Design

- The choice of style, size and configuration of bus shelters must be agreed with us
- The shelter design must be able to accommodate the numbers of intending passengers and bus information products
- Shelters generally consist of one to four panels (known as a 'bay'); each bay being 1,300mm in width
- Where footway widths allow, bus shelters should be fitted with either a full or half-end panel to provide greater protection from the elements
- See-through panels have advantages for visibility, security and safety including interactions between pedestrians and cyclists if there are adjacent cycle paths or tracks

Responsibility

TfL Bus Infrastructure supplies and maintains shelters for London Buses, taxis and coach services within Greater London. TfL London Buses is responsible for providing bus services throughout London in a safe, efficient and economic manner, while encouraging the use of buses and public transport, aligned with the Mayor's Transport Strategy.

Authorisation

TfL has powers under Section 104 of the London Passenger Transport Act 1934 to erect passenger shelters on the public highway with the consent of the highway authority. In addition to the provisions of the London Passenger Transport Act 1934, local authorities may themselves provide passenger shelters where we are unable to do so, granting licences to erect and maintain them.

Commercial advertisements on bus passenger shelters require the owner to apply for consent under the Town and Country Planning (Control of Advertisements) (England) Regulations 2007.

Additional information

Department for Transport:

Inclusive mobility – A guide to best practice on access to pedestrian and transport infrastructure, 2021

Traffic Signs Manual 1982, Chapter 1: Introduction

Transport for London:

Accessible Bus Stop Design Guidance, 2015

Bus pre-signal assessment and design guidance – Bus Priority Team technical note BP1/05, July 2005

Bus priority at traffic signals keeps London's buses moving – Selective Vehicle Detection (SVD), January 2006

Traffic calming measures for bus routes – Bus Priority Team technical note BP2/05, September 2005

Statutory instruments:

Section 104, London Passenger Transport Act 1934 – power to erect a bus shelter given to the local authority or highway authority

Section 64, London Passenger Transport Act 1937 – adds a requirement to give frontagers notice of TfL's intention to build a shelter

Greater London Authority Act 1999

Bus intelligence technology

Realtime information (RTI) Countdown displays

Passenger shelters can be fitted with RTI Countdown displays, which show the arrival predictions in minutes for approaching buses as well as indicating which routes are running. The displays also have the functionality to scroll special messages to passengers regarding information on traffic delays, forthcoming roadworks and major events impacting the network.

The displays are hardwired into the shelter power supply and data transfer is carried via a 3G network.

Location

The RTI display is usually attached to the underside of the shelter roof at the arrival end. It can also be fitted in a void above the information panel on a Landmark London type shelter model. In a small number of exceptional locations it may be provided as a free-standing unit (FSU), however, at the time of print there is currently a programme underway to upgrade the estate of eight FSUs with single bay narrow roofed 'info' shelters.

Figure 196: Bus countdown displays

Interactive bus stop London, UK

Assisting wayfinding and functionality of London's bus stops

Key functions

Opportunity

Real-time information is increasingly perceived as necessary for public transport users in London. TfL and Clear Channel have developed the UK's first interactive bus shelter.

Benefits

The interactive bus stop addresses the needs of commuters and visitors alike. Piccadilly Circus was chosen for the initial trial because it is one of London's most popular destinations.

Implementation

A large colour touchscreen was installed in a shelter at Piccadilly Circus in 2014. Rather like a smartphone, the screen can display Tube status, weather forecasts, maps and Mayor's Cycle Hire Scheme locations. It also provides information on local tourist attractions and walking routes. It has USB charging ports and a free WiFi connection.

Applying in London

If the trial proves successful, interactive bus stops could be deployed across much of central London.

Pepsi MAX bus stop London, UK

Surprising and delighting customers at a London bus stop

Key functions

Opportunity

A 2014 advertising campaign by PepsiCo used a specially designed London bus shelter to surprise and amuse passengers waiting at the stop.

Benefits

The Pepsi MAX bus stop shows how augmented reality can provide stimulation and surprise as part of a person's journey.

Implementation

The end panel of the bus shelter was fitted with high-resolution camera and screen. From within the shelter, the panel resembled a window; however, this view was augmented by giant robots, flying saucers and an enormous tentacle plucking a hapless pedestrian off the street.

Applying in London

The technology has numerous potential applications, for information, entertainment and commercial purpose

Additional information

Transport for London:
Guidance on bus intelligence systems, 'Countdown for London'

10.7 Coach facilities

The demand for tourist coaches is forecast to increase as the population of London increases and our population ages. Facilities to pick up and set down passengers and park are important for the coach industry but must be done in a way to minimise impact on the streetscape and

Figure 197: Coach parking bays demarcated with road markings

Figure 198: A row of coaches parked on the Albert Embankment

other road users. Please read this section in conjunction with 'Bus stop environments' and Accessible Bus Stop Design Guidance.

Overview

Any motor vehicle containing eight or more seats (exclusive of the driver) can park in an on-street coach bay. This may require hourly payment as set out by the borough. Some coach parking bays (for example, in Westminster) may not be used between 00:00-08:00.

On-street coach parking is found throughout London. It is concentrated in central London, where most coach activity takes place. This type of facility is typically, but not exclusively, used by the tourist coach sector. A number of places – including Madame Tussauds, Shakespeare's Globe Theatre, Tate Modern, Natural History Museum and some hotels in Cromwell Road – have 20-minute set down and pick up bays outside or nearby.

Within the central London boroughs there are 214 on-street facilities. Of these, 44 per cent are located on the TLRN. Long-stay parking and coach stations are located off the public highway.

Facilities

The following types of on-street coach facilities exist in London:

Type	Description
Pick up and set down (PUSD) – on red routes	Coaches are allowed to stop at certain locations while passengers are boarding or alighting. These sites include dedicated facilities and red route bus stops where the sign plate indicates 'except buses'.
PUSD – on yellow lines	Coaches are allowed to set down and pick up passengers on single and double yellow lines. Some highway authorities allow up to 10 minutes waiting time when no loading restrictions are in operation. Where a bus stop sign plate indicates 'except local buses', tourist coaches are not permitted to stop.
Short-stay parking	Mostly dedicated on-street facilities – maximum stay of 20-30 minutes depending on location. Charges apply in some cases.
Medium-stay parking	Mostly on-street – maximum stay of one to four hours, however, a few locations permit up to 12 hours. A charge applies to the majority of these dedicated facilities. Overnight parking is not generally permitted.

Design

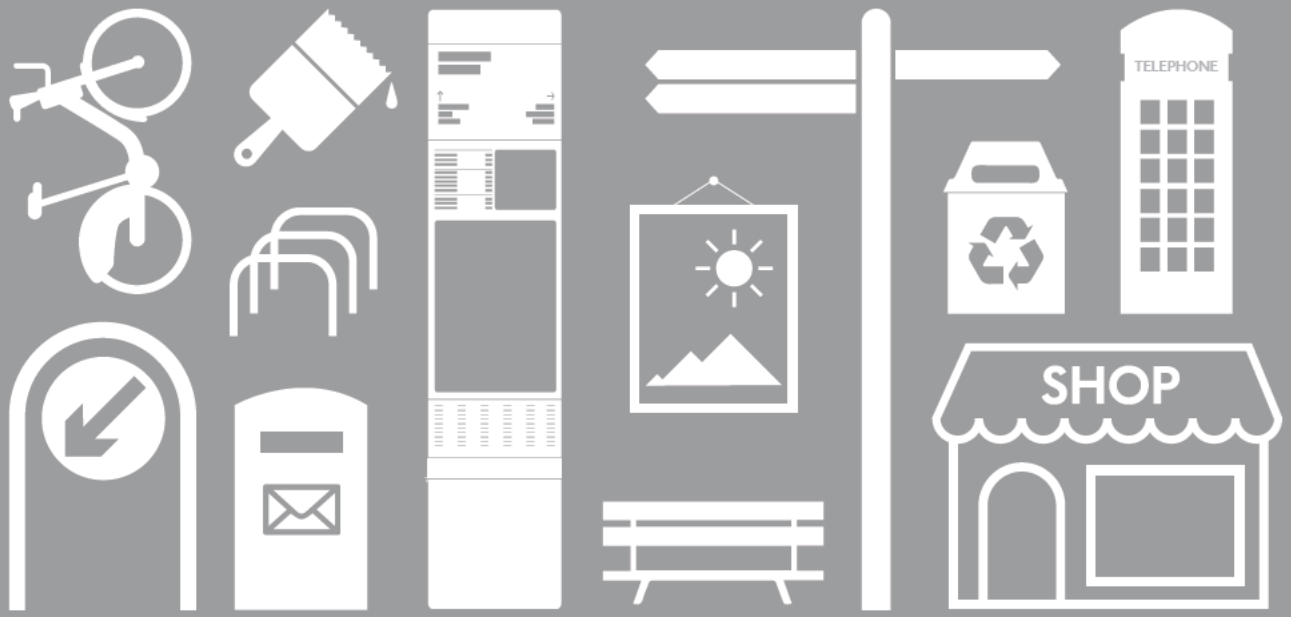
Coach disabled ramps require 3000mm of space. Pick-up/set-down locations need to incorporate footway space.

Additional information

Transport for London:
Tourist Coach Action Plan, 2013
http://www.tfl.gov.uk/cdn/static/cms/documents/tourist-coach-action-plan.pdf

Figure 199: A coach stop flag

Part E Footway amenities



11.1 Vision

The immediate impression and character of any modern city is often determined by the quality and aesthetic appeal of its street furniture design. This can help to animate the public realm and signals to users what and where certain behaviour is desirable and appropriate. A specific location can often be recognised by simply referring to its street furniture design. However, poorly placed or excessive street furniture can create a cluttered environment resulting in obstructions, reduced legibility and a blighted character. Successful public spaces have had every piece of street furniture rationalised and creatively placed to achieve multiple aims.

There is no 'one solution fits all' when selecting and applying street furniture. Material selection and layout must be contextually appropriate. Some settings may require street furniture that quietly complements the character of the area, provides structure, or adds surprise and delight.

We value exceptional detailing to ensure that street furniture is beautiful, robust and maintainable, complementing the surrounding streetscape with 'the right product in the right place, done right'.

General principles

The term 'street furniture' applies to any vertical piece of equipment placed within the highway, to provide a practical function. Most components are located on the footway and provide functions relating to traffic management, safety and amenity. Products include signposts, signals and enforcement equipment to inform motorists, as well as pedestrian oriented elements such as seating, wayfinding signage and kiosks.

The palette of materials selected for the TLRN reflects our ambition to provide a consistent high quality streetscape. The street furniture components shown in this section emphasise design intent rather than prescribing specific products. Dimensional requirements are mandatory and have been specified based on advice from best practice.

Design teams should check specifications with manufacturers and select products that satisfy the criteria. Options are given where there may be an opportunity to reflect local character be it stylish and contemporary or historic. Design teams may recommend alternatives to the standard palette that are in keeping with the spirit of this guidance. Alternative street furniture will require SDRG approval for any TLRN route.

Figure 200: A street furniture zone of cycle parking and trees located at the back of the footway

Figure 201: A street furniture zone located at the front of the footway

Coordinating street furniture

Streetscape Guidance advocates using a coordinated approach for designing and maintaining the layout of street furniture to:

- Minimise cluttering footways with unnecessary furniture
- Maximise unobstructed widths for comfortable pedestrian movement
- Satisfy network operational requirements
- Ensure that the product is appropriate for the location in function and style
- Merge or combine street furniture components on a single post where practicable to further reduce clutter

In identifying locations for street furniture within the footway, a number of related factors should be considered which will impact on appropriate placement. These factors determine how to integrate street furniture.

