Department for Transport

Local Transport Note 1/24: Bus User Priority

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1. Introduction

In March 2021, the Government published the National Bus Strategy (NBS) which set out the Government's vision for bus services in England outside London. The main aim of the strategy is to increase bus journeys, firstly by returning the overall number of journeys made by bus to pre-Covid levels, and then to further grow bus journey numbers. Through Bus Service Improvement Plans (BSIPs) and the establishment of statutory Enhanced Partnerships (EPs) or franchising local communities will benefit from the delivery of more services, simpler and cheaper fares, greener and more accessible buses, and appropriate bus priority measures. This approach was developed to increase passenger numbers and help reduce congestion.

While this guidance focuses on improving bus services, it is important to recognise the possible impacts on other road users. The Plan for Drivers, published in October 2023, includes a range of measures to ensure smoother journeys. This guidance delivers the commitment to strengthen guidance to make sure bus lanes help rather than hinder traffic.

As set out in the 2024 BSIP guidance, the NBS states that to increase bus use, buses must become attractive to far more people. The key to doing this is making them faster and more reliable. The NBS therefore expects plans for bus priority on roads where there is a frequent bus service, traffic congestion, and the physical space to install it. Bus lanes should be as continuous as they need to be, and have the hours of operation they need to have, to insulate buses from delays caused by traffic congestion and parked vehicles. The Plan for Drivers confirms that this means bus lanes should be provided only where they are needed and should operate only when buses are running or when traffic is heavy enough to cause delays to buses. Bus priority measures should be developed with full consideration of the impacts on other road users.

Local Transport Authorities (LTAs) across England are now delivering their BSIPs, with LTAs working closely with their local bus operators and stakeholders. This work reflects the role of buses in supporting wider government priorities, including decarbonisation and levelling up.

The role of bus travel is central to delivering on the Government's wider strategic and policy ambition to create a public transport system that is inclusive and able to meet the needs of all people. Buses play an important role as part of an overall journey experience which will also typically include walking, wheeling or cycling to and from a bus stop or interchange. Supporting bus travel through the implementation and management of appropriate bus priority schemes, initiatives and interventions helps to achieve the objectives outlined in the 2018 Inclusive Transport Strategy.

1.1 Application

The National Bus Strategy, published in March 2021, included a commitment to update technical guidance on providing bus priority. This guidance delivers that commitment by superseding LTN 1/97 Keeping Buses Moving: A guide to traffic management to assist buses in urban areas, which is now withdrawn. This updated guidance applies to schemes across England.

This guidance is relevant to everyone involved in delivering better bus services – local authorities, consultants and other practitioners.

The legislative framework for the planning and delivery of bus priority is governed by various acts and regulations, including the following:

- Road Traffic Act 1991
- Transport Act 2000
- Traffic Management Act 2004
- The Bus Lane Contraventions (Penalty Charges, Adjudication and Enforcement) (England) Regulations 2005
- Equality Act 2010
- Bus Services Act 2017
- Road Traffic Regulation Act 1984
- Traffic Signs Regulations and General Directions 2016
- Highways Act 1980
- Town and Country Planning Act 1990

Local authorities are responsible for setting design standards for their roads. This national guidance provides a recommended basis for supporting and prioritising buses and their passengers within an integrated road network. It sets out key design principles and redefines bus priority to focus on the bus user and a whole-journey experience. Local authorities are expected to demonstrate that they have given due consideration to this guidance when designing schemes that qualify for dedicated Government funding. It should also be considered in any broader Government funded schemes.

This guidance covers a broad range of measures as well as providing advice and information on how to take schemes from planning through to successful delivery. It covers the "how" to deliver as well as the "what".

Practitioners should make sure they have the latest version of any documents referenced. This guidance should be read in conjunction with -

- Manual for Streets
- Traffic Signs Manual
- Local Transport Note 1/20: Cycle Infrastructure Design
- Inclusive Mobility
- Network Management Duty guidance 2004
- National Planning Policy Framework guidance

LTAs have a duty under the Transport Act 2000 to produce a statutory Local Transport Plan (LTP). These plans should contain policies, and plans for the implementation of these policies, for the promotion and encouragement of safe, integrated, efficient and economic transport. Therefore, the measures set out in a BSIP should integrate with, and service the delivery of, a clear overarching vision and objectives for local transport set out in an authority's LTP.

This guidance is intended to support LTAs to plan and deliver bus priority schemes which can support the role buses play in local communities, and improve passenger outcomes, through:

- showcasing integrated design principles
- identifying how to develop an evidence base of benefits to generate support for bus travel
- creating bus services that are accessible by design
- being realistic and recognising that there is no one size fits all approach
- providing practical tools and techniques for all local authorities to follow when consulting on and evaluating the benefits of bus priority schemes
- helping to build local authority internal capability relevant to the range of local situations and challenges they face
- future-proofing bus priority and considering what the future public transport system could offer

Public Sector Equality Duty

Section 149 of the Equality Act 2010 places the Public Sector Equality Duty (PSED) on public authorities. This requires them, in carrying out their functions, to have due regard to the need to eliminate unlawful discrimination, and to promote equality of opportunity and understanding between people who share a protected characteristic and those who do not. Managing their road network and the bus services which use it is a function to which the PSED applies.

In the context of this guidance authorities should ensure that they consider the equality impacts of respective policies at all stages of their development and identify any steps needed to mitigate potential negative consequences or to enhance positive results. Impacts may not be restricted to passenger-facing aspects of services and might also include factors such as network design and road-space priority.

1.2 Preparation of updated guidance

This Local Transport Note was researched and prepared by Arup/AECOM on behalf of the Department for Transport. The preparation of this guidance included undertaking research to understand and collate examples of bus user priority measures for both infrastructure and technology as well as approaches and processes to support successful planning, delivery and the ongoing operation of bus user priority schemes. The research consisted of a desk-based literature review and primary research through engagement.

The literature review was used to inform wider, primary research into what will work, where, and how. The primary research was used to ascertain capacity, capability, and deeply and widely felt barriers to implementing bus user priority schemes, as well as exploring the reasons for low levels of uptake and implementation of currently available technologies. The primary research also sought to understand how local transport authorities assess the impact of bus priority interventions on local communities and on all road user groups, particularly those with vulnerabilities, as well as how they currently undertake stakeholder engagement for bus user priority schemes.

As part of the development of this guidance a steering group was established to:

- test that the updated guidance reflects the views of a wide range of stakeholders
- help build a clear and up-to-date picture of current bus user priority provision, good practice, and issues
- shape the preparation of updated guidance to improve delivery of bus user priority nationally

Table 1 lists the organisations involved.

(Table 1: steering group members)

Steering group members

Transport for All – Access, Rights, Advice
Disabled Persons Transport Advisory Committee
Active Travel England
Logistics UK
Confederation of Passenger Transport
Association of Local Bus Managers (ALBuM)
The Association of Directors of Environment, Economy, Planning & Transport (ADEPT)
National Traffic Managers Forum (NTMF)
Real Time Information Group (RTIG)

1.3 Structure of this guidance

This guidance is split into two parts:

- part 1 focuses on providing advice and information on **how** to take schemes from planning through to successful delivery

- part 2 focuses on **what** range of measures and techniques can be used to support better bus user priority across the whole passenger journey

Part 1: scheme planning, design and delivery

2. Redefining priority for buses

2.1 Bus user priority

This guidance redefines bus priority to take account of the different factors and features that impact on the bus journey and the importance of the passenger and their experience. Simply focusing on the on-road aspect, and on single measures such as bus lanes, will not achieve the outcomes sought at both a strategic, operational and commercial level. The passenger experience should be at the heart of good bus priority, hence this guidance redefines bus priority to look at the user, not just the vehicle itself.

Bus user priority definition:

Bus user priority is a combination of measures and techniques providing safe, accessible, reliable and efficient bus journeys that are consistent and minimise delay.

It includes not only infrastructure measures that improve journey time and reliability such as bus lanes but also improvements to the passenger experience. These include access to the service, the waiting environment, and technology such as CCTV. In planning, designing and delivering bus service improvements an integrated holistic approach is needed that considers the end-to-end journey and the different aspects of that trip and associated touch points.

2.2 Objectives for bus user priority

In seeking to improve bus services planners and designers should focus on the objectives sought and the types of measures and changes that will achieve them, while also considering the impacts on other road users and local businesses. Objectives will generally include:

- fast or delay-free journey time
- reliable, or consistent journey times
- increased patronage and passenger use
- buses as an attractive and accessible choice for passengers and a genuine alternative to private vehicles

- priority or preference on-road over other modes where appropriate

2.3 Design principles for implementing bus use priority

There are six core principles:

Enable and support passenger access to the bus stop - ensuring passengers can walk or wheel to and from a bus stop safely and comfortably, and cross the road easily and safely. Access routes should be inclusive to facilitate access by different users.

Provide a safe, comfortable and accessible bus stop - a bus stop should provide a safe location both from a road safety and personal safety perspective. Space should be available for passengers to wait. The bus stop kerbside arrangements should enable the bus to safely stop adjacent to the kerb with minimal step height or gap between the vehicle and the kerb, with sufficient space for the wheelchair ramp or lift to be deployed and be able to re-enter the traffic stream with minimal delay. Passengers should be protected from the elements, with seating and information to reduce journey uncertainty.

Minimise interruptions and delay along a route - reducing the time and number of delays caused by interactions with other vehicles or features along the bus route to provide free flow movement. This means identifying what could hold up the bus and seeking to address or minimise the likely delay.

Give the bus vehicle priority - where other measures are unable to eliminate or reduce delays then it may be necessary to give the bus priority through preferential treatment.

Support reliability - passengers rely on timetables and buses should adhere to them, so passengers have confidence in using the service. This supports locks in journey time on a route so that there is resilience, and reduced uncertainty in when the bus will arrive.

Provide accessible information - including audible and visual route information and real time service information. Inclusively designed mobile apps to provide ticket and fare information, and payment methods are also important elements of encouraging greater bus use.

Applying these design principles requires a package of measures and improvements. This guidance provides further information on technical specifications and the benefits and challenges associated with them.

2.4 OpEx savings

When introducing bus priority measures through government funding, LTAs should consider whether these interventions could yield reductions in operator expenditure (OpEx, the total amount it costs an operator to run their services at the specified standard on a particular route), so that those savings do not just benefit the operators in the form of additional profit. Savings could include reductions in vehicle requirements on a certain route if journey time reductions result in less bus journeys for the same period of time to deliver the same service provision. Those savings can then be reinvested through EP decision making processes into other improvements in the local bus market which further benefit passengers, increase patronage and deliver BSIP objectives.

An OpEx saving mechanism is the method by which financial savings by a bus operator resulting directly from funding are properly calculated so that this saving can be reinvested by the partnership to deliver additional benefits. It is therefore good practice for LTAs to develop an OpEx mechanism in collaboration with their operators as part of an EP scheme or as a separate agreement to run alongside it. The DfT is producing guidance to assist LTAs in developing their OpEx mechanisms.

3. Planning, designing and delivering bus user priority

3.1 Roles and responsibilities for delivering bus user priority

The successful planning and delivery of schemes to support bus user priority involves collaboration between different organisations. Table 2 below summarises the high-level organisational responsibilities held by central government and local authorities in relation to planning and delivering schemes.

(Table 2: organisational responsibilities in relation to planning and delivering schemes to support bus user priority)

Organisation	Roles and responsibilities
Central Government	Creates, reviews and develops legislation and policy for transport. Oversees setting and monitoring of national standards and governance for service provision and vehicles, for example through the Traffic Commissioners, the Vehicle Certification Agency and the Driver and Vehicle Standards Agency. Develops, communicates and manages performance of national strategies. Identifies and allocates capital and revenue funding to support the bus system.
Local Transport Authorities	Develops, communicates, and manages performance of local transport plans and BSIPs to meet the requirements of national policies and strategies. Oversees establishment of enhanced partnerships and/ or franchising in accordance with the regulatory requirements set out in the Bus Services Act 2017. Identifies and allocates capital and revenue funding to support the bus system, for example through council tax or surplus traffic enforcement income. Collects data and undertakes monitoring of performance to plan changes and improvements to the bus network.
Local Traffic Authorities	Day-to-day running of their local road network, including fulfilling statutory duties such as the Network Management Duty to manage and maintain it for the benefit of all road users. Regulating traffic through use of a range of powers, for example installing traffic signs and making traffic regulation orders (TROs). Undertaking enforcement of parking and moving traffic offences, including bus lane contraventions, where they have taken up the relevant powers.

Local transport authorities will require the support and in some instances approval of wider organisations when implementing bus user priority measures.

Depending on the type of measures or improvements proposed, some organisations will have a statutory requirement to be involved, and for others it will be a matter of good practice to engage with them either as delivery partners or interested parties. Section 3.3 of this guidance covers engagement and consultation in more detail.

3.2 Planning, design and delivery stages

There are four scenarios where bus user priority should be considered:

- an existing bus route which has been identified for improvements or has performance issues
- a corridor, or section of road, or road-based project for other modes that has an impact on buses
- a newly designated bus route
- a new development with provision for buses

The approach to be taken will vary within these scenarios. Where bus improvements are considered on an existing network there are generally three different approaches which can be described as:

- **site specific** - bus user priority measures targeted at specific sites to address specific problems/issues identified through reviewing the network and from feedback received
- **corridor** - this approach identifies particular corridors, generally those with heavy bus usage and then applies a range of improvements targeted along the corridor
- **whole bus route** - similar to the corridor approach, measures are applied along a pre-identified route followed by a specific bus service

A corridor or route-based approach can deliver greater benefits as the combined benefits are greater than an individual scheme or improvement.

Integrating bus user priority in other projects

Any road-based project, particularly those funded by DfT, should consider provision for buses and passengers as an integral part of the schemes.

Existing guidance on planning for buses in new developments

Stagecoach have provided advice in Bus Service and New Residential Developments, available at:

www.stagecoachgroup.com/~/media/Files/S/Stagecoach-Group/Attachments/pdf/bus-services-and-new-residential-developments.pdf

The Chartered Institution of Highways and Transportation have also produced guidance in Buses in Urban Developments, available at:

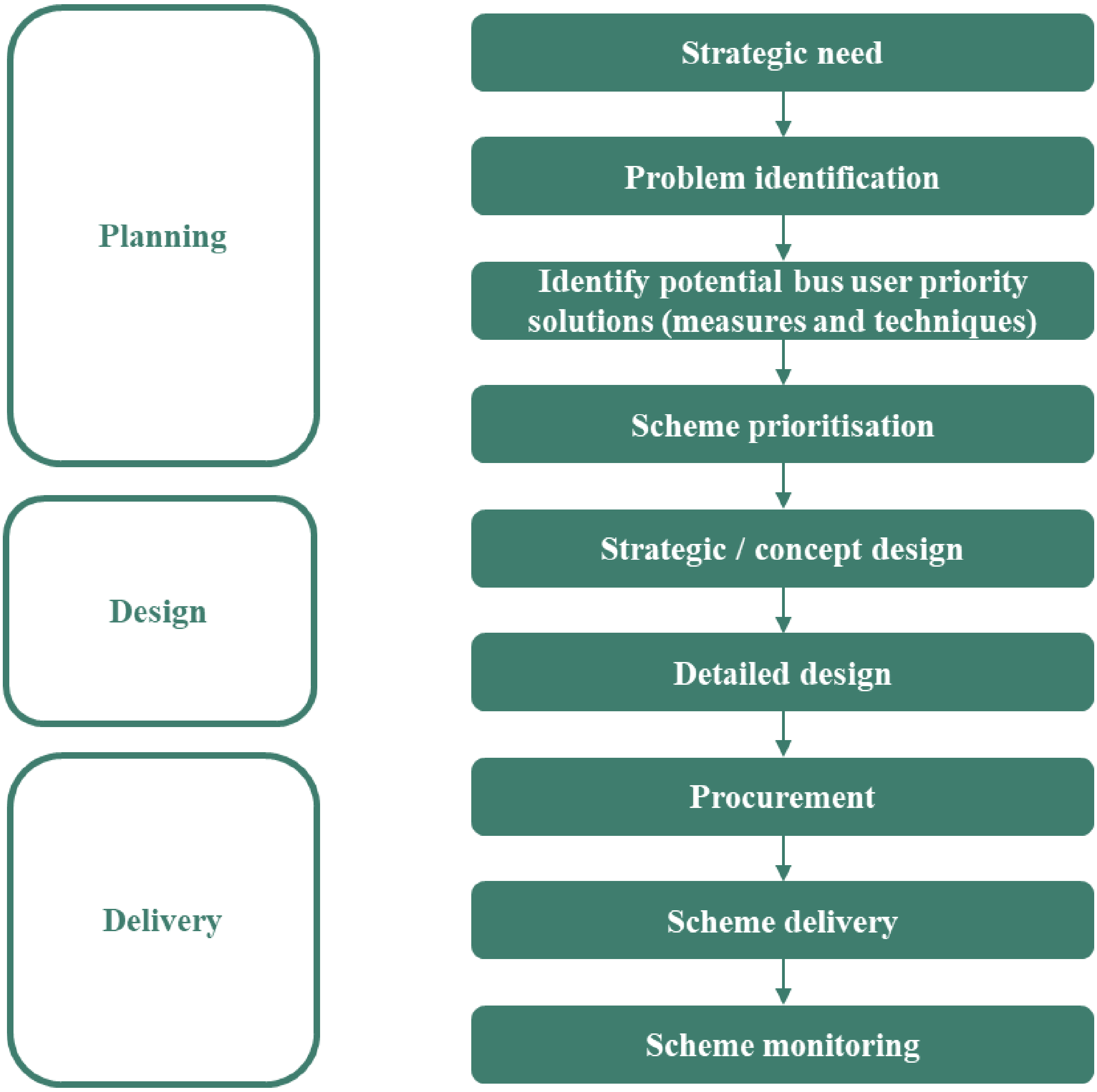
www.ciht.org.uk/media/4459/buses_ua_tp_full_version_v5.pdf

Key requirements to consider are:

- geometric and spatial requirements to accommodate buses within the development
- provision of bus stops and associated infrastructure
- access for all passengers to/from stops
- integration of land use planning and transport

It is also important to consider whether providing routes through a new development is the most appropriate approach. Providing improved, safe quality access to an existing bus service may be a more appropriate response. This could mean considering use of development funding to support improved access to existing bus stop facilities.

