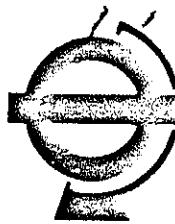


London Transport International



LIGHT RAIL DEVELOPMENTS IN BRITAIN

David Catling

Former Engineer Manager

Docklands Light Railway



LRTA

Light Rail Transit Association

LIGHT RAIL DEVELOPMENTS IN BRITAIN : DAVID CATLING

1. SYNOPSIS

The Paper lists all known light rail schemes in Britain, including existing systems, those at an advanced or preliminary planning stage, and those where LRT is only one of several public transport options being evaluated for a particular region or city.

It attempts to highlight and summarise the distinctive and common features of each system, in meeting a particular defined public transport need, whether in the choice of route to maximise use of existing rights of way, or the system, or method of funding, to illustrate the flexibility and diversity of light rail, which is one of its greatest assets. The Paper does not give detailed descriptions of each scheme, but lists known relevant references.

It is generally confined to fairly conventional LRT schemes and does not cover existing 'People mover' shuttles, such as the Westinghouse Transit Expressway at Gatwick and the GEC Maglev at Birmingham Airports, or other special systems at leisure parks.

2. INTRODUCTION : CRITERIA FOR A SUCCESSFUL LIGHT RAIL SCHEME

Before reviewing the various existing and possible new light rail schemes in Britain, one should first recall that the planning and completion of a new light rail system in an established city is a major long-term task, (Ref 1) requiring strategic vision coupled with much experienced detailed practical work, and winning and maintaining the support of all those bodies with a legitimate interest. The following are the main interacting and iterative tasks which must be completed before any construction can begin:-

- Develop an overall strategic plan for the city or region, and preserve potentially useful existing rights-of-way, but without creating a planning blight .
- Carry out a transport study of the medium and long term trends, the likely patronage and revenues, and assess the possible public transport options to satisfy them.
- Where light rail appears to offer the most cost-effective and appropriate solution, develop alignments and system elements which exploit its special characteristics to optimise the design and minimise capital and operating costs, namely:- using the high curving and gradient potential to avoid costly civil works; running at grade on existing rail rights of way, or on streets (segregated where possible) to reach traffic objectives inaccessible to heavy rail; the ability to carry the disabled, including those in unassisted wheelchairs.
- Prepare and keep up-to-date realistic capital and operating cost estimates based on appropriate management and staffing levels.
- Consult and inform all interested bodies at every stage.

- Prepare Parliamentary Plans and Private Bills(s) to obtain legal authority to 'acquire land and construct a railway', if possible first reaching agreement with major objectors; monitor and assist all Parliamentary stages up to Royal Assent.
- Obtain necessary capital funding from Central/Local Government, private sources or any appropriate combination, using all accepted evaluation criteria, and stressing other indirect community and environmental benefits.
- Obtain approval of Railway Inspectorate on all system safety aspects at all stages.

This rather lengthy and formidable list provides a framework and a checklist for each of the various schemes described in the following sections. They are given in approximate order of their progress along the way, starting with operational systems, those at the Parliamentary and pre-Parliamentary stages; then preliminary feasibility and planning studies.

3. BLACKPOOL

Blackpool deservedly heads the list as the sole and centenarian survivor of the 200 tramways in Britain. Some 70 trams running over 18km of reserved track along the seafront between Blackpool and Fleetwood carry over 6m passengers annually, providing both a regular service for residents and a tourist attraction, with a blend of new single deck one man operated trams with thyristor equipment and historic and 'fun' cars.

Blackpool teaches us the merit of retaining a valuable right of way, and what can be achieved by enterprise and imagination, even with limited technical resources and funds.