Designers should consider:

- **Footway and verge widths** – location, orientation and quantity
- **Vehicle speeds** – speed limits will govern minimum set backs from the kerb line
- **Pedestrian flows** – refer to Pedestrian Comfort Guidance for London (2015) to determine these
- **Parking and loading requirements** – street furniture should not be located where it is at risk of damage from vehicle movement or where access to the street furniture poses a safety risk to pedestrians except where street furniture has been placed to discourage vehicle movement
- **Street Types** – the material and layout of furniture should contribute to the function, performance and character of the street
- **Adjacent land uses** – furniture should satisfy a need as well as reflect the character of the setting without causing an obstruction or reducing the functionality of the surrounding buildings or land uses
- **Street furniture size and location requirements** – individual components should satisfy designated criteria to ensure a minimum standard is attained
- **Security** – furniture must not create a situation which compromises the safety or security of any user
- **Maintenance** – street furniture placement does not restrict standard cleansing regimes

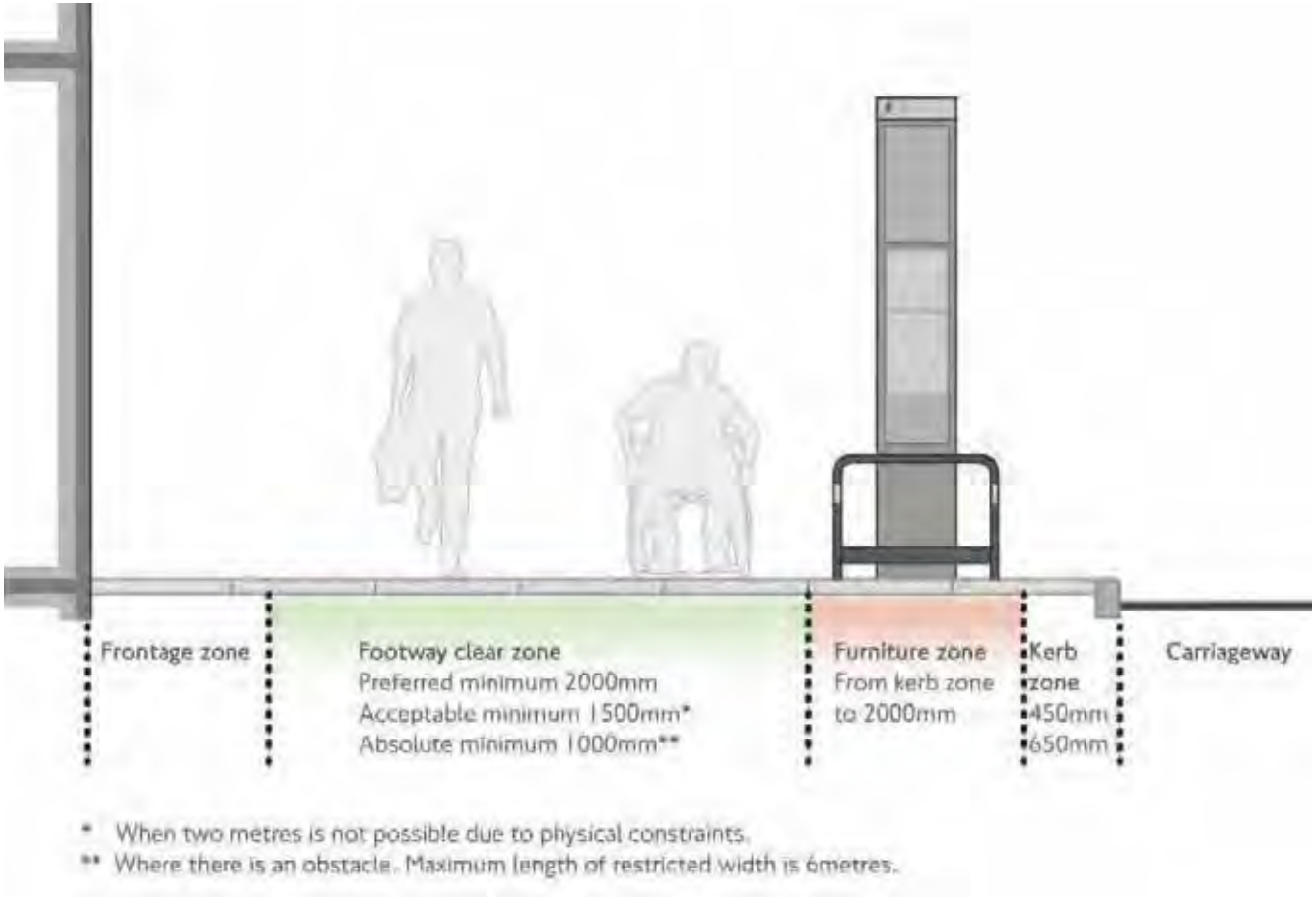
11.2 Footway zones

The area between the kerb line and the highway boundary can be divided into four zones, which serve distinct functions within the streetscape:

- Kerb zone
- Furniture and planting zone
- Footway clear zone
- Frontage zone

The relative importance, scale and treatment for each of the zones will vary according to the context.

Figure 202: Footway zones



Kerb zone

A kerb zone should be kept completely free of street furniture to prevent damage from vehicles overhanging the carriageway edge. Each piece of street furniture and equipment has a minimum distance it must be placed away from the kerb edge. Please refer to each streetscape element to determine the specified distance from kerb edge.

It is essential to consider the camber of the road to allow for high-sided vehicles leaning over the footway.

Figure 203: Street furniture and bus stops aligned towards the front of the footway in Barking

Furniture and planting zone

The furniture zone is provided adjacent to the kerb zone to coordinate street furniture in a consistent arrangement which maximises the unobstructed width of the footway for pedestrian use. Features such as lighting and signage should be located in this zone, along with on-footway cycle parking, seating and other amenity elements.

Furniture should only be provided where it serves a specific function and is appropriate for the location. A furniture zone should therefore not exist where there is no need for street furniture.

Design teams should acknowledge that the requirements for the footway clear zone will ultimately determine how much space can be afforded to street furniture.

A furniture zone should only be provided where suitable clear footway widths and kerb zone widths are deliverable. The width of the furniture zone should be selected based on the footway constraints, which in turn will impact on the street furniture that can be used:

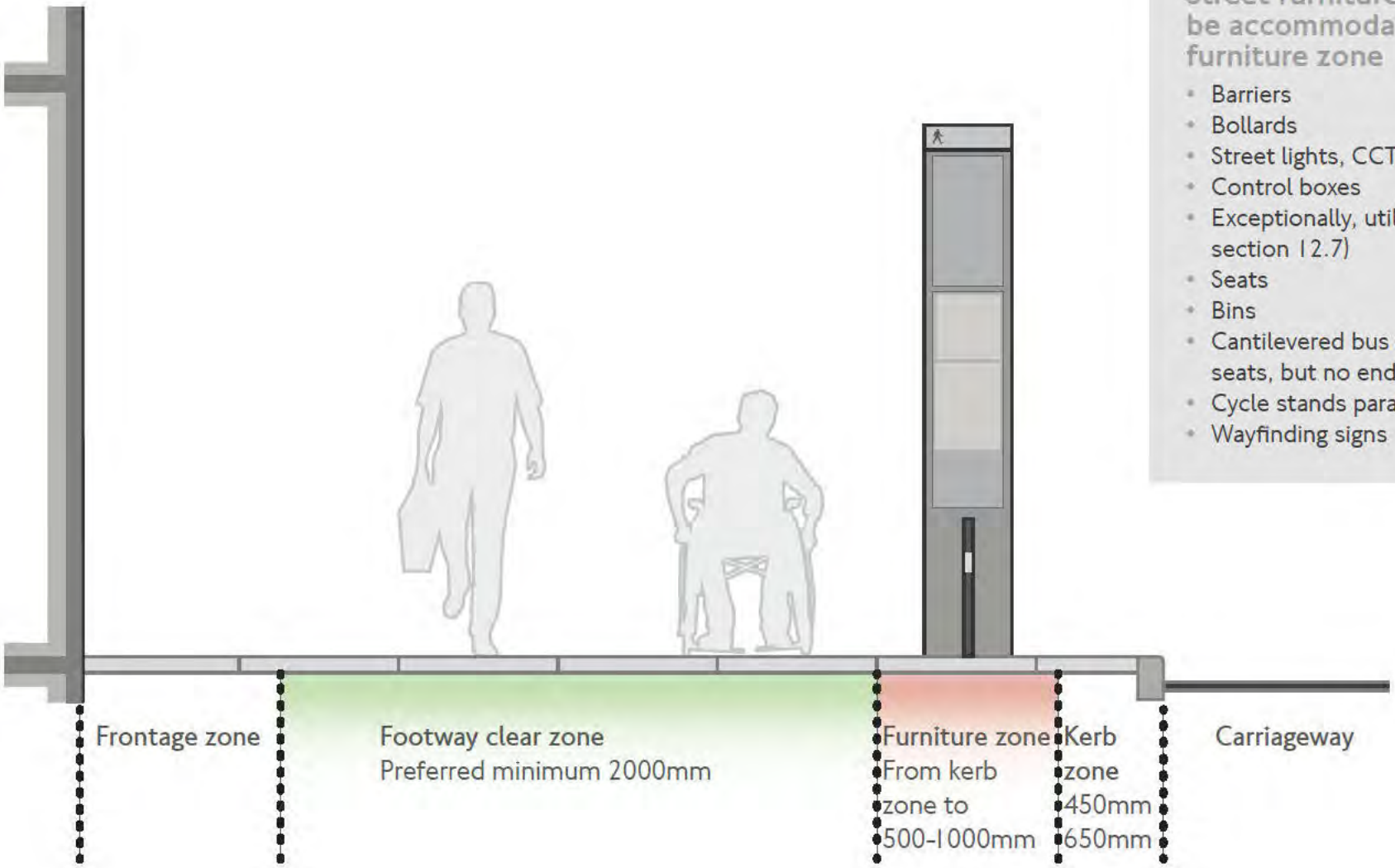
Furniture zone design standards

Furniture zone width

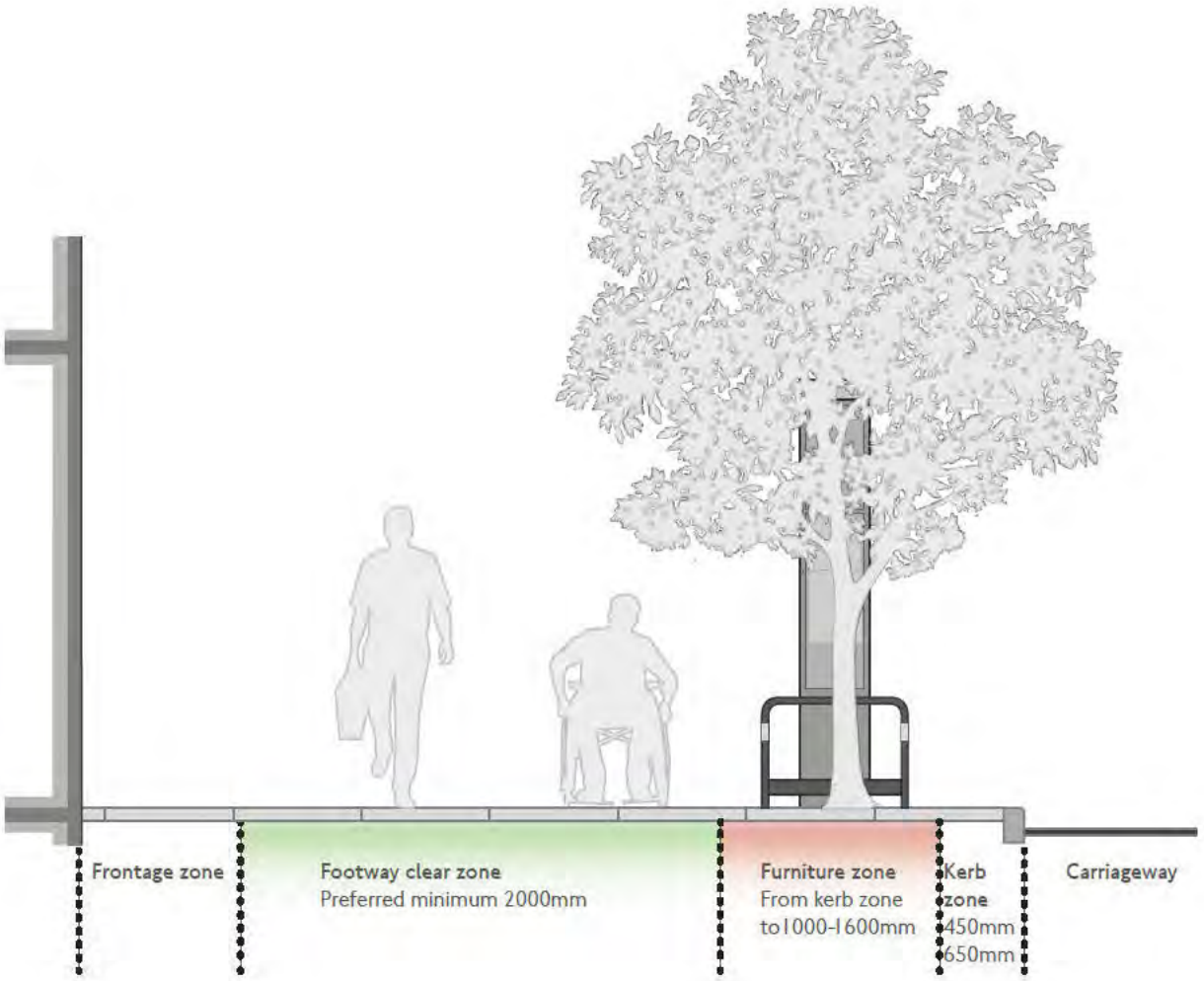
500-1,000mm wide

Street furniture that can be accommodated in the furniture zone

- Barriers
- Bollards
- Street lights, CCTV, traffic signals, signs
- Control boxes
- Exceptionally, utility cabinets (see section 12.7)
- Seats
- Bins
- Cantilevered bus shelters with perch seats, but no end panels
- Cycle stands parallel to the kerb
- Wayfinding signs