For any scenario there are a series of steps to follow to establish the right bus user priority solutions. Figure 1 provides a simple overview of this project lifecycle, from identifying the need to change, through to design, delivery and monitoring of bus user priority solutions.



(Figure 1: bus user priority project lifecycle)

Taking a theory of change approach to decision making can aid planning and evaluation of schemes and feeds into the strategic need, problem identification and scheme monitoring project stages shown in Figure 1.

Applying a theory of change approach can help to identify objectives and how bus user priority measures and techniques can best be applied to achieve these. Theory of change is a comprehensive illustration of how and why a desired change is expected to happen in a particular context. It seeks to identify the desired long-term goals and then works back to identify the outcomes that must be in place and the actions that must be taken for the goals to occur. An example theory of change template is set out in appendix A.1.

Once the theory of change process has identified an issue or impetus for change, the decision-making process shown in Figure 2 can be used to determine the most appropriate bus user priority solutions. It also considers when engagement with key stakeholders and the community should take place and how and where any bus user priority measures should integrate with existing BSIPs and local cycling and walking infrastructure plans (LCWIPs). This process can also be used as part of any wider scheme prioritisation process to determine which measures and techniques should be progressed.

Step 1:

Asess the road or street to determine its desired environment

(Align with street typologies, for example primary street, secondary street,high street, local street, tertiary street).

Step 2:

Identify the bus network hierarchy, based on locally identified service planning guidance, either rapid, frequent, locl or on demand.

(Linked to number of services per hour / hours of operation).

Step 3:

Based on classifications from step 1 and step 2, identify and evaluate the bus user priority type against the 6 core design principles.

Undertake engagement with stakeholders to understand any opportunities or constraints in the area, for example planned walking, cycling or bus interventions or complex utility arrangements.

Consultation with local MPs or elected members should also be considered.

Step 4:

Select bus user priority design.

Undertake engagement before the design is selected so the local community have an opportunity to raise any issues or concerns.

Seek stakeholder feedback on their preferred design so there is community buy-in for the proposed measure/scheme.

Step 5:

Evaluate the preliminary bus user priority design including its alignment with other priorities identified by stakeholders, for example improvements identified in local transport plans , bus service improvement plans (BSIP) and local cycling and walking infrastructure plans.

(Figure 2: decision making process)

Completing the design and delivery of any bus user priority scheme will depend on the individual or package of measures and techniques identified for implementation. Part 2 of this guidance provides design and delivery details on the broad range of measures and techniques available.

3.3 Role of engagement and consultation

Stakeholder engagement and public consultation is a key part of the process of introducing change and improvements to bus services. Engagement with stakeholders, particularly local residents and businesses, can help establish user appetite for changes in services and investment in local bus user priority measures. It can help identify the needs of other road users in order that these can be met, and effects on them which may need mitigation. It can also provide an opportunity to help influence new street and/or development design outcomes and highlight opportunities for additional improvements.

Effective engagement with a variety of stakeholders, LTAs, and their partners such as local transport operators can provide a wider understanding of what issues or problems individuals encounter and help get buy-in from users and address their concerns. The aim is to consider the views of different people to ensure the outcomes work for as many people as possible. Some issues could be unique to an individual, whilst some may have a collective impact.

Toolkit for engaging with local communities

The Confederation of Passenger Transport has created a toolkit to help LTAs engage effectively with local communities and present the case for bus user priority measures. It is available at

CPT's Toolkit for Engaging with Local Communities

Areas in which stakeholder input will be needed to help inform the type of priority required could include, but not be limited to:

- local service times and service provision
- connectivity – whether proposals facilitate multi-modal trips. This could be particularly relevant in rural areas
- accessibility requirements for bus stops, bus shelters, buses and service provision
- trip factors – to understand what factors influence decisions to take the bus rather than other forms of transport
- delays to users – to understand congestion hotspots and other factors affecting bus reliability, such as traffic signal delays

Public engagement and consultation enables stakeholders to shape proposals while they are still at a formative stage. By gaining an understanding of what factors can encourage or deter bus patronage, LTAs can identify and allocate resources to help remove barriers.

Travel habits evolve over time and engaging with a variety of user groups can help understand what factors directly influence people's choices. Personal circumstances can have a significant impact on choices:

- **price** – the cost of a particular mode of transport makes it unaffordable compared to others
- **change of location** – moving to a new location may increase the reliance on car travel if there are few established public transport connections at the new location
- **change of employment** – a change of jobs could result in more home working, reducing their need for travel, or increase journeys made due to new commuting patterns
- **change of family structure** – these can have a significant impact on journeys made, particularly as part of chain trips. This may lead to a family either buying a first car, or buying a second if public transport provision doesn't provide an alternative
- **accessibility** – challenges relating to personal mobility or inaccessible infrastructure can be a key factor (see Section 4.4) when making choices on transport provision

3.4 Good practice in engagement and consultation

There are many ways to engage effectively with stakeholders and each approach should carefully consider the following factors:

The purpose of the engagement or consultation – if the objective is to inform stakeholders then this will involve a different approach to gathering feedback. The former might involve public events, websites, virtual events, or brochures. The latter may require tools such as surveys, interactive mapping, site visits or focus groups.

Scale of engagement – is it taking place at a local or regional level? The format chosen should be appropriate to the scale involved.

The stakeholders taking part – depending on the audience, the narrative will need to be aligned accordingly, ensuring key messages are conveyed in a language stakeholders will understand and relate to. Engagement must be representative and inclusive, and all efforts should be made to engage with hard-to-reach groups.

3.5 Accessible and inclusive engagement

Information on inclusive engagement is set out in Chapter 2 of Inclusive Mobility, which should be read alongside this section.

Authorities or other agencies, and their designers and practitioners should carry out appropriately diverse engagement when considering, developing and introducing schemes. People’s needs differ greatly, and engagement should be a constructive process used to ensure that these needs are understood and responded to.

Engagement should include a wide and appropriate range of people who have a protected characteristic defined in the Equality Act 2010. This is likely to be particularly relevant for disabled people, older people and children.

Effective engagement enables designs and schemes to be tested with end-users, maximising inclusivity. Planners and designers should also engage with other key stakeholders, such as local authority access officers, other equality & diversity professionals, engineers, architects, surveyors and transport providers. Engagement should continue throughout a project, contribute to the design, and might include user tests and trials.

Any online engagement or consultation materials should comply with the Public Sector Bodies (Websites and Mobile Applications) (No. 2) Accessibility Regulations 2018 to ensure they are accessible to disabled people. Any events should be arranged to accommodate people’s access needs.

3.6 Stakeholders

LTAs should develop an appropriate stakeholder communication and engagement plan for each scheme. Table 3 sets out potential stakeholder groups which it may be relevant to engage with.

(Table 3: summary of potential stakeholder organisations)

Public interest	Delivery partners	Other organisations
Existing bus passengers **Local residents** **Existing and potential passengers with specific access needs and preferences, including disabled people and people with other relevant protected characteristics.** **Local elected members** **Local businesses, local shops and major employers** **Local schools, colleges and universities** **Wider user groups such as Transport Focus, Transport for All, Living Streets, Sustrans**	Adjoining local authorities Bus operators and bus drivers Public health bodies National Highways Network Rail Tourism providers / operators Train operators	Other local authority departments Statutory consultees – for example Active Travel England who are statutory consultees on planning applications for major new developments Emergency services Taxi and PHV drivers, and PHV operators.

Case study: sprint bus priority corridor, West Midlands

Transport for West Midlands’ (TfWM) bus priority corridor called Sprint, links Walsall to Solihull via Birmingham City Centre in one continuous route. The project comprises a package of improvement measures that includes the extension of bus lanes and the prioritisation of buses at busy junctions together with upgraded bus shelters and the introduction of zero-emission double decker buses.

TfWM undertook detailed consultation on the proposed design of the Sprint routes which involved engaging with residents, businesses, and community groups through a variety of channels, including conducting on-street interviews at bus stops along the proposed route to capture the views and support of bus users – a group which is traditionally underrepresented compared to other transport modes. The customer intelligence team undertook 527 on-street interviews, comprising 35% of total engagement undertaken for the project.

This engagement approach helped TfWM to better understand how to shape the Sprint scheme in a way which delivers the best outcomes for the maximum number of people and increased overall support for the scheme.

Source: https://www.wmca.org.uk/news/revised-plans-for-a34-sprint-route-through-perry-barr-unveiled/

3.7 Monitoring success

Monitoring the success of any scheme should be inherent in any scheme delivery. As defined in the department's transport analysis guidance (TAG), monitoring and evaluation are generally used in conjunction, with monitoring providing early evidence of outputs while evaluation builds on this to provide a fuller assessment of the outcomes and impacts of an intervention. This can provide evidence that the scheme represents value for money, and that the needs of local communities have been met. More information on TAG can be found at www.gov.uk/guidance/transport-analysis-guidance-tag.

As identified in Section 3.2, defining strategic need and implementing the theory of change approach can be used to systematically identify specific targets and outcomes and to evaluate whether these have been met across one or a number of schemes. It also provides an overview of the evidence that needs to be collected. Defining what success looks like at the start of a project will help identify and enable this evidence to be collected which can be used to help inform improvements to existing schemes or help shape future schemes. Understanding passenger satisfaction in regard to bus user priority is fundamental to identifying what success looks like.

Implementing bus priority measures provides the greatest benefits to the people who rely on, and travel by, bus. Measuring and monitoring passenger satisfaction is the primary way to understand and interrogate the success of bus user priority measures. Passenger satisfaction surveys can be used as a mechanism to collect this data and will establish a consistent database of information. It is important to ensure that surveys are undertaken both before and after a scheme has been implemented to fully understand the impact of a scheme on bus passengers.

TAG identifies 'impact evaluation' as one of three main evaluation activities. This type of evaluation aims to identify what difference the intervention has made. This is particularly applicable to understanding the impact on bus passengers. The type of questions that can be answered through this type of evaluation include:

- did the intervention achieve the expected outcome? - to what extent?
- how exactly did the intervention cause the observed impact?
- to what extent can the difference be attributed to the intervention?
- what would have happened anyway (without the intervention)?
- what unintended consequences did the intervention have (positive or negative)?

The questions included in passenger satisfaction surveys should aim to answer one or more of these questions to gain a robust understanding the impact of the scheme that has been delivered.

Part 2: measures and techniques that can be used to support better bus user priority

4. Understanding bus users' journeys

4.1 Passenger experience

To improve bus services, it is necessary to understand what makes up the bus journey and the perspective and experience of the bus user. Without this understanding any improvement measures risk being poorly targeted and not achieving their objectives.

Bus user priority is not just about the time spent on the bus itself. Planners and designers should consider how passengers get to and from bus stops and interchanges and the 'human experience' at bus stops. Improvements in the door-to-door journey experience will make bus travel more attractive, leading to a growth in passenger numbers.

Providing a positive journey experience is key to encouraging more people to use buses. A Transport Focus survey undertaken in 2020 found the top 10 priorities for improvement for existing bus users were:

1. buses running more often
2. buses serving more places
3. more buses on time at the stop
4. better value for money
5. more bus journeys on time
6. more effort to tackle anti-social behaviour
7. faster journey times
8. more stops with 'next bus' displays
9. better quality information at stops
10. more space for wheelchairs and buggies

BSIPs are expected to drive improvements for passengers through the creation of a bus passenger charter (BPC). The BPC sets out commitments between the local authorities and local bus operators to ensure defined standards are met for each journey and to provide a tangible set of outcomes from the BSIP. The standards of service could include matters such as punctuality, vehicle cleanliness, proportion of services operated, service information, and opportunities for redress. It should also include a commitment on the accessibility of bus services and set out that it has been developed in compliance with the

Public Sector Equality Duty (PSED). The Department's BSIP guidance provides advice on preparing BPCs. In summary, BPCs should:

- make clear which transport authorities and bus operators the charter covers
- involve passenger representatives in the development of the charter

In the main, the charter should:

1. explain what passengers should expect when they travel by bus
2. focus on the things that matter to passengers
3. encourage passengers to feedback if their expectations are not met
4. set out what complainants can expect about the way the complaint will be handled
5. keep the document concise, with links and references to other documents as appropriate
6. be well publicised and promoted in vehicles, bus stops / interchanges, travel shops, and on-line
7. be produced and made available in accessible formats
8. performance against the charter commitments should be regularly reviewed and reported with proposed improvements discussed with passenger representatives

4.2 Journey time

Bus journey times are a key factor in the passenger experience and attractiveness of bus travel, as they determine the duration and reliability of the service to ensure a passenger arrives at their destination on time, every time. Reducing bus journey times makes bus services run faster and more reliably, making them more attractive to passengers.

At its simplest, bus journey time is the total time it takes a vehicle to get from the start to the end of its journey. It can be split into:

- running time (the time the bus spends moving), often described as the time the bus is not at a stop
- stationary or delay time (time the bus spends stopped or delayed)

Buses will be stopped for a variety of reasons, not just at a designated stop, and therefore the stationary or delay time will be made up of all or some of the following:

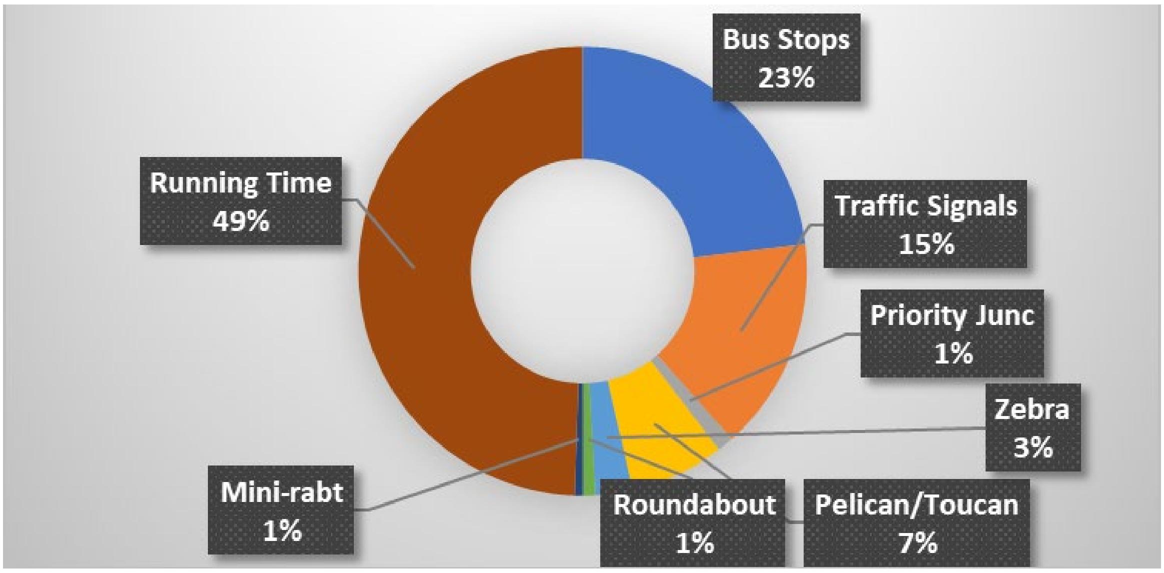
- at bus stops boarding and alighting passengers

- at priority junctions awaiting right of way
- at traffic signal-controlled junctions and crossings
- stopped in traffic queues and congestion
- general delays caused by interaction with other vehicles, such as those accessing parking/loading bays (also known as friction delay)

Delays can be associated with different features along a route, such as bus stops or junctions, with general congestion, or with friction due to interacting with other vehicles, for example at parking bays or where traffic merges from two lanes into one. The congestion and/or friction delay can be expressed as a reduced speed which leads to an increased running time. Once this is known analysis can be undertaken to identify the factors impacting on bus journey time and where improvements should be targeted.

Using surveys or GPS analysis it is possible to breakdown the different components of a bus journey. In this way the total bus journey time for a route will be made up as follows:

Running time + feature delay (e.g. junctions) + bus stop delay = journey time.



(Figure 3: sample of route bus journey time components as a % of overall trip)

Figure 3 above shows a typical breakdown of a bus journey taken from on-board surveys on a route in an urban area. The breakdown shows time spent delayed at key features along the route such as traffic lights, and the time allowing passengers on and off at stops, as well as the time “moving”. Whilst this is based on one route these figures generally reflect the balance between delay, boarding/alighting and running time on routes without significant bus user priority.

There are a few key points to note -

- running time - the time the bus is generally moving may be less than half the total journey time - this indicates that measures to reduce delay for buses, such as bus lanes, are unlikely to be the sole measures required to achieve the objectives

- bus stops make up almost a quarter of total running time - this indicates that both the number and design of bus stops can have an important impact on the journey time

- certain junction types can have more of an impact depending on their frequency along a route

Detailed analysis of the bus journey is important to understanding the actual issues along a route. Surveys on-bus as well as GPS surveys should be obtained as understanding this journey time breakdown is important in then developing improvements.

4.3 Importance of reliability

Bus reliability and punctuality is key to building passenger confidence and increasing usage. A reliable bus service also reduces operating costs by reducing the number of vehicles required and ensuring efficient running of individual vehicles.

Data analysis and observations

Understanding how a bus route operates, the time it takes to travel, the delays and friction points, and how passengers access bus stops are important in developing bus service improvements. A range of approaches should be taken to obtain data to inform this.

Site visits and trips on the bus are strongly recommended. This provides a true user experience from the passenger point of view, including aspects of the journey that can make the trip uncomfortable, such as ride quality and road layouts.

