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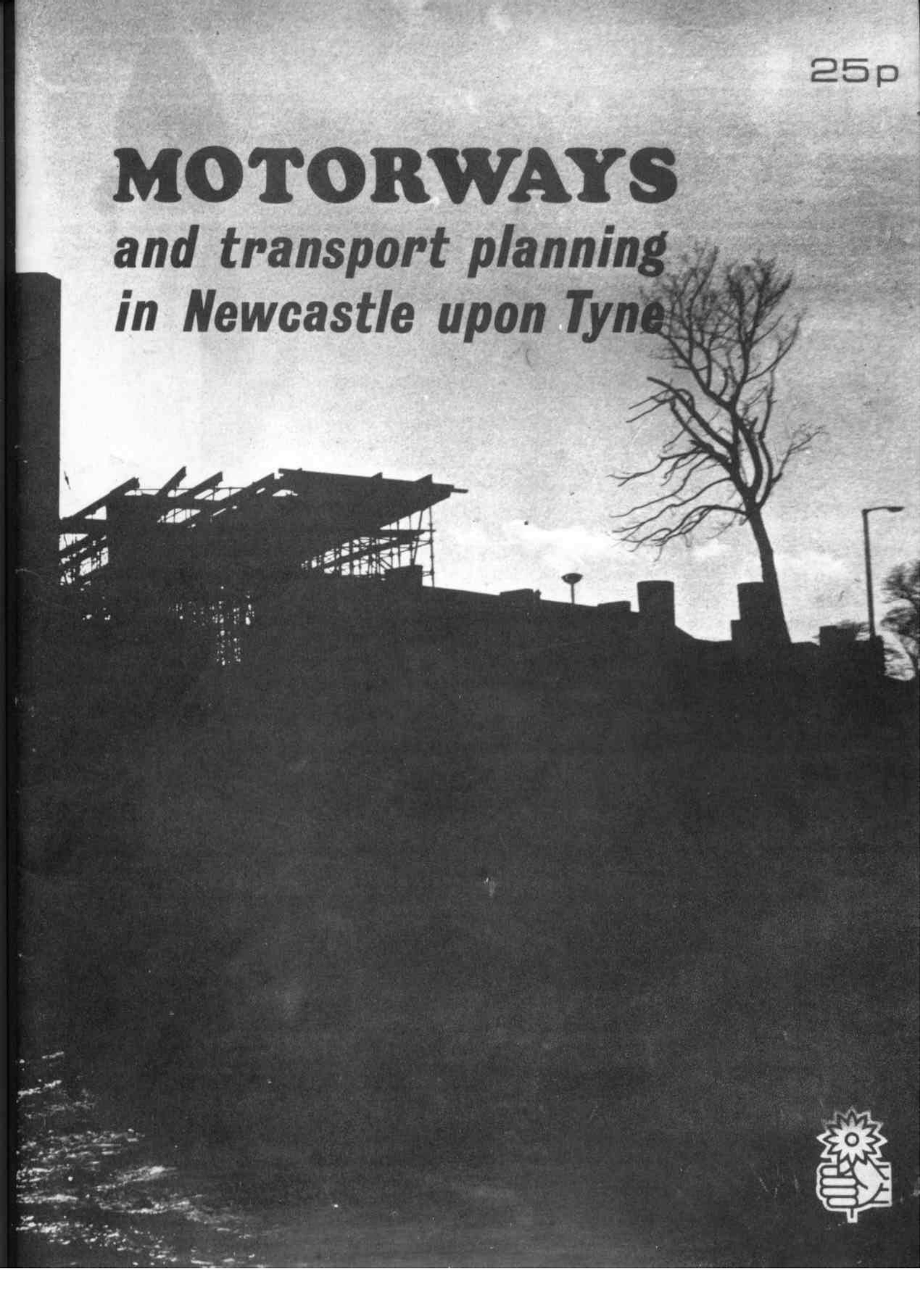
MOTORWAYS

and transport planning in Newcastle upon Tyne



MOTORWAYS

and transport planning in Newcastle upon Tyne

A report commissioned by the Chairman and Committee of
SOC'EM!. - Save Our City from Environmental Mess! -
Newcastle upon Tyne, and sponsored by
TRANSPORT 2000 (North East)

Report compiled by Mary Cooper, M. A. , Ph.D.

Foreword by John Horam, M. P.

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Cover photograph: Brandling Park, Newcastle upon Tyne

Abbreviations

CEGB - Central Electricity Generating Board
C.M.E. - Central Motorway East
GLC - Greater London Council
TPTA - Tyneside Passenger Transport Authority
TPTE - Tyneside Passenger Transport Executive

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TTR1 "Urban Motorways in Newcastle" (Sept. 1972)
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foreword

by John Horam, M. P.

I served as a member of the Expenditure Committee of the House of Commons when it produced its major report on Urban Transport Planning. That report concluded that:

"National policy should be directed towards promoting public transport and discouraging the use of cars for the journey to work in city areas."

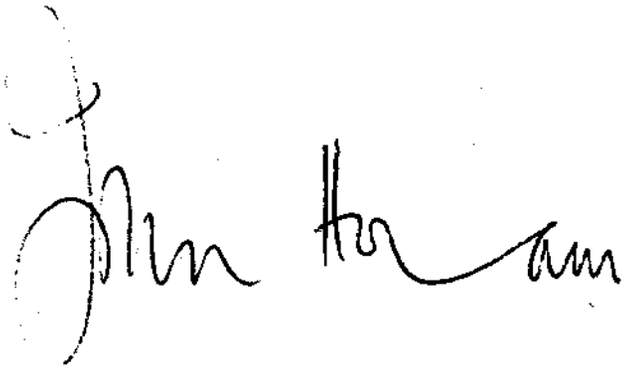
This report shows just how relevant that conclusion is to a city like Newcastle upon Tyne.

Newcastle, indeed Tyneside as a whole, has history and style. Much of that is expressed in the magnificent physical fabric which has been handed down to us. That fabric is delicate. Almost invariably, motorways wreak havoc with it. Buildings and homes are destroyed, the visual scale is ruined, pollution increases. I am told that few planning courses have a purely aesthetic element in them. It does not surprise me.

It does surprise me however that the people are so often forgotten. The most disadvantaged groups in our society are the elderly, the disabled and the low paid. It is they who are least likely to have cars, and who must wait in the rain by the bus stop. It is they whose homes are most likely to be bulldozed.

To switch resources from motorways to public transport is to help the disadvantaged, to decrease inequality.

I welcome this report. It is clear and perceptive, and exposes the nonsense talked by some planners for what it is.



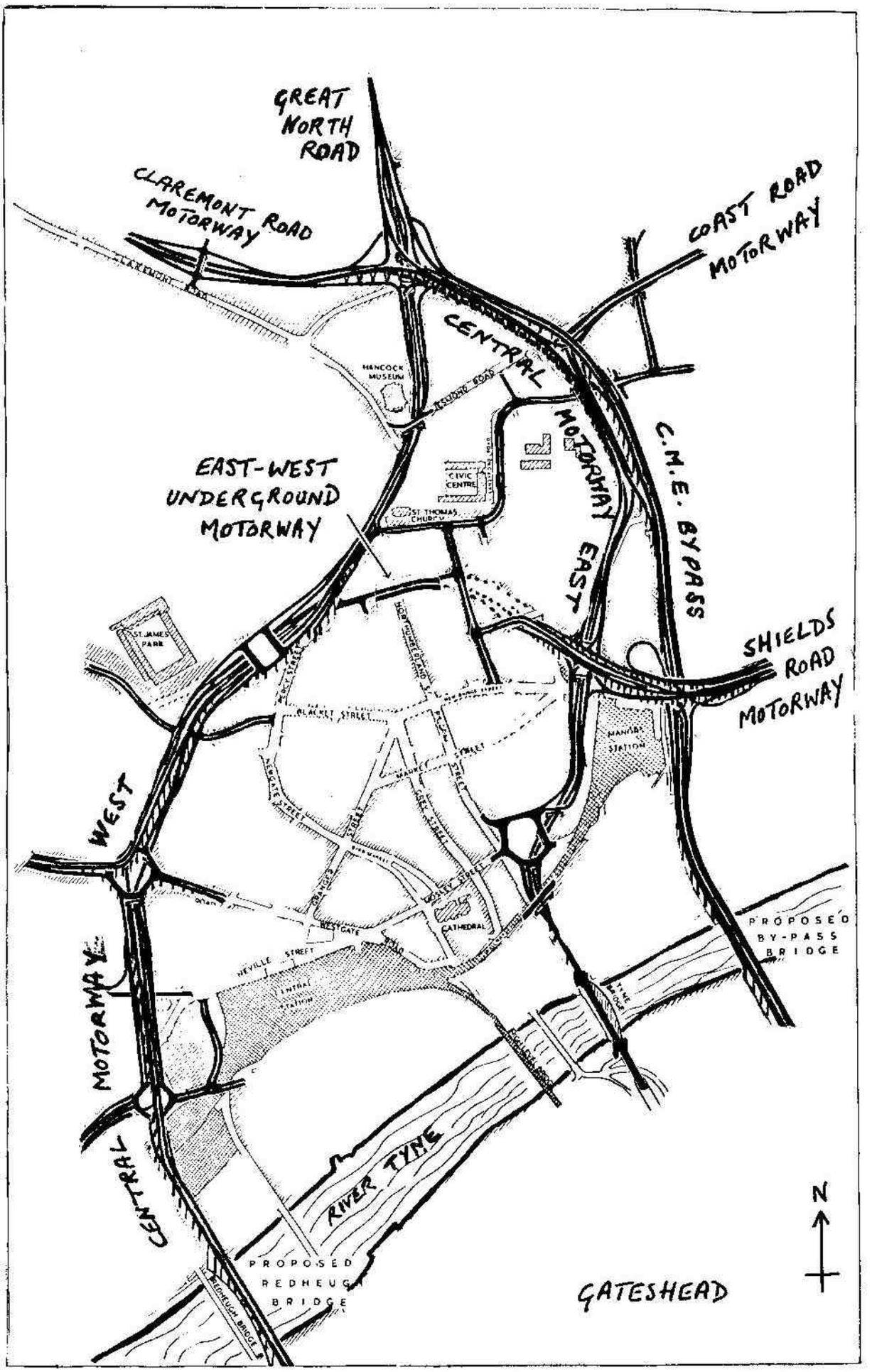


Figure 1. Proposed central motorways (adapted from ref. 2)

1 the motorway plans

The urban motorway system planned for Newcastle upon Tyne consists of three North-South roads completely enclosing the city centre, plus the Claremont Road Motorway, Shields Road Motorway and Coast Road Motorway.*

The CENTRAL MOTORWAY EAST will curve from the Pilgrim Street roundabout, across New Bridge Street and through the Sandyford Road area to link with the Great North Road, the Claremont Road Motorway and the Central Motorway West, in a complex interchange at the site of Exhibition and Brandling Parks. There will also be multi-level intersections with the SHIELDS ROAD MOTORWAY at New Bridge Street, and with the COAST ROAD MOTORWAY at Jesmond Road. On the section of the C.M.E. between Northumberland Road and Brandling Park, Northbound traffic will travel on an elevated roadway with Southbound traffic underneath at ground level, and Sandyford Road will pass below the motorway in a cutting.

The planned CENTRAL MOTORWAY WEST will extend from the Brandling Park interchange down the line of Barras Bridge and Percy Street; at this point the motorway will have elevated sections and will interchange with the EAST-WEST UNDERGROUND MOTORWAY. The latter will pass in a tunnel below Northumberland Street, to link with the C.M.E. in the John Dobson Street area.

Below Percy Street, the Central Motorway West will curve across Gallowgate to an interchange near the bottom of Westgate Road, and will cross the Tyne via a new Redheugh Bridge.

