed for a given degree of cover as a fleet of vehicles is split into non-interchangeable subsets with different characteristics. As an example, consider a situation in which, on average, only 80% of vehicles are available for duty on any particular day. Assume that the probability of failure is normally distributed about the mean of 0.2 with a standard deviation of 0.08 (a distribution which is not unrealistic for public transport operations). Table 1 gives probabilities derived from the normal distribution for a number of vehicle requirements in two situations, one with a fleet size of 100 vehicles and the other with a fleet size of 50.

Remembering that it is the absolute number of vehicles (and hence the absolute number of diagrams that can be covered with the available vehicles) which is critical to the operator, we can calculate the probabilities of being any given number of vehicles short of the required number on any particular occasion. Table 2 presents the probabilities for three situations:

(i) for a single fleet of 100 vehicles,

(ii) for 100 vehicles which are operated as two subfleets of 50 vehicles, and

(iii) for 100 vehicles operated in two subfleets of 75 and 25 vehicles.

Probabilities for the fleet of 100 are taken straight from Table 1. As an example of the calculations, consider the probabilities for two fleets of 50 vehicles, and the case of being two vehicles short.

TABLE 1

PROBABILITIES OF VEHICLE FAILURE

Failures n=100	Failures n=50	s.d. from mean	Probability of occurrence
20 or less	10 or less	0.00	0.500
22 or less	11 or less	0.25	0.401
24 or less	12 or less	0.50	0.309
26 or less	13 or less	0.75	0.227
28 or less	14 or less	1.00	0.158
30 or less	15 or less	1.25	0.106
32 or less	16 or less	1.50	0.067

There are three ways in which this can arise:

1. one extra failure in each fleet.
   Probability = (0.599 - 0.5) X (0.599 - 0.5) = 0.0098

2. two extra failures in fleet A, but none in fleet B.
   Probability = 0.5 X (0.691 - 0.599) = 0.046

3. two extra failures in fleet B, but none in fleet A.
   Again, probability = 0.046

The total probability of being two vehicles short in this case is the sum of these, i.e. 0.102. The cumulative probability of being as many as two vehicles short is therefore 0.102 larger than that for one vehicle (0.451 as opposed to 0.349).

TABLE 2

PROBABILITIES OF VEHICLE SHORTFALL

No. of vehicles short	Probability of occurrence		
	Fleet of 100	Fleet of 75 + Fleet of 25	2 Fleets of 50
0 or less	0.500	0.250	0.250
1 or less	0.550	0.379	0.349
2 or less	0.599	0.499	0.451
3 or less	0.646	0.598	0.551
4 or less	0.691	0.677	0.643
5 or less	0.734	0.740	0.724
6 or less	0.775	0.793	0.793

The results given in Table 2 are significant. Whilst, on average, a large fleet of 100 has sufficient vehicles to cover all the required duties, the most likely situation with two smaller fleets is to be two or three vehicles short of requirements. This has considerable cost implications in terms of spare vehicles required to cover for either demand peaks (e.g. party travel) or supply troughs (e.g. the incidence of failures, as described above).

These results may be applied to a large number of transport operating environments. Similar situations are particularly likely to occur in transport modes such as rail where asset life is long. In such cases, different generations of rolling stock are likely to be used simultaneously whilst being completely incompatible with each other because, for example, new braking and control systems have developed during the life of the older assets. BR suffers from this problem especially in the domain of multiple units (e.g. Sprinters cannot work a train in multiple with traditional DMU stock).

The method suggested here can also be used to examine accurately the trade-off between, say, having a standarized fleet of mixed-traffic locomotives, or having two separate fleets, one for passenger use and another for freight use. It shows the underlying reason why it is that, of British Rail's High Speed Train sets, the Pullman sets are amongst the least-utilized, since they alone can be rostered for services advertised as Pullmans, because of the extra catering and first-class vehicles they include; the costs associated with this poorer utilization need to be taken into account when justifying the service in the first place. Similarly, increasing the average size of a company's bus garages may enable a reduction in vehicle requirement (and even in the crucial Peak Vehicle Requirement) to be made, as well as making security easier to enforce. Perhaps most worrying of all, however, would be the rigid adherence by BR operators of locomotives to the work of Railfreight's five sub-sectors (covering coal, oil, steel, aggregates and general freight); such adherence would create considerable additional locomotive requirement.

In practice, the results demonstrated here can be readily applied to any particular transport undertaking by deriving a frequency distribution of the number of vehicles available for traffic every day for a month or so, data which traffic managers often keep anyway. Having calibrated the distribution for their own individual environment, it is then easy for operators to set a target for a particular percentage of failures (and hence cancellations), and to act accordingly.