A route drive on a bus with a route operator may also be useful - many operators are supportive of this as it enables them to provide their input to help identify problems. It allows exploration of aspects such as problematic geometric and discussion with drivers.

Data on route travel times and delays can be obtained from a variety of sources including GPS and ticket machines, or via on-board surveys. Relevant data will include:

- **total journey time** - the travel time duration from start to finish

- **delays** - features along a route that slow journey progression i.e. junctions or congestion

- **bus stop dwell time** - time taken for passengers boarding and alighting at a stop

- **reliability** - the likelihood and frequency of a service arriving as per the scheduled timetable

4.4 Passenger access

The positioning of bus stops and access to them is critical in encouraging increased patronage. Poor access creates barriers which can have a detrimental impact on a person's individual experience and for some, it may mean their transport choices are limited. Access improvements can include the following:

Passenger crossing points – These should be positioned upstream of bus stops so passengers are not encouraged to cross the carriageway in front of the bus, once they disembark, where sight lines may be adversely affected. People's destinations may be on the other side of the road to the stop, and dropped kerbs and associated tactile paving should be provided to enable accessible crossing facilities.

Pavement access / maintenance of hedges, trees etc – Footways leading to and from bus shelters should be accessible at all times. Restricted width can prohibit access for some disabled people, particularly mobility impaired people, people with assistance dogs, and people with buggies. Surfaces which are uneven and poorly maintained can pose a safety issue alongside accessibility and drainage issues.

Street lighting provision – the positioning of street lighting should consider any mature trees along the bus route, to avoid a significant reduction in light provision at street level. Well-lit areas provide a heightened perception of security and safety, encouraging usage during hours of darkness and reducing the barriers to use some people can experience.

Drainage – the location and positioning of bus shelter(s)/boarding and alighting area should consider the potential for ponding, with designers establishing if there is a history of issues with surface water/runoff, particularly from the carriageway. If this is identified, appropriate remedial measures should be considered.

Inclusive mobility – to help facilitate journeys for everyone, footways should provide:

- appropriate dropped kerb provision at crossing points, where the carriageway is flush with the kerb-line to facilitate inclusive access
- appropriate unobstructed pavement width to facilitate wheelchair access
- avoidance of steep gradients and sudden changes in levels which could pose an issue for mobility impaired people and wheelchair users
- appropriate consideration when positioning street infrastructure on pavements, to help ensure accessibility is maintained for those walking and wheeling
- avoidance of steep camber on the approaches and routeways to the bus stop which could prevent mobility impaired people and wheelchair users from accessing the stop

For further guidance refer to ‘Inclusive mobility: a guide to best practice on access to pedestrian and transport infrastructure’. Figure 4 shows how narrow footways and intrusive vegetation can create access difficulties for some people.

(Figure 4: narrow footways and intrusive vegetation can cause a barrier to access)

4.5 Personal security

The personal safety of a bus journey is as important as road safety. If a potential passenger is fearful of travelling, they are unlikely to use the service irrespective of how quick or reliable the service is. This means designers should consider the personal safety of routes to and from stops, and the waiting time at the bus stop or interchange. Enhanced personal safety features can help to remove barriers to women using buses, as well as helping to prevent security concerns faced by other groups such as racist, homophobic, transphobic and hate crimes. Section 17 of the Crime and Disorder Act 1998 requires local authorities to exercise their function with due regard to the likely effect on crime and disorder It may be appropriate to undertake a crime and disorder assessment for new bus stops and shelters.

4.6 Design Advice

When considering personal safety on buses, the following factors are likely to be relevant:

Design and Layout: The layout and design of the bus stop and shelter should ensure good sight lines from all directions with minimum blind spots, so that passengers feel safe. A design which promotes natural surveillance prevents criminal activity and improves the sense of security for all users.

Lighting: A well-lit environment during hours of darkness will enhance visibility and provide a sense of safety for passengers waiting at bus stops /shelters / platforms.

Surveillance and monitory system: Strategic deployment of CCTV systems at bus stop/shelters/platforms can help deter criminal behaviour.

Panic buttons: Installing alarm buttons at bus stops and shelters can provide an extra layer of personal safety and security. Panic buttons allow all users to quickly and discreetly alert relevant authorities in the event of emergency or threatening situation, enabling a quick response and assistance.

4.7 Operation and maintenance

Bus infrastructure which is poorly maintained and in disrepair can lead to negative perceptions of security and safety which detract from the travel experience. Evidence of antisocial behaviour, including graffiti and broken glass, can lead to more vulnerable users choosing alternative modes of transport due to safety concerns, particularly when travelling alone or at night. Bus infrastructure should be subject to regular maintenance checks to ensure infrastructure is fit for purpose and operational, contributing to a safe environment for both passengers and drivers.

Bus operators should also have clearly defined emergency procedures in place to respond quickly and effectively to unforeseen situations to ensure the safety of all passengers.

5. Types of measures

Bus user priority measures can be considered as a toolkit. They can be categorised as:

- **direct priority**: examples include bus lanes or bus gates where the priority element is obvious in the infrastructure
- **indirect priority**: where the measure supports the outcomes but the infrastructure is not obvious - examples include waiting restrictions to keep routes clear of parked vehicles, or traffic signal priority within a signal junction
- **complementary or supporting**: measures or activities that support other measures, such as enforcement or routine maintenance

Part 2 focuses on these measures and techniques in more detail. Table 4 identifies different types of measures, and where more information can be found.

(Table 4: bus priority toolkit)

	Type			
Measure / technique	Direct	Indirect	Support	See Chapter
Bus stop	Y			Chapter 6
Bus shelter	Y			Chapter 6
Panic button			Y	Chapter 4 & 6
Passenger information		Y		Chapter 11 & 12
Mobility hub		Y		Chapter 6
With-flow bus lane	Y			Chapter 7
Priority vehicle lane	Y			Chapter 7

Contra flow bus lane	Y			Chapter 7
Segregated busways	Y			Chapter 14
Bus only street	Y			Chapter 8
Bus gate	Y			Chapter 8
No waiting restrictions		Y		Chapter 9
No loading restrictions		Y		Chapter 9 & 13
Red routes / urban clearways		Y		Chapter 9
Controlled parking		Y		Chapter 9
Loading bays		Y		Chapter 9
Inset parking/loading areas		Y		Chapter 9
Turn bans		Y		Chapter 10
Bus turn exemptions	Y			Chapter 10
Side road closures		Y		Chapter 10
Amending junction right of way		Y		Chapter 10
Technology	Y	Y		Chapter 11
Controlled pedestrian crossing		Y		Chapter 11
CCTV			Y	Chapter 11
Enforcement			Y	Chapter 13
Network management			Y	Chapter 12
Cashless ticketing			Y	Chapter 12

An integrated design approach will bring together a package of measures. It also provides a range of options as there is no one size fits all approach and the types of treatments required vary depending on context, scale of issue, and outcomes sought. The toolkit can be applied to both urban and rural situations.

Measures should be selected based on the context of the road they are being applied to. Where one treatment may be applicable to a highly trafficked street, another may be wholly inappropriate for that street type. The road classifications suggested in Appendix A.2 provide a robust overview of the function and context of a street and can be used to determine appropriate bus user priority treatments, as outlined in Table 5. Treatments should be considered in context and as part of a suite of measures to improve bus user priority.

(Table 5: bus treatment matrix)

Measure / technique	Primary Street	Secondary Street	High Street	Local Street	Tertiary Street
Bus stop	x	x	x	x	Unlikely to recommend bus user priority measures on this street type due to width and purpose / use of street
Bus shelter	x	x	x	x	
Passenger information	x	x	x	x	
Panic button	x	x	x	x	
Mobility hub	x	x	x		
With-flow bus lane	x	x	x		
Priority vehicle lane	x		x		
Contra flow bus lane	x		x		
Segregated busways	x				
Bus only street		x		x	
Bus gate		x	x	x	
No Waiting restrictions	x	x	x	x	
No loading restrictions	x	x	x		
Red routes / urban clearways	x	x	x		
Controlled parking	x	x	x	x	
Loading bays	x	x	x		
Inset parking/loading areas	x	x	x	x	

Turn bans	X	X	X		
Bus turn exemptions	X	X	X		
Side road closures	X		X	X	
Amending junction right of way		X		X	
Technology (TBC)	X	X	X	X	
Controlled pedestrian crossing	X	X	X	X	
CCTV	X		X		
Enforcement	X	X	X	X	
Network management	X	X	X	X	
Cashless ticketing	X	X	X	X	

6. Bus stop facilities (stops and interchanges)

6.1 Importance of bus stops

The bus stop is the key interface between the bus service and the passenger. The location and design of a bus stop and how it is accessed can be critical in the success of a bus service. If a bus stop is not accessible, well placed or safe then passengers are far less likely to use the service, reducing the effectiveness of any other measures.

This guidance focuses on the design of on-street bus stops. Advice on the accessibility aspects of the design of interchanges and bus stations is available in Inclusive Mobility.

6.2 Design advice

The guidance on bus stop design provided by Transport for London (https://content.tfl.gov.uk/bus-stop-design-guidance.pdf) provides comprehensive advice and information on bus stop design with a series of proposed layouts, and key geometric and physical characteristics for planners and designers to consider.

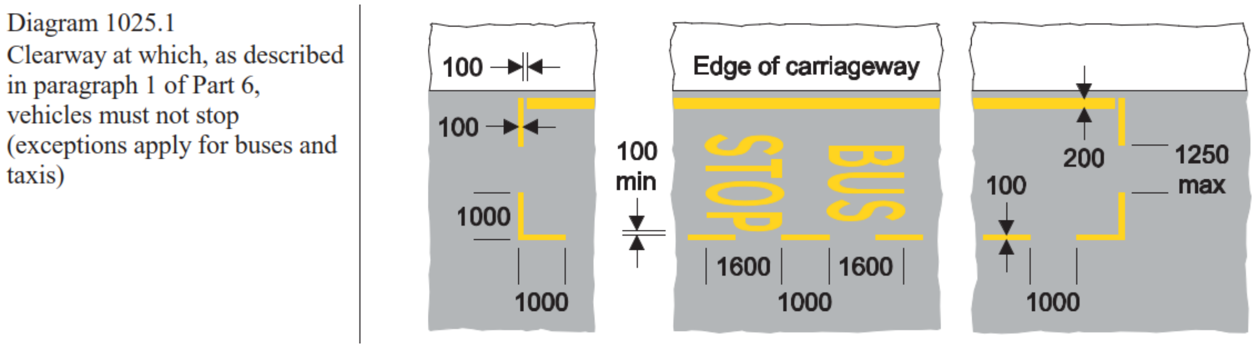
Key features of bus stops are:

- design that minimises the time buses spend entering and leaving the stop to where passengers board and alight - ideally the goal is between 20-30 seconds or less

- passengers need to be able step easily on and off the bus - the stop needs to accommodate step free and ramp access for mobility impaired people, layouts that require passengers to step down into the road, or board in the traffic stream, are less likely to enable access for all

- Critical to this is the bus stop cage - **the size of this cage area should be designed to provide exclusive access by the bus so it can approach, manoeuvre, stop alongside the kerb, and then safely exit, not just cover the space where it is stationary at the kerbside.**

Bus stops are indicated by the marking to TSRGD diagram 1025.1, as shown in Figure 5. This is a clearway restriction which may operate at all times, or at specific times indicated by an accompanying upright sign. A TRO is not required for this restriction.

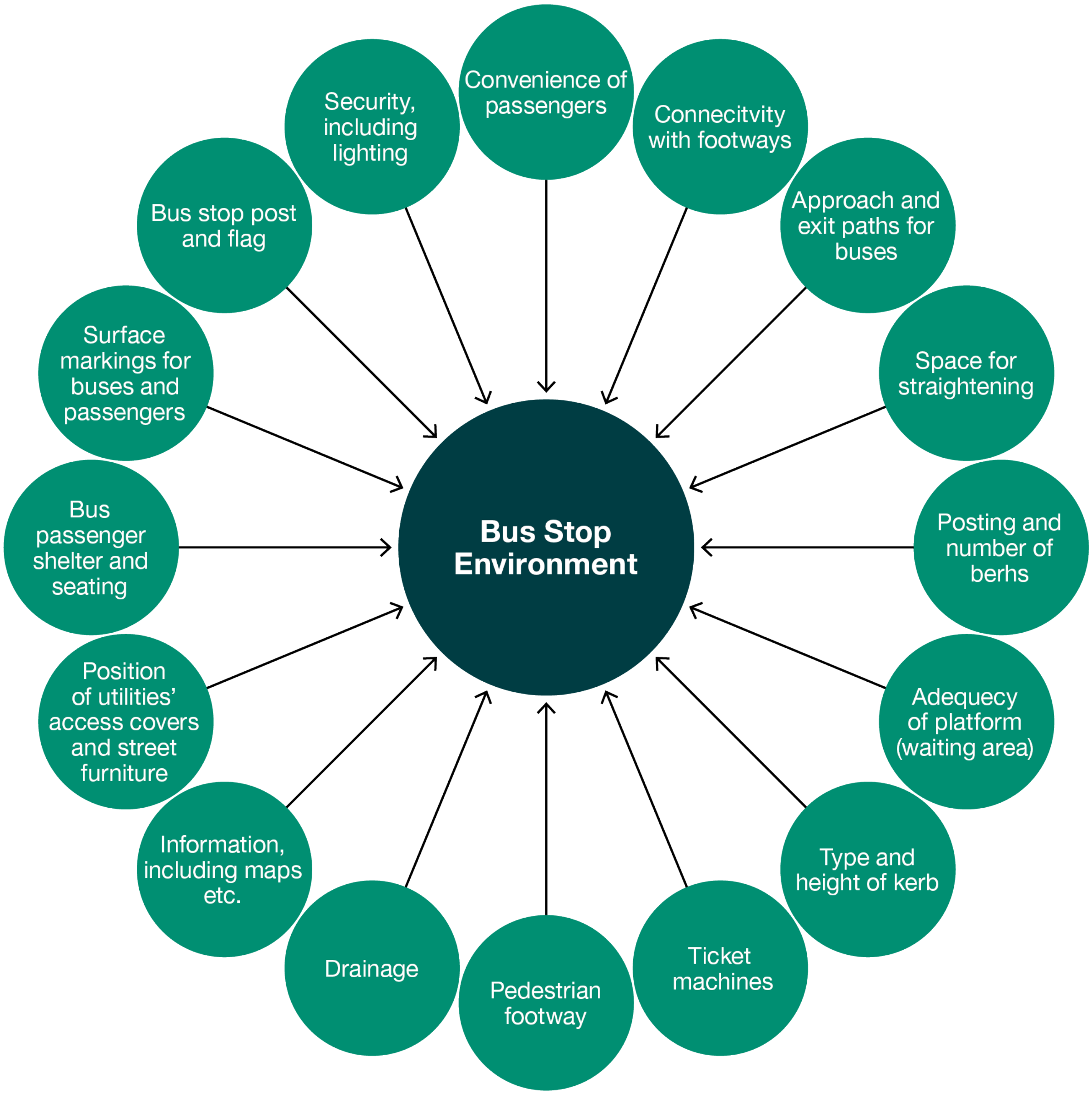


(Figure 3: bus stop marking (TSRGD diagram 1025.1))

For full details of road marking and signing requirements refer to Chapter 3 of the Traffic Signs Manual.

6.3 Components of a bus stop

A high-quality bus stop environment is comprised of many different components, as outlined in Figure 6.



(Figure 4: features of a bus stop environment (TfL accessible bus stop design guidance 2006))

6.4 Location and spacing

There are many elements to consider, as outlined in Figure 7. Bus stops should be spaced approximately 400m apart in urban areas, creating a walking time of about 5 minutes for non-disabled people between stops. In rural areas spacing may be significantly greater as bus stops should be located near to destinations that both generate and attract flows. More frequent spacing should be avoided as frequent stops increases journey time due to the bus accelerating and decelerating, which stops it reaching cruising or maximum speed. Stop/start activity can also lead to poor ride quality for passengers.

Stops should be paired so the passenger start and end point for trips is similar. This also allows sharing of facilities such as crossings.

Stop locations and spacing should be reviewed to identify changes that will improve journey times.

Depending on local circumstances, stop relocation or consolidation (for example merging two stops into one halfway between the two) may help ensure bus stops are optimally located. It may also enable provision of higher quality supporting infrastructure by reducing the number to be provided for. However, this should be considered carefully as increasing walking and wheeling distances, and changes in routes, may cause problems for some disabled people. This is the type of issue that can be considered through an equality impact assessment.

(Figure 5: considerations for bus stop locations (TfL accessible bus stop design guidance 2006))

6.5 Bus stop configurations

There are four main types:

Kerbside bus stop (Figure 8): these can be located along a link or associated with a junction or controlled crossing. The size of the bus cage area will depend on possible obstructions to the entry/exit areas. Placing the bus stop on the exit side of a junction or a controlled crossing utilises the junction space or controlled areas as an approach area, reducing the amount of space needed. Exit side arrangements also encourage passengers to walk to the rear of the bus thereby facing oncoming vehicles which is safer for crossing movements when they walk to their destination. Where a bus stop and crossing are located close together, any impact on sight lines and forward visibility for the crossing should be considered to ensure safety is not compromised. There is an exemption in TSRGD for buses to stop on the white zig-zag markings on the exit side of a crossing.

(Figure 6: example of kerbside bus stop)

Bus boarders (Figure 9): this is a full width (standing out from the kerb) or half width (partial) buildout from the kerb creating a platform and dedicated area for buses to stop and passengers to wait. By building out into the carriageway, the bus can easily stop by the kerbside which requires less space. The size of the platform length will vary depending on the vehicle configurations, whether other street furniture is to be located on it, the frequency of buses using it and associated numbers alongside at any one time.

Boarders are a useful way of providing space for bus shelters, seating, etc where footways are narrow. As the bus does not have to deviate from the general traffic flow, exiting the stop is relatively easy, reducing delays.