In addition to these roads, it is proposed to build a CENTRAL MOTORWAY BYPASS to run roughly parallel to the C.M.E., crossing the river by a new bridge downstream from the Tyne Bridge. The bypass will be on a similar scale to the C.M.E. and will interchange with the Shields Road Motorway, and with the C.M.E. at the Coast Road intersection.

Order of Construction

Construction of the CENTRAL MOTORWAY EAST was commenced on 4th April 1972 and is expected to last for 2½ to 3 years.

The COAST ROAD MOTORWAY was due to be started in September 1972, with completion at about the same time as the C.M.E. However, work on the Coast Road was postponed by order of the Dept. of the Environment, and the Coast Road proposals have since been the subject of a public inquiry (see below).

Construction of the CLAREMONT ROAD MOTORWAY was scheduled for early 1973. The Grandstand Road underpass was started in August 1972 and is now open. At the time of writing (November 1973) work on the Claremont Road Motorway itself has yet to be commenced.

The first stage of the SHIELDS ROAD MOTORWAY (from the Byker Odeon, South

* General information in the section is from references 1 to 6.

of the existing Shields Road, to the East end of Byker Bridge) is scheduled for early 1974.

The EAST-WEST UNDERGROUND LINK may be started around 1975, and will take 3 years to build. This will link eventually with the CENTRAL MOTORWAY WEST: work on the latter will not begin before about 1979.

Finally, the CENTRAL MOTORWAY EAST BYPASS is scheduled for the more distant future still - probably after 1985.

Finance

The capital cost of the Central Motorway East is estimated at around £11,500,000,* of which the construction tender submitted by Costain Engineering Ltd. comprises £7,770,604. The remainder of the cost includes design fees to consultants, charges for drainage work and £2,325,000 paid for land and compensation.

The total cost of the motorway system is estimated to be £40 million to £45 million (1972 prices).

Development Plans and Transport Studies

The Central Motorway plans were first described in detail in the Development Plan Review of 1963 (ref. 1). Chapter 12 gives some details of the survey results and assumptions on which the plans were based, as part of a general description of transport policy for the city.

The final Development Plan (Written Statement) was published in 1967.

A readable account of the city development plan as a whole will be found in "Newcastle: A Study in Replanning at Newcastle upon Tyne" (Leonard Hill, London, 1967), written by the then Chief Planning Officer, Wilfred Burns. A slightly more technical description of the transport plan is given in a joint paper by Wilfred Burns and the City Engineer, Derek Bradshaw: "Planning for Movement in Newcastle upon Tyne" (ref. 2).

Details of public transport surveys, parking statistics and a discussion of transport policy are given in "Traffic and Transportation in Newcastle upon Tyne" by Wilfred Burns (1967). (Complete data on surveys of traffic flows, origin and destination, car ownership and traffic generation, collected in the period up to 1965, are contained in "Traffic Surveys, 1963", vols. 1 to 4, published by the Tyneside Major Highways Joint Committee).

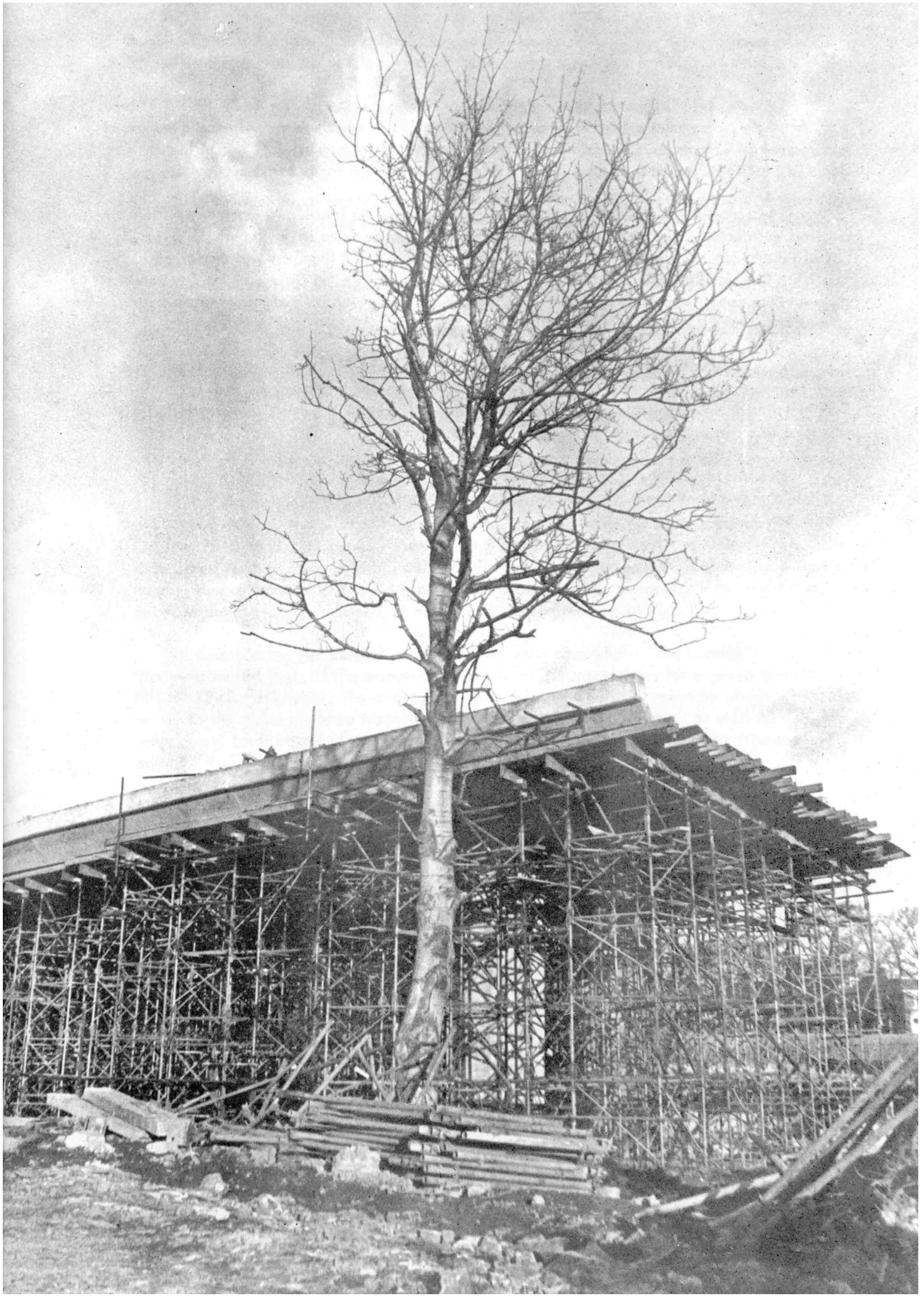
A complete land use/transportation study for Tyneside, known as the Tyne Wear Plan, was commenced in 1967/8 by Alan M. Voorhees & Associates and Colin Buchanan & Partners. The short-term transport study (up to 1984) was published in 1972 and the longer-term study "Urban Strategy" in 1973.

Public Inquiries and Planning Decisions

The majority of routes concerned in the motorway system will be new roads; and, as they appear in the approved Town Map, the Council may deem grant of planning permission and then proceed with their construction. Before any route can become a Special Road (motorway), however, the Council must publish a Scheme and Order under Sections 11 and 13 respectively of the Highways Act 1959 (as amended by the Highways Act 1971). The Secretary of State for the Environment will then consider whether a public inquiry is necessary before deciding whether to confirm the Scheme and Order.

*See note on page 6.

Motorway Construction at Brandling Park >>>>



A public inquiry into the Central Motorway East project was held in the Spring of 1967; the then Minister of Transport pronounced in favour of the project in September 1968.

Schemes and Orders for the Central Motorway East were confirmed in 1969. There was, however, a second public inquiry, in February 1971, which dealt with the question of environmental effects on Exhibition and Brandling Parks. In August 1971 the Minister decided that the Corporation were making adequate provision for public open spaces (ref. 4).

The Coast Road Motorway was the subject of a public inquiry in September 1968, dealing with compulsory purchase of land. The Minister decided in favour of the project, but although construction work was scheduled for summer 1972 the Corporation failed to publish a Special Road Scheme for this route. Because of this the Dept. of the Environment ordered that construction be delayed until the public was given its statutory right of objection.

A second public inquiry was therefore, held, in May 1973. A number of objectors were represented including SOCEM, Tyneside Environmental Concern, Friends of the Earth, The Northumberland and Newcastle Society and several local residents' associations. The result of this inquiry is expected towards the end of 1973.

For the remainder of the motorway routes, Special Road Schemes have yet to be published - and confirmed - so that in this sense at least the plans have still to be approved.

Note added in proof:

The estimated cost of the Central Motorway East has now risen to £15 million (ref. 72).

2 motorways and the city

Urban Motorways as a Traffic Solution

"The purpose of motorways is fairly obvious: they should provide safer travelling, they should reduce the time taken to make the journey - and they should carry more traffic." (ref. 7).

Although at first sight one might expect a new urban motorway system to achieve the above objectives, in the long term this may not be the case. A kind of Parkinson's Law operates in congested city areas; traffic expands to fill the space provided for it, and new roads may be filled to capacity within a short time of being opened (ref. 8, 9, 10, 11). The 'traffic generation' effect of motorways may be considerable: it has been calculated that the proposed London motorways* would have raised the volume of main-road traffic in London by 70 to 100 % above that which might be expected in their absence (ref. 8).

What is more uncertain is the effect of urban motorways on traffic congestion over the remaining road network. In an analysis of the American situation (ref. 9), J. R. Meyer J. F. Kain and M. Wohl argue that although motorways themselves become choked with peak-hour traffic, the overall effect is to reduce congestion on the surrounding network. On the other hand J. Michael Thomson, in the report "Motorways in London" (ref. 8), has calculated that an inner orbital motorway (of a type similar to the GLC Ringway 1 proposal) would have relatively little effect on traffic speeds off the motorway - raising the average network speed from an assumed 12 m.p.h. to approximately 14 m.p.h.