Furniture zone design standards



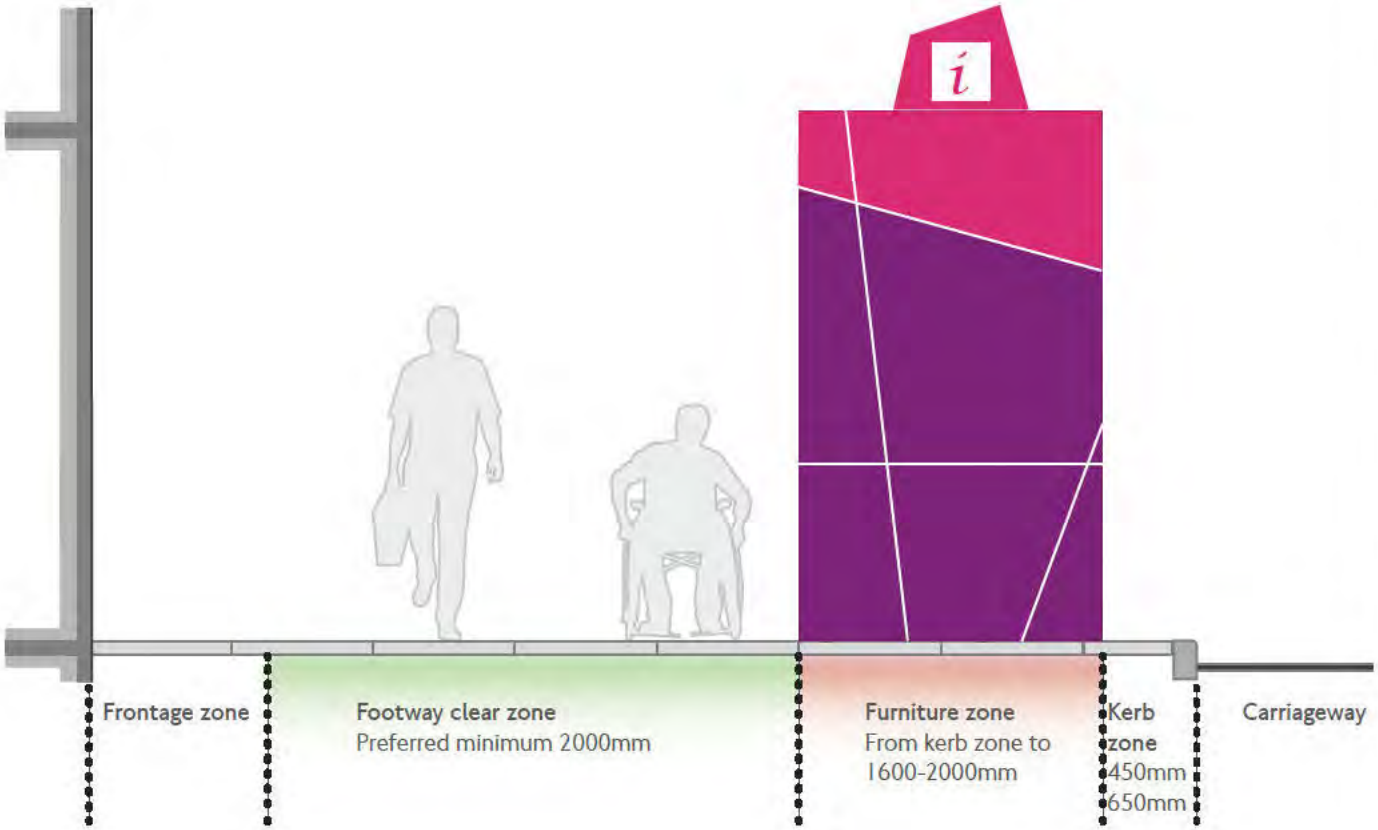
Furniture zone width

1,000-1,600mm wide

Street furniture that can be accommodated in the furniture zone

- Barriers
- Bollards
- Street lights, CCTV, traffic signals, signs
- Control boxes
- Exceptionally, utility cabinets (see section 12.7)
- Seats
- Bins
- Cantilevered bus shelters with perch seats, but no end panels
- Cycle stands parallel to the kerb
- Wayfinding signs
- Telephone boxes and other larger items
- Cycle stands angled at greater than 45 degrees to the kerb line (echelon cycle parking)
- Street trees

Furniture zone design standards



Furniture zone width

1,600-2,000mm wide

Street furniture that can be accommodated in the furniture zone

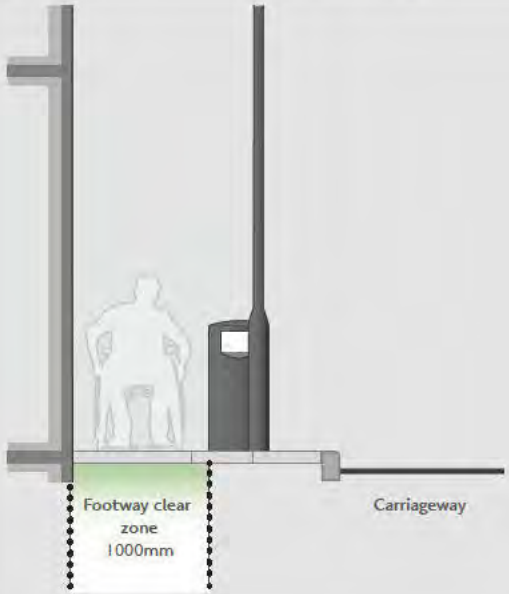
- Barriers
- Bollards
- Street lights, CCTV, traffic signals, signs
- Control boxes
- Exceptionally, utility cabinets (see section 12.7)
- Seats
- Bins
- Cantilevered bus shelters with perch seats, but no end panels
- Cycle stands parallel to the kerb
- Wayfinding signs
- Telephone boxes and other larger items
- Cycle stands angled at greater than 45 degrees to the kerb line (echelon cycle parking)
- Street trees
- Cycle stands can be provided at 90 degrees to the kerb line, although echelon parking remains the preference
- Kiosks and other large structures
- Bus shelters with half and full end panels
- Larger street trees

Footway clear zone

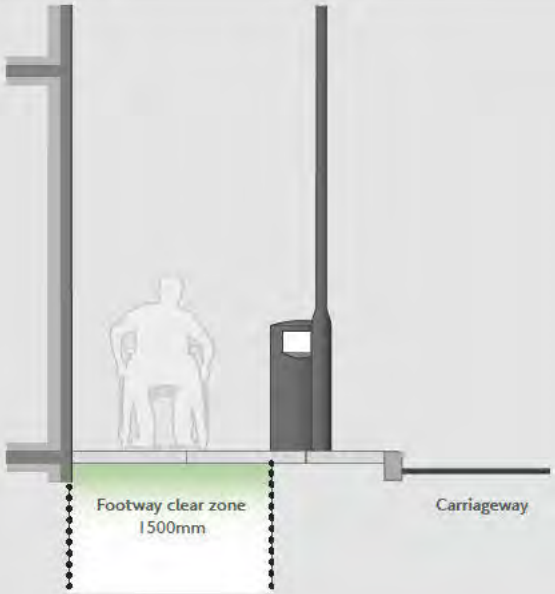
The clear zone should be entirely free of obstructions to allow for unhindered pedestrian movement along the footway. The width of the clear zone provided should relate directly to the character and use of the street, and in particular the volume of pedestrians. The footway clear zone should be designed to comfortably accommodate peak pedestrian demand and satisfy acceptable levels of service (refer to DfT's Inclusive mobility, 2021, and to our Pedestrian Comfort Guidance for London, 2010, for further information).

Footway clear zone design standards

Unobstructed width	Design criteria
1,000mm wide	• Absolute minimum unobstructed width • Where a minimum width is provided, it should not be continued for more than 6,000mm along the length of footway



Unobstructed width	Design criteria
1,500mm wide	• Minimum acceptable unobstructed width. Allows for a wheelchair user and person walking to pass one another



Unobstructed width	Design criteria
2,000mm wide	• Preferred minimum unobstructed width. Allows for two wheelchair users to comfortably pass one another

Frontage zone

The frontage zone is the area adjacent to the property line and highway boundary. Wherever possible this zone should be kept free of street furniture to:

- Enable visually impaired people who use canes to navigate the street using the building line
- Minimise obstructing retail frontages to encourage window browsing

Where footway widths are narrow, essential street furniture may be located tight against the property boundary to minimise street clutter within the kerb zone. The maximum recommended distance is 275mm away from the building line for positioning street furniture within the frontage zone. Building overhangs, shop signs, awnings, banners, planters, and drain pipes may encroach upon this zone and require statutory approval from the highway authority.

Approval for extension beyond the frontage zone into the footway zone must only occur where minimum clear headroom of 2,400mm is maintained. A 2,100mm clearance below suspended signs is allowed where cyclists are not permitted on the footway.

In certain areas, the frontage zone may be occupied by café seating. In these instances it is important to ensure that clear boundaries are defined so that café furniture does not obstruct the footway clear zone.

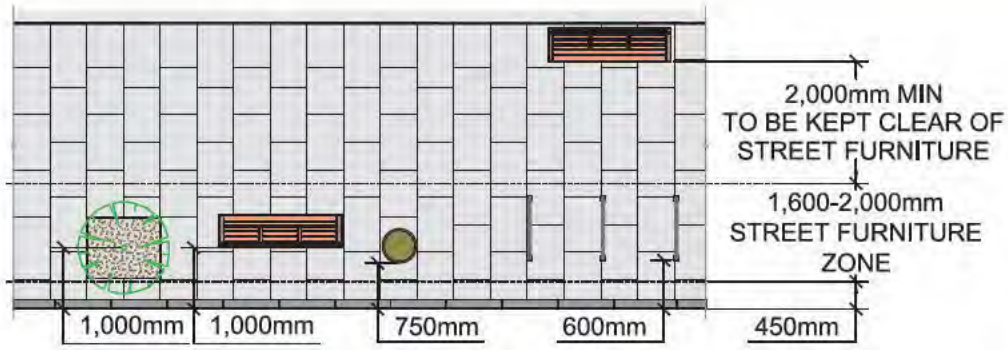
Alternative solutions

If the existing situation and/or the scope of the project makes it difficult to create a furniture zone, larger furniture objects will be difficult to incorporate within the streetscape.