Buses stopped in the carriageway will prevent overtaking by other vehicles. If this is likely to be problematic, a half width boarder may be more suitable. This creates some footway space, reduces the bus stop length, keeps the bus partially in the traffic stream making re-entry easy but may enable overtaking without moving into the opposing traffic stream.

Boarders can discourage illegal parking/stopping as they sit in the traffic stream.

Variations of boarders with angled entry can be useful in some circumstances where entry and exit tapers may be reduced due to obstruction.

(Figure 9: example of a bus boarder)

Bus bays or laybys (Figure 10/Figure 11): this is an inset area set into the footway enabling the vehicle to get out of the main traffic stream and stop. A bus layby needs to be large enough for the vehicle to wholly enter, align with the kerbside and exit.

Within urban or built-up areas, where the speed limit is less than 40 mph, laybys should not be used, for the following reasons:

- buses may have difficulties re-entering the traffic stream which can cause unnecessary delays compromising bus priority

- unless a bus stop clearway or other parking restriction is provided and enforced, there is a tendency for other vehicles to park there, creating access issues for the bus and passengers

- whilst other vehicles may be delayed it sends a strong message about the importance of the bus in the modal hierarchy

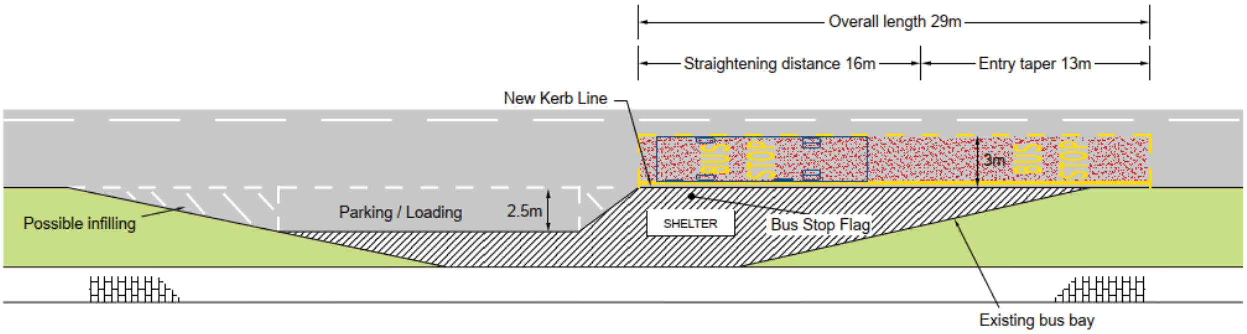
Laybys should be avoided in new developments.

It is strongly recommended that laybys on existing routes be filled in wherever possible. If a layby is retained, it can be partly infilled, or changes made to make it easier to enter/exit. Examples are provided in the Transport for London accessible bus stop guidance.

Lay-bys may be appropriate where the bus will wait or stop for extended periods such as at a timing point, end of route, or crew change location. In this case the ‘Bus Stand’ variant of the bus stop cage marking should be used.

On roads with traffic speeds greater than 40 mph designers will need to consider the safety aspects and risk of rear end shunts when deciding whether a layby or kerbside type arrangement is more appropriate.

(Figure 10: example of bus bay / layby)



(Figure 11: example of bus bay / layby)

6.6 Kerb heights

A key consideration in stop design is to minimise the step distance between the footway and the bus. Step-free access should be the norm. This is particularly important for mobility impaired people but is also helpful for people with pushchairs or heavy luggage. Step-free access will make boarding and alighting quicker for all users.

All new bus stops should enable step free access.

Standard kerbs with heights of 125 to 140mm may require deployment of a ramp, and for the bus to actively kneel, all of which creates additional delay.

Bus stop kerbs designed to facilitate the tyre and bus pulling in as close to the kerb as possible are recommended. As shown in Figure 12, these have a greater height of 160mm and can be used in the boarding/alighting area to minimise the area of footway impacted by raising kerb heights. Footway gradients and cambers should also be accessible for wheelchair users, and drainage should be adequate where heightened kerb upstands may lead to a backfall.

Further guidance is given in Inclusive Mobility and TfL’s bus stop accessibility guidance.

(Figure 7: raised kerb for ease of boarding and alighting)

6.7 Bus stops and cycles

When designing bus stops, the interactions between the bus infrastructure and adjacent cycle lanes/tracks are to be carefully considered to ensure the safety and comfort of cyclists, pedestrians and passengers boarding and alighting.

In the absence of dedicated off-carriageway cycle facilities, cyclists will be travelling within the carriageway. Bus stops pose a potential conflict point for cyclists riding in the nearside secondary position due to the movement of buses moving kerbside to allow for bus passenger boarding and alighting.

There are several options for providing cycle facilities at bus stops. However, these options may introduce potential barriers for some disabled people, particularly visually impaired people. The Government takes seriously the issues raised in some parts of the country around safety risks to pedestrians. Therefore, at the time of writing, research is ongoing into these measures. As the results are not yet known, this guidance does not make recommendations as to the appropriateness of these for different situations. They are described below for information only.

If they are being considered, early engagement with relevant interested parties should be undertaken, including those representing disabled people, and pedestrians and cyclists generally. The public sector equality duty should also be considered, with particular focus on groups such as children, older people and disabled people. Further information is given in LTN1/20 Cycle Infrastructure Design.

Bus stop bypass – a separate cycle track which is taken around the rear of a bus stop that allows cyclists to continue their journey without interruption. Bus stop bypasses can be designed with the cycle track at carriageway or footway levels, both requiring clear forms of demarcation to minimise potential conflict and severance for pedestrians. Access to and from the floating island will need careful consideration due to the need for pedestrians to cross the cycle track.

Shared use bus boarder – a facility where a footway level cycle track is positioned between the footway and bus cage. Shared use bus boarders introduce an area of shared use directly at the point where bus passengers will be boarding and alighting.

Shared use cycle tracks – a facility where the footway is converted into a cycle track, shared with pedestrians. The use of short sections of unsegregated shared use may be preferred in and around bus stops where cyclists would otherwise by positioned towards the front of footway within a segregated facility. This could potentially pose a conflict point with passengers boarding and alighting, as well as any infrastructure positioned at the front of the footway, such as bus a shelter and flag.

Active travel can also be encouraged through the provision of secure cycle storage at bus stops, providing a smooth transition between cycling and using the bus service, as shown in Figure 13. There are various options for implementing these facilities, such as secure bike racks, cycle hangers, cycle lockers and cycle hubs. However, the provision of cycle storage facilities should be assessed based on location suitability, anticipated usage, cost of implementation and its effectiveness. Advice is given in LTN 1/20.

(Figure 8: integration of cycle parking and bus stop facilities at a rail station)

6.8 Bus stops and traffic signals

Efficient traffic signal coordination can significantly improve bus travel times and reliability. Systems like transit signal priority (TSP) can change signal timing by giving priority to bus movement by increasing green signal durations or offering dedicated signal phases for buses.

Advanced pre-emption systems enable buses to seek priority at traffic signal junctions, allowing them to move rapidly through busy and crowded locations. Furthermore, coordinating, and synchronising signal timing through the bus route/corridors reduces stops and delays, providing green signal wave that keeps buses moving at a constant pace. This can also benefit general traffic travelling on the same route. More information is in Chapter 9.

6.9 Bus stop capacity

The number and arrival pattern of buses using a stop should determine the size of the cage. As the bus stop cage facilitates manoeuvring as well as stopping, the length should allow for more than one vehicle accessing a stop at any one time. This is dependent on frequency, headway between services and average dwell times. A “single” stop is generally sufficient for a frequency of between 15 and 45 buses per hour (bph). Over 45 bph, space should be provided for more than one bus to access and serve the stop at the same time.

Arrival patterns, dwell times and existing behaviour should be factored in where a stop is being upgraded.

6.10 Passenger waiting area

The passenger waiting area, adjacent to the bus stop area is critical infrastructure which contributes to overall functionality and accessibility for a bus stop, and the user experience and is shown in Figure 14. This should provide the following facilities:

- weatherproof shelter - protection from wind and rain and shade from the sun
- seating - to let passengers wait comfortably, especially mobility impaired people
- a wheelchair space within the shelter
- real time information, preferably in both audible and visible formats - confidence on bus arrival times improves the passenger experience and not all users have access to online applications, audio next stop announcements triggered by a fob or similar device are in place in a number of cities and can ensure access to information for the majority of passengers

- lighting - to support personal security and access
- timetables and route maps; ensures passengers know range of services they could use and options for future trips
- waste bins
- accessible ticket facilities - pre-boarding ticketing can help reduce boarding time
- security and surveillance systems - CCTV to observe behaviour in the area, with potential information / panic buttons for passengers
- accessible ramps - ensuring passengers can reach the stops, and easily navigate the environment

A waiting area should be large enough to accommodate the expected number of users and the needs of a diverse range of bus passengers including disabled people, taking in to account the location and passenger traffic. Sufficient seating should be provided and clear signing. The area should be designed to give people waiting a clear line of visibility to oncoming buses and traffic. It should also give bus drivers a clear view of waiting passengers, noting that not all passengers can signal to the driver.

(Figure 9: high quality accessible bus shelter)

6.11 Future proofing

Bus stop design should consider future challenges and trends in transport. For example, the increasing use of green roofs on bus shelters can add a bio-diversity element and add to the visual amenity associated with the bus stop.

This can be reflected in bus stop planning and design requirements by considering the following:

- number and geographical coverage of bus stops that satisfy likely future demand
- infrastructure for future bus electrification or passive provision
- smart grid integration to accommodate electric bus charging infrastructure
- up to date technological solutions to fulfil the advancement in future bus priority systems
- integration of other renewable energies such as hydrogen fuel cell buses
- space for expansion to incorporate mobility hub components such as cycle hire and parcel lockers

6.12 Mobility hubs

Mobility hubs are integrated and strategically designed interchanges bringing together different modes of transport. They serve as a central point where different forms of transport modes intersect, allowing easy transitions and reducing travel times. Mobility hubs vary but can offer access to a range of transport modes and services. Size and scale will vary by location, and they can be integrated into existing interchanges such as rail or bus, or be more localised in nature in both urban and rural situations. Rural mobility hubs enable greater catchment for public transport by providing active travel connections.

Assuming a bus stop component a mobility hub could include:

- cycle, e-scooter1 and mobility scooter parking
- access to shared mobility including cycle, e-bike, e-scooter and car (preferably electric)
- accessible toilet facilities
- cargo lockers
- commercial activities such as a café, cycle shop, post office, etc

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[1] At the time of writing, only e-scooters provided as part of a designated trial are lawful in England.

- public realm or placemaking provision such as seating, pocket parks, and so on

By integrating different modes of transport, providing a comfortable environment, and promoting sustainable travel choices, mobility hubs help reduce congestion and elevate the importance and role of buses within this approach.

When planning a mobility hub, consider the following:

- site requirements - mobility hubs should be in strategic locations easily accessible by the public and within reasonable walking and wheeling distance
- current and future demand for the mobility options to be provided
- other related services and infrastructure that would bring additional value
- commercial viability of services
- future maintenance arrangements

Advice and further information can be found from CoMoUK at https://www.como.org.uk/.

Milton Keynes central interchange

This interchange serves as a centre point where different modes converge, including trains, buses, taxis, and cycles. This allows users to undertake muti-leg journeys with ease and provides connectivity within and beyond Milton Keynes. The hub has a range of amenities including ticketing facilities, a waiting area, information boards, shops, cafes and accessibility features.

Manchester Piccadilly

Located in the centre of Manchester, Manchester Piccadilly serves as a gateway to the city and surrounding areas. Trains, tram services and local buses all converge here. The interchange includes ticketing facilities, waiting rooms, shops, cafes, toilets and Wi-Fi access.

Park and ride

Park and ride schemes allow people to park their cars in a designated car park and continue their journey by bus. An example in Chelmsford is shown in Figure 15. They can also act as mobility hubs and can include parking facilities for different modes of transport. They have commonly been provided on the edge of urban areas where parking is limited, or vehicle access restricted, for example in historic towns and cities.

Park and ride facilities can help reduce urban congestion and vehicle-related pollution. They can support bus use by providing cheaper, faster and more convenient alternatives to town and city centre parking. To be effective, park and ride facilities should offer dedicated and frequent bus services, making them an attractive alternative to city or town centre parking.

As well as commuter or shopper access to towns and cities, park and ride facilities can be used to enable access to heavily trafficked tourist areas, reducing congestion and the associated negative impacts. There are examples in Cornwall where provision enables tourist access to towns and villages with restricted roads and heritage layouts. Park and ride facilities can form an important part of any town or city access strategy.

Changes to work patterns have meant that the viability of park and ride facilities as a purely commuter focused provision has changed. As in Cornwall, they have the potential to effectively relocate town or city centre parking to less central locations, enabling space taken by car parking to be used for placemaking or other uses.

(Figure 10: Chelmsford park and ride)

Truro

Located outside Truro, the park and ride at Langarth, shown in Figure 16, serves as provision for bus access to the nearby hospitals and the centre of Truro. This reduces vehicle trips to both the hospital, and to the historical and constrained centre of Truro.

(Figure 11: Truro park and ride)

7. Priority lanes

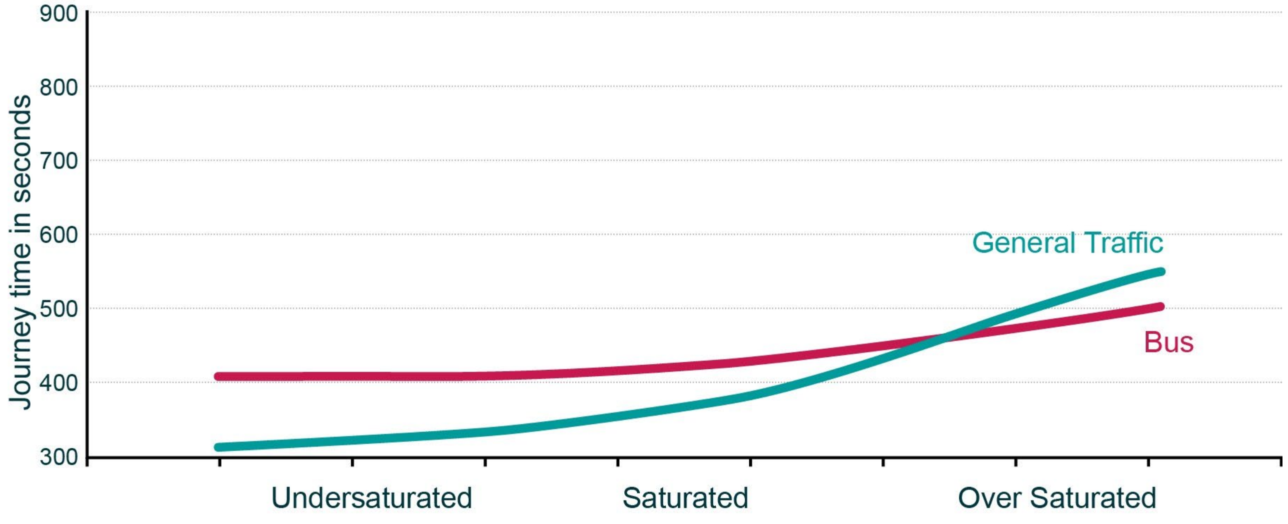
7.1 Overview

A priority lane restricts access to a section of the carriageway to certain identified modes. A bus lane is the most common form; it enables buses, and permitted other modes, to bypass vehicle traffic queues and typically results in journey time savings and greater reliability for bus passengers.

In the Plan for Drivers, the government made a commitment to strengthen guidance to make sure that bus lanes help rather than hinder traffic, by operating only when buses are running, or when traffic is heavy enough to cause delay to buses. With this in mind, this chapter is intended to promote best practice in the use of priority lanes to facilitate smoother journeys for buses without hindrance to general traffic flow. Where used, priority lanes should be developed alongside other measures as a package. Without a whole-route approach, priority lanes in isolation will only improve the easiest sections of the journey, meaning no benefit to overall user journey times, with possible negative impacts to general traffic. This chapter covers the different types of lane, the benefits, and other considerations.

A bus lane provides a dedicated lane that operates without congestion and flows freely to substantially remove delay to buses. Restricting access to buses, and limited other modes, manages flows such that delay caused by congestion is not experienced. Bus lanes may be with-flow, with buses travelling in the same direction as general traffic, or contra-flow, with buses travelling against general traffic flow.

It is important for designers to be aware that the expected benefits of bus lanes in terms of improved speeds and greater reliability are only provided if there is congestion in other traffic lanes.



(Figure 12: comparison of general traffic vs bus journey time with varying flows)

Figure 17 illustrates this. It compares journey times of general traffic against a bus in a bus lane. The x axis indicates the level of congestion in the general lane. The bus is slower if there is no congestion, due to stopping to pick up/drop off passengers. However, as congestion increases in the general traffic lane, journey time for buses within a bus lane improves as network congestion increases. Bus lanes provide the greatest benefits to buses when the network is oversaturated, mitigating general congestion, and making the bus faster than other vehicles.

In the absence of congestion a bus lane will only offer limited speed or reliability benefits, therefore bus lanes should not be used in areas where conditions are free flowing, or where such conditions can be maintained by other means.

Hours of operation should be chosen to coincide with peak hours when buses will gain maximum benefit. Bus lanes should not operate when no bus service is running, or when general traffic is light enough not to cause delay to buses. For example, bus lanes should only be 24 hour when there are night buses in operation and where there is significant congestion. If there is not significant congestion, the bus lane should not be 24 hours.

Authorities need to be satisfied that where bus lanes operate for time periods that include quieter times of day (for example, 7am to 7pm, or 24hr) that the case for doing so – such as to support bus journey times - is well-evidenced and the impacts on other road users are properly considered and mitigated.

A traffic regulation order must be made to identify the length of the bus lane and to limit its use to those types of bus and other vehicles which the authority wishes to allow. The restriction must be indicated using the prescribed signs and road markings in the Traffic Signs Regulations and General Directions.