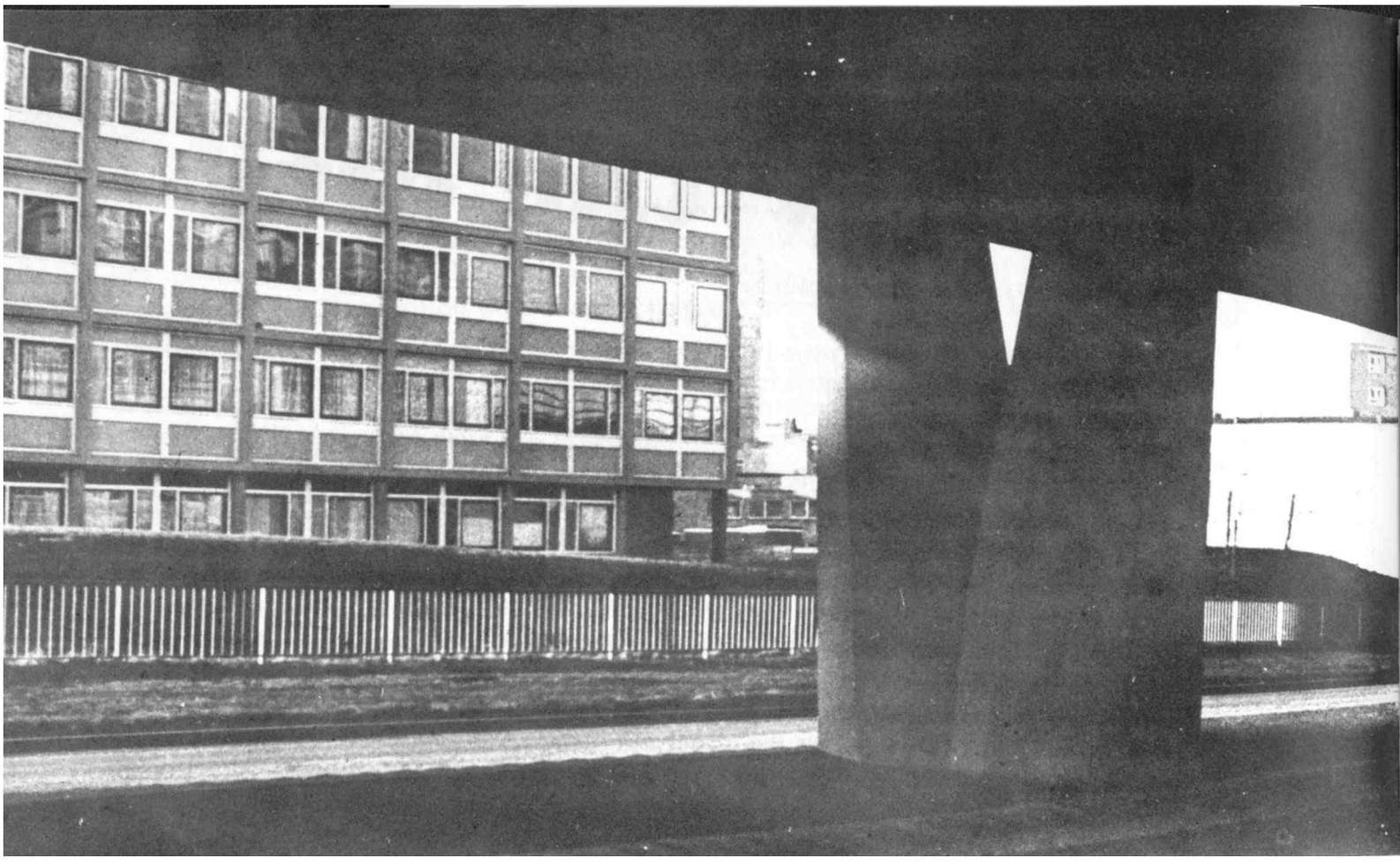
Considering the London motorway proposals as a whole, the London Transportation Study estimated that, if the motorways were built, journey times for a given distance would fall by 22 %. However, the average journey length would increase by about 40 %, due partly to the extra distance travelled to make use of the motorways, as well as the greater inducement to dispersal of origin and destination. Thus, average journey times would actually be longer (ref. 8).

One of the potential advantages of motorways is increased safety. The accident rate on the M 1, during its first year after opening, was half to one third the average for the road it bypassed, the A 5 (ref. 13). A study of the M 6 in Lancashire showed that the opening of the motorway reduced total accidents on the M 6 and A 6 combined by about a third (ref. 14). It should perhaps be remembered that urban motorways are inevitably built to lower design standards than rural motorways (ref. 8); and the frequency of interchanges and weaving movements will be unfavourable to safety. Nevertheless, data from American cities indicates that accident rates on expressways are substantially lower than on ordinary roads (ref. 15).

Another factor to be considered, however, is that the increased volume of traffic on the whole road network will present a magnified safety hazard. Referring again to the London situation, it has been estimated that the motorways might produce an extra 250 to 900 road deaths per year in Greater London (ref. 8).

To summarise, it seems clear that urban motorways have the effect of generating

* All references to the London motorway proposals concern the complete scheme, before Ringways 1 and 2 were dropped in April 1973 following the GLC elections (ref. 12).



Visual Intrusion in Gateshead ^ ^ ^

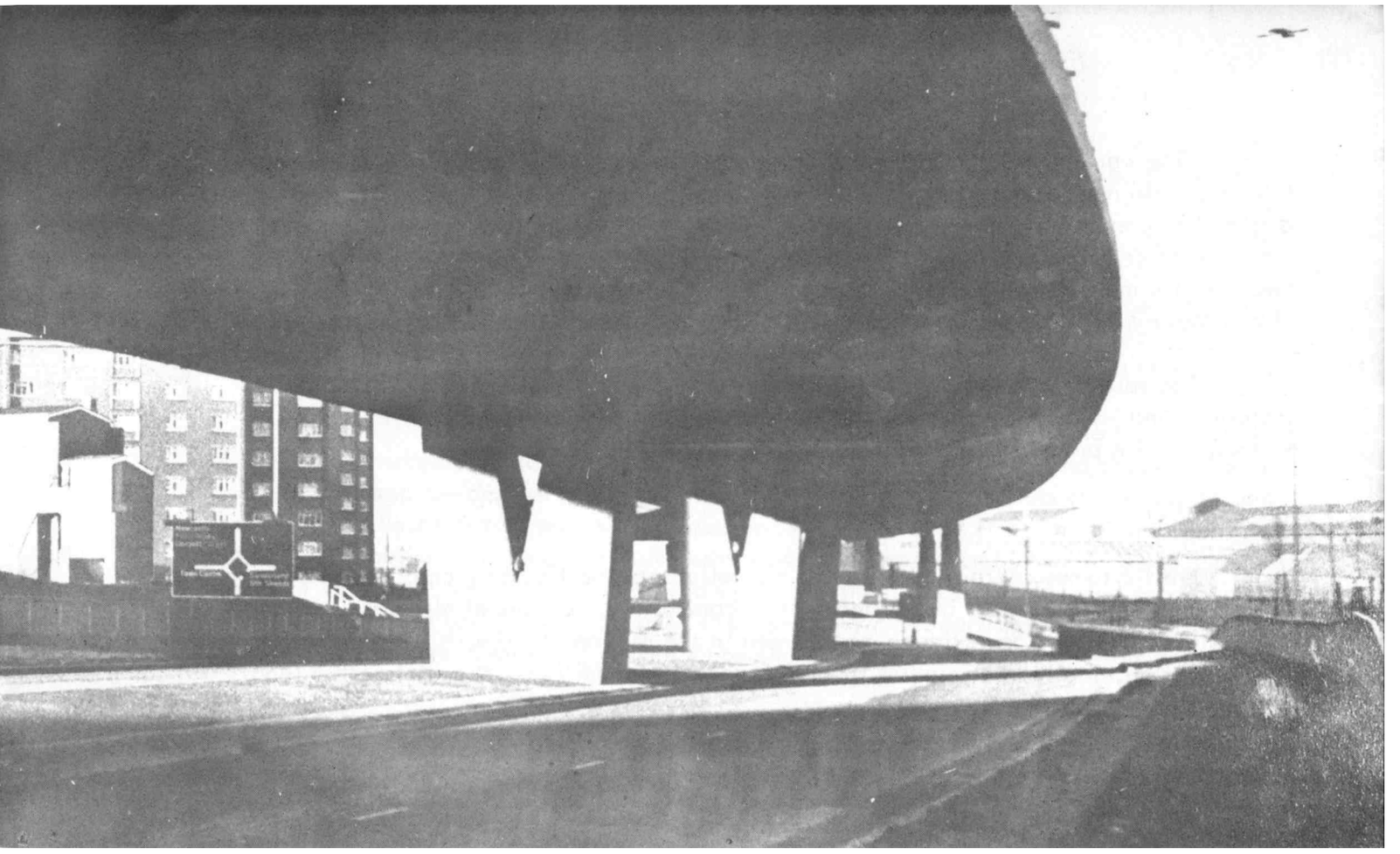
extra traffic and thus increasing traffic volumes on the road network as a whole; but it is by no means certain what their overall effects may be on traffic congestion and on road safety in the city.

Visual Intrusion

"There is nothing, it can be held, in the experience of the United States, to suggest that frank acceptance of the visual impact of the motor vehicle is leading to the emergence of any new kind of brilliant, lively urban townscape. On the contrary, it is producing unrelieved ugliness on a great scale . . . our conclusion is that visual intrusion is a serious matter, to which society, perhaps after some false starts and bitter experiences, will be bound to pay serious heed." The Buchanan Report, para 35 (ref. 16).

Aesthetic judgements are necessarily subjective, but it cannot be denied that urban motorways intrude significantly on the visual scene. The question is one of scale, and of integration with the rest of the environment. A motorway running beside dock sheds, a power station or railway architecture will, for example , harmonise better with its surroundings than the same road cutting through a more domestic environment (ref. 17). A particular danger in areas of historic interest is that small pockets of antiquity maybe preserved, "with the alarming implication that all other parts may be disregarded" (ref. 17).

Various approaches to reducing the visual impact of urban motorways, such as landscaping, use of purpose-designed screening buildings and modifications in the design of the motorway itself, are discussed in some detail in the report "Motorways in the Urban Environment" (ref. 18). In Newcastle, a specially-designed block of flats, intended to screen the Shields Road Motorway (and known locally as the "Byker Wall") is currently under construction.



The question of visual intrusion by urban motorways is receiving increasing attention, and research projects are now in progress to measure the amenity loss and environmental deterioration caused by these roads (see below).

Noise

Road traffic is by far the largest source of undesirable noise in the city environment (accounting for some 50 to 70 % of the total urban noise, in a survey of American cities - ref. 19). It is interesting that the noise problem tends to be increased by city redevelopment involving tall buildings, which contain the noise and prevent it escaping (ref. 20).

A high-capacity urban motorway, passing through the inner city and carrying a large volume of generated traffic, must inevitably create noise problems in surrounding areas where people live and work.

Typical (daytime) kerbside noise levels for dual three- or four-lane urban motorways will be in the region of 83 dBA (decibel A scale) (ref. 18), compared with 70 dBA for a typical (inner-London) shopping area (ref. 21). (It should be noted that an increase of 10 dBA corresponds to a doubling of perceived loudness.) Urban motorways would have to be aligned at least 500 feet from the nearest house or 1,200 feet from the nearest hospital or church, to achieve acceptable noise standards inside the buildings (ref. 18).

If a motorway passes too close to housing areas, residents may find the resulting noise intolerable. A recent example of this was the opening of the M6 interchange at Gravelly Hill ("Spaghetti Junction"), when Birmingham health authorities considered the deterioration of the environment to be so severe that some houses adjoining the motorway might have to be demolished (ref. 22).

"The very elements of an urban motorway that make it efficient - traffic concentration, fronting buildings set back, high speeds - create a major source from which it is most difficult to prevent the noise spreading out in all directions. The zone of environmental intrusion of an urban motorway is far wider than is often realised - perhaps two kilometres (well over a mile) and certainly 0.5 km." Prof. J. A. Proudlove, "Time to Re-think the Urban Motorway" (ref. 17).

The spreading of noise will be dependent on such factors as the elevation of the motorway and its detailed design. For a discussion of possible means of alleviating motorway noise problems, see ref. 18.

Air Pollution

Traffic fumes contain a number of air pollutants, particularly carbon monoxide and unburnt fuel (resulting from incomplete petrol combustion), oxides of nitrogen (formed in the combustion chamber from nitrogen and oxygen in the air) and lead salts (chiefly lead bromochloride; the lead originates from antiknock fuel additives, e.g. tetraethyl lead).

Carbon monoxide is highly poisonous, because of its ability to combine with haemoglobin and thus impair the oxygen-carrying capacity of the blood. Prolonged exposure to levels of 50 parts per million is definitely harmful, and lower levels are also suspect. Average concentrations near fairly heavy traffic are 15 to 20 ppm (although a smoker inhales more carbon monoxide from cigarettes than a non-smoker would receive on a busy road) (ref. 23).

Potentially far more dangerous is lead, because its effects are cumulative. Inorganic lead is stored in the bones, and may be released at a much later date to produce anaemia, kidney disease and damage to the nervous system - with such effects as convulsions, brain haemorrhage and mental retardation (ref. 24). Tetraethyl lead, which forms a small percentage of the lead released in traffic fumes, is a psychotropic poison whose symptoms can mimic those of a psychotic or psychoneurotic disorder (ref. 25,26). Although the health hazard from present environmental lead levels is a matter of some controversy, "one must remember that lead absorbed in seemingly harmless trace quantities over a long period of time can accumulate to exceed the threshold level for potential poisoning and produce delayed toxic effects" (ref. 24).