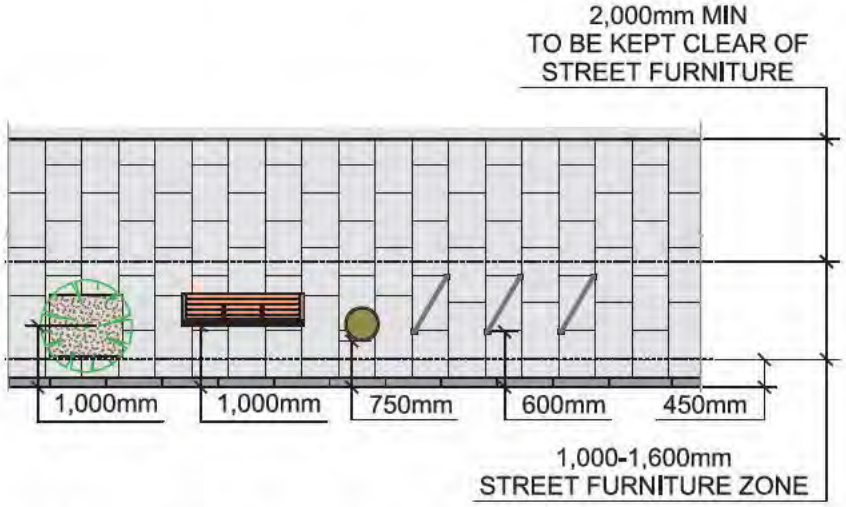
Alternative solutions may be to:

- Locate street furniture on side roads, with due consideration for operational requirements
- Locate service boxes, signal controllers or telephone kiosks in building recesses
- Integrate post boxes and cabinets, where practical, into the building structure with appropriate access (wayleaves required)
- Negotiate with adjacent landowners the location of street furniture beyond the highway boundary
- Consider locating specific furniture on the central median or carriageway, such as cycle parking

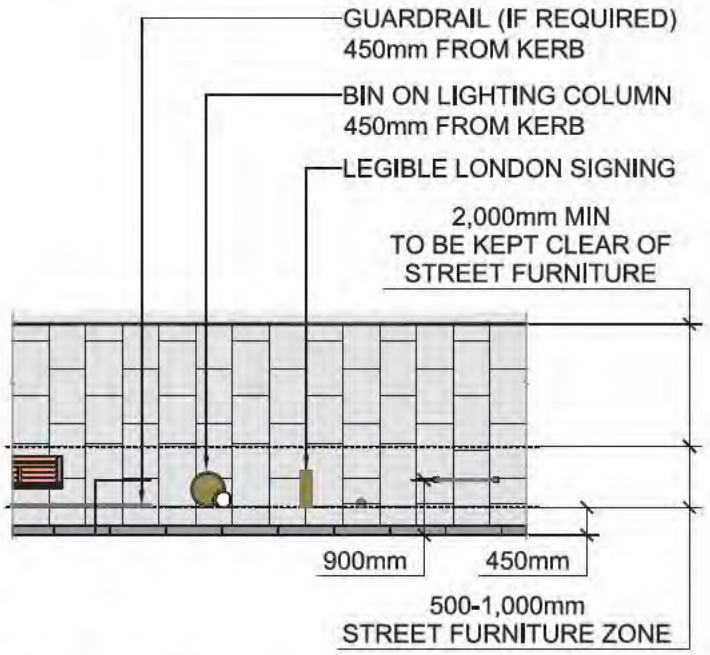
Figure 204: Street furniture placement



PLAN - FURNITURE ZONE 1,600-2,000mm



PLAN - FURNITURE ZONE 1,000-1,600mm



PLAN - FURNITURE ZONE 500-1,000mm

11.3 Working with businesses

Many controllable on-street activities contribute directly to the economic viability of the local community, the vibrancy of the place and/or the safety of the surrounding structures. London's road network provides, in select locations, the opportunity for a variety of services to be offered to Londoners in the form of a kiosk, market stalls and outdoor café seating. Business opportunities are provided in a range of forms from retail opportunities to providing information, exhibitions, or public engagement.

Figure 205: A local market on the carriageway

Like all elements of the streetscape businesses must sit comfortably within their environment, be well designed and provide a benefit to Londoners. The following section presents standards for the siting, design and maintenance of kiosks, market stalls, pop-ups and outdoor café seating in their various forms to create flourishing and welcoming spaces. Many of the activities listed are controllable by the issue of consents or licences issued by the highway or local authority. When working on the TLRN, in most cases TfL's consent should be sought.

Kiosks and pop-ups

Retail kiosks and pop-ups are owned and managed by companies to assist in the sale and distribution of their products or to provide information and are most often located at stations or transport interchanges. These areas are the busiest and most congested parts of London so footway space is especially valuable for ensuring adequate pedestrian comfort. Newspaper stands should therefore be carefully managed to reduce their visual and physical intrusion within the street environment

Newspaper kiosks

Permanent and temporary kiosks which are operated by local traders can have a positive impact on the street environment if they are well managed and do not spill out across the footway. Kiosks should be provided so as to minimise the visual intrusion within the streetscape and allow adequate space for pedestrians on the footway.

Designers should consider the impact that pedestrians gathering around a stall can have on footway capacity and should ensure that any existing kiosk is not overly impacting on the quality and comfort of the walking environment.

Kiosks should be removed where situated in a position that adversely impacts on the quality of the streetscape, or where poorly managed and maintained by the leaseholder.

Figure 206: A permanent newsagent kiosk located towards the front of a wide footway

Design

Designers are encouraged to work with the newspaper companies to use a limited colour palette for stands placed on the road network to reduce their visual intrusion. The design of newspaper kiosks should reflect the local context in materiality, colour and form. The preference is to provide temporary facilities that are removable. Designers should consider using metal studs to demarcate agreed locations for newspaper stands and to aid enforcement.

Enforcement

Greater enforcement of newspaper kiosks is required to minimise the encroachment of stands on to the footway. As a general principle, a newspaper kiosk is not acceptable where it impacts on sightlines at corners or crossing places, nor where it impacts on the free flow of pedestrian traffic.

Location

- Stands should be located in an agreed location upon consultation with London Underground, the borough and the relevant newspaper companies
- Newspaper stands are typically located against a building wall in close proximity to a station entrance, and should be placed to minimise obstructing pedestrian desire lines
- They may be positioned temporarily during peak periods and removed when all papers have been sold, or larger units can be a permanent fixture in the streetscape
- Newspaper stands should not back on to guardrails as it increases the visibility and visual intrusion of the stand, with fixings visible from all sides
- Where multiple newspaper stands are located in close proximity, the stands should be located directly next to each other to minimise the footprint size

Licensing

The borough's licensing requirements must be met for street trading. On any section of the TLRN our approval is required unless evidence exists that the local authority had passed a 'designating resolution' for the street (or part of the street) in question prior to July 2000, under section 24(1)(a) of the London Local Authorities Act 1990, or under such equivalent provisions repealed by the 1990 Act. In those circumstances designation would be continued by section 24(2) of the 1990 Act without further express designation. Any such designations will have been made by formal resolution of the local authority. No presumption of designation can be made without the support of appropriate contemporaneous records. When considering new designations then the general principles of this guidance relating to safe passage around licensed areas will apply, as will the requirement to remove receptacles and other equipment from the highway at the end of each trading session and not to retain it on the highway overnight.

Pop-up kiosks

Pop-up kiosks provide a temporary service. Examples include retail, information, exhibitions and public engagement. They were used extensively during the 2012 Games.

As with permanent kiosks, pop-ups must not have an excessive impact on the quality and comfort of the walking environment. Given their association with large-scale events, the requirement for an unobstructed pedestrian environment may be even more acute.

Figure 207: Temporary or pop-up kiosks offer short-term services

Design

The main design characteristic of pop-up kiosks is that they are flexible. They will also need to be distinctive, attractive and appropriate to their context. They are typically single-storey and need to be quick to assemble/disassemble, while maintaining a high-quality appearance throughout the duration of their use.

Location

The location of pop-up kiosks will vary depending on their function and associated events. The procuring authority should follow the guidelines for permanent kiosks as far as is necessary to ensure a functioning streetscape.

Licensing

Consent should be sought from the local authority and ourselves.

Market stalls

Design considerations

Market pitches may be delineated and numbered using paint, paving materials, or studs depending on the context. Market stalls may be owned by individual traders, supplied by the local authority or by stall contractors. Market stalls must not cause interference or inconvenience to street users.

Licensing

Market stalls are usually licensed by the relevant local authority which grants a street trading licence, however, our consent is also required when working on the TLRN. The local authority can also grant licences for various street activities or street trading to control the type and scale of activity.

Dealing with waste

Market traders are responsible for keeping their stall and surrounding area clean and free of litter and rubbish during hours of trading. Traders are also responsible for removing and disposing of their rubbish.

Despite these requirements, litter and waste often blight market stalls. Local authorities and market stalls should aim to reduce the total space taken by waste. Waste should be managed and kept out of sight until ready for collection, as well as limiting the amount of waste produced by market activities.

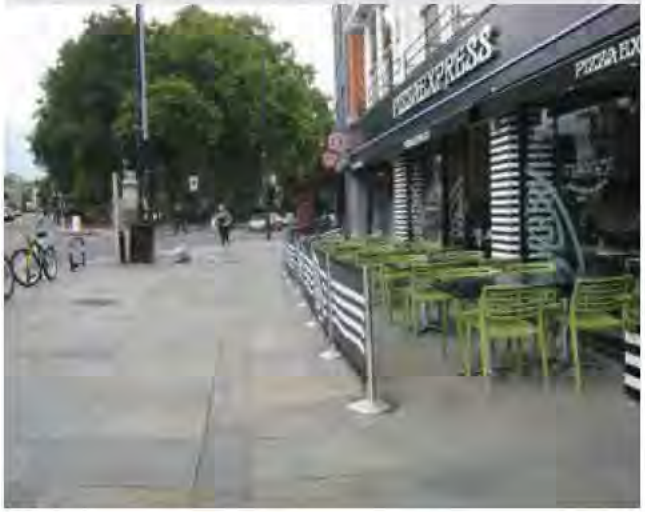
Figure 208: A woman shopping at a market stall

Wastewater is also an important consideration. Drains in market stall areas are susceptible to blockages from wastewater, fat and refuse. Provision of foul water sewers (not gutter gullies) helps to prevent this.

Outdoor café seating

Outdoor cafés and dining can provide a sociable and attractive addition to the streetscene when located appropriately and successfully managed. Outdoor café seating will be promoted where space allows and where it will animate and add character to the street. Wider footways make this more achievable.

Figure 209: Outdoor café seating may be located on wide footways



Design considerations

Pedestrian movement must be taken into consideration when outdoor café applications are received, ensuring that acceptable footway widths are maintained. Clearance for access to adjacent properties and for emergencies must also be maintained. The footway adjacent to the café seating should provide a minimum unobstructed width of 2000mm.

Materials and layout

- Areas can be demarcated by a variety of means; the most common and visually acceptable is through the use of metal studs
- Metal studs can be retrofitted to most paving surfaces by drilling and secured with a high strength adhesive
- Stainless steel studs in chrome or bronze should be bevelled and not exceed six millimetres in height, so as to avoid posing a potential trip hazard when no seats are laid out
- Temporary barriers to cordon off the seating should have a plain style and be within the height range of 700-1,000mm, so as to not visually obstruct views down the street or pose a trip hazard
- Awnings should be free of advertisements and should not exceed the width of the designated seating area
- Planters may be used where adequate drainage can be provided and upon agreement with the SDRG, as these constitute permanent structures
- Outdoor furniture or appliances are not permitted to be stored on the road network

Licensing

- Outdoor cafés are usually licensed by the relevant local authority which grants a Highways Act S115E licence in accordance with set criteria for the purposes of providing refreshments. Licensed areas on the TLRN must have our prior consent to be valid
- Local policies provide the management principles for licensing and managing commercial activities on or adjacent to the highway
- Seated areas that are located on private forecourts or to the rear of buildings and in private courtyards do not generally require a licence if they are an extension of an A3 or A4 commercial use; however planning permission will be required for any permanent structure
- It is the local authority's duty to ensure that access along the footway and to the seating area is compliant with standards outlined in the Equality Act 2010
- The local authority can also grant licences for various street activities or street trading to control the type and scale of activity

Additional information

Department for Transport:

Inclusive mobility – A guide to best practice on access to pedestrian and transport infrastructure, 2021

Highways Act:

Guidance on the application of powers under Section 115, Highways Act 1980

Advertising boards

An objective of the MTS is to make it easier for cyclists, pedestrians and disabled people to get about. In support of that objective, we have removed miles of unnecessary pedestrian guardrail and thousands of unnecessary traffic signs and bollards.

Figure 210: This advertising board is obstructing the footway and should be removed

We have also set a priority for the removal of unauthorised obstructions from our roads as such items can cause inconvenience to pedestrians, present a hazard – particularly for people with poor eyesight – and make the street feel unnecessarily cluttered.

We will serve removal notices and issue a fixed penalty notice to businesses that obstruct the public footway with advertising 'A' boards. 'A' boards constitute any type of free-standing advertisement, directional or information signage placed within the highway.

TfL policy

- Planning authorities are responsible for regulating and approving advertising in the public highway as detailed in the Town and Country Planning (Control of Advertisements) (England) Regulations 2007

Figure 211: Advertising boards correctly placed on Station Road in Harrow

- 'A' boards placed without permission within the highway authority's jurisdiction should be removed. Authorities are able to issue fixed penalty notices for unauthorised obstruction of the highway
- Boards positioned on private forecourts do not require planning permission, however, local authorities are encouraged to engage with shopfront owners to adopt a regime of minimum clutter and conform to the design standards outlined below

Unacceptable placement

The following placements are unacceptable, regardless of property ownership considerations:

- Where the board constitutes a hazard as identified by the local authority or ourselves
- Where any form of vehicular access is required
- 'A' boards fixed to street furniture, trees or the public highway
- Boards leaning against walls
- Partial placement on the public highway and private forecourt
- Boards on grass verges; these can create a road safety hazard

Ownership of subsoil does not necessarily negate an area being public highway. Highway authorities should ensure that any 'A' boards on the highway are removed and have powers to do so, provided by the London Local Authorities and Transport for London Act 2003.