Not only, however, are there substantial scale economies apparent with the use of capital assets, but the same arguments also apply to the use of staff. For instance, if rail services require both a driver and a guard, then the percentage spare cover needed to maintain a service at an acceptable level of reliability will be reduced if the average depot (and hence pool

of staff) is large. Such a trend towards larger depots has indeed occurred in the history of the railways from the early days when locomotive depots were very widespread. Militating against the further rationalization of depots, though, are factors such as the increased operating costs incurred in running empty from depots to the origin of demand, whilst the reliance of an entire system on the operation of a very small number of depots can also be important.

In conclusion, then, there are major scale economies that can be realized from increasing fleet and depot size, and these are sufficiently important (saving the capital expense of two buses means saving around £200,000) to offset most diseconomies of scale. However, in many cases, it should be admitted that operaters are, in fact, prevented from taking advantage of the scale economies noted here because of other factors (e.g. political pressures preventing the closure of small depots because of the loss of local employment opportunities, and planning constraints preventing the expansion of existing infrastructural facilities).

Moreover, it may be possible for operators to avoid the worse excesses of the diseconomies demonstrated by retaining a small number of dual-purpose vehicles available for covering a few diagrams of either set of vehicles, thus improving reliability up to a pre-determined level. For many operators, this is the preferred solution since the problem of non-interchangeability is only partial. For instance, in the case of London Underground, smaller tube trains can run on subsurface lines built to a larger gauge, even if the reverse is not possible. A similar solution may present itself for staff; although it may be expensive, drivers can do guards' work even if guards are not permitted to drive. Other possibilities for ameliorating the problem include the temporary external hiring of vehicles from other operators (expensive in any case, and not

usually a practical option for either BR or LU) or internal hiring from other depots elsewhere on the system (a frequent solution for BR). Furthermore, since resources are only fully committed at peak times, there is considerable scope at off-peak times for employing vehicles temporarily standing idle, but in peak periods, this option does not exist and service cancellations may be necessary if operators have not managed to adopt a strategy of massed reserves.

(The views set out here are those of the author and do not necessarily reflect the views of London Underground Ltd.)

TEG NEWS

CHAIRMAN'S REPORT FOR 1987/8

The previous Annual General Meeting on 18 February 1987 concluded with the expression of concern that attendances at meetings were not as high as we would wish. Happily, the ordinary meeting which followed immediately afterwards - addressed by Chris Green, Director of BR's Network South East Sector - displayed a large and enthusiastic audience. Good attendances have also been observed at many other London meetings this year, notably Sion Haworth's talk on Transport in Docklands (October), and Tony Harrison's on the Channel Tunnel (December) [both reported in this issue].

Other subjects covered have included the London road assessment studies (Denzil Coombe, March), the value of time (April), a county council viewpoing on bus deregulation (Kieran Holmes of Derbyshire, May), transport for tourists (Peter Stonham, November), and effects of road on the local economy (Jeremy Vanke, January).

Northern area meetings have covered urban public transport subsidies (John Dodgson, February 87), monitoring bus deregulation (Norman James et al, May) the Manchester Airport Rail Link (Stan Jobling, October), and road v. rail freight issues (Aidan Nelson, February 88) [reported in this issue].

Due to problems of organising advance publicity, the September meeting did not take place but the scheduled topic (freight transport in the European Community) will instead be covered in June this year.

The Committee elected at the last AGM was largely unchanged from that previously in place - Don Box as treasurer and membership secretary, Stuart Cole as editor, Roland Niblett as programme organiser, and myself as chairman. Nick Lester joined the committee, also becoming vice-chairman, the previous holder of this position, Peter Collins, remaining as an ordinary member. Due to pressure of work, David Bruce resigned from the committee. His place as secretary was taken by Ernest Godward. Chris Nash of Leeds Univesity has continued as committee member and Northern meetings organiser.

Particular thanks are due to Don Box for his commitment as both treasurer and membership secretary in a year which has seen membership rise to a record of 154, despite continued turnover. After two years of stable subscription rates a modest increse to £13 has been introduced for the current year.

I am pleased to record the award of the OBE to our long-standing member John Hibbs in the New Year Honours List. However, I regret to report the death of Mark Egerton of the Department of Transport, who spoke at the April 1987 meeting on the value of time.

The journal has continued to cover a wide range of issues, and frequency of publication has been increased to four times a year.

Thanks are also due to Joanna Irving for word processing and mailing on behalf of the Group.

Peter R. White, Chairman, 15 February 1988

TREASURER & MEMBERSHIP SECRETARY'S REPORT FOR 1987

Again a small surplus has been achieved over the years' activities. This is entirely due to the buoyancy in members' subscriptions during the year as expenditure has increased as expected and the subscription rate was kept down to the 1986 level of £12 per member.