Atmospheric lead absorption approaches - or may, in some cases, exceed - absorption from dietary sources (ref. 24,25). As much as 98 % of identifiable airborne lead may originate from cars (ref. 27) and the level of atmospheric lead varies directly with the volume of traffic (ref. 24). This being the case, an urban motorway system generating large volumes of extra traffic must present a magnified threat to public health. Lead levels in the blood of residents living near the M 6 "Spaghetti Junction" interchange have increased by 25 % between May 1972 and March 1973 (ref. 28).

Motorways and the Community

There are several effects that urban motorways may have on the community, and in particular those people using the roads or living near them.

Firstly, the mobility of the individual motorist is increased; there is a greater incentive to travel long distances to secure marginal advantages in such things as shopping and entertainment, and in general the choices of home, employment, etc. are widened. This is one reason for the tendency of motorways to increase average journey length (ref. 8).

On the other hand, if transport systems become too biased towards the car, other sections of the community suffer. "Those who are incapable of driving cars (the young, the elderly and the infirm) are being increasingly handicapped by the new metropolitan ecology and the new transportation system. Those who are too poor to own cars find their mobility similarly impeded. That is to say, the distributional consequences of the automobile system have fallen very unevenly upon the various segments of the urban population. While it is certainly true that the majority of urbanites have profited immensely, others have been severely hurt." (M. Webber, University of California, ref. 10).

One particular danger of motorways is community disruption. The physical barrier of a motorway mainly affects journeys on foot between housing areas and shops, schools, parks, etc., and the degree of disruption is dependent on such factors as the design and location of pedestrian bridges and underpasses (ref. 11). Even if a route is available, the old or disabled may have difficulty with steps and ramps, and women may be positively afraid of long, narrow subways. "Even a small lengthening of a route, and especially if it meanders around and down or up over slip roads and main carriageways at junctions, creates considerable changes in people's use and acceptance of their environment" (ref. 32).

Other social problems are noise and loss of privacy in housing bordering the motorway, and traffic nuisance in surrounding roads due to the increased traffic flow (generated by the motorway) exceeding the acceptable capacity of the secondary road network. In fact the report "Motorways in the Urban Environment" concludes that "the environmental implications of urban motorway development in London will, in fact, be more serious and widespread on the secondary road network than in the areas beside the motorways themselves" (ref. 18).

Research

The Science Research Council has recently granted £195,000 to the University of Leeds for research into measuring the detrimental effects of urban motorways - including noise, fumes, pedestrian delays and community disruption. The aim is to develop guidelines to aid transport planners in safeguarding the environment of cities (ref. 29).

The Urban Motorways Committee

In July 1969, an Urban Motorways Committee was set up jointly by the Minister of Transport and the Minister of Housing and Local Government. The Committee's purpose was "to consider what changes would enable urban roads to be related better to their surroundings, to examine the legal, financial and procedural implications of any policy changes it may think desirable, and to recommend what changes, if any, should be made" (ref. 30). One of the main problems under study was the evaluation of amenity loss, as "a generally accepted and practical method of evaluating amenity considerations would be an invaluable tool for rational decision-making" (ref. 31).

The Committee's report, "New Roads in Towns", was published in July 1972 (ref. 32) and was followed by a Government White Paper (ref. 33). The Committee recommended "a new approach to urban road planning" to take more account of environmental effects and in cost-benefit analyses of new roads "the indirect costs and benefits of such schemes should be looked at with the same care as the direct cost and movement benefits".

The Committee also recommended that "local authorities will need to reappraise schemes in preparation, where the extent of commitment makes this practicable and decide on the merits of each whether it will sufficiently satisfy the new approach to be publicly acceptable, or whether it will need substantial rethinking."

3 traffic growth

Reasons for a Motorway Plan

The basic assumptions behind the Newcastle motorway plans are: 1) that motor traffic in the city will, if given the opportunity, increase by large amounts in the coming decades, and 2) that as much opportunity as possible must be given to allow the increase to occur.

This attitude is clearly brought out in statements by the then Chief Planning Officer, Wilfred Burns, and the City Engineer, Derek Bradshaw:

"The centre must cater to the maximum extent possible for car traffic" (ref. 2)

"The Central Motorways - representing the maximum physical provision that can be envisaged in the City Centre . . . " (ref. 34).

Priority is thus given to encouraging road traffic, and particularly the private car, so that public transport tends to become a secondary necessity, required because the car can be provided for no further.

" . . further increases in traffic volume are virtually impossible to deal with. Two decisions flow from this. First, the technique of limiting flows to the predetermined level must be worked out . . . and, secondly, we must ensure that public transport can give an attractive enough service to make the necessary restrictions on the use of the private car reasonably acceptable to the general public." (ref. 2).

Note that the level of traffic flow is 'predetermined' by the decisions in the plan regarding the amount of road provision.

These decisions were made, in 1963, on the basis of certain information and assumptions about the nature and growth of traffic in Newcastle. These factors will be examined in the following sections.

Traffic Composition in Newcastle

In 1961, only 2.3 % of the total north-bound traffic crossing the Tyne was bound for the Great North Road, compared with 54 % stopping in the Newcastle central area. "Through" traffic made up 20 % of the traffic entering Newcastle from other directions; the remaining 80 % was "stopping" traffic, of which 55 % was stopping in the City Centre. (ref . 2). It has been estimated that, in 1981, the percentage of "stopping" traffic entering central Newcastle and Gateshead in the morning peak hour may be about 55 % (with a new bridge at Newcastle) or 59 % (with a new bridge at Friars Goose) (ref. 35). These estimates, together with the 1961 survey results, show that the Central Motorways will cater primarily for traffic stopping in the City Centre.

How will this traffic be composed? I n 1981, it is expected that 94 to 97 % of the peak-hour traffic which enters central Newcastle and Gateshead by major access routes will be private cars (ref. 35).

In spite of this overwhelming predominance of the private car on the roads, the

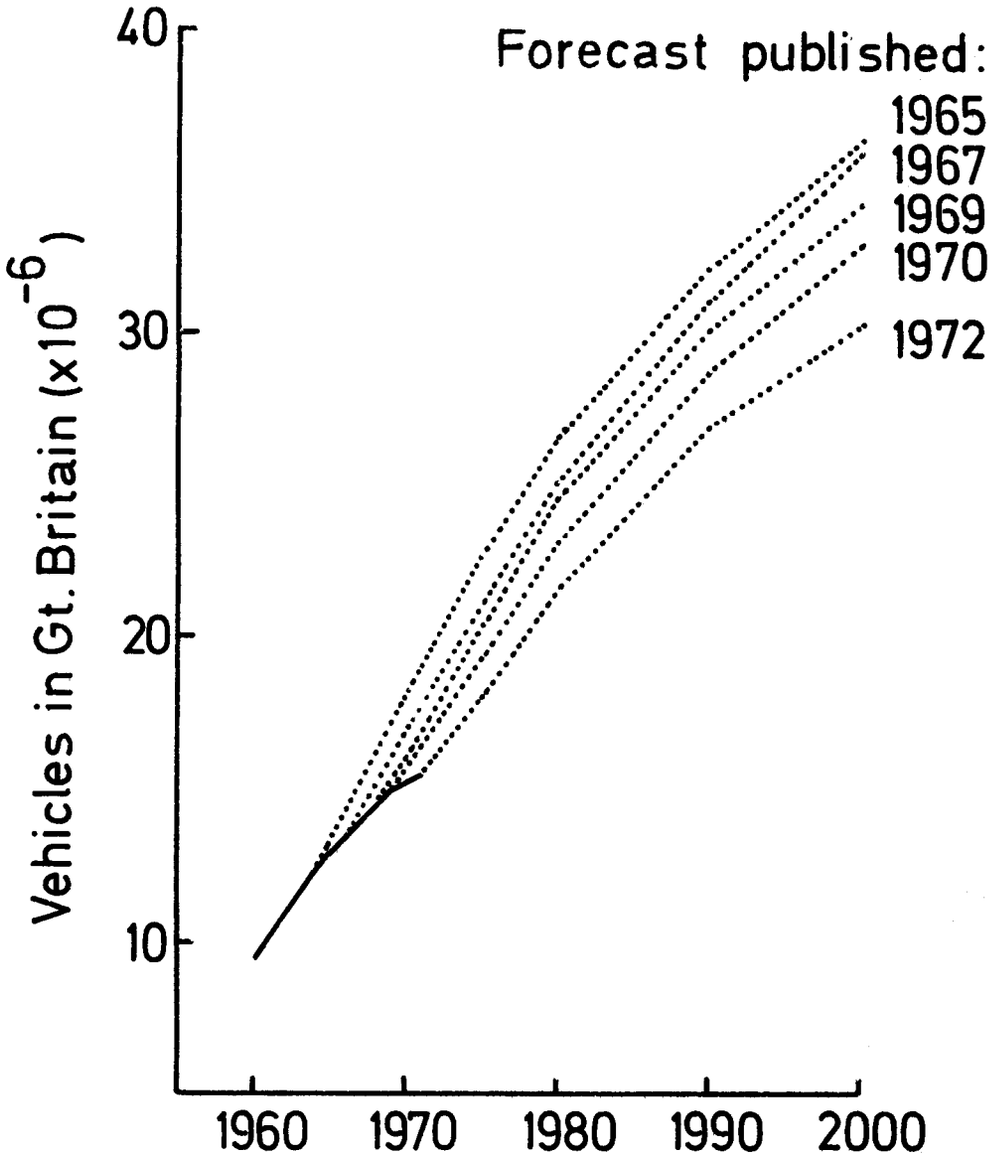


Figure 2. Vehicle ownership forecasts from 1965 onwards have been falling steadily as they are revised by fresh data (ref. 37, 39).

majority of travellers entering central Newcastle will do so via public transport. A survey in 1963, covering trips to the Central Area for all purposes between 7.30 a.m. and 7.30 p.m., showed that on a typical weekday, over 75 % of all trips were made by public transport (although buses comprised only 4 % of the traffic) (ref. 34, 36). Even with the increase in car traffic which will be made possible by the motorways, it is expected that almost 70 % of all 'commuter' trips in the future will still have to be made by public transport (ref. 34).

Traffic Growth in Newcastle

When the motorway plans were formulated in the early 1960s, road traffic and vehicle ownership in Great Britain were both increasing by about 8 % per annum (ref. I). A projection for 1980, contained in the Development Plan Review of 1963 and based on

this rate of growth, gave a figure of 2.6 times the 1960 traffic volume. In addition, it was calculated that the City Centre redevelopment might attract extra traffic and increase this value to 3.8 times the 1960 volume (ref. 1). It was also calculated that, with full motorisation, and assuming national average car ownership was reached, traffic would increase by 1980 to 5.3 times the 1960 volume (ref. 2).

These projections are now ten years old, and it should therefore be asked whether any revision is necessary. It is significant that the forecast of national vehicle ownership for 1970, published from the Road Research Laboratory only five years previously (ref. 37), was as much as 19.7 % too high (ref. 38). In fact, vehicle ownership forecasts from 1965 onwards have been falling steadily as they are revised by fresh data (ref. 37, 39).

In Northumberland (including Newcastle and Tynemouth), vehicle ownership has increased by an average of only 2.5 % per annum over the period 1965 - 1971; in Newcastle itself, vehicle ownership has virtually ceased to grow (average increase 1965 - 1971 = 0.25 % p. a.) (ref. 40).

The number of licenced vehicles in Northumberland in 1970 was 1.46 times the 1960 value (ref. 38, 41). If the 2.5 % p.a. increase is maintained, ownership in 1980 will be 1.87 times the 1960 value. This is almost 30 % below the forecast in the Development Plan Review.

Future Traffic Growth: The Energy Gap

As this report is being written (Nov. 1973), Government legislation is in hand to impose petrol rationing if conditions should demand it. Although the immediate cause is political, this must not obscure the fact that oil supplies will become increasingly scarce in the future.