7.2 Other permitted vehicles

A range of other modes can be permitted within a bus lane. Pedal cycles (as defined in Schedule 1 of TSRGD) are permitted to use with-flow bus lanes by default as this is more likely to be safer for them than riding in the main traffic lane with buses passing on their nearside.

Other permitted vehicle classes typically include solo motorcycles, taxis (hackney carriages) and private hire vehicles (PHVs; indicated on the traffic signs as 'authorised vehicles'). The bus lane can be reserved for local bus services only or all buses. A lane for local buses would exclude coaches, or other privately chartered bus or coach services.

Emergency vehicles on call and cleaning or maintenance vehicles are typically permitted to use a bus lane by the TRO, but these exceptions are not signed as these vehicles are easily identifiable for enforcement purposes. Other vehicle types, such as non-emergency patient transport vehicles, can be allowed to use bus lanes in the same way.

There are two factors to consider when deciding whether to allow other modes to share a bus lane. Firstly, will doing so negatively impact on the performance of the lane for the bus? If free flow conditions are maintained, low numbers of other modes will not affect performance. This will need consideration not only of the link flow but also implications at junctions. A bus lane setback should enable a bus to get through a set of signals within a single cycle. Filling a lane with non-bus vehicles that inhibits this queue discharge does not support bus priority. It is likely flows of 200-300 vehicles would still enable a bus lane to operate effectively.

The second issue is lane occupancy and compliance. A lane that is perceived as “empty” by other users may lead to compliance issues, and negative public perception. Having a level of lane occupancy where bus frequencies are low can negate such concerns.

Any additional vehicles allowed to use a bus lane should be easily identifiable, both for enforcement purposes and to make their status clear to other drivers, increasing understanding and compliance. The following should also be considered:

- impact on road safety
- potential for delays to other traffic
- the hierarchy of road users and integration with the wider network
- equalities considerations
- the impact on modal split

Traffic Advisory Leaflet 1/24: Motorcyclists using bus lanes is clear that wherever it is appropriate to do so, local councils should allow motorcyclists to use bus lanes, using their existing powers. The Plan for Drivers includes a commitment to consult on making motorcycle access to bus lanes the default position, rather than at local authorities' discretion. Depending on the outcome of that consultation, this guidance will be updated as necessary.

Studies indicate that allowing cycles to share with-flow bus lanes has no detrimental effect on bus journeys unless bus average speeds exceed 20 kph and the other lanes are congested, preventing overtaking of cycles2. However, local authorities must take care not to let the provision of cycling in bus lanes detract from better, safer, cycle provision, as they do not provide an environment attractive to a wide range of people and should therefore not be regarded as inclusive.

Where pedal cyclists use bus lanes, the lane should be at least 4m wide, and preferably 4.5m, to enable buses to pass cyclists with sufficient room. Bus lanes less than 4m in width are not recommended and widths between 3.2m and 3.9m wide should not be used as these have the potential to encourage unsafe overtaking of cyclists within the lane.

For cyclists, sharing a bus lane with motorcycles can have a detrimental effect on perceived safety unless the lane is more than 4.5m wide. Sharing of bus lanes with powered two-wheelers may also confuse pedestrians, who will not be expecting the smaller vehicles when preparing to cross.

Permitting taxis to share bus lanes may have an impact on bus speeds and could discourage cycling. Even where they may not drive in a bus lane, picking up and setting down of passengers can still be accommodated. Any vehicle may enter a bus lane to stop, load or unload where this is not prohibited and exemptions from any stopping or loading restrictions can be provided. This is an important accessibility benefit, particularly for some disabled people who may rely on taxi services.

Freight or priority vehicle lanes

Allowing other vehicles into bus lanes can enable road space to be used more effectively. A managed or priority lane approach can be tailored to different configurations. This can be particularly relevant where bus frequencies are low, generally less than 10 buses per hour.

One option is to permit heavy goods vehicles (HGVs) in a bus lane, as shown in Figure 18. An HGV is easily identified by the rear markings. Permitting HGVs into bus lanes can support the movement of freight as well as bus users. This type of lane may be appropriate in some locations where bus movements are low, but the road has an important strategic role such as an arterial road and is subject to congestion.

[2]Rotherham Borough Council, 2003

(Figure 13: examples of bus lanes which allow HGV use)

Regulatory requirements

(Table 6: shows vehicle class descriptions and whether they can be accommodated in priority lanes without additional DfT authorisation)

Vehicle Class	Vehicle Class Description	Can be Included in without additional DfT authorisation?				Comments
		With-flow bus lanes	Contraflow bus lanes	Bus only streets	Bus gates	
Bus	A motor vehicle constructed or adapted to carry more than 8 passengers (exclusive of the driver); including minibuses or a local bus (see below).	Y	Y	Y	Y	
Local bus	A public service vehicle used for the provision of a local service not being an excursion or tour.	Y	Y	Y	Y	
Cycles	All types of pedal cycle including hand-cranked cycles and cycles that conform to the Electrically Assisted Pedal Cycle Regulations 1983 (as amended). It does not include mopeds, e-scooters or other powered two-wheeled vehicles.	Y	Y	Y	Y	DfT authorisation required if cycles are to be excluded from a with-flow bus lanes. Where road width is minimum 4.0m. At indicated times if they are shown on the sign. Contraflow: at local authority's discretion
E-scooters	Two wheeled vehicle with an electric motor,	Y	Y	Y	Y	At the time of writing, e-scooters

	capable of carrying a single rider.					are only lawful in designated trial areas.
Solo motorcycles	Includes solo motorcycles, scooters and mopeds	Y		Y		At local authority's discretion. If so, the symbol will be shown on the sign.
Taxis	In England and Wales, a vehicle licensed under— (i) section 37 of the Town Police Clauses Act 1847(a); or (ii) section 6 of the Metropolitan Public Carriage Act 1869(b); or under any similar enactment;	Y		Y	Y	Hackney carriages only, at local authority's discretion. Will be shown by the word 'taxi' on the signs.
Private hire vehicles (PHVs)	A vehicle not licenced to collect passengers from ranks or to be hailed in the street but licensed only to be hired by prior arrangement.	Y		Y	Y	At local authority's discretion. Identified on the signs as 'authorised vehicles'.
Heavy goods vehicles (HGVs)	Vehicles constructed for transporting goods and with a gross weight over 3.5 tonnes.	N	N	N	N	Requires DfT authorisation for the signs to incorporate the relevant symbol
Emergency vehicles	A vehicle used by the emergency services, including ambulances, vehicles used at the request of NHS ambulance services, police vehicles and fire and rescue service vehicles.	Y	Y	Y	Y	Permitted at local authority's discretion within the TRO, without need for additional symbols on signs. Access may be when on emergency call only, or for general use.

7.3 Waiting and loading

A bus lane creates a prohibition on driving within the lane, but any vehicle may still enter it to stop, load or unload where this isn't prohibited. Waiting should always be prohibited within a bus lane during its operational period. The need for access to the kerb to enable the setting down and picking up of disabled passengers and Blue Badge holders should be borne in mind. Signs and markings indicating the duration of the prohibition should be provided in accordance with the TSRGD and Chapter 3 of the Traffic Signs Manual. Where waiting is prohibited at all times, and the bus lane operates for a shorter period, double yellow line to diagram 1018.1 should be placed.

Loading should also normally be prohibited during the operational hours, although there may occasionally be reasons why it needs to be allowed, such as off-peak loading in a 24-hour bus lane. Any prohibition of loading, whether during or outside the hours when the lane is in force, should be indicated with signs and markings in accordance with the TSRGD and Chapter 3 of the Traffic Signs Manual.

7.4 With-flow bus lanes

With-flow bus lanes are the most common form of bus priority measure. They are indicated by a continuous white line road marking and associated traffic signs which reserve a traffic lane, typically nearside, for the use of buses. With-flow bus lanes may be:

Static: continuously operational as a bus lane only.

Dynamic: operational only during peak hours and further sub-categorised as:

-
- intermittent bus lane - a bus lane which cars are permitted to share at junctions and where space is restricted
-
- bus lane with intermittent priority - a general traffic lane which can be converted to an exclusive bus lane on demand

7.5 Dimensions

Recommended dimensions for with-flow bus lanes are set out in Table7

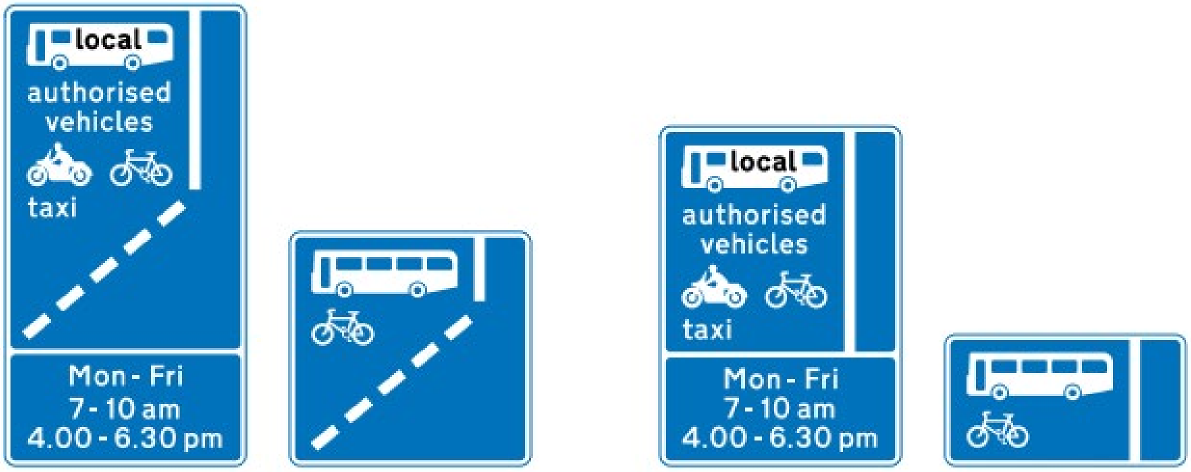
(Table 7: dimensions for with-flow bus lanes)

Bus Lane Type	Desirable Minimum Width	Absolute Minimum Width
Bus only	3.2m	3.0m
Bus & pedal cycles	4.5m	4.0m

The desirable minimum width for a with-flow bus lane is 3.2m, giving clearance between vehicles, and improved ride quality. This also reduces maintenance issues associated with the wheel track and gullies in the kerbside.

7.6 Signing and road markings

Guidance on signing and road markings is given in the Traffic Signs Manual. The times and days of operation can be varied. Examples are shown in Figure 19. Where there is more than one bus lane along a particular length of road or within the same geographical area, the times of operation should be consistent, where possible, to avoid driver confusion.



(Figure 19: signing for with-flow bus lane ahead (alternative types))

The end of a with-flow bus lane will usually be obvious through the termination of the diagram 1049A marking. If considered necessary due to observed driver behaviour, an upright sign to diagram 964 may be provided as shown in Figure 20. The lane should normally terminate short of the stop line at signal-controlled junctions.

(Figure 14: sign indicating the end of a bus lane)

7.7 Contraflow bus lanes

A contraflow bus lane is effectively a one-way road with a bus lane running in the opposite direction. They can help buses avoid unnecessary diversions and maintain route patterns when new one-way streets are introduced. They are typically used by buses only, but pedal cycles may also use the lane were permitted by the order. Contraflow bus lanes normally operate at all times.

Contraflow bus lanes, in the direction of travel along the lane, should always be provided on the nearside; an off-side lane would result in traffic travelling on the wrong side of oncoming traffic. Even if the lane were physically segregated, the effect would be disconcerting to drivers and at night dipped headlights might result in dazzle. Cycles can be allowed to use contraflow bus lanes, but consideration needs to be given to interaction at junctions and stops to ensure cyclist safety is not compromised and buses delayed. Unlike with-flow bus lanes, other classes of vehicle are not permitted to use contraflow bus lanes without special signs authorisation.

Pedestrian safety should be considered at contra flow lanes with low flows as this may result in pedestrians failing to be aware of traffic coming from an unexpected direction.

Appropriate pedestrian crossing locations with warning signing and road markings should be provided.

Restriction of kerbside access can pose problems for blue badge holders who rely on having close access to shops and public amenities. Authorities should attempt to maintain kerbside access wherever possible, particularly in areas such as main shopping thoroughfares.

7.8 Dimensions

Recommended dimensions are set out in Table 8.

(Table 7: dimensions for contraflow bus lanes)

Bus Lane Type	Desirable Minimum Width	Absolute Minimum Width
Bus Only	4.0m	3.0m
Bus & cycles	4.5m	4.0m

Contraflow bus lanes should be a minimum of 3m wide, but 3.2m upwards is preferred by operators. Where cyclists are using bus lanes, the lane should be at least 4m wide, and preferably 4.5m, to enable buses to pass cyclists with sufficient room. Bus lanes less than 4m in width are not recommended and widths between 3.2m and 3.9m wide should not be used as they have potential to encourage unsafe overtaking of cycle users within the lane. Care should also be taken to ensure that narrow lanes do not encourage buses to leave the bus lane to pass cyclists, thus increasing the risk of collision with oncoming traffic.

(Figure 15: contraflow bus lane)

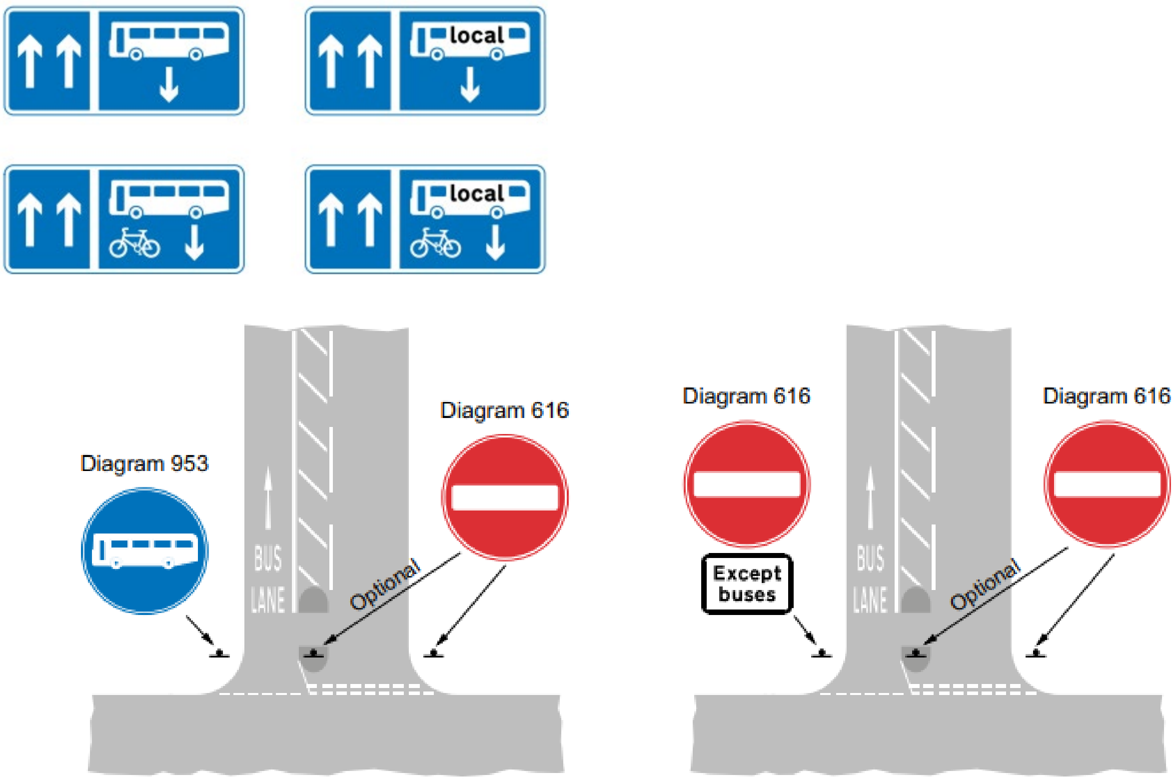
Contraflow lanes should incorporate physical segregation at the start and end. Whilst they can reduce journey time, for example at gyratory systems, there can be issues with their operation. The design of the entry and exit needs to be carefully considered to operate safely. Limited space can also provide safety issues for allowing cycles in the lane. Access requirements to adjacent premises and homes should also be considered.

7.9 Signing and road markings

Detailed guidance on signing and road markings for contraflow bus lanes is available in the Traffic Signs Manual and are summarised in Figure 22. A contraflow bus lane is separated from the rest of the carriageway by a continuous line to diagram 1049A. The marking should be discontinued where it passes a traffic island and angled at an appropriate taper to guide vehicles from each direction past the obstruction.

Signs to diagram 960 should be located at the beginning of the road, in each case on the nearside and on any central refuge. There is no specific requirement to provide repeater signs however it is recommended that signs are placed beyond each side road to ensure that drivers are informed joining or continuing on the road are reminded of the restriction. The number of arrows pointing upwards on the left-hand side of the sign should be varied to indicate the number of traffic lanes available in that direction.

A sign showing both the bus and cycle symbols should be used where the contraflow bus lane is also used by pedal cycles. The legend “local” on the bus symbol indicates that the lane may be used only by those buses operating a local service.



(Figure 16: signing and lining for contraflow bus lanes)

7.10 Bus and priority lanes: other supporting measures

There are other measures which can be implemented to improve understanding of, and compliance with bus lane restrictions. This can help reduce the risk of drivers accidentally entering a bus lane. these can include:

- **colour differentiation of road surface**: coloured surfacing may highlight the presence of the lane and reduce unintentional encroachment by other vehicles
- **full segregation**: a bus lane may be separated by kerbs from the remainder of the carriageway, commonly used with contra–flow lanes - lack of available carriageway width and the need for part time access to the lane may preclude widespread use
- **traffic islands**: islands may make separation of the bus lane from the rest of the carriageway more obvious

See Chapter 11 for further guidance on technology-based enforcement measures.