Additional information

Department for Communities and Local Government:

Outdoor advertisements and signs: a guide for advertisers, 2007

Legislation:

Highways Act 1980, Section 132

Town and Country Planning Act 1990

Town and Country Planning (Control of Advertisements) (England) Regulations 2007

London Local Authorities and Transport for London Act 2003

11.4 Colour of street furniture

The colour of metal components for any piece of street furniture should comply with the following colour criteria:

- Black street furniture is preferred as a default for the TLRN with the exception of higher speed routes that do not provide for pedestrian movement
- Signal grey is the standard colour for higher speed non-pedestrian roads
- A stainless steel finish should be considered as non-standard and requires SDRG approval
- Contrasting band

Colour of metal street furniture	Application	Finish	Contrasting visibility band
RAL 9005 Black	TLRN in most boroughs, town centres and low speed roads	Matt micaceous iron oxide	White (RAL9010)
RAL 7004 Signal grey	High speed non-pedestrian roads and by exception as approved by the SDRG	Matt micaceous iron oxide	Black (RAL9005)
Stainless steel	By exception as approved by the SDRG	Stainless steel or aluminium finish	Black (RAL9005) if required

Visibility

Black furniture can provide better colour contrast for visually impaired pedestrians. Visibility bands are required on all street furniture with the exception of guardrails and seats.

Bands should be provided to contrast with the colour of the main body of the stand: white or white reflective banding on black furniture; black banding on stainless steel (an exception to the standard colour palette).

Special finishes and coatings

Requests to use alternative colours to black, to match borough, town centre or historic palettes will be treated as exceptions and should be submitted for approval by the SDRG. Special coatings for flyposting and graffiti prone areas can be applied up to a height of 3,000mm on lighting columns.

Additional information

Legislation:
The Equality Act 2010

Department for Transport:
Inclusive mobility – A guide to best practice on access to pedestrian and transport infrastructure, 2021

Figure 212: A 'keep-left' hoop bollard illuminated by carriageway lighting

Figure 213: A 'keep-left' hoop bollard which is internally illuminated

11.5 Cycle parking

We are supporting the Mayor's Vision for Cycling, published in March 2013, by planning for growth in cycling and making safer and better streets for all. The provision of fit for purpose, well-located and secure formal cycle parking facilities is vital for supporting the cycling growth targets for London. A lack of appropriate parking is often cited as a barrier to cycling and cycle ownership.

The number and the quality of cycle parking spaces must not only keep pace with the growing use of cycles, but allow for the substantial future growth set out in the Mayor's vision. It must also allow for all types of cycle to be securely parked, ensuring that any cycle user with a physical, sensory or cognitive impairment should enjoy access to good quality cycle parking. Please refer to LCDS for further information.

Figure 214: A row of Sheffield cycle stands at Euston Circus

Location, demand and security

Cycle parking facilities on the TLRN are generally located on the footway within the furniture zone. London Cycling Design Standards (2014) should be referred to for further information on assessing demand for cycle parking and ensuring that provision:

- Meets current and likely future demand
- Supports different uses
- Is appropriately located
- Has step-free access
- Is secure, well-overlooked, and well-lit at night
- Is well integrated with the public realm
- Includes some provision for larger models, such as cargo cycles and tricycles

Placement

Cycle parking is best positioned where it is not visually or physically intrusive, yet is sufficiently overlooked for security purposes. The visual impact of cycle stands can be reduced if placed between other street furniture, such as tree planting, bus stops and seating, as part of a coordinated furniture zone. Cycle parking may also be useful in discouraging pedestrians from crossing at certain points.

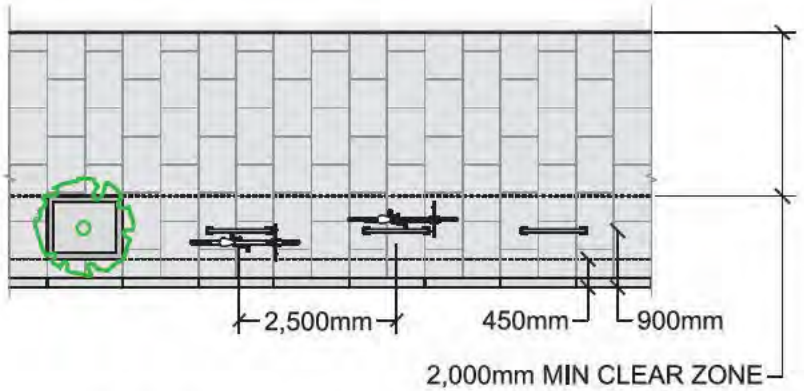
Echelon and perpendicular arrangements offer greater capacity than parallel layouts. In addition, echelon arrangements take up less width than perpendicular arrangements. Please be aware of the following when selecting locations for cycle parking:

- Cycle parking facilities may be provided on the carriageway alongside the kerb but require a traffic order
- Locations under overhanging deciduous trees may require additional maintenance
- A minimum clearance of 450mm between any part of the cycle and the carriageway should be retained when a cycle is parked on the stand
- Leaving a large gap (1,500mm or more) after the last stand in each run is a good way of ensuring that spaces for larger cycles are available
- Cycle parking placed on the median strip can help to reduce clutter on the footways, but should be carefully considered with regards to access, safety and pedestrian crossing visibility
- Tactile paving should not be provided around the base of cycle parking stands on the TLRN

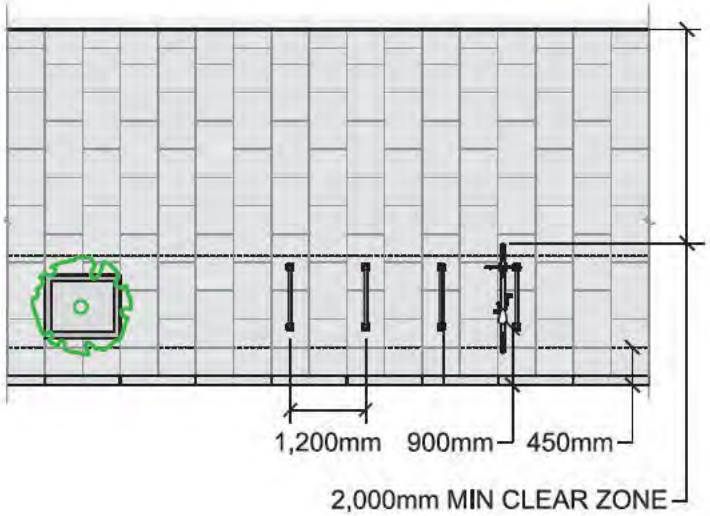
To consolidate furniture placement and facilitate integrated transport, cycle parking should be considered at stations, tram stops and bus stops, particularly outside central London.

Easy, step-free access to the facility should be provided through the use of dropped kerbs, crossings and sufficient space to manoeuvre. Dropped kerbs should be located as close to the cycle parking as possible.

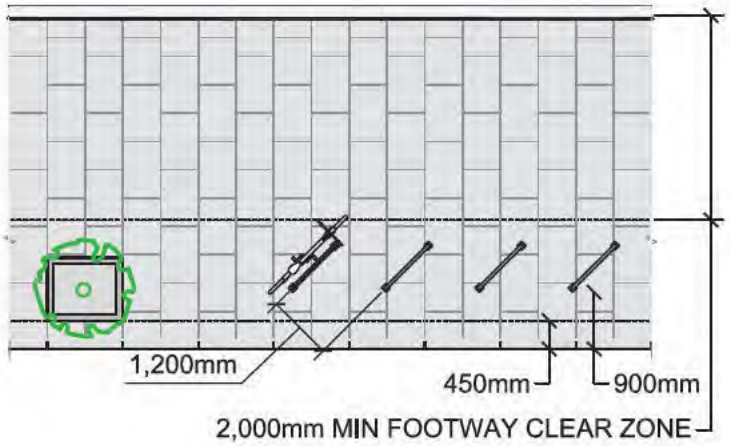
Figure 215: On-footway cycle parking arrangements are dictated by the amount of footway space



PLAN - CYCLE RACKS PARALLEL ARRANGEMENT



PLAN - CYCLE RACKS PERPENDICULAR ARRANGEMENT



PLAN - CYCLE RACKS ECHELON ARRANGEMENT

Figure 216: Sheffield cycle stand

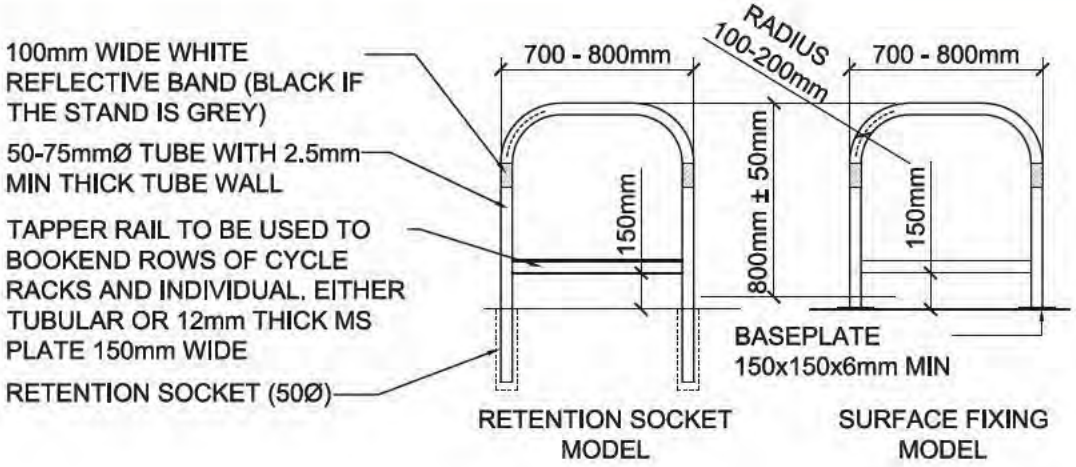


Figure 217: Cycle stands must have a contrasting visibility band

M-profile stands are also now accepted for use on the TLRN, but should not be considered the default option as they have a more intrusive presence within the public realm than the Sheffield style.

Product specification

Short-stay parking in the form of footway-mounted cycle parking stands is the standard facility for the TLRN.

The Sheffield (or inverted U) stand offers a simple, durable and cost effective tubular design, enabling the frame of the cycle and both wheels to be secured. These stands are the default option for the TLRN, assuming the following criteria are satisfied:

Cycle parking stand design criteria	
Distance between legs	700-800mm
Crossbeam height	700-800mm
Tube diameter	50mm
Tapping rail height above footway	100mm±25mm
Tapping rail width	Equal to the tube diameter of the stand up to a maximum of 75mm

Colour

The colour of the cycle stand should generally match the street furniture standards: black nylon-coated stands are standard on the TLRN, and stainless steel may be used following approval from the SDRG. However, there is some flexibility with regards to selecting cycle stands that are deemed appropriate for the context, such that stainless steel may be considered for areas adjacent to stations or new developments.

Visibility bands should contrast with the colour of the main body of the stand: white reflective banding on black stands; black banding on stainless steel.

Accessibility features

A tapping rail should be provided on the end stands where stands are placed in a row perpendicular or 45 degrees to the kerb or building, but are to be omitted for intermediate stands. Stands placed parallel to a kerb or on a curve require a tapping rail.

- Parking symbols on the tapping rail are not required to reduce visual clutter
- Stands should be root fixed within the footway and surface materials carefully cut or drilled to provide a round hole that minimises the visibility of concrete infill
- At locations where vandalism is anticipated, demountable bolt-down fixings may be used

What if I want to do something different?

Tubular stands other than the Sheffield model, which fulfil the design criteria, may be considered for use on the TLRN but require SDRG approval.

TfL-branded cycle stands recently introduced at stations require SDRG approval for use on the TLRN.

Long-stay facilities such as lockers, cycle hubs or two-tiered racks should be provided at transport interchanges, but again require SDRG approval when considered for the TLRN. Covered structures require planning approval from the local authority.