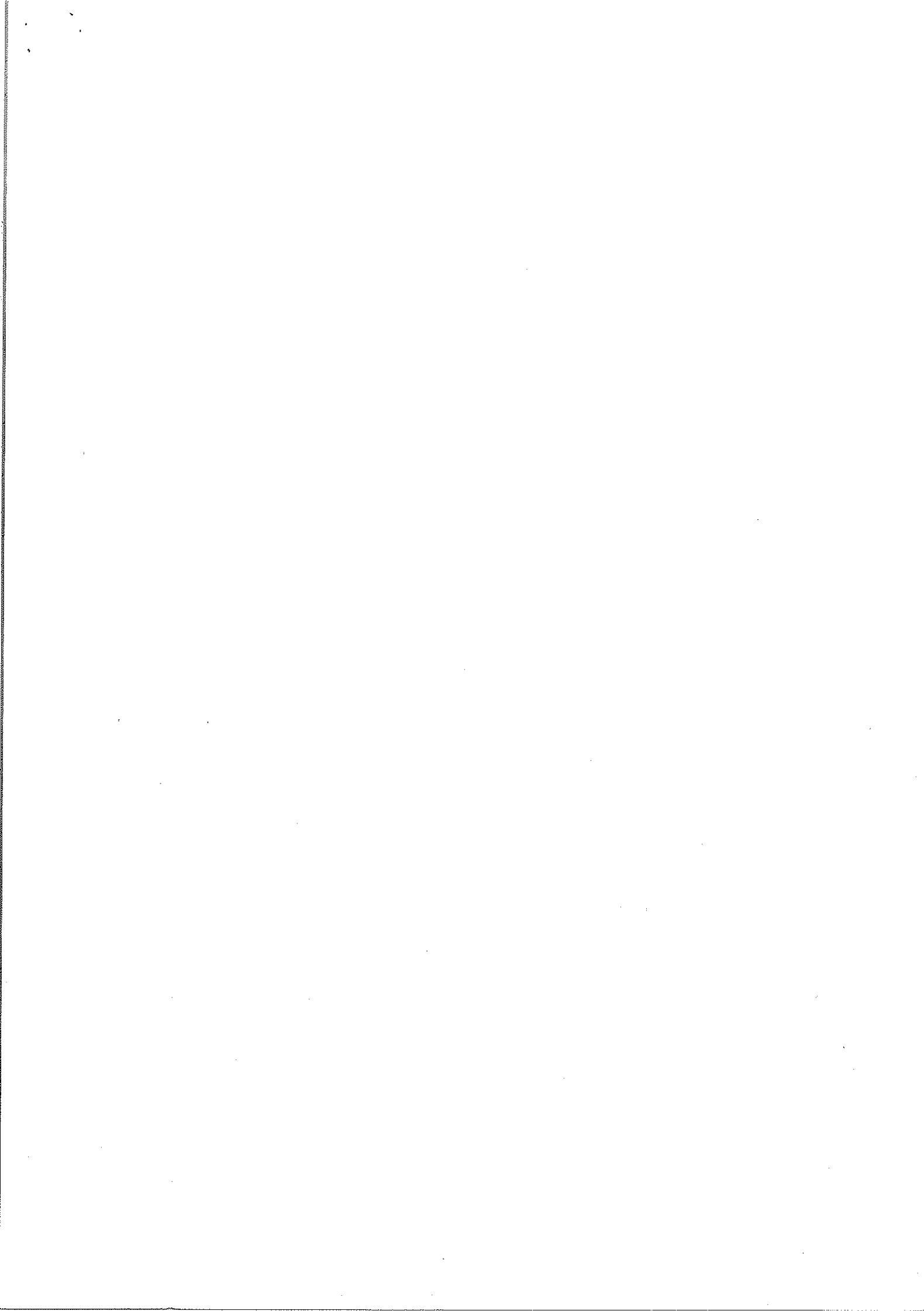
4. NEWCASTLE : TYNE AND WEAR METRO (REF 2)

Planned in the early 1970's as part of an integrated passenger transport system for the Tyne and Wear conurbation, the Metro was designed to use mainly existing British Rail tracks, plus new tunnels to reach the City Centre and a bridge over the River Tyne to link the north and south. Since its opening in 1980 it has grown to 55 route km with 45 stations and 60M passengers annually, carried in twin body articulated units. A further low cost extension to Newcastle Airport is being studied.

Newcastle has shown what can be achieved by thorough and determined visionary long term planning; full use of valuable under-used rail rights of way; the choice of appropriate 'state of the art' technology and alignments - in this case a 1500 V DC fully signalled railway with vehicles developed from current German designs, and extensive tunnel running - which demonstrate the flexibility of the light rail concept at the top end of the light rail spectrum.