8. Bus priority access measures

8.1 Bus only street

A bus only street is a section of road to which only buses and other permitted vehicles have access. They can offer buses a more direct route, supporting a more efficient, resilient and reliable network.

Bus only streets can minimise impact from external factors on the bus network. They can also support access to business and shopping areas at times when it is denied to other vehicles. This helps to make bus services a more attractive choice by providing convenient access for bus passengers.

8.2 Other permitted vehicles

As with bus lanes, other vehicles permitted to use bus only streets can include cycles, taxis and solo motorcycles and permit holders. Access or loading requirements can also be permitted. Access for taxis, PHVs and Blue Badge holders should be considered to provide accessibility benefits.

The reduced number of vehicle movements associated with bus only streets can make this a supportive measure for cycles where they are permitted users.

8.3 Signing and road markings

Signing should be provided in accordance with TSRGD to indicate the point from which restrictions apply. Access to bus only streets is signed in the same way as a bus gate, with signs to diagram 619 or 953. A traffic regulation order is also required.

Where a one-way or two-way road is reserved for buses and any other permitted vehicles, the entry points may be indicated in multiple ways. Supplementary plates allow for specification of authorised vehicles and a time period for when bus only street restrictions apply if not continuous. Advice on the use of signs and markings is given in the Traffic Signs Manual.

8.4 Bus gate

Bus gates, are short connector lengths of streets closed to other traffic, as shown in Figure 23 and Figure 24. They effectively create a “no through road” for all traffic other than buses (and potentially cycles) and can be used to control access to bus (and cycle) only streets, or other area wide treatment. The bus gate may be located either at a junction or part way along a road and can be implemented through physical measures such as rising bollards, traffic signals or upright traffic signs and road markings. Signed restrictions will require a TRO.

Access requirements should be carefully considered to ensure residents, businesses and disabled road users are not unduly impacted. Alternative parking bays should be created for blue badge holders if these are removed due to the creation of a bus gate. Engagement with communities should be undertaken as part of the planning process, as well as the statutory consultation required as part of the TRO process.

Signing and routing should be clear and legible to avoid any potential enforcement issues. **If a bus gate is placed on a road that was previously a signed route or was used by significant through traffic, updated directional signing should be provided to guide prohibited traffic to an alternative route.** Temporary direction signing may be required in the initial six months of a change. This supports compliance and effective enforcement by making it clear to drivers well in advance that the route is no longer available to them.

Enforcement is a key consideration to ensure the effectiveness of a bus gate. The effective use of signing, coloured surface treatments and/or surfacing materials can provide clearer demarcation of the facility, helping to improve compliance rates. Locations with a high violation rate may require camera enforcement to ensure ongoing compliance.

Installation of bus gates on Valley Gardens in Brighton allowed for reduction in the extensive network of dedicated bus lanes adjacent to general traffic lanes which were recognised to cause a high level of severance. The bus gates retained access for businesses and residents, while significantly reducing the volume of through traffic that could cause congestion for buses. As well as improving bus reliability, this has also positively impacted the overall public realm by enabling improved placemaking.

8.5 Other permitted vehicles

Bus gates may be used by other vehicles where permitted by the order and nearside bus gates should by default be accessible by cyclists. Where bus activated signals are used without a cycle bypass, it will be necessary to provide a means for cyclists to activate the signals. This may be achieved by a suitable means of detection or a push button unit for cyclists to operate. Refer to LTN 1/20 for further guidance on provision to accommodate cycle users as part of a bus gate.

(Figure 23: bus gate with cycling permitted and camera enforcement)

(Figure 24: bus gate with authorised vehicles permitted and camera enforcement)

8.6 Signing and road markings

A bus gate is signed in a similar manner to a bus only street as outlined in Section 8.1. Advice is given in Chapter 3 of the Traffic Signs Manual.

9. Kerbside controls

9.1 Importance of kerbside controls

How the kerbside operates can have a significant impact on both day-to-day operations and future bus service improvement proposals. Vehicles at the kerbside can create delay and interference to bus operations along a route. Dealing with these matters in a proactive way is important to maintain reliability and journey consistency.

Kerbside activities can include parking and loading as well as pick up and drop off activity.

Typical issues can include:

- friction from vehicles entering and exiting parking and loading spaces
- stationary vehicles creating obstructions and therefore a need to give way to opposing flows
- illegally parked vehicles blocking bus lanes stopping access and impeding bus movement
- vehicles in a bus stop forcing buses to stop in the carriageway making passengers walk into the carriageway and delaying boarding and alighting

In delivering improvements to bus services, controls on kerbside activity are a fundamental part of the toolkit. This means the introduction of parking, loading, or stopping controls should be considered in any package of improvements and will usually be required.

Altering or removing parking or loading provision can be highly sensitive. Consultation and Engagement is key to addressing such issues and is discussed in more in Chapter 3.

It is important for authorities and designers to remember that **the primary use of the public highway is for the movement of people, goods and vehicles**. Any kerbside activity is by permission not by right. This is further reinforced through the Network Management Duty placed on traffic authorities by the Traffic Management Act 2004. This duty requires them to manage their road networks to ensure the “expeditious movement of traffic”, which includes buses.

Any package of bus user priority should include measures to control and manage kerbside activity so that such activities do not cause delay or obstruction to buses. It is also important that such measures complement other infrastructure such as bus lanes and bus gates where kerbside controls are also required. In less urban situations, and where space is limited for installing bus lanes, waiting and loading controls by themselves can be an appropriate bus user priority measure.

Local authorities have a range of powers available to them to enforce waiting, loading and moving traffic restrictions. The implementation of any kerbside controls should include an enforcement strategy. Further discussion on enforcement is found in Chapter 13.

The options for kerbside controls include:

- no waiting
- no loading
- loading bays
- controlled parking
- disabled badge holder (Blue Badge) parking
- red routes/clearways (no stopping)

These are discussed below. Signs and markings used must comply with TSRGD, and advice on their use is given in the Traffic Signs Manual.

9.2 No waiting

Waiting should always be prohibited within a bus lane during its operational period. Signs and markings will indicate the duration of the prohibition which may be the same as that for the bus lane or longer.

On sections of a route where the road narrows and stationary vehicles delay buses, waiting restrictions should be considered. These can be targeted at specific times. Designers should be mindful of exemptions that allow parking from Blue Badge holders and potential loading activity. Picking up and setting down passengers is a standard exemption to waiting restrictions, which is particularly important for disabled passengers.

9.3 No loading

Loading should also normally be prohibited during the operational hours of a bus lane, although there may occasionally be reasons why it needs to be allowed, such as off-peak loading in a 24hour bus lane. Loading bans can control sections of route where servicing would otherwise obstruct bus movements.

9.4 Loading bays

The impact of loading on bus lanes should be minimised, and to achieve this, hours should be restricted, or loading bays inset or relocated away from the main carriageway, such as within side roads. Identifying specific locations that do not impede bus movements is a more proactive means of controlling these activities. A loading bay sign is shown in Figure 25.

On priority corridors the proactive designation of places to load in locations that do not disrupt bus movements is recommended.

(Figure 25: loading bay signing)

Virtual loading bays are an alternative way of making more efficient use through advance booking of short parking or loading timeslots as the driver approaches. This enables loading or deliveries at a place and time known in advance and has been effectively implemented by Westminster City Council as part of their kerb system.

9.5 Parking controls

Where parking is permitted along bus routes, consideration should be given to whether time based or other controls are required. This would be up to the individual highway authority to consider. One factor to consider is that where time restrictions are short (for example, 30-minute waiting) this is likely to create a high turnover of spaces. This turnover with vehicles frequently entering/leaving spaces can create delays for buses.

9.6 Blue Badge parking

Blue Badge holders may park on yellow line restrictions for up to three hours, provided they don’t cause an obstruction. It is important that any bus improvement measures consider where blue badge parking should be located, and it is actively managed with dedicated provision.

9.7 Red routes and urban clearways

Clearways or red routes can be used to introduce no stopping restrictions.

Red routes prohibit stopping activity to maintain the free flow of vehicles. Red routes are intended to be used strategically to deal with traffic problems assessed on a whole route or corridor basis, not to deal with issues on relatively short lengths of road.

Red routes are indicated by single or double red line road markings and can be accompanied by an upright sign prescribed by Schedule 6 of TSRGD. Single red line markings indicate that restrictions only apply during a set time period which allows parking and loading to be provided at certain times.

It is not possible to introduce a peak hour prohibition of stopping with waiting restrictions at different times; red and yellow lines cannot both be laid along the same length of road. Therefore, red route controls either operate for 24 hours or, if overnight parking can be permitted, throughout the day, typically 7 am to 7 pm. To enable buses to stop on a red route, bus stop clearways to TSRGD diagram 1025.1 are required.

A red route order should permit a licenced taxi to stop to pick up or set down passengers and the driver of a vehicle displaying a blue badge to stop to pick up or set down a disabled person. Drivers of other vehicles should not be permitted to stop for any purpose other than in an emergency.

Similar to a red route in function, the urban clearway (indicated by the sign to TSRGD diagram 646) limits stopping during peak periods, but is effectively a prohibition of waiting and loading as drivers may stop to pick up and set down passengers. It applies to both sides of the carriageway and includes footways and verges.

The Traffic Signs Manual provides guidance on signing and road markings for red routes and urban clearways.

9.8 Inset bays

Designers need to be both practical and creative in managing kerbside activity.

It is rarely practical to remove all kerbside access. Inset bays can maintain kerbside access while reducing delay for buses. This can help address concerns about removal of loading or parking provision which in turn can help deliver bus user priority measures. These can operate for longer time periods, which may provide advantages over standard kerbside bays. However, they should not reduce the remaining footway width below the recommended minimums set out in Inclusive Mobility.

Some examples are shown below in Figure 26 and Figure 27.

(Figure 26: inset flexible space loading bay)

(Figure 27: inset bays in bus lane)

10. Priority at junctions (non-signalised)

10.1 Other junction treatments

Time spent waiting at junctions can be a source of delay to buses therefore giving priority, or controlling movements, is an important tool in improving bus route performance. This section focuses on give-way and other junction types; traffic signal junctions are discussed in Chapter 11.

Measures to support buses include:

- vehicle turn bans
- turn ban exemptions for buses
- side road closures

10.2 Vehicle turn bans

Vehicles turning at junctions into side roads can cause delay to vehicles including buses, particularly right turning movements. High levels of pedestrian movements across side roads may also contribute to vehicle delays. Prohibiting turns either permanently, or at key times of the day, can remove obstruction and delay to buses and should be considered. Rationalisation of junctions and access points along a corridor is an important means of improving mainline flow by minimising delay. It can also be used to support other measures designed to enable active travel choices. The potential impact on other traffic should always be considered as part of any such proposals.

10.3 Turn ban exemptions for buses

Exempting buses from turn bans is a simple form of priority and is often used with other measures such as contra flow bus lanes or bus only streets.

10.4 Roundabouts

Roundabouts should be designed to ensure safe passage for bus movements, with sufficient lane widths and entry/exit path radii to safely accommodate vehicle swept paths. Mini roundabouts can be inappropriate for use along routes frequently used by buses due to difficulty in completing turning movements. Sharp turning movements when negotiating mini roundabouts can lead to poor ride comfort and pose a safety risk, particularly for standing passengers who are at increased risk of falling.

Bus priority can be more easily incorporated for roundabouts with multiple entry and exit lanes, including the use of bus lanes and bus gate pre-signals. Bus gate pre-signals can assist buses within the nearside lane to progress to the offside where a route requires a bus to turn right at a roundabout. Traffic signal priority (TSP) can also be utilised at traffic signal-controlled roundabouts, whereby the detection of a bus approaching the roundabout can lead to that approach arm being provided with priority.

Innovative approaches to the design of roundabouts, including "throughabout” roundabouts which allow traffic to pass directly through the middle of the central island, as shown in Figure 28, have also been used effectively to provide bus priority, such as the Sprint BRT corridor in Birmingham.

(Figure 28: throughabout with bus gate at Heybarnes Circus, Birmingham)

The placement of bus stops near a roundabout requires careful consideration, with stops on the approach arms best incorporated within a bus lane to ensure easier entry and egress. Bus stops on the exit arms should be located away from nearside lane mergers for safety reasons. Stops should be sited within an accessible distance to a formal crossing facility to assist the interchange between connecting services.

The provision of clear signing, including advanced directional signs and lane destination markings, is recommended to reduce lane changing behaviour which can cause delay and negatively impact on bus journey times.

Where buses are turning onto road from minor side roads, particularly in less urban areas, the conversion to a roundabout can be effective in reducing bus delays and should be considered.

11. Traffic signal priority and other technologies

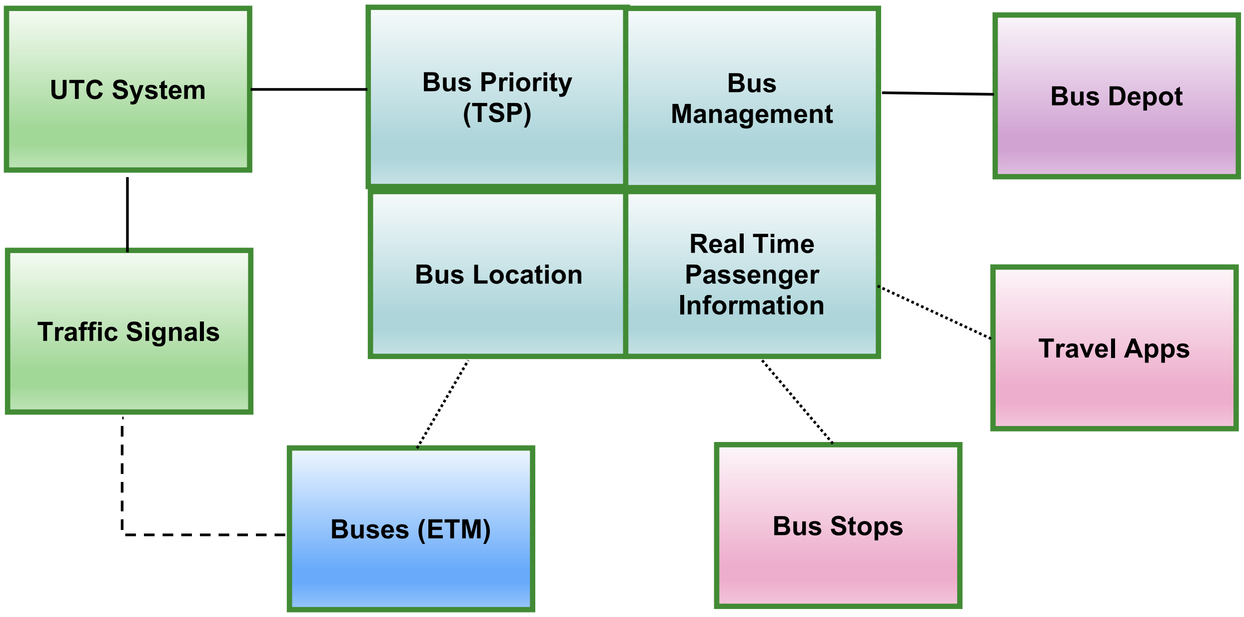
11.1 Introduction

Traffic signal technology has been used to improve bus journey times for many years. With space for physical bus priority measures at a premium in some places, and an increasing demand for more reliable service information, the development and application of newer, more evolved, technologies, and associated systems, has become essential to provide a range of service reliability and user information services. The evolution of technology has seen a major growth in recent years of the availability of advanced technological solutions for both local and network-based systems, tending towards a more centralised and coordinated approach.

Technological advancements provide the ability to locate and identify individual buses across a network through automatic vehicle location (AVL) systems, using onboard electronic ticketing machines (ETM) to establish their position through the global positioning system (GPS), as outlined in Figure 29. The ability to identify individual bus locations, and obtain other passenger information through the ETM, allows useful data to be provided to various control and centralised information systems.

This data can be used to control, influence and monitor journey times, with the aim of improving and maintaining reliable journey times. This can be achieved by combining the centralised information with traffic signal-based systems providing traffic signal priority (TSP). The use of adaptive control systems such as urban traffic control (UTC), with split cycle offset optimisation technique (SCOOT), for network coordination can provide better control of journey times by understanding if priority should be given, how much priority is required, and where, within a network, priority gives the most benefit. For a more local, but less informative, approach TSP via local selective vehicle detection (SVD), under microprocessor optimisation vehicle actuation (MOVA) control will provide some benefits over basic traffic signal control.

Information from the centralised system can be also used to provide reliable service information, such as bus times, current usage and accessibility information, through real time passenger information (RTPI) systems. This information can then be relayed to bus stops, variable message signs, mobile apps and websites.



(Figure 29: centralised AVL system)

11.2 Assessment of new or additional technology

General guidance on the design and use of traffic signals is given in the Traffic Signs Manual (TSM), Chapter 6. When considering the application of new or additional bus priority technology, there are several factors it is essential to consider:

The current operation of any existing systems and how the proposed new systems and technology will integrate with them;

- Where and how it will be deployed
- Its suitability
- Benefits of deployment
- Installation, maintenance and future asset management.

A review of current systems and associated assets should be carried out as part of the overall assessment to determine the need for new or additional systems. For example, ensuring UTC systems are revalidated and any faulty detection equipment is fixed may provide an improvement to journey times, meaning a reduced or even no need for specific bus priority systems. As with any technological systems, it is essential that they are suitably maintained and kept at an optimal operational state at all times to achieve the most benefit.

A review of current assets will also allow information to be gathered to understand where and how any proposed technology will be deployed and determine the suitability of the proposed technology at each location. Items that should be considered when assessing existing assets and locations for proposed assets include -

- Communications, if required, and whether provided by fixed broadband line or mobile networks. The type of asset may influence the choice of communications method, for example CCTV may require additional bandwidth which may be difficult at remote sites.