Paperclip cycle rack Minneapolis, USA

Cycle racks that speak to urban contex

Key functions

Opportunity

Customised street furniture can enhance the character of a local area, emphasise a unique local history, or speak to the purpose of neighbouring businesses

Benefits

The innovative design of the cycle racks combine utility and style; alterations to basic cycle racks were made to improve their appearance while preserving their functionality.

Implementation

The customised cycle racks on the Minneapolis Art Institute's campus have added a surprising twist to a necessary element of the public realm

Applying in London

Customised designs can reinforce an element of the local context. For occasions where there is a particular need for bespoke cycle parking, such an approach can work well. At other locations, Sheffield stands are best.

ECO-Cycle system
Tokyo, Japan

Automatic underground cycle parking system

Key functions

Opportunity
The ECO-Cycle system is a space-saving and secure solution for cycle storage in cities.

Benefits
By removing ground level storage and placing cycles underground, station entrances can become obstacle free and increase pedestrian capacity in and out of the entrances and exits.

Implementation
It takes 15 seconds to insert or retrieve a cycle from 11 metres underground. Each unit can hold up to 144 cycles, thereby freeing up space in the public realm. The underground garage protects cycles from theft and bad weather. Like all Japanese structures, it is designed to withstand earthquakes.

These subterranean cycle parks have been successful and have been rolled out across Tokyo and currently hold 800 of Tokyo's cycles.

The system owes its success to the speed and ease at which it operates. The units are also located in areas adjacent to metro stations for commuter convenience

Applying in London

High demand for cycle parking in London gives this system significant potential.

Additional information

Transport for London:

London Cycling Design Standards, 2014. Chapter 8: Cycle parking

Cycle Security Plan, 2010

Department for Transport:

Traffic Advisory Leaflet (TAL) 5/02: Key elements of cycle parking provision

Figure 218: A cycle hire docking station on Albert Embankment

11.6 Cycle hire docking stations

Vision and purpose

The Mayor's Cycle Hire Scheme is a public scheme for London, launched in July 2010 as a standalone mode. It was the first TfL mode to be sponsored and it provides more than 10,000 bicycles for hire from more than 730 docking stations and 20,000 docking points within a central London area of 100km2. The scheme was expanded to east London in March 2012 and launched in southwest London in December 2013.

The scheme has become a renowned part of London's streetscape since its inception in 2010, with its distinct look and stylised bicycles and docking stations. It is a self-service, bike-sharing scheme, designed as an affordable, alternative option to conventional public transport for short journeys.

We are keen to see that the network continues to serve our customers and will be looking for new opportunities for intensification of the existing network where appropriate. Where new docking stations are proposed, the design and layout of the station should be carefully considered to complement the overall composition of the streetscape.

Cycle hire scheme

The scheme comprises of physical on-street assets, namely bicycles which can be hired from, and returned to, docking stations placed around various locations within central and inner London. Each docking station comprises of at least one terminal that customers interact with for setting up access to hire. Each terminal is connected to docking points where the bicycles are physically docked for hire and return. Supporting the scheme are back office and on-street systems and operations.

As part of a Mayoral initiative to develop the customer offering for cycle hire, a TfL mobile application for Apple and Android users was released in May 2015. All the functionality of a terminal at a docking station has been replicated along with options linked to TfL journey planner. The real-time data feeds have been made available to commercial developers and a number of apps are now available which provide real-time information about docking stations locations, bike availability, free docking points and more.

The Mayor's Cycle Hire Scheme provides an effective way to add transport capacity to the network and helps relieve congestion for peak trips in central London. As an active, self-powered, emissions free and almost silent mode of transport, the scheme delivers important health benefits and contributes towards reducing CO_2, harmful local air pollutants and urban traffic noise.

The Mayor's Vision for Cycling commits to future enhancements of the scheme. It recognises the hire scheme as one of the world's most successful, playing an important role in normalising cycling in London by enabling customers to try cycling for a minimal outlay and encouraging them to adopt cycling as a lifestyle choice. This commitment is reflected in the cycle hire vision as stated below:

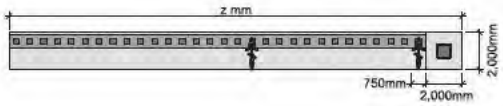
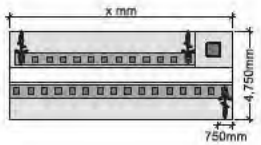
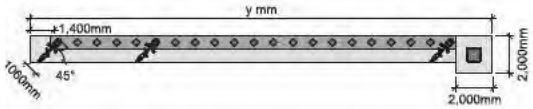
'To deliver a service fit for the future, enabling Cycle Hire to adapt and grow.'

Detailed layout considerations

The following is an indicative checklist of things to consider when identifying a potential docking station location. Please note consultation with, and agreement by ourselves and the local planning authority will be required prior to final station location.

Docking station layouts

There are three types of docking stations layouts, detailed below:

Layout name	Layout	Docking point formula	Example picture
Linear docking station		DPS= [length (x) 2,000mm]/750mm	
Double row		DPS= [length (y)-2,000mm]+[length (y)]/750mm]	
Echelon		DPS= [length (z)-2,000mm-1,400mm]/1,060mm	

Detailed layout considerations

Consideration	Detailed information
Space	A rough guide is 25 metres by 2,000mm as the minimum space required for a viable docking station of 27 docking points (see above indicative layouts).
Operational access	Redistribution vehicles must be able to legally stop within 15 metres of the station to maintain it and distribute bicycles. Line of sight must be maintained between station and vehicle. Loading and parking bays are the preferred location for stopping.
Footway width	A preferred minimum clear footway of 2,000mm in width must be maintained. Clearance of 450mm must be maintained from the carriageway.
Utility covers	Docking points or terminals cannot be installed over utility covers however bicycles can be docked over covers.
Drainage	Site footprint is required to have sufficient drainage to prevent ponding.
Vertical clearance	A vertical height clearance of 2,800mm is required for terminal and installation.
Existing vegetation	No loss of trees or grassed areas.
Existing street furniture	Minimal relocation of existing street furniture, including existing cycle stands.
Pedestrian/cycle/ vehicular flows	Sufficient space to maintain clear pedestrian/ cycle/vehicular paths.

Consideration	Detailed information
User safety	Safe and secure areas with good natural surveillance and street lighting.
Existing usage	Avoid areas of high pedestrian congestion and areas known to be unsuitable for cyclists.
Public access	Docking stations must be accessible to the public 24 hours a day, 365-days-a-year, ie they must be on public highway or land where the public have a right to unfettered access.
Terminal power	Terminal power is obtained from UK Power Networks (UKPN) via a feeder pillar located near the docking station. Typically feeder pillars are installed on the public highway and trenched to the terminal.
Foundations	The maximum foundation depth required for a docking station is 450mm and maximum width is 700mm.
Road safety audits	All sites will be subject to a full road safety audit.
Lease	A lease/agreement is required between TfL and the landowner, ideally at nil cost.
Connecting to existing cycle routes in the area	Sites should be located near existing cycle routes for users to continue their journey.

Infrastructure

Each docking station consists of at least one terminal and should have a minimum of 27 docking points, which can be provided in a number of layouts to fit the local circumstances. Based on our five years of experience operating Mayor's Cycle Hire Scheme in London, it has been found that 27 docking points is the best operational number at the majority of locations. Stations of this size require much less redistribution and have higher bike and space availability for users' convenience.

Please note there is a six-month lead time for all infrastructure to be manufactured and delivered.

Terminal

Each docking station has a payment and registration terminal which allows users to:

- Print a record of their journey
- Print cycle release code
- Find other docking stations if one is full or empty
- See a local street map, costs and code of conduct
- Buy 24-hour access for up to four cycles
- Get extra time if user needs to return their cycle to another docking station should the docking station be full

The terminal displays Legible London style mapping to assist wayfinding for cyclists and pedestrians. Legible London mapping is the only mapping used to ensure uniformity across the scheme and maintain ease of use.

Docking points

- Docking points release and secure bikes
- Members insert key to release bikes
- Non-members must retrieve a code and enter the digits into the keypad

Terminal

- Height: 2400mm
- Width of wide face: 500mm
- Width of slim face: 350mm

Figure 219: A cycle hire payment and registration terminal

Docking point

- Height: 792mm
- Width of bottom: 300mm
- Width of top: 225mm

Figure 220: Docking points without bikes

Foundations

There are three types of foundations as described below:

Standard

One foundation per docking point set into a concrete base. This is our preferred method of reinstatement as it is adaptable, allowing docking stations to be constructed on slopes or in a curved arrangement. In addition reinstatement around the docking points can aesthetically match existing, surrounding material. This foundation type requires 350mm depth and can be used on either the carriageway or footway.

Inset

Steel plate set into a concrete base, shallower dig required. Inset foundations can be used in circumstances where there are shallow utilities running underneath the docking station footprint. These are to be used on the footway only and require 150mm depth.

Surface mounted

No excavation required. Surface mounted foundations are used when there is significantly limited depth. However, the surface must be completely level and straight.

Figure 221: A cycle hire docking point in a concrete base and paved to match the carriageway

Figure 222: An inset cycle hire docking point on a steel plate

Figure 223: Surface mounted docking points

Procedures

There are various consents and approvals required as part of the delivery process. Such as:

Stage	Requirement
Pre-planning consent:	• Archaeological impact assessment (where relevant) • Arboricultural assessment (where relevant) • Ground radar survey • Topographical survey • Planning permission • Stage 1/2 Road Safety Audit • Planning permission from the relevant local planning authority
Prior to construction:	• Traffic Regulation Order (for carriageway sites) • Permit for construction works • Parking suspension (where relevant) • UKPN install feeder pillar for electricity supply • Watching briefs arranged (where relevant) • S8 agreement/private lease completed • Area reinstated around foundations • Install appropriate TSRGD traffic signs and line marking
Prior to installation:	• Permit for works • Parking suspension (where relevant) • Mapping updated on local docking stations
Post-installation:	• CAT/LAT test completed • Health and safety documentation completed • Stage 3 Road Safety Audit is required as soon as possible once live, wherever possible within three months of becoming operational. Please refer to TfL SQA-0170

Additional information

Transport Trading Limited:

London Cycle Hire Scheme Agreement, 2009:

Schedule 2 – On-Street Infrastructure Statement of Requirements Lot 1

Schedule 37 – Docking Station Implementation and Traffic Management

11.7 Seat

Functionality, comfort and accessibility are key requirements of seating, but equally it provides the opportunity to delight users through creative designs and thoughtful placement. The material choice, composition and form offer a multitude of opportunities to select or design a seat that improves the user experience.

We are eager to raise the ambition of seating choice and placement within the streetscape. Functionality is no longer considered the only criteria to satisfy.

Seating can perform many functions within the streetscape besides providing a place for people to rest. Designers should consider how seating can: reflect the character of the space; create a sense of whimsy; provide social cues about the purpose of the space; reinforce the design intent; or encourage socialisation. Whatever the intention, seating provides one of the most effective ways to enhance or reflect the character of an area and add to the vibrancy of the space.

Figure 224: Seating at Holborn Circus with arm and back-rests

Placement considerations

Formal seating should be provided according to the following criteria:

- A clear space either side of the seating should be provided so that wheelchairs/scooters/ prams can be positioned alongside
- Adjacent to or visible from a pedestrian route
- Where pedestrian flows will not be impaired
- Where provided near walls, the seatbacks should be against a wall to reduce the likelihood of damage from skateboards
- In an open aspect that enables approaching pedestrians to be seen
- In areas of natural surveillance to minimise antisocial behaviour
- So as to avoid impeding access to buildings
- In public spaces that are attractive and in sunlit areas where possible, as these areas are more likely to be used
- Away from wind tunnels, for example between tall buildings, which could make use uncomfortable
- Where possible a continuous run of seats should be provided where high use is anticipated. However, seating should not be placed directly opposite to one another.