We have striven to keep expenditure at the lowest level consistent with the number of meetings and issues of the journal that members have come to expect. Measures taken include a number of reviews of the cost of the journal and some success in keeping steady the costs of meetings.

The breakdown of expenditure between the main items and compared with the previous year is:

	1987 (%)	1986 (%)
Administration	39	43
Publications	49	41
Meetings	10	13
Other	2	3

The formal accounts and balance sheet were made available to members at the AGM and are also appended to this report.

On membership I can report that we have had some success in stemming the loss of members during the year and this taken in conjunction with a steady flow of new members has increased the total at the year end to 154.

Bearing in mind the increases in expenditure we anticipate in 1988 and the relatively small surpluses of the last two years the committee consider it prudent to increase the subscription charge in 1988 to £13 per annum. This will be the first increase since 1985.

S.D. Box, Treasurer & Membership Secretary, February 1988

INCOME & EXPENDITURE ACCOUNT FOR 1987

		£	£	£
Income	Subscriptions		1848	
	Interest		9	
	Other		11	1868
Expenditure	Administration - Secretary	491		
	- postage etc	216	687	
	Publications		860	
	Meetings - Room hire	59		
	- Entertainment	114	173	
	Insurance		40	
	Corporation Tax (@ 35%)		3	1763
Excess of income over expenditure for the year				105

BALANCE SHEET AT 31.12.87

	£	£
Members' accumulated funds at 31:12.86	942	
Add Excess of income over expenditure	105	1047
Creditors (inc. tax provision)		603
		1650
Represented by: Bank accounts - deposit	185	
- current	1465	1650

Signed: S.D. Box, Treasurer

REPORT OF THE AUDITOR

To members of the Transport Economists Group:

I have examined the books and records of the Transport Economists Group and have received explanations from your Treasurer as necessary. In my opinion the Balance Sheet give a true and fair view of the state of affairs as at 31st December 1987 and the Income & Expenditure Account properly reflects the excess of income over expenditure for the year then ended.

Signed: J.C.Bentley FCCA, 24 Phillimore Rd, Emmer Green, Reading.

FORTHCOMING MEETINGS

1987/88 LONDON AREA MEETINGS

Wednesday, 18 May 1988
BA PRIVATISATION ONE YEAR ON

18.00 for 18.30, PLC

Wednesday, 15 ~~May~~ June 1988
FREIGHT TRANSPORT IN THE EUROPEAN COMMUNITY
Mike Browne, Transport Studies Group plc
18.00 for 18.30, PLC

All London Area meetings are held on the third Wednesday of the month, at 18.00 for 18.30 at the Polytechnic of Central London, 35 Marylebone Road, London NW1 adjacent to Baker Street Underground Station. Meetings are generally held on the third floor of the main block directly fronting Marylebone Road. The room number is displayed in the reception area.

COMMITTEE 1988/89

Chairman
Peter White, Senior Lecturer in Public Transport Systems, Transport Studies Group, Polytechnic of Central London, 35 Marylebone Road, London NW1 5LS (01-486 5811 X 298)

Vice Chairman
Nick Lester, 10 St Johns Church Road, London E9 6EJ.

Secretary
Ernest Godward, 29 Redhill Close, Old Swinford, Stourbridge DY8 1NF

Treasurer & Membership Secretary
Don Box, 73 Silverdale Road, Earley, Reading RG6 2NF (0734 64064)

Publications Editor
Stuart Cole, Senior Lecturer in Transport Economics & Policy, The Business School, Polytechnic of North London, 2-16 Eden Grove, London N7 8DB (01-607 2789 X 2457)

London Programme Organiser
Roland Niblett, 48 Delves Avenue, Tunbridge Wells, Kent TN2 5DS (0892 26608 - Home)

Committee Members
Peter Collins, Group Planning Manager, London Regional Transport, Lindsay House, 167-9 Shaftesbury Avenue, London WC2 (01-240 7292)

Chris Nash, Institute of Transport Studies, University of Leeds, Leeds LS2 9JT (0532 431751 X 7212)

ADVERTISEMENT

COPY DATES FOR THE TRANSPORT ECONOMIST

In an attempt to relate the copy dates of the magazines to the numbers of meetings taking place between issues, the Committee at its meeting on 16 December decided on a revised schedule.

Edition	Vol.	No.	Copy Date	Date Out
Spring 1988	15	3	14 March	30 April
Summer 1988	15	4	14 June	31 July*
Autumn 1988	16	1	14 September	31 October
Winter 1988	16	2	14 December	31 January

*The programme for 1988/89 is included in this edition.