5. LONDON DOCKLANDS LIGHT RAILWAY (REFS 3,4)

The initial 12km system, which opened for public service in August 1987 was wholly financed by Government, as a project of regional or national importance. The 1.8km City extension in tube and the major upgrading of the initial railway now in hand will be part funded by Government and



part by developers. The 7.5km surface extension to Beckton, with a Bill now in Parliament, is to be entirely funded from land sales. Further extensions to the east and/or south under the River Thames, are now being studied.

The lessons from this project, which opened on time and within budget in three years after placing a single 'design and construct contract', are:- the necessity for long term planning, but coupled with a flexible response to changing political and funding conditions; the DLR's role as essential catalyst in a development area, with the use of old railway alignments making possible a fully segregated system and a 'high tech' solution to meet Client aspirations; the success of intensive personal local contacts to ensure the railway being welcomed, not resented; the value of a small separate light rail team in a large transport organisation, and the successful building of a complete railway with complex urban interfaces by one contract.

6. GREATER MANCHESTER (REF 5)

Manchester is next along the way, with enabling Bills in the final Parliamentary stages, and a detailed application to the Government for Grant Aid for the first phase of a staged 100km network of six LRT lines, based on BR tracks, linked by 3km of street running in the City Centre.

Manchester has been bedevilled for over 140 years by the absence of a rail link between the two main rail stations, Victoria on the north side and Piccadilly on the south, about 1km apart, for which many past solutions have been proposed, including the costly 'Picc-Vic' tunnel.

The present proposed surface scheme, which originated in 1981 has won almost universal acceptance, and has reached its present stage by the full and continued cooperation of the City Council and Transport Authorities and British Rail, and has survived the recent major political changes resulting from the abolition of the Metropolitan County Councils. It required first the concentration of all BR Inter-City services at one main Station (Piccadilly), achieved by constructing two relatively short new rail links, and then very careful detailed operational, traffic and environmental planning of the street running sections in this very busy City, as the 'key' which 'unlocks' the whole of this extensive scheme.

The PTE's and the Government's financial consultants are now jointly examining a range of options to introduce private funding into the scheme, and a further extension to serve the Salford Quays development is now being studied (Ref 4).

Lessons are:- the vital necessity of joint long-term strategic planning with wide political support; full evaluation to demonstrate viability using accepted Government criteria; good local information and public relations including the demonstration running this year of a DLR unit modified for overhead current collection; provision for the disabled; a thorough, practical scheme suitable for phased introduction, and finally a further example of LRT's technical flexibility - the possible use of 750V DC in the low speed street running sections, and 1500V DC in the high speed outer sections.

7. SHEFFIELD AND SOUTH YORKSHIRE (REF 4)

Sheffield comes next, with a Bill deposited in November 1985 by the South Yorkshire Passenger Transport Executive. This scheme now covers a new 22km route from Mossborough in the east to Hillsborough in the west through the City Centre, including a new much needed link to the main BR Station. It originated in a far-sighted proposal by the PTE to safeguard a network of six alignments for a Segregated Passenger Transport System (SPTS), approved in 1979, and subsequently confirmed in 1983 that light rail would be the most cost effective and appropriate solution.

Unlike the three new schemes previously described, it uses no railway alignments, but runs entirely on the highway, with about 60% on segregated rights of way. The PTE recognised from the start the major traffic, operational, technical and environmental issues which would have to be resolved in inserting such an extensive street running system into a major City, albeit with some use of former tram routes, and so, in full collaboration with the local planning and highway authorities, they made detailed studies of all aspects of the best modern practice in track laying and delineation; power supply, vehicle and stop design, including access for the handicapped; traffic management, especially signalling at junctions; minimising capital and operating costs. Despite this very thorough study, and the preparation of a very sound financial case, the scheme's progress has suffered a temporary setback after the reorganisations following the abolition of the Metropolitan County Councils, and the Parliamentary process has been delayed, pending further independent assessments of the scheme (including bus deregulation effects) to resolve any remaining differences between the PTE and the City Council (Refs 6,7). It should, however, be resumed before the end of the year.

8. BRISTOL AND THE AVON METRO (REF 8)

Next in the Parliamentary 'queue', a private company, 'Advanced Transit for Avon', hope to deposit a Bill for the first phase of a new system in November. It is the only scheme described in this Paper to be sponsored and developed entirely by private resources. Work started on the scheme in 1979 by local initiative, and the study embraced an ultimate but staged network of some 150km with 50 stations, to serve the City and rapidly developing conurbations, with about 90% on existing or disused BR alignments, and a new section in the City Centre, which is crucial to the whole scheme.