Seat placement standards	
Recommended set back from kerb for inward facing seat	1,000mm
Recommended set back from kerb for outward facing seat	2,000mm
Maximum recommended spacing interval for seating on high streets, city places and steep inclines	50 metres

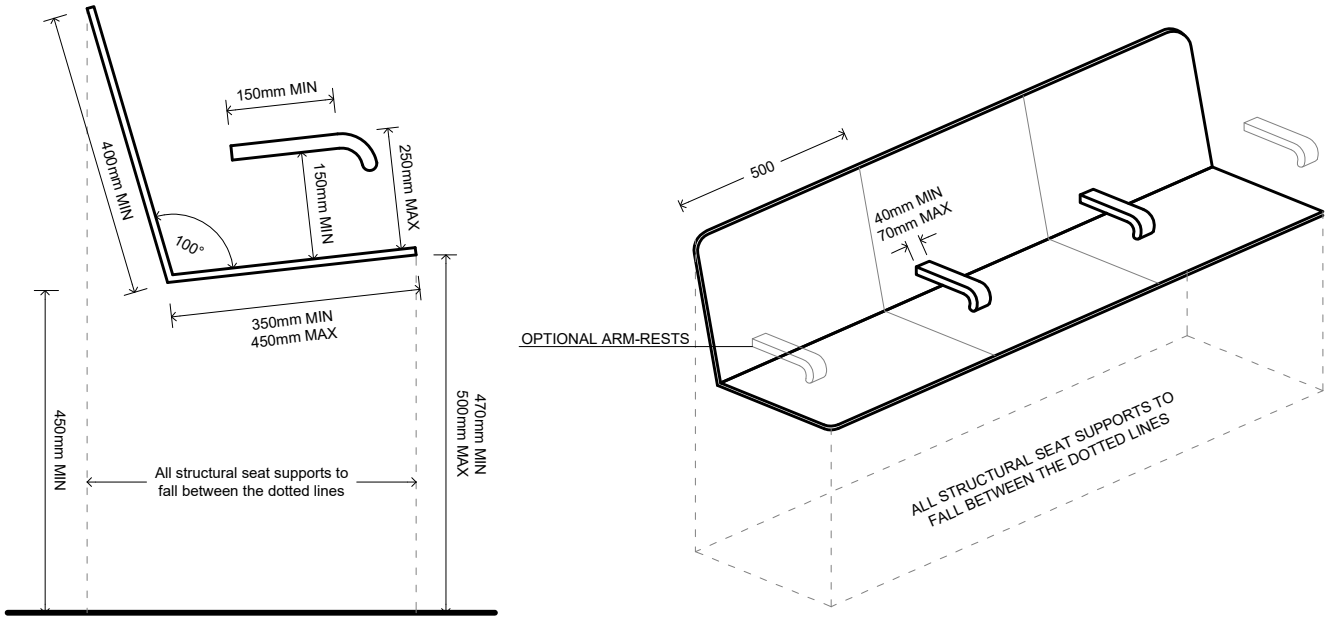
Product design standards

Seating should be selected which combines comfort, ease of maintenance, durability and resistance to vandalism.

Figure 225: A bench with arm and back-rests offers a range of options for users

The following design criteria should be used to assist in selecting an appropriate product:

Figure 226: Minimum bench requirements



Seat material standards	
Timber	Preferred material for where people may wish to sit for longer periods To be compliant with GLA's responsible procurement policy and accredited to Forest Stewardship Council (FSC) standards or equivalent Is preferred where the seat will be well maintained and vandalism is rare
Stainless steel	May be considered for areas where vandalism is anticipated Concealed ground fixings should be used
Natural stone	Non-standard. May be used as an alternative to security bollards, large natural stone blocks may be used upon approval by the SDRG

Authorisation

Seats may be provided by the local authority or adjacent landowner subject to the approval of the highway authority.

Wharf Green, Swindon, UK

Seats may be provided by the local authority or adjacent landowner subject to the approval of the highway authority. High quality Streetscape Guidance compliant bench planter

Key functions

Opportunity

This project took place in Wharf Green, central Swindon. Traditionally a commercial area, this was a catalyst project aimed at regenerating the local area and reinforcing a sense of place.

Benefits

Wharf Green has subsequently transformed into a popular space that hosts regular events.

Implementation

This seating planter was built from durable hardwood with stainless steel corner edge detailing and feature lighting. It was designed as an innovative piece of street furniture to enhance the newly created events space.

Image courtesy of Woodscape Ltd

Applying in London

Beautifully detailed and durable street furniture should be encouraged everywhere in London.

The High Line, New York, USA

A family of benches as a unifying element

Key functions

Opportunity

New York's High Line is a world-famous redevelopment of a disused heavy rail viaduct into a public park, with high quality materials throughout.

Benefits

The 'peel-up' bench is an integral repeating element in High Line Park. These benches create a 'family' of design elements which are used not just for seating but as play elements and picnic areas.

The family of benches acts as a unifying element that ties disparate spaces together and reflects the historic use of the High Line.

Implementation

A family of benches have been created through the use of a similar form and a consistent palette of materials, ie wood, stainless steel and natural stone.

Applying in London

Street furniture families should be used in London to enhance local character and to connect disparate spaces. The proposal for a family of benches should be reflective of the local character and identity.

Images courtesy of Aleksandra Grabowska

Additional information

Department for Transport:
Inclusive mobility – A guide to best practice on access to pedestrian and transport infrastructure, 2021

Greater London Authority:
The GLA Group Responsible Procurement Policy, 2008

11.8 Art

The use of public art on the TLRN may be considered for an area where a special or decorative design feature or landmark will help to define a particular place and enhance people's daily experiences. We will prioritise designs in which the promoter can demonstrate that the installation will make a positive impact on the quality and distinctiveness of the local setting.

Design considerations

Public art is often designed to provide a landmark which people can identify and use to navigate. Artwork may therefore be appropriate in areas which lack other recognisable features.

Public art should not be limited to single objects or expensive finishes. The best design response is often the most simple: a repeated single element across a wider area, or a well-conceived adjustment to the 'standard'.

Public art should be delivered in accordance with the Equality Act 2010 and should not pose a health and safety risk, restrict sightlines or pose a trip hazard.

Temporary art installations may be considered for certain situations, such as during the construction of wider street improvement works, or as part of a temporary wayfinding strategy and, in exceptional circumstances, to promote major events.

The maintenance and management of public art must always be taken into account as part of the design process.

All art installations (temporary or permanent) should be detectable at ground level by a symbol or a long cane. Any projections from art installations should not present a collision hazard to those using the footway.

Designers should aim to support local artistic talent. In some cases, it may be appropriate to involve the local community in judging a design

Figure 227: Playful artwork

Figure 228: A sculptured granite bench in Windrush Square

competition through the local authority's arts coordinator.

Public art does not necessarily need to be expensive or complex. A simple transformation of everyday objects can be just as effective.

Location

Design teams should ensure that the placement of the artwork complies with our Streetscape Guidance general location principles and that any structure does not overly impinge on footway space and impede pedestrian movement.

Public art may be considered across a wide range of settings including, but not restricted to: public areas where people gather, such as transport interchanges or public squares; highly visible traffic corridors and routes, for example on roundabouts; and distinct urban structures, such as bridges or subways.

Delivery

Planning consent may be required from the local planning authority. Design teams wishing to commission art for the TLRN should liaise with one or more of the following contacts:

The relevant local authority's arts coordinator.

Our Art on the Underground team – for projects relating to London Underground station forecourts.

Art in the Open – support organisation for additional public realm art commissioning guidance.

When working on the TLRN, design teams or external promoters of public art should forward their recommendations to the SDRG.

Figure 229: Winning sculpture: Goat atop packing crates in Spitalfields

Maintenance

Any proposed intervention should not require significant changes to the existing maintenance regime. The standard of maintenance depends on many factors including the location, condition and function of the area or feature.

Additional information

Greater London Authority:
All London Green Grid SPG, 2012
The London Plan, 2011

11.9 Bins

The regular and convenient provision of bins on footways provide an important contribution towards supporting a litter free environment, but can also impact on the general appearance and quality of the streetscape.

Limited provision of bins in litter hotspots, where people congregate or near tourist attractions, can help to manage the problem of litter, assuming bins have sufficient capacity and are regularly serviced.

Figure 230: Bins which combine functionality to separate several types of waste are encouraged

We acknowledge the distinct character of different areas on the road network and so a single style of bin cannot be used across all environments. Streetscape Guidance recommends a restricted range of styles which relate to the surrounding context and the anticipated level of use, while ensuring that efficient cleansing regime standards are maintainable.

There are three types of bins that typically occur on the road network: the litter bin, recycling bins and trade refuse bins. This section details the types of bins, their placement, appearance and coordination with the local authority who generally provides and maintains them.

Figure 231: Cigarette bins may be located on poles if approved by SDRG

Litter bins

Litter bins should have a simple aesthetic which is robust and functional. Conservation and special areas require heritage bin designs which better reflect the character of the area and should be finished in black.

Bins should be freestanding, however, wall-mounted bins may be considered in exceptional circumstances where there are footway constraints. Bins should be bolted down to discourage antisocial behaviour. The use of integrated cigarette disposal units may be considered.

The capacity of the bin needs to take account of the intensity of use to avoid contents spilling on to the surrounding footways.

Litter bins on the TLRN should be covered and have open-sided access, sufficiently wide for convenient disposal of litter. Bins should not have an open top, as they allow rainwater to collect and litter can blow away when full. Fully closing lid designs should also not be used as these can discourage use by being less sanitary and have additional maintenance issues.

Location

Bins should be placed according to the following standards:

- Litter bins should be placed a minimum of 450mm from the kerb edge and within the streets furniture zone (see pages 203-210)
- Bins should be positioned so as not to cause an obstruction on the footway
- Access to adjacent properties should not be constrained
- Visibility should not be obstructed
- Maintenance and access requirements should be considered

Ensure footway width is not reduced below 2,000mm.

Bin placement should be coordinated with other street furniture, such that bins may be positioned adjacent to seating. Bus Infrastructure should be consulted regarding any proposal for bins near to bus stops.

Bins may be attached but not mounted on to lamp columns as they are prone to leaking and can pose a hazard for white cane users who cannot detect them.

Materials

The colour and finish should be consistent with other street furniture on the TLRN; black as standard.

- Cast iron or plastic bins are the preference on the TLRN
- Stainless steel should be treated as an exception to the palette. Designers should note that stainless steel bins with solid sides can stain and deteriorate quickly and are prone to flyposting

- Timber may be used in exceptional circumstances, adjacent to parklands or in rural areas, but requires SDRG approval
- Plaques and ornate labelling are acceptable where approved by the borough
- Where graffiti and flyposting are a problem, a chemical-resistant low adhesion anti-graffiti finish should be applied to the surface of the unit
- Litter bins on the TLRN which provide advertising space require SDRG approval

Planning

The placement of litter bins needs to be carefully considered, so that any provision is aligned to demand where there is a proven issue of littering. This is especially relevant to surrounding land use; for example, shops such as takeaway restaurants will likely require additional litter bin facilities.

Local authorities have borough specific policies regarding the provision of bins and the standards that are acceptable within the borough. Bins on the TLRN should be provided which align with both the borough standard and Streetscape Guidance. Design teams need to liaise with the relevant local authority to ensure that the design of the bin allows the local authority to carry out standard cleansing regimes.

Security

In high security areas, the use of blast-resistant litter bins with concealed ground fixings will be required. Advice should be sought from our transport community safety managers within the Enforcement and On-Street Operations team.

Trials

Where routine monitoring of the TLRN identifies a lower level of cleansing standards than normal, the introduction of litter bins may be considered as part of a trial.

During the trial period the condition of each bin and the remaining capacity should be noted regularly to establish how the bin is being used and whether permanent provision would make a long-term contribution towards enhancing the quality of the streetscape.

Additional information

British Standards:

Publicly Available Specifications (PAS) 68 and 69, 2005

Figure 232: A combined rubbish and recycling bin uses bold colour to emphasise proper use

Image courtesy of Lambeth Council

Recycling bins

Recycling bins are provided to encourage Londoners to recycle waste. Recycling bins can be combined with litter bins. However, when recycling bins are not combined, the design of the bins should be similar yet distinctive enough to differentiate its purpose from other litter bins.

Recycling bins do not offer disposal facilities for commercial or retail establishments. The provision and management of recycling bins is the responsibility of the local authority, and governed by local policy. The demand for recycling bins is likely to increase in line with sustainability policies, the United Nations' Agenda 21 and growing public awareness.

Location

Recycling bins should be located to provide convenient, safe access for residents, as well as adequate space for collection and emptying. Representatives from the local authority and TfL must agree a suitable location.

Recycling bins should not be installed where the footway width would be reduced to less than 2000mm. Bins should conform to Streetscape Guidance's furniture zones and not be placed in special areas or where they detract from listed buildings or heritage features.

Care is required to ensure that traffic flows are not impeded by collection vehicles. Access to adjoining properties should be maintained.

Where collection vehicles are anticipated on the footway, the structural strength of the surface materials must be reinforced to avoid damage.

Best practice

The functional design of each bin is generally related to the type of material being recycled.

