Department for **Transport**

Traffic Advisory Leaflet 6/01 April 2001



Bus Priority

Introduction

This leaflet is a summary of findings of research on bus priority for the DETR. More detailed Traffic Advisory Leaflets are planned, covering individual aspects of bus priority measures.

The Government has set out a radical new approach and reform programme. The Ten-Year Transport Plan will deliver improvements for passengers, motorists and business. Transport investment of £180 billion will be made over the term of the plan, of which £107 billion will go to public transport.

The investment will fund a more integrated public transport system with modern buses, trams, light rail, and Park & Ride schemes. It is recognised that buses will remain the main public transport option for most local journeys. The Government's aim is to improve standards, so that buses provide a high quality service that is an attractive alternative to the car. This is to be achieved partly through Quality Partnerships (agreements between Local Authorities and Bus Operators) to improve buses, infrastructure and priority measures. Reallocating road space to buses, and allowing them to avoid the worst congestion spots, can greatly improve journey times and reliability. Such improvements can make buses a viable alternative.

Background

The strategy for transport is to tackle congestion and pollution by improving all types of transport. This includes examining transport as a whole to form integrated transport solutions, and modernising the transport network to make it better, safer, cleaner and quicker. This leaflet summarises results from a number of DETR research projects examining how improvements to the bus priority network can assist in achieving sustainable transport.

A large number of local authorities and bus companies have used Quality Partnerships and Bus Initiatives to invest in bus priority and highway infrastructure or modern vehicles. Some of the achievements have been:

- More accessible buses
- Improved physical priority and Selective Vehicle Detection (SVD) for buses (including more innovative schemes)
- A corridor approach to improving bus services
- Reduced travel times
- Cleaner buses
- A greater emphasis on public transport benefits than on non-priority vehicles
- Infrastructure bus stops, shelters, and waiting areas
- Real-time passenger information
- Integration with other modes

- Increased bus frequency
- More reliable buses

Scope for improvement

A combination of surveys and modelling has been used to investigate the maximum improvements to travel time and reliability that can be attained from implementing priority measures. A selection of the results of this work is:

- Greatest bus passenger benefits are obtained from whole route priorities, which may comprise a combination of bus lanes, queue relocation and junction priorities (SCOOT, MOVA, Selective Vehicle Detection, etc.). Congestion along bus routes is often irregular, and buses generally obtain most benefits from measures in the most congested areas. Often such measures cause the greatest delays to other traffic, though these can be diminished with careful planning.
- Fully enforced bus lanes could reduce travel times by 7 to 9 minutes along a 10-kilometre highly congested bus route. The effect on reliability is highly site specific, though the greatest improvements can be obtained through route length implementation.
- Modelling indicates that implementing extensive bus lanes could reduce travel by car by up to 6% (in London this is equivalent to 1.4 billion vehicle kilometres per annum). Reduction in car travel was estimated using stated preference modelling of current car users, rather than direct measurement
- 84% of car users stated they would be willing to consider some changes and possibly use public transport more.
 16% of car users stated they would

not alter their current travel patterns under any circumstances.

- Bus priority is possible at traffic signals, and can use systems already in place for other purposes, e.g., realtime bus information equipment.
- Modelling, confirmed by on street surveys, indicates Bus SCOOT can reduce bus travel times by 2 to 4 minutes on a 10 kilometre bus route, with the variability of travel time improved by up to 16%. Time savings of 1 to 10 seconds per junction (with an average of 4 seconds), and travel time variability improvements of 0 to 20% (with an average of 12%) were achieved.

Effective priority

By considering traffic and pedestrian requirements along the whole route, a total route control strategy can be established to provide maximum benefit for all modes. Throughout the transport network there is a limited amount of road space, and therefore capacity, especially at junctions. When allocating priority, and road space, to buses the following potential problems may need to be considered and solved by the solutions described in the next section:

- Reduced junction capacity
- Insufficient queuing space
- Down-stream congestion preventing a junction clearing
- Increased flows of conflicting traffic
- Poor scheduling of buses because adjustments are not made for improved travel time and reliability
- Bus lane violations

Time reductions

Example of Travel Time Reductions achievable with bus priority on five routes surveyed throughout the country



Solutions

In order to improve the quality of bus operations a number of techniques have been developed.

- Elimination of setbacks: Improved benefit for priority vehicles, as no queuing before the junction, but can severely reduce junction capacity for other road users.
- **Bus advance areas:** Pre-signals to allow buses to be the first in the queue at a signalised junction, without loss of capacity.
- Bus Gates: Use of Selective
 Detection to permit access by buses
 only.
- **Rising Bollards:** Permit bus access only, by retracting when a bus is detected.
- Selective detection: On detecting a bus, green times can be extended, or red time reduced, to reduce the waiting time of the vehicle.
- Queue relocation: To prevent downstream blocking, traffic queues can be moved to an upstream section with sufficient capacity to contain the queues. A priority lane on this section will allow buses to overtake the queue, and travel unhindered down

the previously congested section of road.