It is most interesting to see how the classic elements of light rail can be applied to the particular transport needs and geography of this historic maritime City, namely: the serpentine twin course of the River Avon round which the City grew, with its steep hills and famous gorge; the remoteness of Temple Meads Station from the City centre; the rapid residential and commercial growth in the surrounding areas and consequent traffic congestion problems which, if unsolved, will choke the City and inhibit further growth; the need for better links with the adjoining towns and motorways. The treatment of the key section in the City Centre will be the most important and difficult, and the whole scheme will clearly require the support and active co-operation of the City and regional authorities and British Rail.

However, the application of the same basic design criteria as in Manchester or Sheffield will surely produce a solution which meets Bristol's particular needs, and it is again a measure of light rail's flexibility that it could be made to work in three such diverse City centres.

9 BIRMINGHAM AND THE WEST MIDLANDS

The phrase "Hope deferred" in Light Rail "87" (Ref 4) aptly sums up the present state of this major project. In 1984 the West Midlands Passenger Transport Executive published a full study recommending a comprehensive network of rail and road based lines radiating from the City, followed by detailed feasibility studies, with the aim of depositing a Bill in November 1985. This was for an initial route with extensive costly tunnelling in the City centre, and street running requiring extensive property demolition and road traffic schemes, which gave rise to considerable public opposition. The problems could not be resolved in time, and the proposal lapsed the following year with the abolition of the West Midlands County Council.

Fortunately, a fresh start has been made, and the newly formed Passenger Transport Authority has launched a new scheme 'Midland Metro', backed by all seven Metropolitan District Councils, (Ref 9) with new publicity (Ref 10). This stresses that specific routes, segregated by various means wherever appropriate, will be decided in collaboration with the local people and their District Councils. Various options are being evaluated, based on modern low floor LRVs with good disabled access and frequent unstaffed stops.

The Government have promised to discuss firm proposals, and it is hoped to deposit a Bill in November 1989 for an initial 19km route, likely to run from Birmingham Snow Hill to Wolverhampton over the old GWR alignment, with the cost of £200M over the first five years, and £800M in total, funded up to 50% by the European Regional Development Fund, with one half of the balance by Government grant and the other by private sector funding and loans.

The enforced earlier delay may thus lead eventually to a more cost-effective and appropriate scheme, by which the three million people of the West Midlands will lose their present doubtful distinction of living in the largest industrial and commercial conurbation in Western Europe without a metro or light rail system.

10. LEEDS AND WEST YORKSHIRE (REF 11)

Last May the West Yorkshire Passenger Transport Authority issued a consultative document for the Development Strategy for public transport over the five Metropolitan District Councils of the area, covering the upgrading and re-opening of British Rail routes; possible conversions to light rail; introduction of trolleybuses. The PTA also approved further detailed studies in collaboration with the Leeds City Council of a street based LRT system for East Leeds, covering about 21km, with over 90% segregated from general traffic.

11. EDINBURGH AND LOTHIAN

Lothian is the conurbation round Edinburgh with a half million population. A major study is in progress into the possible role for light rail, particularly taking account of the constraints on the construction of roads and parking facilities in Edinburgh's fine historic centre.

12. OTHER LONDON SCHEMES (REFS 12,13)

Last year British Rail and London Regional Transport published the Report of a joint study of the possible scope for light rail in the whole of the Greater London area, which identified over 30 'categories of opportunity'. Several were followed by further in house studies, including the possible future conversion and extension of the East London Line. One major scheme then formed a more detailed study by external Consultants, covering the whole of the Croydon area, partly because it appeared to offer the greatest potential for light rail but also because it involved all the elements likely to occur in other studies, namely the conversion and extension of BR routes, with new low cost stops; a new suburban street running route; the effects on bus traffic; and finally a vital street running link across the centre of Croydon. This Study is now nearing completion, and will then be used as a basis for discussion with all concerned to decide if more detailed work is warranted.

13. GLASGOW AND STRATHCLYDE

Strathclyde Passenger Transport Executive is currently reviewing all its services in the area, which could include the potential for light rail, but as yet there are no firm proposals.