If oil usage continued to increase exponentially, the known world oil reserves would be completely exhausted by about 1990 (ref. 42). What is expected to happen in practice is that demand will outstrip supply somewhere around 1980, and remaining reserves will then dwindle gradually (see Figure 3) (ref. 43). Meanwhile petrol prices will rise, and an estimate of £1 a gallon in a few years' time is not unreasonable (ref. 44).

In addition to conventional reserves, a large quantity of oil is present as oil shales and oil sands. A process has been developed which may permit the economic recovery of oil from the hard shales of the Rocky Mountains (although not suitable for softer deposits such as those in Scotland) (ref. 70). Shale oil could perhaps triple the known oil reserves, but only at high prices and with massive capital investment (ref. 70). Figure 3 shows that, the absolute value for total reserves makes comparatively little difference to the, point at which exponentially-growing demand begins to stretch above supply. As soon as this occurs, increasing competition for oil between private transport, public transport, power generation and industrial uses will mean the introduction of some kind of allocation, system - in other words fuel rationing.

Conventional forecasts which predict a doubling of vehicle ownership and traffic in Britain by the turn of the century (ref. 39) take no account of restrictions imposed by fuel shortage. A switch to battery-operated vehicles would require the construction of about a hundred new 1000 MW generating stations (twice the present output of the CEGB) and seems to be out of the question (ref. 43). Hydrogen (liquid, or as metal hydrides) has

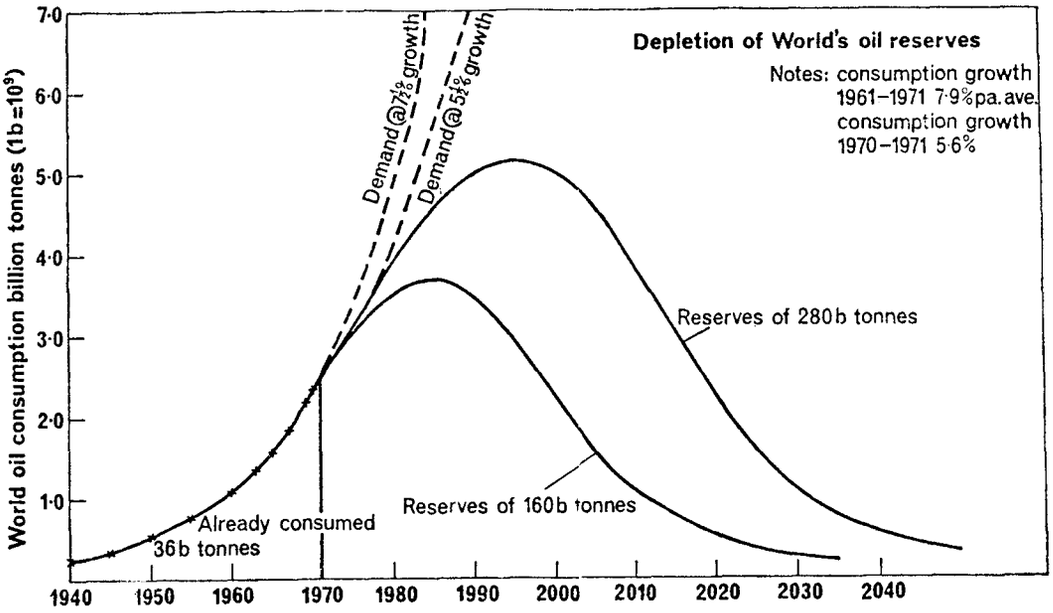


Figure 3. Theoretical depletion patterns of world oil reserves (ref. 43).

interesting possibilities as a fuel (ref. 45), but again is dependent on electricity or nuclear power to produce the fuel from water. In any case it is doubtful whether the massive technology changes required could be introduced rapidly enough to enable the increase in vehicle ownership to continue during the foreseeable future.

The only major argument for building new motorways - that private transport will continue to increase indefinitely over coming decades - therefore falls to pieces. At best, new urban motorways will act simply as a "stop-gap" solution to cope with short-term traffic increases up to the mid-1980s, when fuel shortages may be expected to cause a swing back to public transport and other less energy-intensive modes of travel (such as walking). The necessity for a change in transport priority has been recognised in a recent Government decision to transfer some £200 million from the urban roads programme to rail investment over the next five years (ref. 71).

The Newcastle motorway system is not scheduled for completion until the late 1980s. By then, it may well be obsolete.

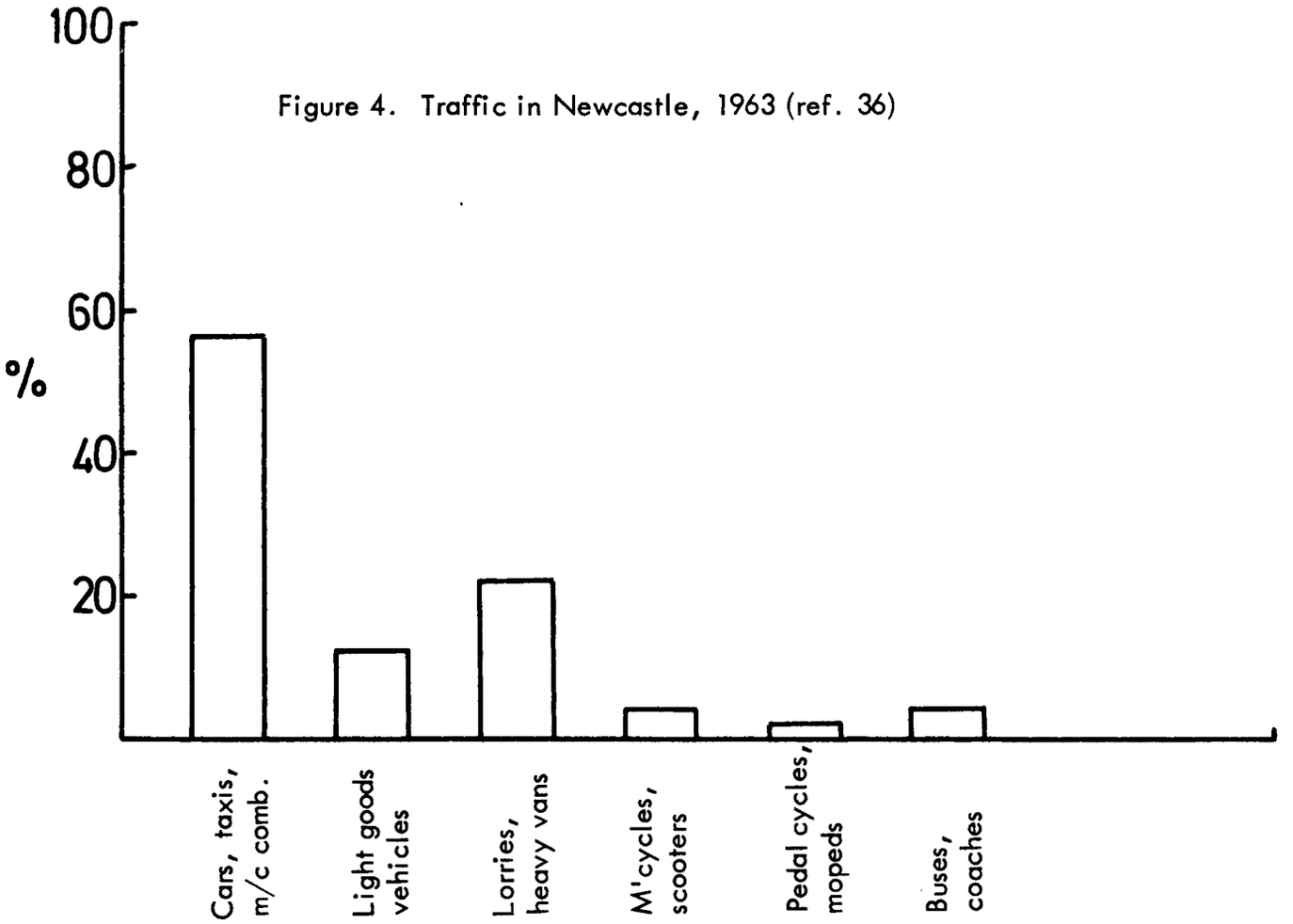


Figure 4. Traffic in Newcastle, 1963 (ref. 36)

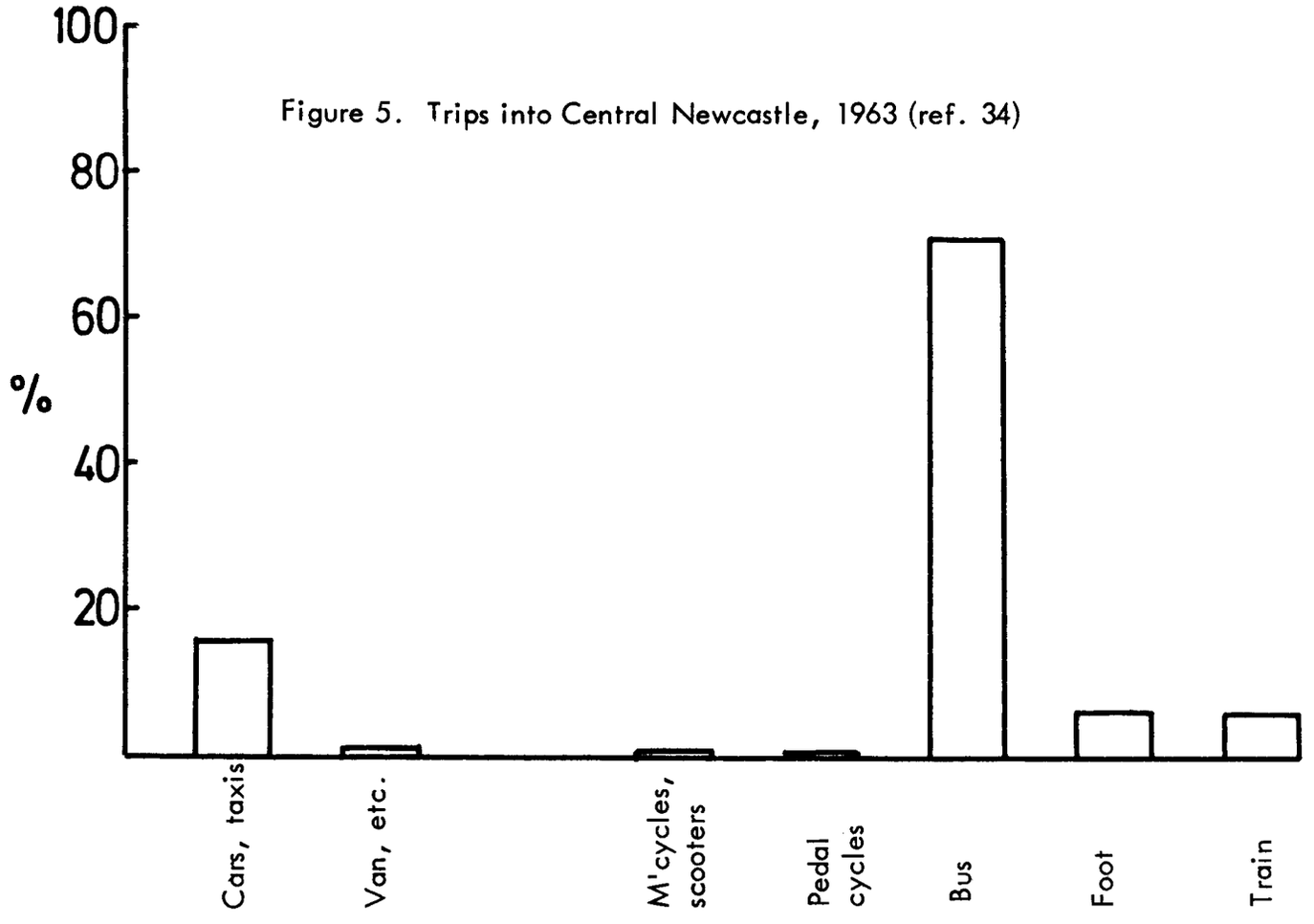


Figure 5. Trips into Central Newcastle, 1963 (ref. 34)

4 alternatives

Assuming that the private car is here to stay for another decade or two, at least, what alternatives are there to building primary road systems of the urban motorway type, as proposed in Newcastle?