- Whole corridor approach: In the past, problem sites and easier sections have been looked at in isolation. The whole-route approach ensures that if bus priority is implemented in one location, dispersed traffic does not adversely affect other parts of the route. Queue relocation methods can be used. An example of this is the route 43 in London, where 12 km of bus priorities and 6m of virtual bus lane (using queue relocation) are planned to protect 63% of the bus route: this is combined with SVD signal priority at 34 junctions. In Edinburgh, Greenways bus priority corridors have contributed to an increase of 3% in bus use over the past two years.
- **Busways:** Complete segregation of buses from other vehicles.
- Guideways: Complete segregation of buses from other vehicles, with guiderails to steer the bus. It is selfenforcing and can take up less road space. However, they are expensive to implement and inflexible if a vehicle should breakdown.
- Shared Use Lanes: These are generally of use along trunk and other major roads and can result in a more

efficient use of capacity, particularly if bus frequency is low. Examples of shared use include High Occupancy Vehicle Lane, and use by heavy goods vehicles, pedal cycles or taxi's. However, they are difficult to enforce.

- Bus Boarders: By introducing a boarding area jutting out from the kerb, buses do not need to pull into a stop and are unhindered by parked vehicles. Passengers do not need to step into the road to board the bus. Further, they aid passenger access, particularly on low-floor bus routes, by reducing the step height at the entrance of the bus.
- Bus Stop Clearways/Bus Boxes: Clearly marked bus stop box, with strict parking restrictions. They may be enhanced by coloured road surfaces.

Enforcement

Priority lanes can only work if respected by other road users. A parked vehicle in the lane forces priority vehicles to enter a nonpriority lane, and queue with other traffic. This can negate any benefits obtained from the priority measure.

Non-priority vehicles travelling in a priority lane will increase queues at junctions, delaying priority vehicles and reducing benefits. Manual enforcement is costly, though some innovations, including traffic wardens travelling on buses to catch offenders, have improved efficiency.

Automated systems are now in use, which increase the level of offence detection, and therefore afford stronger deterrence. These include:

- Bus mounted cameras
- Roadside CCTV
- Roadside fixed cameras

Such systems require initial purchase of equipment, the setting up of an operations centre and signing (regulatory and warning).

Self-enforcement design features can make bus priority easier to enforce, and reduce the

need for active enforcement. Features include:

- Physical entry treatments to deter vehicles from accidentally entering a bus priority lane, e.g. chicanes, islands and bollards
- Conspicuous lane markings and signing to help deter the unauthorised use of priority features
- Entry to a bus lane direct from a bus stop box
- Exit from a bus lane controlled by features such as bus activated signals and rising bollards

Bus priority initiatives

Oxford introduced a transport strategy in 1993 due to the growing demand for travel. Initial measures adopted to combat the problem were based on Park & Ride sites, combined with extensive bus priority. Additionally, capacity improvements were made to the ring road to allow for displaced traffic, and a cycle network was developed. More recently, further traffic restrictions and bus priority improvements have been introduced, to discourage general traffic from the City Centre.

The London Bus Initiative was announced in November 1999, with a budget of £78.1 million. It aims to make buses more attractive and therefore a first choice travel mode. One of the main changes in emphasis is to consider the whole journey, rather than individual problem areas. Bus priority measures are being increased to achieve significant improvements, and these are being combined with enhanced enforcement to prevent the gains being eroded. Improved image, and perception of waiting time, is also being achieved through the introduction use of real time information.

Overcoming barriers

Many hurdles need to be overcome between the start of a scheme's planning and its implementation. Some of these are considered below:

- On highly congested corridors: Use innovative techniques, including queue relocation or UTC (Urban Traffic Control) to platoon traffic through the corridor ("Total Route Control"). Alternatively, implement the priority in stages.
- Low bus frequencies: Use a shared priority scheme. Alternatively, enter a Quality Partnership.
- Local policies: Make the process inclusive of affected parties, with good public relations at an early stage.
- Market the scheme: showing how it will benefit the area.
- **Budget:** Use a package approach with alternative schemes available.
- **Staffing:** close contact between planners, engineers and operators.

 Lack of enforcement resources: Use more innovative methods, based on cameras, automatic recording or design (self-enforcement).

Technical enquiries

TM Division, Zone 2/06 Great Minster House 76 Marsham Street, London SW1P 4DR Tel: 020 7944 2599

Reference

LTN 1/97 Keeping Buses Moving, SO, 1991 ISBN 011 551075 3, £12.50

Traffic Advisory Leaflets (TAL) are available to download free of charge on the Department for Transport website www.dft.gov.uk

Sign up for a free e-mail alert to receive notification when a new TAL is published by sending an e-mail to tal@dft.gsi.gov.uk with the subject line "subscribe".

To obtain a printed copy of this and/or other TAL's, contact: DfT Publications, PO Box 236, Wetherby, West Yorkshire, LS23 7NB. Telephone 0870 122 6236. Fax 0870 122 6237. E-mail: dft@twoten.press.net

The Department for Transport sponsors a wide range of research into traffic management issues. The results published in TAL's are applicable to England, Wales and Scotland. Attention is drawn to variations in statutory provisions or administrative practices between the countries.

Within England, enquiries should be made to: Traffic Management Division, Department for Transport, 2/07 Great Minster House, 76 Marsham Street, London, SW1P 4DR. Telephone 020 7944 2478. E-mail: tal@dft.gsi.gov.uk