14. YORK (REF 14)

Modern Tramway mentioned the possible introduction of LRT on the alignment of the redundant single track Derwent Valley light railway, which could serve suburban housing needs, but it is understood that is only one of a number of transport options being considered by the City Council, and no decisions have been taken on whether any further work would be justified.

15. SOUTHAMPTON (REF 7)

Modern Tramway also reported the City Council's project for a 4km loop round the City centre based on the Westinghouse automated rubber tyred Peoplemover (as in Gatwick). They hoped to finance the £24M scheme through the private sector.

16. OTHER SCHEMES

The review of the Gloucester City Council plan recently completed includes a reference to a proposal for further studies to be made into the potential for providing a tramway link between the City Centre and the new redevelopment at the historic Gloucester Dock.

Plans have been mentioned for Belfast Cambridge and Salisbury, but no details are available.

17. THE RAILWAY INSPECTORATE

The UK Railway Inspectorate have the delegated legal responsibility of approving on the Transport Secretary's behalf all safety aspects on any part of a statutory light rail or tramway system. Their role is therefore crucial to the successful introduction of any proposed new system, and informal advice and consultation (which is given freely and constructively) at the very earliest and all subsequent stages is essential, so that the final formal submission and approval to open a new system or extension is not impeded at a late stage by major problems which should have been identified at an early stage.

Also, since the Inspectorate did not wish to hamper the introduction of new and novel schemes by the need to conform to outmoded standards, they have prepared new guidelines for conventional and automated systems.

18. CONCLUSIONS

- 18.1 With three schemes now in Parliament (Manchester, Sheffield, and Beckton for DLR), followed by Avon and Birmingham in the next two years, and several other schemes still in various study stages, the prospects for light rail in Britain must be hopeful, with great benefit to the Cities concerned and to British industry from the development of a widely based home market.
- 18.2 As in other developed countries it cannot be stressed too often that the insertion of a new fixed transport mode into a developed city must necessarily be a long and carefully planned process, requiring detail assessment of the real transport needs; analysis of the transport options, and only then the development of the appropriate minimum technology and optimised design; maximum use of existing infrastructure ('never sell your right of way in a city'); continuous consultation with all the many diverse authorities and interest groups who are quite properly concerned with the introduction of a new system in a city; never underestimating the 'political' and public relations aspects, and the resources, time and sheer persistence necessary to plan and complete even a small system, which will still have nearly all the technical and operational elements of a large one.

19. ACKNOWLEDGEMENTS

The author gratefully acknowledges the valuable help of LRTA members and publications; published data supplied by members of the PTE informal Light Rail Transit Group; an unpublished review by David Bayliss, LRT's Director of Planning, prepared for a recent London Meeting of the UITP International Light Rail Commission. The author is, however, responsible for the opinions expressed and for inevitable omissions and errors in what he believes is the first comprehensive published review of light rail in the United Kingdom, and welcomes any additions or corrections.

REFERENCES

1. Catling D T 'Light Rail Concepts' Institute of Civil Engineers Conference. 'Moving People in tomorrow's world, London 1986.
2. Baggs J Tyne & Wear Metro - the first five years. University of Leeds Annual Seminar on Public Transport Operation Research 1985.
3. Docklands Light Railway Handbook, DLR Ltd, PO Box 154, Poplar, London, E14 9QA.
4. Light Rail '87: LRTA Publications, 13A The Precinct, Broxbourne, Herts, EN10 7HY.
5. Modern Tramway, November 1986: LRTA Magazine, published by Ian Allan.
6. Modern Tramway p137, April 1987.
7. Modern Tramway p243, July 1987.
8. Advanced Transit for Avon Ltd brochure, September 1987, 76 Alma Road, Clifton, Bristol, BS8 2DJ.
9. Railway Gazette International p685, October 1987.
10. Midland Metro WMPTA, 16 Summer Lane, Birmingham, B19 3SD.
11. 'Development Strategy' A Report for Consultation, West Yorkshire PTE Policy Unit, Metro House, West Parade, Wakefield, WF1 1NS.
12. 'Light Rail for London?', LRT Group Planning Department, c/o 55 Broadway, SW1H 0BD.
13. Modern Tramway, p147, May 1987
14. Modern Tramway p 38, February 1987.

R20 OCT