"The general lesson is unavoidable - if the scale of roadworks and reconstruction seems frightening, then a lesser scale will suffice provided there is less traffic."

The Buchanan Report, para 464 (ref. 16).

Car v. Bus - The Modal Split

One of the fundamental questions in urban transport planning is the amount of priority to be given to the private car compared with other means of transport. The distribution of journeys between different transport modes is known as the 'modal split' . In planning transport systems the size of the modal split is a crucial factor, for the following reasons:

The average occupancy rate for cars is something like 1.5 persons per car. This means that if a typical busload of people were transferred into cars they would occupy about 15 to 20 vehicles (ref. 39). Transport by car therefore uses considerably more roadspace than transport by bus. This is shown in the survey data for Newcastle in 1963, when about 70 % of journeys into the City Centre were made in buses comprising only 4 % of the traffic. In contrast, only 15.5 % of total trips were made by car (plus taxi), but cars made up over 50 % of the traffic (see Figures 4 and 5).

It has been calculated theoretically that if all commuter journeys into an average-sized city were made by bus, only 4 % of the city centre would be needed for roads, compared with a total of 17 % for roads + parking if all trips were made by car on urban motorways (ref. 46).

Travel by car not only uses more roadspace - it also causes more pollution, uses more fuel, and of course costs more (see Figure 6).

Data such as these show that car transport is very inefficient as a means of catering for mass travel within the city. This is not to deny that the car has very important advantages over other forms of transport in certain situations*; but the widespread use of cars in cities when there is a public transport alternative - particularly for the journey to work - is clearly very wasteful and is the prime cause of congestion at peak periods. The growth in car use is also the main reason for the formulation of urban motorway plans in Newcastle and elsewhere.

It follows that the only real alternative to such plans is an increased emphasis on public transport in the city, with encouragement to switch journeys from car to public transport wherever possible. This is a more rational solution than the private car/urban motorway combination; not only is it more efficient in terms of resources and land use, and less destructive of the environment, but it is also of benefit to the whole community - including those who cannot drive (the elderly, the very young, the infirm) - and those

* (The author of this report is herself a car owner, and therefore recognises the possibility of bias.)

who do not own cars.

It may therefore be concluded that an improved public transport system is not only environmentally superior to the private car/urban motorway option, but it is also socially preferable because it offers increased mobility to all sections of the community.

The House of Commons Report

In December 1972 the House of Commons Expenditure Committee published a major report on urban transport planning (ref. 53). This report was based on extensive evidence taken from the Dept. of the Environment, the GLC, the Passenger Transport Authorities and Executives of other conurbations, British Rail, the universities, professional transport planning consultants and many other sources.

The Committee recommended a programme directed towards promotion of public transport:

"National policy should be directed towards promoting public transport and discouraging the use of cars for the journey to work in city areas."

The Committee also recommended that:

"As an urgent priority, all trunk and principal schemes of urban road building which have not reached the exchange of contract stage should be re-examined ab initio."

The Need to Restrict Car Use

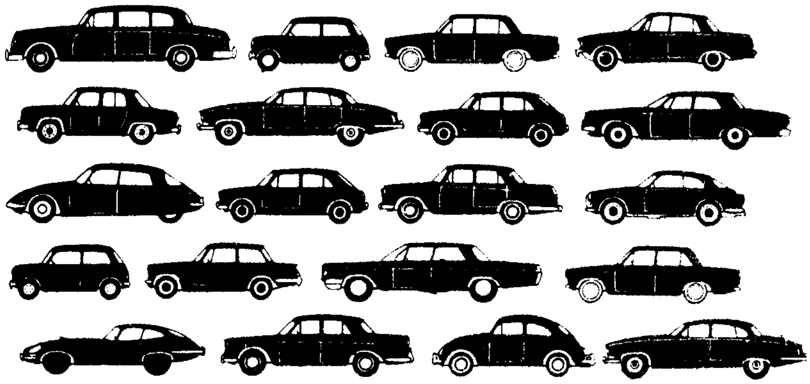
It is impossible for city roads to cater for the number of journeys which could potentially be made by car - even with maximum restructuring of the city to provide urban motorways (ref. 2, 16). A high degree of traffic restraint is therefore inescapable, whether or not motorways are built, but it is especially important if motorway construction is to be avoided.

For public transport to be a viable alternative to urban motorways, ways must be found of encouraging the choice of public transport instead of car for most journeys within the city. At the moment there is little incentive for most motorists to alter their mode of travel (partly because the social costs of traffic congestion are ignored, and car use therefore appears relatively cheap), and it seems unlikely that improvements in public transport will by themselves cause a significant switch from car use. This means that direct traffic restraint measures will also be important in keeping car use down to an environmentally acceptable level.

If nothing else is done, traffic volume is limited mainly by congestion. The evidence from Central London is that traffic tends to build up to a saturation level close to, but above, the breakdown point of the system (ref. 8). Provision of extra roadspace would allow traffic volume to increase again until it re-stabilised at a new level, with congestion restored.

The purpose of traffic restraint is to keep traffic volume below the point at which it becomes self-limiting in this way. At the moment parking restriction is the main controlling factor; it is the view of the House of Commons Expenditure Committee, however, that "as a major means of implementing policy, the regulation of parking is at the present weak, muddled and lacking in effectiveness and overall cohesion" (ref. 53). The Committee calls for much stronger and better-enforced restrictions of parking in city centres.

Figure 6. Efficiency of Bus and Car Transport.

ROADSPACE (a)		
POLLUTION: CARBON MONOXIDE (b)	*	* *
POLLUTION: LEAD (c)	Zero	9,000 tonnes per annum used in UK petrols
FUEL(d)	PPPPPPP	PPPPPPPPPPPPP
OPERATING COSTS (e)	£££££££ ££££££	£££££££££££££££ ££££££££££

Notes

(a) 1 bus = 20 cars = 10 x roadspace, from ref. 46

(b) Petrol vehicles 56 tonnes/million vehicle miles, and diesel vehicles 8 tonnes/million vehicle miles (rough estimation from refs. 47 and 48). Assume 1 bus = 20 cars.

(c) Ref. 49.

(d) Direct energy in kcal per passenger mile, ratio 350:630, from ref. 50.

(e) Bus costs per vehicle mile = 26.97p, from ref. 51.
Typical car costs (12 to 2 litre car) per vehicle mile = 2.488p (running cost only), from ref. 52. Assume 1 bus = 20 cars.

In Newcastle, parking control is seen as the main method of restricting traffic volume to the capacity of the motorway system. For this reason the 17,000 car spaces provided for in the original plan were reduced to 13,000 (ref. 2). The number of public parking spaces presently available (Feb. 1973) in the city centre is 3,008 off-street (ref. 54, less 400, ref. 55), plus 1,173 on-street (ref. 55), plus 502 multi-storey (Manors); this totals 4,683, but even with this level of provision the traffic volume in central streets is appreciable. This suggests that for really effective traffic restraint, parking spaces should be held at their present number, or even reduced - as is proposed in London (ref. 56).

Besides parking control, two other direct methods of traffic restraint are advocated. The first is road pricing, which is based on the principle that car use in congested areas imposes an economic burden on the community. It is therefore proposed that the motor taxation system should be altered so that the annual flat-rate licence fee is reduced or even abolished, and the motorist pays directly according to the amount he uses his car in congested areas. This would mean that instead of discrimination against car ownership, there would be an economic disincentive against car use under conditions where it is damaging to the community.

The mechanics of road pricing have been under study for some years (ref. 39, 57), and it is fair to say that from a technological point of view, a system could be introduced more or less at once. Road pricing is politically unpopular, however, and it is unrealistic to assume that it will be introduced at least in the near future (ref. 8, 53). It should also be noted that this is a matter of national policy, which cannot be decided by individual cities. Although there are indeed proposals in London for the setting up of a pilot scheme to charge extra for motoring in the city centre (ref. 56), it seems most unlikely that other cities could "go it alone" in this way.

The conclusion on road pricing, therefore, is that although "these proposals are of the utmost importance and could completely transform the urban transport problem throughout the world" (ref. 8), it is impractical to consider them as a means of traffic restraint at least in the short term and where individual cities are concerned.

The other main method of limiting traffic volume is by some form of physical restraint. This may take the form of complete road closure to create a pedestrian precinct, or more usually the selective banning of through traffic while retaining the right of entry for buses and for access to premises. Such pedestrianisation schemes are both popular and environmentally beneficial. In Newcastle the closure of Northumberland Street is an obvious success, and eventually it is intended to extend pedestrianisation to include large portions of the central area - for example the whole area between Percy Street and John Dobson Street, bounded on the North by the Civic Centre and on the South by Newgate Street/Market Street. This feature of the Newcastle Development Plan deserves praise for its recognition of the need to improve environmental quality in the city centre.

The trouble with pedestrianisation schemes, however, is that by themselves they do little to reduce traffic volume on the road network, but simply push it on to other routes. One argument commonly used in support of the Newcastle motorway plans is that they are needed to accomodate traffic which would otherwise use the city centre streets. Clearly if traffic volume is to be reduced throughout the city a more radical scheme of traffic restraint is needed, and an approach to this problem has already been made in the new transport proposals for Nottingham (see below).

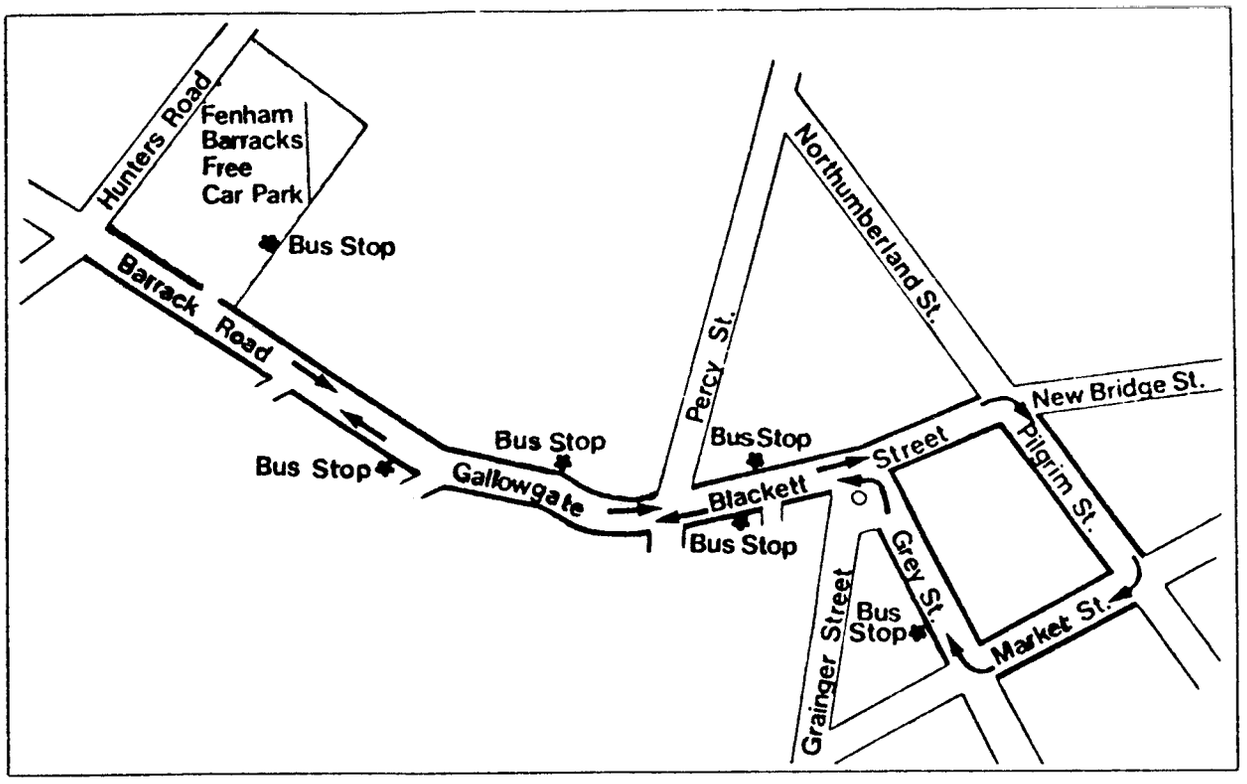


Figure 7. The park-and-ride system operated from Fenham Barracks into central Newcastle has proved convenient and popular with motorists (ref. 51).