- Ducting and cabling for additional above or below ground infrastructure.

- Infrastructure for mounting equipment.

- Equipment cabinets including space within existing cabinets.

- Power connections.

- Other unrelated infrastructure nearby that may cause operational interference, either physically or passively.

The potential benefits of new technology should be considered both during the early stages of a proposal and then again once other technology and asset reviews have been completed as this could change the outcome of the benefits review, especially regarding cost.

Whether the chosen location can provide the required benefit should be considered. For example, placing traffic signal sites close to busy bus stops often do not work well, and sites where regular bus services operate on conflicting routes can be problematic.

The benefits of proposed technology should not be at the expense of other factors, for example traffic congestion. For example, a traffic signal junction regularly called upon to prioritise bus movements may generate significant queues for other traffic, which could create potential impacts on air quality and the local environment.

11.3 Technology for traffic signal priority (TSP)

Traffic signals are an important part of the toolkit, helping to ensure adherence to the timetable and journey time reliability. It is important to have a clear strategy and approach for the deployment of TSP technology, that maximises benefit for bus operations whilst minimising impact on wider traffic flow, in line with wider traffic management objectives. This should be documented so that operators, those responsible for network management and policy makers are aware of the approach and priorities. Traffic signal priority works best when delivered over a network and as part of a package of other measures. Making short term changes to the operation of a junction to move buses through rarely works in isolation as it reduces junction efficiency and disbenefits all traffic. Conversely, when well delivered, traffic signal priority for buses can also provide benefits for general traffic in the same stream.

TSP for buses has been available for many years in various forms. Modern systems are based around on-bus ETM and AVL systems and service running information. These require either a link between the local bus and the signals, or a link between a central server link to the traffic signals or UTC system.

Digital based platforms with cloud-based data are becoming more widely available, which can make information more accessible to other intelligent transport (ITS) based systems. More versatile and flexible ways for TSP systems to make requests to traffic signal controllers and adaptive systems such as SCOOT and MOVA are becoming available.

11.4 Traffic signal priority, detection technology

Buses can be given priority at traffic signals more effectively if the signal can be made to respond to the arrival of the bus. This is known as selective vehicle detection. Traditionally, this was achieved by fitting buses with an electronic device which can be detected either by satellite using GPS techniques or by static equipment in the highway which is linked to the traffic signal controller. The most common form of this is a bus fitted with a transponder which is detected as it passes over an inductive loop slotted into the road surface.

With the evolution of digital and wireless cloud-based systems, SVD inputs have become virtual, through the use of GPS via the ETM, and form part of a centralised AVL system. Older types of SVD, such as the inductive loop may still have a place. Various types of SVD and AVL are listed below.

SVD and AVL systems provide inputs to traffic signal controllers and/or a UTC system to enable priority to be given to buses. The methods of providing that priority and the level of priority differ depending on the method of control in operation at a site, for example whether localised vehicle actuated (VA), microprocessor optimised VA (MOVA), or network UTC/SCOOT control.

11.5 Inductive loops / magnetometers - SVD

An inductive loop uses a loop of cable buried in the highway surface. The inductance of the loop changes under certain conditions, in particular, the presence or passage of ferrous material. The change in inductance is then monitored to detect a vehicle.

Magnetometers operate in similar way as inductive loops but use magnets rather than loops of cable. They use wireless technology to communicate back to the traffic signal controller via access points.

Simple inductive loops and magnetometers may be suitable in areas where buses are the only vehicles present. More advanced versions are capable of detecting vehicle axles and axle spacing to identify different vehicle types and provide selective vehicle detection input to traffic signal priority systems, which may be suitable in mixed traffic.

11.6 Vehicle based radio transmission units - SVD

Similar to, transponder technology, a vehicle can be fitted with a radio frequency identification (RFID) tag which uses specific radio frequencies to communicate with a receiver linked to the traffic signal controller.

11.7 Radar detection - SVD

Much like the inductive loop, the radar detector is a commonly used form of detection technology for standard traffic signal detection but with recent advancements radar detection can be used for SVD applications as well.

Advanced radar detection systems are able to be selective by analysing the larger radar signals returned from buses providing a local TSP input into the traffic signal controller. This technology can be used at a bus gate or in conjunction with a dedicated bus lane to provide priority at the signals. However, it may not be able to distinguish between large vehicles like HGVs, and buses.

11.8 ANPR & AI cameras - SVD

This type of detection technology is still emerging, but there are trials currently being carried out (2023) to help develop this technology for future use.

Automatic number plate recognition (ANPR) / artificial intelligence (AI) powered traffic camera uses advanced vehicle classification algorithms to differentiate between vehicle types and provides a local TSP input into the signal controller. This requires onsite setup and calibration.

It should be noted that these ANPR / AI cameras are purely for detection purposes and are not capable of carrying out enforcement activity.

11.9 Electronic ticket machine (ETM) - AVL

The ETM uses GPS technology to allow buses to be detected at selected points along the network by the use of virtual detection zones (loops). Virtual loops are programmed into the on-board computer which, via wireless communications, is able to send data to both local control facilities and / or network-based control systems, such as Urban Traffic Control (UTC). The ETM forms part of the centralised AVL system and is currently the only detection system that can provide the journey ID, service and route data, that is needed to offer selective TSP based on service hierarchy or degree of lateness.

11.10 Local control traffic signal priority

Local SVD applies a basic level TSP input into the traffic signal controller. Typically, this is via vehicle profiling through inductive loops or above ground technology. Once a filtered priority detection event has been identified, an output from the detector is passed to the traffic signal controller.

Under local vehicle actuated (VA) control, the request for bus priority will be serviced in the form of a hurry call which will request an immediate move to and/or extend a specified stage as long as there are no conflicting safety requirements within the controller. Due to the impact of hurry calls on normal operation, they can have a negative impact on overall junction capacity if called frequently; this impact can be moderated by inhibiting repeated demands (a prevent period) for a specified time.

Under local MOVA control, the bus priority request is passed as a specific detector output into the outstation transmission unit (where MOVA software is running) to be actioned. Unlike VA, MOVA introduces flexibility in the level of priority given to particular links or vehicles and incorporates optimisation and recovery techniques that make this a popular platform for bus TSP control. This flexibility includes:

- the use of emergency demand immediate moves that are only subject to the constraints of safety critical minimum periods, or priority demands that are constrained by other traffic related controls, for example emergency demands or other priority demands that will take precedence
- the ability to take specific actions on emergency/priority links to control the application of stage truncation, stage skipping and stage extensions

The main benefits of local TSP include:

- they can be applied to any traffic signal-controlled location
- reliability, if installed and maintained properly
- they are applied locally, without the need for a UTC system

Disbenefits of local TSP include:

- TSP demand will be generated for all public service vehicles, including those not in service
- hardware and installation works required at each traffic signal controller location
- cannot provide the journey ID, service and route data, that is needed to offer selective TSP based on service hierarchy or degree of lateness

Where local SVD is being installed, there will be a need to install the physical infrastructure and update the traffic signal configuration information and/or MOVA datasets to interpret the new inputs and outputs. In addition to undertaking a signal controller commissioning, TSP validation must be undertaken to ensure it is operating as intended and for the on-site conditions.

11.11 Network adaptive control traffic signal priority

In addition to be able to read and influence local bus priority inputs and outputs where local SVD is present, network adaptive control systems such as urban traffic control (UTC) enable network wide bus priority strategy and can utilise bus AVL systems such as electronic ticket machine (ETM) and wireless communications for bus TSP.

SCOOT-UTC bus priority is a common platform for applying TSP in urban areas, due to its adaptive control and optimisation techniques. Similar to MOVA, SCOOT has varying methods and user-selectable degrees of influence in applying TSP and goes through a recovery process that re-optimises the SCOOT region following a TSP demand.

If the site is under UTC control there may be no requirement to modify the controller, however, to implement UTC bus priority software design will be required to; produce bus service operators data-bundle including associated virtual loop locations; set up the required secure VPN links between AVL centre and UTC system; set up the UTC installation for the for the receipt of TSP; undertake controller commissioning and TSP validation.

The main benefits for AVL via ETM include:

- no additional physical infrastructure required
- low cost to set up TSP when AVL/ETMs in operation
- no physical maintenance required, reducing costs associated with lane closures and traffic management
- virtual loop locations can be adjusted if queueing distances increase or decrease

Disbenefits for AVL via ETM include

- only works with sustained UTC connection – if connection is lost, a very low risk, the system will not operate
- not all bus operators currently have on board technology
- relies on local authorities using ETM / AVL bus open data (BOD).

Case study: SCOOT signal technology, Greater Manchester

Transport for Greater Manchester (TfGM) has used technology that tracks buses to provide those that are running late with priority at traffic signals. Improving the punctuality of these buses has been achieved by linking two distinct systems:

The TfGM urban traffic control (UTC) system, which controls traffic signals across Greater Manchester.

The automatic vehicle location (AVL) systems of bus operators, which use GPS satellites to track buses and their adherence to schedule.

The majority of traffic signals connected to the TfGM UTC system are controlled by SCOOT (Split Cycle Offset Optimisation Technique), an adaptive form of control that co-ordinates signal timings to reduce delay and improve traffic flow. A facility within SCOOT allows late running buses to be prioritised as they approach the signals.

The link between them allows messages to be sent from the AVL systems to the UTC system when buses reach trigger points upstream of the traffic signals. These messages include information on buses' adherence to schedule and if they are late then SCOOT can grant priority in one of two ways:

An extension, which holds the signals on green until the bus has passed the stop line.

A recall, which brings the signals back round to green earlier than if there had not been a late running bus.

Differential priority, based on lateness, allows it to be granted to those buses that most benefit from it. Additionally, in combination with knowledge of how busy the junction is, SCOOT can minimise the impact on other road users by only granting priority to buses if they are late and if the junction is not over-capacity.

When installed at sites already under SCOOT control, this form of priority is not expensive, as there is no requirement for new physical infrastructure. Large numbers of passengers on buses also mean that the benefits can be large, making SCOOT bus priority a cost-effective solution. This was demonstrated by TfGM analysis showing that buses granted priority received significant time savings and that the impact on general traffic was minimal. Following an initial trial, these positive results led to TfGM rolling out SCOOT late running bus priority at traffic signals across Greater Manchester.

12. Application of other technology

12.1 Real time passenger information (RTPI)

RTPI is an integral part of the centralised AVL system. It uses the bus's ETM, providing live information about bus arrival times, passenger numbers (space availability on the bus) and accessibility of the bus. Information provided by RTPI systems can be disseminated in a variety of ways such at bus stops (see Figure 30), variable message signs and online travel apps and websites. RTPI systems help to provide confidence for passengers to make an informed and smart choice to travel by public transport. RTPI data also helps stakeholders such as bus operators and highway authorities monitor the network.

(Figure 30: bus stop electronic information sign)

12.2 Closed circuit television (CCTV)

CCTV systems can be used to monitor bus journeys, identify incident situations and enable enforcement of bus lanes and other priority measures. CCTV systems can be in either fixed locations (see Figure 31) or mobile units. Remote viewing enables real time interventions and awareness of operational issues. It can be used at individual sites and in urban networks.

(Figure 31: bus lane enforcement camera)

12.3 Automatic bollards (bus bollards)

Automatic rising bollards can be used to control access to certain areas, such as bus only corridors. Typically used as a standalone solution, bollards are not only used as a bus priority measure but also a physical form of enforcement into bus only areas. They can also be integrated into other bus priority measures as part of a TSP solution, as shown in Figure 32, combining enforcement with traffic signal priority.

(Figure 32: TSP with integrated bus bollards and AI camera)

12.4 Urban traffic monitoring and control (UTMC) integration

Urban traffic management and control systems allow various control and monitoring systems to work together, including those used to obtain and share bus journey data. UTMC systems can maximise road network potential by creating a more robust and intelligent system. For example, it allows UTC systems to directly communicate with AVL systems as well as providing links to other key systems such as RTPI, incident & enforcement monitoring systems and systems that control and monitor Variable Message Signs.

12.5 Real time traffic prediction systems

The advancement of traffic technology and real time software solutions for traffic networks over the past few years has created the ability to monitor and predict traffic conditions, integrated control systems such as UTMC with traffic simulation software integration. Such systems combine dynamic traffic models with live traffic data to provide current and forecasted congestion across the network. They can also allow operatives to test alternative scenarios for the next hour, next day or weeks into the future. These systems allow highway authorities to predict how the network will operate allowing adjustments to be made throughout the network which in turn helps with bus journey time reliability.

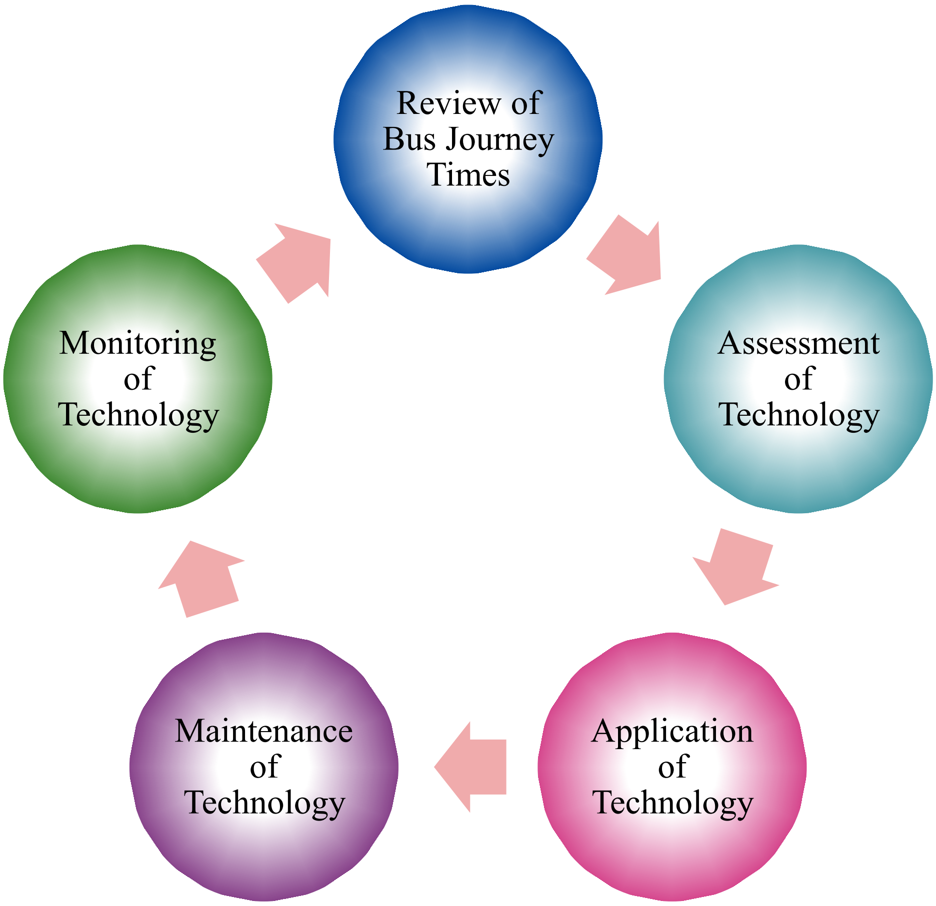
12.6 Maintenance & monitoring of technology

The monitoring and maintenance of technology is essential to ensure that it continues to operate as intended and to the same level of efficiency. Properly maintained technology, and associated systems, help keep traffic moving safely, also helping to reduce air pollution and noise levels by helping to reduce the amount of time vehicles remain idling in traffic. In addition, appropriate maintenance reduces the risk of costly repairs.

For all technological applications, it is imperative that the current technology assets including communications are maintained. A full review of the technology functionality should be undertaken quarterly as a minimum, in addition to the normal routine maintenance and monitoring periodic inspections, to maintain bus journey time reliability.

A requirement to monitor bus journey times, as well the operational condition of the technology deployed on street, is also essential.

The monitoring and maintenance of traffic-based technology is part of the life cycle for maintaining reliable bus journey times, outlined in Figure 33.



(Figure 33: monitoring and maintenance lifecycle)

12.7 Integration with other bus priority measures (non-technology based)

The design and application of technological measures alongside non-technological ones requires a good understanding of benefits each provides and how the combination of these measures gives further improvements and benefits. For example, bus lanes and TSP can work together well, with the priority provided at traffic signals enhancing the benefits provided by the bus lane.

If technological and non-technological measures are not well integrated, benefits will be reduced. For example, if a bus stop is located too close to a traffic signal junction with TSP, the system may not distinguish between a bus about to stop and one continuing to the junction. It may insert a demand that is not fulfilled, leading to unnecessary delays to other traffic or to the bus itself.

12.8 Stakeholders

A range of stakeholders should be involved when developing technological solutions. These may include:

- highway authorities
- bus operators
- contractors
- designers
- local residents and businesses
- private developers

Each will have insights which will help decision-making to ensure appropriate solutions are developed. Their individual objectives and requirements will contribute to a holistic understanding of the big picture.

13. Other complementary measures

13.1 Enforcement

Measures such as waiting and loading restrictions, bus lanes and bus gates are important elements in providing priority to bus movements and removing delay factors, but these measures will only provide benefits if other road users respect and comply with them.

Key to compliance is effective enforcement, meaning an enforcement strategy should be seen as an important component of a holistic bus user priority improvement package. Capital investment in enforcement technology should be seen as beneficial to bus services as it supports compliance, and ongoing benefits of different types of measures. Potential compliance levels should be considered in any assessment of measures.

Enforcement should be proportionate, and primarily target dangerous and irresponsible drivers. It should not be a way to raise revenue. A perception of unfair enforcement may undermine compliance with bus priority measures, and acceptance of the need for them among local communities.

Almost all local authorities have the powers to enforce waiting and loading restrictions.

All local authorities have the power to enforce bus lane restrictions through the Road Traffic Act 1991 or the Transport Act 2000.

In London, the boroughs and Transport for London have enforcement powers for a range of moving traffic contraventions under the London Local Authorities and Transport for London Act 2003.

Outside London, since May 2022 local authorities have been able to apply for powers under Part 6 of the Traffic Management Act 2004 to enforce the same moving traffic contraventions as in London. Where authorities have taken these up, they are responsible for enforcing these. Where they have not, enforcement remains a police matter.

In both cases, the offence is that of disobeying a traffic regulation order indicated on street by the appropriate traffic sign. The signs covered include:

- No Entry

- No left or right turn
- Entering a yellow box junction when the exit is not clear
- Prohibition of motor vehicles

Well-designed traffic signing is key to ensuring drivers are clear about where they may go, and that any enforcement is fair. Local authorities must ensure traffic signing is compliant in design, is properly placed so that drivers can see it in time to avoid fines, and accurately conveys the restriction in the Traffic Regulation Order. The good practice advice in Chapter 3 of the Traffic Signs Manual should be followed.

Advice for authorities wishing to apply for powers to enforce moving traffic contraventions is given in statutory guidance published by the Department and available at: www.gov.uk/government/publications/bus-lane-and-moving-traffic-enforcement-outside-london/traffic-management-act-2004-statutory-guidance-for-local-authorities-outside-london-on-civil-enforcement-of-bus-lane-and-moving-traffic-contravention

13.2 Bus modal priority

Network management (hierarchies/roadworks)

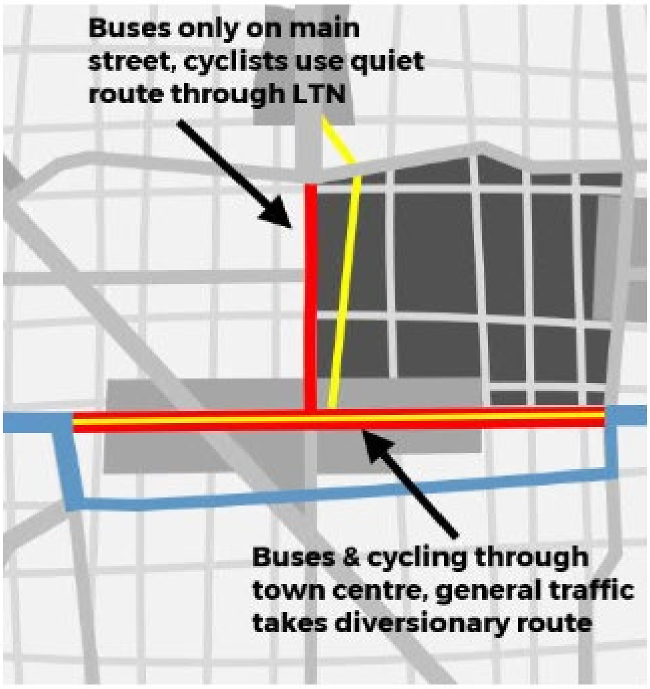
The Traffic Management Act 2004 puts a network management duty on all highway authorities to manage their road networks to provide expeditious movement of traffic, with a view to reducing congestion. 'Traffic' covers all modes of transport including buses, pedestrians and cyclists. In the context of bus service improvements this has two aspects:

- network planning and prioritisation
- network resilience and operational service maintenance

Highway authorities should be clear on the modal priorities along a given section of road, or junction. However, in terms of allocation of road space, or the way for example traffic signals are controlled, this will depend upon network priorities. Often within spatially constrained urban areas providing priority infrastructure e.g., bus or cycle lanes, is not physically possible without land acquisition which may not be feasible. It should also not be assumed providing for every mode with dedicated infrastructure achieves the best outcome due to impacts on operational performance, safety and placemaking due to the width of corridors involved.

Designers, in line with the MfS should seek to define movement networks indicating the relative importance for each link across the network. From a bus perspective this is important in identifying those links which bus user priority should be proactively considered, and where bus and passengers' considerations may be of more importance than other modes including not only motor vehicles but also cycles. User priorities versus modal network priorities are outlined in Figure 34.

Consider first	Pedestrians
	Cyclists
	Public transport users
	Specialist service vehicles (e.g. emergency services, waste, etc.)
Consider last	Other motor traffic



(Figure 34: user priority versus modal network priority)

13.3 Experimental and temporary traffic regulation orders

Under the Road Traffic Regulation Act 1984 local authorities have powers to introduce experimental or temporary traffic regulation orders (TROs).

Temporary TROs are used to manage short-term closures. They enable works such as felling, bridge repairs and other maintenance work to be carried out. They can be in place for a maximum of 18 months.

Experimental TROs are made for a maximum of 18 months and can provide an effective way to test and refine measures before making them permanent. Measures such as bus lanes, bus gates or bus only streets are the type of measure best suited to an experimental TRO approach. ETROs incorporate a statutory 6-month objection period after making, during which the traffic authority must consult with statutory consultees, including bus operators.

Case study: experimental and temporary traffic regulation orders, Cumbria

Westmorland and Furness Council (WFC) (Formerly Cumbria County Council) and Cumberland Council have introduced experimental and temporary traffic regulation orders (TROs) on several roads within the Lake District national park in recent years in response to growing issues around uncontrolled and potentially unsafe parking practices. TROs can be used to manage large fluctuations in seasonal or event-based demand and can also facilitate short-term closures, enabling repair and maintenance works to be carried out.

Growing visitor numbers travelling to the national park by car puts increased pressure on the road network leading to dangerous and obstructive vehicle parking at the roadside, particularly at the weekends and during school holidays. This has caused issues for bus services and emergency vehicles which have been unable access the full extent of the road to pass clearly – leading to long delays and response times.

Experimental TROs have been used successfully in areas including Pooley Bridge, Grange, Borrowdale and Ambleside to prohibit dangerous waiting and parking of vehicles as well as to test the introduction of new restrictions, such as school streets. Both orders are quicker and easier to implement than permanent TROs as there are fewer requirements to consult the public before enforcement. These TROs also act as a useful trial for temporary measures which can help support the case for full delivery and implementation.

Source:

https://www.localgov.co.uk/Council-takes-emergency-measures-to-improve-Lake-District-traffic-/54617

13.4 Network resilience and roadworks

The impact on bus users, stops and routes should be considered within any temporary traffic management planning for road works or street works. Maintaining access for buses is important not only due to their place in the use hierarchy but also because of the potential impacts on more vulnerable parts of the community by closing or removing bus access or stops.

Access to bus stops and routes should be maintained during roadworks. If a stop needs to be closed or relocated measures should be taken to ensure passenger access, including suitable crossing or footways to any alternative stop. Stop closures should be publicised, for example through local media so that local passengers are aware. Stops closed with diversion signing on its own may not be obvious to some groups, particularly visually impaired people, and additional ways of alerting people should be considered. These may include physically covering the bus timetable and closing the shelter where present.

For some works temporary priority measures should be considered if delays are caused.

13.5 Cashless ticketing

Cashless or pre-purchase ticketing systems can reduce boarding time at bus stops. Given the proportion of total journey time that is spent at stops any measures that reduce this will help improve the performance of a bus service. These systems can be app or smartcard based or use payment cards - factors to consider in choosing such systems should include ensuring apps are accessible, and that alternatives are available for people who do not have access to smartphones or online systems.

13.6 Ride quality / maintenance

The on-board experience for passengers is a key part of delivering a complete door to door journey, including ride quality. Roads with poor quality road surfacing, potholes and rutting can significantly contribute to poor ride quality and can in some instances leads to injury slips and falls. Where possible when improvements for buses are being considered these should be integrated with maintenance works, or resurfacing.

13.7 Operational maintenance of technology

As discussed in Chapter 11, maintaining traffic signals regularly can significantly contribute to bus user priority. Ensuring the hardware, especially detectors, are working is important for ongoing reliability and performance. It is also important for authorities to regularly check that the times and control plans are appropriate. Networks evolve over time, and regularly reviewing traffic signal installations will support better passenger experiences.

14. Future application of bus user priority guidance

14.1 Overview

This guidance provides a recommended basis for supporting and prioritising buses and their passengers within an integrated road network as it currently operates. It has set out key design principles and redefines bus priority to focus on the bus user and a whole-journey experience within the context of supporting traditional local bus services and fleets.

Embracing future innovation in vehicle technology and making transport modes look and feel part of the same system will help to enable seamless passenger journeys. Public transport itself might not be able to offer door-to-door journeys, but when combined with active and micromobility modes it can rival the car, making it a realistic and attractive choice for people. A new understanding of travel as seamless, multi-modal and continuous will replace traditional notions of moving from A to B. Passengers of tomorrow's public transport system are likely to be mode-agnostic – choosing whichever mode gets them to their destination via the fastest, most efficient or most direct route, depending on their preference.

Successful transport systems will therefore operate as a network of 'civic' transport modes, combining public and private providers. The design principles and focus on bus user priority as described in this guidance will remain just as relevant as schemes involving demand responsive transport and automated vehicles become more prevalent.

When developing or supporting schemes that involve these forms of public transport, LTAs should consider how they can appropriately apply this bus user priority guidance to improve scheme development. This could include but is not limited to exploring the following aspects.

14.2 Inclusive transport

In 2018 the government committed to support the creation of an inclusive transport system by 2030, enabling disabled people to travel easily, confidently and without additional cost. Building accessibility into scheme design from the beginning can help ensure that bus services not only meet the basic needs of disabled people, but actively attract their custom and that of their families and friends, providing choices that non-disabled people take for granted. With an aging population, transport design which works for disabled people is often more usable by everyone, future-proofing installations and ensuring their longevity as passenger requirements evolve.

14.3 Faster, reliable, joined-up services

Improving reliability is crucial to the operation and attractiveness of public transport services. Bus user priority should be established on corridors identified as core public transport routes, enabling faster, more reliable journeys. High-quality roadside infrastructure at bus stops and mobility hubs, as well as a public realm that supports and encourages active transport is also required to build consumer trust in public transport as a viable and attractive alternative to car use.

Transfers between services can be improved by well designed infrastructure where bus routes coincide. This improves the interchange experience for passengers, and reduces the difficulty, perceived and actual, of changing service.

14.4 Demand responsive transport

The move to less fixed route bus services through demand responsive transport (DRT) will mean that aspects of a fixed route will no longer apply.

Services in general will continue to make use of existing bus stops. Therefore, the importance of access for passengers from origin to the stop remains important as part of the experience, as does the bus stop itself.

In terms of on-road priority measures DRT may place greater emphasis on indirect measures. Technology and traffic signals are likely to become more important as the ability for communication between vehicles, traffic signals and a UTMC system enables priority to be given wherever a vehicle comes from.

14.5 CAV/AV

The advent of connected and autonomous mobility (CAM) / connected and automated vehicles (CAVs) and the possibilities around DRT that they enable could impact the level of and provisions for bus user priority that is required along existing bus corridors.

The user priority requirements and impacts of CAM / CAVs acting as mass transit may be different from existing bus services and will depend on the operational design domain, including the level of segregation as well as the future mix of vehicles. This may require changes to:

- bus stop infrastructure, including the spacing and length and potential provision of charging infrastructure
- safety and security measures including wider considerations such as access to a reliable and secure 5G (or equivalent) network
- the location, sizing and purpose of a remote operation centre

- depot / CAV parking facilities
- charging infrastructure for electric vehicles

14.6 Segregated busways

Segregated or guided busways are a form of bus-only road corridor that are usually purpose built, as shown in Figure 35. They may be guided or non–guided and are typically set within concrete channels. Additional wheels mounted on the side of the bus assist with guiding it along the channel, enabling a reduction in width compared with a conventional bus lane. The physical road infrastructure associated with a busway can provide reassurance to residents of an area of a long-term commitment to bus connectivity. The Guided Busway Construction Handbook produced by Britpave should be referred to for further guidance on the technical requirements for segregated busways.

In the UK they have had limited use however they are an option that can be considered especially within the context of a city/region/area wide transport strategy.

Fasttrack in Dartford provides an unguided busway network to connect large communities which have previously been severed by challenging topography and bypassing major roads and railways. Similarly, integration of the Cambridgeshire Guided Busway with residential environments at Arbury Camp and the New Town at Northstowe is a notable benefit that has been recognised of the scheme.

(Figure 35: segregated busways)

Appendices

A.1 example theory of change template

Rationale for intervention (need)

- The road network is becoming increasingly congested, leading to unreliable bus services
- Reduced year on year bus patronage
- Identification of economically disadvantaged areas locally
- social isolation of specific locations (e.g. rural communities)
- Desire to improve public transport choice through better buses (speed, reliability, patronage, safety)
- Public sector, working with the private sector, acting as the enabler of change, driving improvements, intervening directly where possible

Objectives (core priorities)

- Meeting the social and economic needs of local communities and bus passengers
- Ensuring that priority measures help rather than hinder the flow of traffic - installing bus lanes only when needed
- Avoid adverse impacts on local businesses and other road users wherever possible
- Positive contribution to public health
- Improving accessibility for all, regardless of age and ability, for work, leisure and services
- Reducing congestion
- Achieving value for money and economic growth

Inputs (The drivers of change)

- Bus Services Act 2017
- National bus strategy
- The Plan for Drivers
- Local transport plans
- Bus service improvement plans (BSIPs)
- Local cycling and walking infrastructure plans (LCWIPs)
- Central govenment, regional and local funding opportunities
- Bus user priority guidance including 6 core design principles
- Network management duty

Actions (project focus activities)

- Focusing on whole of journey improvements (access to the bus stop, at the bus stop and on the bus)
- Increasing travel choices by targeted or comprehensive improvements to bus travel
- Identification of roads/ corridors where buses should have priority
- Opportunities for synergy/improvement
- Good practice examples
- Optimum targeting of government funding opportunities

Outputs (measures of success)

- Improved bus reliability, speed
- Increased bus patronage
- Smoother traffic flow for all road users
- Significant social value and tackling poverty and economic deprivation

Outcomes (project delivery)

- Improved passenger experience through improved services generating behavioural change
- Improved comunity health and wellbeing
- Unlocking community wealth and potential
- Improved contribution from infrastructure and operation towards decarbonisation
- Supporting the access of people to opportunities and services
- Enhanced confidence, safety and security of users
- Greater investment through increased revenue and usage
- Maximising value of new and existing assets

A.2 suggested road typology definitions

Primary street

- Designed to take through traffic and public transport, with dedicated lanes for cyclists and public transport where possible. Many A roads will fall into this category.

Secondary street

- Mainly carry local traffic and provide access to neighbourhoods; they are often the location of shopping parades, schools and community facilities and may also be residential streets in themselves. Many B roads will fall into this category. Depending on traffic flows, dedicated cycle and public transport provison may be provided.

High street

- Primary or secondary street with retail and leisure facilities that acts as a focal point for the community. These streets are often with traffic but sometimes traffic-free, and usually have a strong character and identity.

Local street

- Residential streets which should be designed to prioritise active travel and sustainable travel. Mostly permeable to all vehicles but sometimes only to pedestrians, cyclists or public transport. Many minor roads will fall into this category.

Tertiary street

- Often with no route through for motor traffic, these are used for servicing or for access to small groups or clusters of homes. They can include mews, courts or cul de sacs. For rural areas tertiary streets could include lanes.

Glossary of terms

Term	Description
Bus bay	An area adjacent to the main carriageway designed to let buses pick up and drop off passengers without hindering the flow of traffic.
Bus boarder	A section of footway which has been built out into the carriageway to create a platform and dedicated area for buses to stop and passengers to wait.
Bus gate	An access restriction controlling access to bus-only streets by preventing use by general traffic. They may be implemented through rising bollards, traffic signals or upright traffic signs.
Bus only street	A section of road where access is restricted to buses only. Other vehicles may also be permitted.
Bus stop	A place where buses stop to allow passengers to board and alight safely and conveniently.
Contraflow bus lane	A one-way road with a bus lane running in the opposite direction to general traffic.
Demand responsive transport	A form of shared transport for groups or individuals which alters its route based on demand rather using a fixed route or timetabled journeys.
Inset bay	A parking bay that is protected by footway build outs at either end so that they appear to be fully or partially recessed into the footway (or other area beside the carriageway).

Loading bay	A section of road reserved for vehicles to load and unload goods, which may be restricted in duration and to certain days and times.
Local cycling and walking infrastructure plans	A strategic approach to identifying cycling and walking improvements required at the local level.
Local transport authority	defined as upper tier local authorities, usually combined authorities and county councils, but can be also unitary authorities. Combined authorities are local government entities set up by two or more neighbouring councils wishing to co-ordinate responsibilities and powers over services, including aspects of transport, housing and social care. If the authority has a directly elected Mayor it is a Mayoral Combined Authority (MCA).
Mobility as a service	A digital interface to source and manage the provision of a transport related service(s) which meets the mobility requirements of a customer.
Mobility hub	The co-location of different mobility and mobility-related services and infrastructure. Mobility options may include car sharing services, e-cycle or e-scooter hire.
Red route clearway	A Stretch of road on which motorists are not permitted to stop during certain hours of the day. The restriction applies to the footway and verge as well as the carriageway.
Real time passenger information	An electronic information system that provides passengers with live information about the arrival of services at stations and stops.
Selective vehicle detection	A method of bus priority that allows buses to be progressed through traffic signals by prioritising their passage to improve speed and reliability for passengers.
Traffic regulation order	Legal documents that restrict or prohibit the use of the highway, made by local authorities using powers derived from The Road Traffic Regulation Act 1984.
Traffic signal priority	A set of operational improvements that use technology to reduce dwell time at traffic signals for buses by holding green lights longer or shortening red lights.
Urban clearway	A stretch of road in an urban area on which motorists are not permitted to stop during certain hours of the day, except to pick up or set down passengers.

Virtual bus lane	A set of traffic signals along a section of road used by general traffic which uses signal-controlled priority to allows buses to progress through to improve speed and reliability for passengers.
With-flow bus lane	A traffic lane, typically on the nearside, reserved for the use of buses (and other vehicles as identified) that runs in the same direction as the traffic beside it.