Improving Public Transport

Conventional Buses. Ordinary bus services are continually being improved in terms of vehicle design, comfort and operating efficiency (e.g. with the introduction of radio control). The most significant advances in quality of service, however, are likely to depend on an increase in bus priority over other forms of traffic - for example by the use of more bus lanes, more bus priority movements at intersections, and possibly schemes for direct actuation of traffic signals by approaching buses. In London, the opponents of the Ringway 1 proposals have suggested a continuous and integrated bus priority network, along several hundred miles of routes, as one of the best methods of helping public transport to fight congestion (ref. 58).

In Newcastle there are several short sections of bus lane, and in a recent report (ref. 59) the TPTE have proposed a much more extensive series of possible bus lanes.

Park-and-Ride. The principle of park-and-ride is that motorists from outlying districts can drive in to a special (perhaps free) car park some distance from the city centre, and make the rest of the journey by bus or rapid transit instead of adding to the city centre congestion with their cars.

Some of the interchanges planned for the Tyneside Rapid Transit system will in effect provide park-and-ride facilities. In addition, the TPTE have been operating an experimental service for several years during pre-Christmas periods, from a free car park at Fenham Barracks into the city centre by a flat-rate-fare bus. Although the TPTE report that this service is convenient and popular with motorists, they consider it cannot be made

financially viable without more stringent control of parking in the city centre (ref. 51). In spite of this, however, the service operated before Christmas 1972 was extended by public demand to cover the January sales period, and is now continuing every Saturday (see Figure 7).

Further park-and-ride facilities will be considered by the TPTE as parking becomes more difficult in central areas of Newcastle and Gateshead (ref. 59).

Dial-a-Bus. This relatively new idea involves a fleet of radio-controlled minibuses which provide a door-to-door service between home and town centre in response to a telephone call. Other features include a reasonably inexpensive flat-rate fare (around 10p) and possibly free telephones in the town centre to call a bus. This cross between a bus and taxi service is aimed to provide the flexibility of a car without parking and congestion problems, and is ideal for journeys such as shopping trips where door-to-door transport is an advantage.

Utilising the advice of the Ford Motor Co., which has experimented with dial-a-bus in Michigan and Ohio, services were commenced last year in Abingdon, Berks, in Maidstone Kent, and in Harrogate. A number of other towns are intending to start similar schemes (ref. 60); in a conurbation such as Tyneside, however, scope for dial-a-bus may be quite limited in comparison with conventional services (ref. 59).

Rapid Transit. Fixed-track urban transport systems are an important adjunct to bus services because they are not subject to competition from other traffic and can therefore provide a rapid and reliable service for travellers. The TPTE Rapid Transit proposals are probably the most important aspect of public transport planning on Tyneside, and as part of an integrated public transport system will offer a real alternative to the car for many journeys in the city.

The basic outline of the scheme is shown in Figure 8. The system will use the existing North Tyne rail loop and South Shields line (slightly modified), with an underground link-up in central Newcastle and Gateshead, and a new river bridge. Light-weight, high-performance rolling stock similar to existing continental designs will be used, and special interchanges will seek to integrate bus and car travel with the rail system.

The cost of the scheme is estimated at £65 million, of which 75 % would be a Government grant (ref. 61). The system would, however, be economically superior to an all-bus alternative and also to the existing commuter rail service which has been running at an increasing loss. Although the proposed network does not cover the whole of Tyneside, particularly towards the South and West, the system would be capable of extension in the future and it is hoped that Rapid Transit will bring about a real improvement in transport on Tyneside.

British Rail. British Rail commuter services will continue to be important as an alternative to road transport. On Tyneside the main passenger movements not catered for by Rapid Transit are those from Sunderland and Chester-le-Street. A reliable and efficient fixed-track service from these areas is essential, but whether future journeys should be catered for by British Rail or by an extended Rapid Transit system is a matter for further study.

Rail services could be especially important for removing heavy freight "through" traffic from roads in the Tyne/Wear conurbation. Although outside the scope of this report, the question of freight traffic on roads demands serious study in the context of energy resources, road investment and the urban environment.

New Urban Transit Systems. On a more futuristic note, the U.S. firm Rohr, the German firm Krauss-Maffei and a team at Sussex University are all developing personal rapid transit systems, with vehicles carrying 4 to 30 passengers and utilising magnetic levitation and

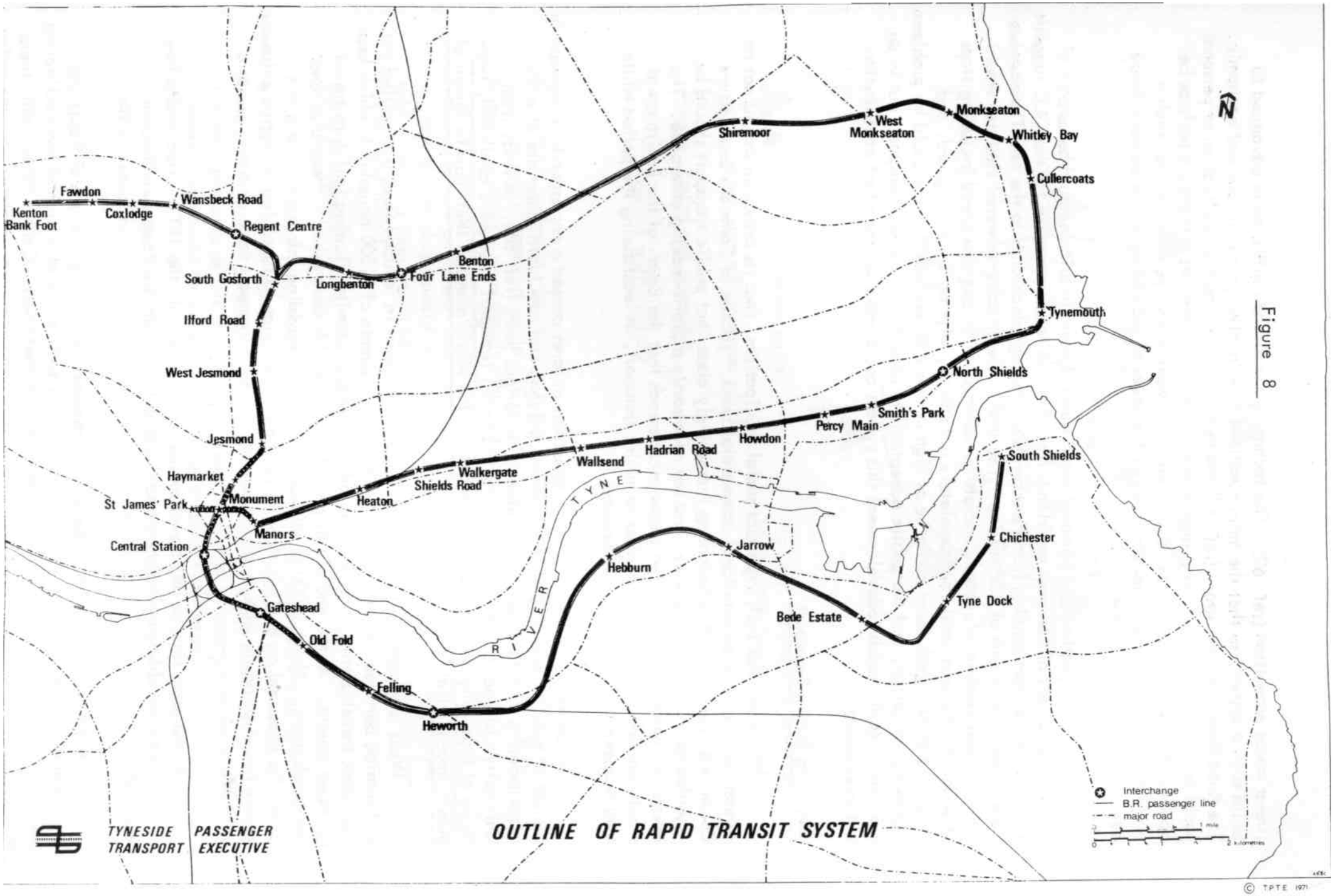


Figure 8

DWG No. 4038

linear motor propulsion (ref. 62). The technology is already sufficiently advanced to build such a system, so that the main questions now involved are political and economic. The Road Research Laboratory (ref. 63) has been investigating the application of personal rapid transit in the context of a redeveloped City of Westminster. It should perhaps be noted that a substantial degree of city redevelopment is seen as necessary for such a project, and it is an open question whether the level of rebuilding would be considered acceptable in a city centre.

The first location of a personal rapid transit system in Britain could be as part of the redevelopment of London's docklands (ref. 64). A report prepared for the GLC suggests a 'mini-tram' system running from Fenchurch St. through docklands to the new Thamesmead development, at a cost of £37 million. The small, electrically-powered vehicles would run on rubber tyres on elevated concrete guideways, at an average speed including stops of 40 km/h; the cars would be completely automated, with no driver or guard, and frequency during peak hours could be as high as every 30 seconds. There could be problems regarding vandalism, and the public acceptability of fully-automated transport, but in an area which badly needs redevelopment this system could make an important contribution to travel needs.

Financing Public Transport

"Transport has such important social implications, that its provision should not be determined solely in conventional commercial terms." (House of Commons Expenditure Committee, ref. 53). It is becoming increasingly clear that public transport should be regarded as a community service, and not necessarily a profit-making enterprise. The House of Commons report quoted above recommends that the Dept. of the Environment should provide operational subsidies to public transport, at least during the period while improvements are being made to services.

In Goteburg (Sweden), a 20 % reduction in fares caused a corresponding increase the use of public transport (ref. 65). Rome, Bologna and now Nottingham are already experimenting with fareless public transport in various forms (ref. 65). A study from University College, London, suggests that if London Transport fares were abolished., two-thirds of those who drive to work in Central London would abandon their cars in favour of public transport (ref . 64).

What is apparently the first controlled experiment in reduced fares was carried out on Tyneside between February and July 1973. In a sample of 2,500 households which kept one-week travel diaries, half were issued with special permits allowing half-fare travel for three months. At the end of this period all households were asked to keep a second one-week diary. About 5,000 people co-operated in providing information, and this survey "is expected on analysis to be of national importance in supplying objective evidence for the first time on the effects of a reduction in public transport fares on travel patterns" (ref. 59).

At the same time as this travel survey was carried out, the TPTA introduced a free travel scheme for old age pensioners and the disabled within the Passenger Transport area (ref. 59).

The question whether to make public transport completely free is a difficult one. There would be some definite practical advantages, such as the abolition of fare-collecting costs and the reduction in delays with one-man-operated buses. On the other hand, there would be problems over where to put the boundary line of the 'free' district, and the main

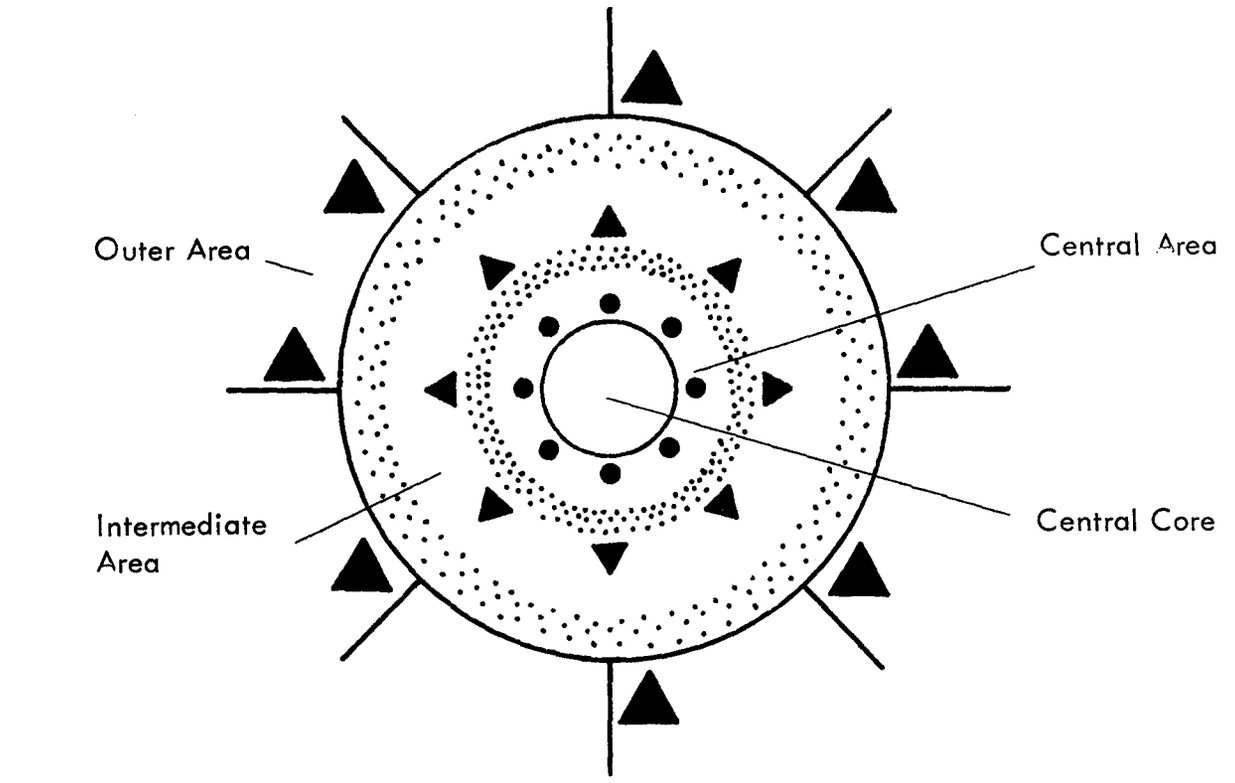


Figure 9. Transport strategy in Nottingham (adapted from ref. 67).

difficulty is to decide who pays the bill. In the Tyneside Passenger Transport Area, zero fare public transport would add 13.5p in the £ to the rates (ref. 59). Public transport is used by many people other than local city residents, and it may be that a complete reorganisation of the present rating system would be needed before any free transport scheme could work fairly (ref. 65,66). But whether the system operated with no fares or with cheap subsidised fares, it seems certain that the reduction of present public transport fares would be a most effective way of encouraging a switch from car to bus or rapid transit.

Doing without Motorways: Transport Strategy in Nottingham

In October 1972, the Nottingham City Council voted overwhelmingly to reject a £100 million urban motorways plan in favour of a radical new scheme involving traffic control, better public transport, and priority to pedestrians and buses over private cars. The main proposals of this scheme are described below as an example of the kind of strategy which could be investigated as an alternative to motorway building.*

The central core of the city (about 1/4 mile radius) will be closed to through traffic (except buses); there will be no on-street parking, and strictly limited off-street

* Information in this section is taken from refs. 67 to 69.

parking, and many streets will either be completely pedestrianised or have pedestrian priority.

Within the central area (about 1/2 mile radius), on-street parking will be limited to short and medium stay, with vigorous discouragement of long-stay commuter parking. An area traffic control system to co-ordinate traffic signals will be introduced with the main objective of assisting public transport, commercial vehicles and pedestrians at peak periods. In addition, traffic management measures and local road improvements will be carried out wherever this will assist public transport and commercial vehicles and not encourage commuters.

Similar traffic management and highway improvements will be introduced within a 2 mile radius of the centre, together with further steps to create residential "environmental areas" designed to exclude through traffic. In local shopping centres there will be pedestrianisation schemes together with provision of public car parks.

In addition to these measures, the possibility is to be investigated of a direct control of peak-hour traffic flows, both by creating bus lanes or "no private car" lanes, and by forming one or more "traffic collars" around the city. The latter would involve limiting the number of access roads to the centre and creating a traffic signal barrier to limit flow according to the level of traffic volume within the collar. The collars would be accompanied by park-and-ride facilities to encourage motorists to park and travel in by express bus instead of queueing for admission at the traffic barrier. A traffic collar scheme, linked to a five-year programme of park-and-ride, has been evolved in conjunction with the Transport and Road Research Laboratory and was introduced in October 1973. The cost of this programme - £10 million capital investment plus £1 million annual running costs — is very low in comparison with that of the rejected motorways scheme.

A free bus service from car parks into the city centre was introduced in November 1972, to be followed by a second free service in July 1973. These two services - paid for by a General Rate Fund subsidy of about £55,000 - are now carrying 100,000 passengers a week. In summer 1973 a start was also made on expanding the main bus service by one-third - an extra 87 vehicles and 200 staff at a subsidy of £500,000. No policy to drastically restrain passenger cars in the city will be introduced until "we have good, dependable, efficient and comfortable public transport" (ref. 69).

The entire programme is a lengthy one, involving both short-term (up to mid-1974), medium-term (up to 1977) and longer-term measures. Nottingham is at present engaged in a land use/transportation study, and the programme as currently conceived may have to be altered in the light of its results. However, the present City Council is determined that no urban motorways should be built, and is planning to place new development over the motorway routes to ensure that these roads can never be constructed.

5 conclusion

It is not possible to present a detailed alternative transport strategy for Newcastle in this report, as the considerable resources and facilities necessary to do so are not available. It is hoped however that the foregoing may be useful to indicate the general guidelines for such a strategy, which must be based on positive traffic restraint measures combined with development of public transport to a standard which offers a really acceptable alternative to the car for most journeys in the city.

It is suggested - in view of the various environmental hazards discussed above, and the uncertainty regarding possible benefits to traffic movement - that the whole concept of a primary urban motorway system in Newcastle should be reconsidered.

This is particularly necessary because short-term traffic growth may have been overestimated, and because energy considerations will demand a complete re-thinking of transport systems in the relatively near future.

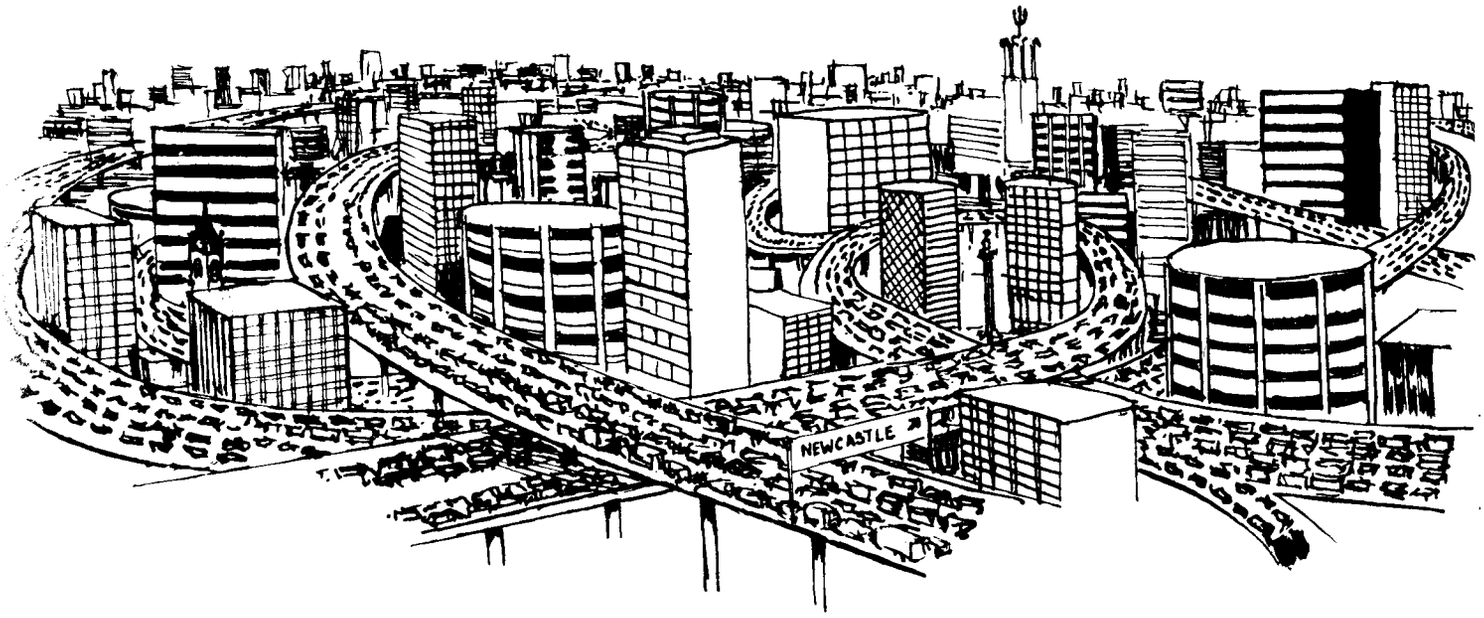
With one motorway under construction and six more in the planning stage, it is essential that a thorough re-examination of transport strategy, including adequate consideration of alternatives, be undertaken immediately before work is commenced on further sections of the motorway system.

It is often argued that, in alternative schemes involving traffic restraint, the personal freedom of the motorist is at stake. If traffic is not restrained by other means, however, it will be restrained by congestion, and this is as undesirable for the motorist (if not more so) as for everyone else. Furthermore, the freedom to drive a car through the city is no more important than the freedom to breathe clean air, live in a quiet environment and walk safely and easily through the city. If the car is used selectively instead of indiscriminately, this will improve the environment for everyone and will increase mobility, not only for the bus user but also for the motorist when a journey has to be made by car.

If these facts are appreciated it is our belief that the car-owning public would not find a responsible programme of traffic restraint unacceptable. In the words of the House of Commons Committee on urban transport "we consider that private motorists neither expect, nor want, extensive provision to be made for them in city centres, to the detriment of the local environment and at the expense of those who have to use public transport. We believe that motorists would accept fair, equitable and well-enforced restrictions made upon car use in city centres if public transport offered them a good alternative" (ref. 53).

Finally, there remains the question of how much overall mobility should be provided for in the city. While it is obviously desirable to develop a versatile and efficient transport system, i t does not follow that mobility should be increased indefinitely to secure yet more marginal advantages in the face of escalating economic and environmental costs.

"The fundamental lesson to be learned from past experience in London and other cities is that 'trend planning' in transport is likely to prove unsuccessful and possibly disastrous. The process of providing more and more capacity, either road or rail, with little regard to the economic and social cost, in order to meet the growing pressure of



How much mobility?

uncontrolled demand, is not likely to solve the problem but rather to reproduce the same problem on a larger scale. "

"Motorways in London" (ref. 8).

In planning for the future, therefore, it is important to realise that the decisions go deeper than a simple choice between different modes of transport. We have to decide how much mobility we need and want, in a situation where any new transport system will create some degree of environmental disturbance, and will use up resources which may be vitally needed elsewhere - perhaps for housing and social services. These are questions which demand careful consideration by politicians, planners and by society.

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