Recycling bins should be robust, fire-resistant and contain explanatory graphics where required. Bins should be leak-proof to avoid the staining of surface materials. Recycling bins should be secure to deter antisocial behaviour.

Smart recycling bin London, UK

Recycling bins with liquid crystal display (LCD) screens for information, advertising and data collection

Key functions

Opportunity

Recycling bins are an essential item of street furniture; however, they are inherently large and can be obstructive. The smart bin uses its bulk to provide useful information via a large screen.

Benefits

This design was an attempt to get more out of the infrastructure of street furniture. The recycling bin also doubles up as a public billboard displaying everything from the weather and news to transport information, adverts and stock prices.

Implementation

A trial of eight bins have been placed in the City of London.

Image courtesy of Control Group

Applying in London

Street furniture that provides enhanced functionality to customers is encouraged.

Trade refuse containers

Trade refuse containers are high capacity bins which ensure the safe storage of large quantities of waste from commercial properties. They are required by a wide range of commercial properties and so should be carefully arranged and managed to minimise their visual impact. Bins should preferably be located away from the TLRN, in servicing alleys and back streets.

The provision and management of trade refuse bins is the responsibility of the local authority and/or private contractors.

Location

Where unavoidable and upon agreement with ourselves, trade refuse bins may be located on the TLRN, assuming safe access can be ensured. They should be positioned where parking for collection and delivery vehicles can be provided and traffic flows are not impeded. The following criteria must be met:

Figure 233: Trade refuse bins can be detrimental to the character of the streetscape and should be kept out of sight where possible

(Image courtesy of STE Waste)

- They should only be placed on footways if the footway clear zone is to remain 2000mm or more
- Visibility sightlines must be maintained
- Metal refuse corrals may be used where a number of moveable bins are located together and need to be aligned and contained for safety and aesthetic reasons
- Bins should be located where access to adjacent properties will not be hindered
- Where collection vehicles are anticipated on the footway, the structural strength of the surface materials must be reinforced to avoid damage

Product specifications:

Trade refuse bins should be robust and fire-resistant, and contain explanatory graphics where required. Integrated discreet graphics are preferred to stick-on labels which tend to peel off.

Bins should have wheels to manoeuvre to collection vehicles and incorporate a facility to allow them to be lifted using modern lifting equipment. Bins should be of a uniform style and colour where possible and coordinated with other street furniture.

Consideration should be given to the use of higher quality bins or screening when located in or near special or historic areas.

In high security areas, the use of lockable or sealed bins will be required. Advice should be sought from our transport community safety managers within the Enforcement and On-Street Operations team.

Implementation and maintenance

A licence from the local authority may be required before installation. Installation is the responsibility of the local authority or a private contractor. Regular collection and maintenance is required to ensure that overflow waste does not pile up next to the refuse container.

Subterranean bins London, UK

Large underground containers to store household waste

Key functions

Opportunity

This system is designed to meet the waste disposal needs of a highly populated city in an efficient manner.

Benefits

By placing a street's rubbish in a large bin, refuse agencies need to make far fewer trips. Sensors in the bin alert the waste company when the bin is getting full. Rubbish collectors can plan the most efficient way of collecting; minimising the use of dustcarts, noise pollution and traffic build-up from the process. Placing the bins underground removes them from the streetscape where they are an eyesore and take up room in the public realm.

Image courtesy of Justine Ancheta

Implementation

The containers take up minimal space on the surface level and store waste in a large container below ground. The system uses WiFi and radio frequencies to transmit information on the waste levels from the sensor.

Applying in London

These are already being used in the London Borough of Lambeth.

11.10 Letter and pouch boxes

Letter boxes

Post letter boxes are a distinct and recognisable feature within the streetscape which perform a daily operational use as well as being an iconic piece of street furniture.

There are several forms of letter box including the pillar box, wall box and small lamp-post boxes.

Pouch boxes

Pouch boxes are used to store mail for onward delivery and are not accessible to the general public. The standard pole mounted design is functional but unsightly and creates significant additional street clutter.

When streetscape improvement projects are being undertaken, the Royal Mail should be contacted with a view to removing any linked post pouches within the scheme.

Design

- Typically 400mm deep and 450mm wide, pouch boxes are usually pole mounted
- Wall-mounted letter boxes reduce street clutter and are the preference where practicable
- Pillar boxes have greatest capacity and have preference over multiple smaller lamp boxes

- All Royal Mail boxes will be painted in standard red and black livery

Location

- Letter boxes should not be installed where the footway clear zone will be less than 2,000mm wide
- They should preferably be placed within the furniture zone and should not obstruct sightlines to crossing facilities
- Post boxes should be placed on a hard surface to allow for easy emptying

Responsibility

Post and pouch boxes are the responsibility of the Royal Mail.

Authorisation

Royal Mail has a statutory right to place and retain letter boxes in the street under paragraph 1, Schedule 6 of the Postal Services Act 2000. Ownership remains with Royal Mail. Although consent is not required, Royal Mail will liaise with the highway authority to obtain agreement for the location and placement.

Planning consent is not normally required for a post box or self-service stamp machine. Listed building consent is required where there are proposals to alter or remove a listed post box, or those set in or adjacent to a listed building. Refer to Planning (Listed Buildings and Conservation Areas) Act 1990.

Additional information

Legislation:

Postal Services Act 2000 c.26, Schedule 6 – Power to place post-boxes etc in streets, section 1. http://www.legislation.gov.uk/ukpga/2000/26/schedule/6/paragraph/1

English Heritage:

Royal Mail Letter Boxes: A Joint Policy Statement by Royal Mail and English Heritage, October 2002.

Figure 234: Post boxes should be located in the furniture zone

11.11 Telephone boxes

Telephone boxes are a common and recognisable feature across the London streetscape, with several distinct modern and traditional styles in operation.

Relocation or removal

Where more telephone boxes exist than deemed necessary, or where a unit or units adversely impact on the quality and functionality of the streetscape, the highway authority should work with the operator to reach an agreement to relocate or remove the structure, while retaining adequate service coverage.

The highway authority may remove a telephone box when it has been disconnected from the network. This means that the operator is

Figure 235: A historical telephone box in Westminster

no longer satisfying the requirements of the electronic communication code and the unit can be construed as an obstruction.

Application for new boxes

The impact of any new telephone box on the coherence and quality of the streetscape should be considered. Locations need to be assessed on their own merits, with due consideration for available footway widths, the impact on pedestrian and cycle desire and sightlines, existing footway demand from surrounding activities and buildings, availability of ATMs, and an analysis of local antisocial behavioural issues.

Telecommunication companies should provide details on location and placement so that we can make a robust and informed decision on the application. Under the Highways Act 1980, any shopfront affected by the unit should be consulted and their views taken into consideration.

Location

- Telephone boxes should not be installed where the footway clear zone is less than 2,000mm wide
- They should not be installed if doing so would create an obstruction which could pose a safety hazard ie at the front of a kerb in close proximity to a junction or side road
- They should be located away from loading bays, service access points and crossovers The doors should not open into the path of pedestrians
- The box should be no less than 450mm from the kerb face
- Boxes should be positioned to ensure that there is sufficient space to allow mechanised cleaning

Products

Telecommunication operators may use their own telephone box style and branding where deemed appropriate, but should be encouraged by the highway authority to coordinate the colour and placement of the box with other street furniture in the local area. The most common units in operation include:

K2 and K6

Traditional red telephone boxes are retained in many central and conservation areas of London. A large proportion of these are heritage-listed structures. They are no longer in production but can be moved to locations to replace other models as they are preferred by TfL to the KX or ST6 series in central areas.

Figure 236: A traditional telephone box, many of which are heritage-listed

KX series

The KX series was rolled out across London in the 1980s and 1990s. A small proportion of these have listed status. They allow for advertisements and are designed to be easier to maintain and better protect against vandalism than older structures. Multiple units may be considered for replacement with an ST6 in specific approved locations.

Figure 237: An example of a KX series telephone box

ST6

New open-sided units, such as the ST6, are now in use and include a 1.36-metre wide illuminated advert on one side. ST6 units should be fitted so that the advertisement faces the flow of traffic. The width of the unit can significantly impinge on footway space and so should not be fitted on streets where footway unobstructed widths would be reduced to below 2,000mm. A footway width of minimum 4,200mm is required but designers should also consider pedestrian flows to determine appropriate placement. They are not appropriate for conservation areas and require planning consent for illuminated advertisements.

Figure 238: An example of an ST6 telephone box

Advertisements

Class 16 of Schedule 3 of the Town and Country Planning (Control of Advertisements) (England) Regulations 2007 [as amended by the Town and Country Planning (Control of Advertisements) (England) (Amendment) Regulations 2011] gives deemed advertisement consent for an advertisement displayed on the glazed surface of a call box, other than a kiosk of type K2 or K6.

The following types of display of advertisements did not receive deemed consent:

- Illuminated advertisements
- Advertisements in conservation areas or where special advertisement controls are enforced
- Advertisements placed on more than one face of a single telephone box (other than the operator branding)
- Where three units or more are located next to each other, advertisements can only be provided on a maximum of two faces

Responsibility

Telephone boxes are the responsibility of the telecommunication operators. Service providers have a duty to provide an appropriate number of working phone boxes where most needed, under the Universal Service Obligation (USO). The Electronic Communications Code (Schedule 2 of the Telecommunications Act 1984) gives operator companies the power to install and retain electronic communications equipment on the public highway. They should be adequately maintained by the operator to ensure good working order and cleanliness.

Authorisation

Telecommunication operators have to seek approval from the relevant local planning authority to determine whether prior approval is required for the siting and appearance of a new unit.

Telecommunication operators with a licence under Section 7 of the Telecommunications Act 1984 may install public call boxes on the public highway.

The Highways Act 1980 provides that the local highway authority has to give consent for objects on the highway.

Listed building consent is required where there are proposals to alter or remove a listed telephone box, or those set in or adjacent to a listed building. Refer to Planning (Listed Buildings and Conservation Areas) Act 1990.

LinkNYC internet pylons New York City, USA

Replacement of payphones with internet pylons

Key functions

Opportunity

With an ever increasing use of smartphones and reliance on the internet, free public WiFi is an increasing priority in New York.

Benefits

The LinkNYC programme aims to replace old payphones with a free public WiFi infrastructure, available across New York. The kiosks will also have a touchscreen interface where members of the public can research locations and public amenities and it will provide capacity for advertisements.

Implementation

As LinkNYC is scheduled to be built during 2015 the results of its success are not yet determined.

Image courtesy of Control Group

Applying in London

These internet pylons would be appropriate for areas in London which are popular tourist destinations and in busy office and retail areas.

11.12 Pedestrian wayfinding

Vision and purpose

Walking is a great way of getting around London; it is free, healthy, environmentally friendly, and often the quickest option. Yet many people are put off by inconsistent signage and confusion about distances between areas.

We have developed 'Legible London' to tackle these issues and help residents and visitors walk to their destination quickly and easily. This award-winning map-based system is integrated with other transport modes so when people leave the Underground, for example, they can quickly identify the route to their destination.

Location

Design teams should provide wayfinding guidance to aid navigation and encourage people to walk rather than seek out public transport, while aiming to minimise the total number of pedestrian signs used to reduce additional street clutter.

Signs should be located where users start their journey as a pedestrian, at key decision points and landmark destinations.

Signage should be located to minimise physical intrusion within the streetscape, but should be sufficiently visible so as to serve its intended purpose.

Figure 239: Pedestrian wayfinding systems such as Legible London offer a consistent and recognisable system of maps across our city

Where pedestrian routes cross the TLRN and are signposted using local authority signs, the signage strategy may be continued on the TLRN subject to compliance with TSRGD.

Wayfinding signs do not need to be illuminated by internal or external lighting, or retroreflective materials.

Legible London

Since its introduction in 2007, the Legible London signage system has become the TLRN standard for pedestrian directional signage.

The system provides a consistent and connected approach to the design and layout of pedestrian wayfinding across London.

Scheme designers should follow a systematic approach to locating Legible London signs in the urban realm by drafting a placement strategy based on the Legible London Design Standards (2010).

Figure 240: Legible London temporary foundation cover plate

A range of approved signage products are available including free-standing map-based totems and fingerposts. Selecting an appropriate product from the family of wayfinding signs available will depend on the scheme objectives and footway space available.

On-street 'liths' include finder maps (a five-minute walk) and planner maps (a 15-minute walk) taken from the Legible London basemap, complete with 3D buildings, walking circle, 'you are here' marker and off-map tabs along with a panel for directional information.

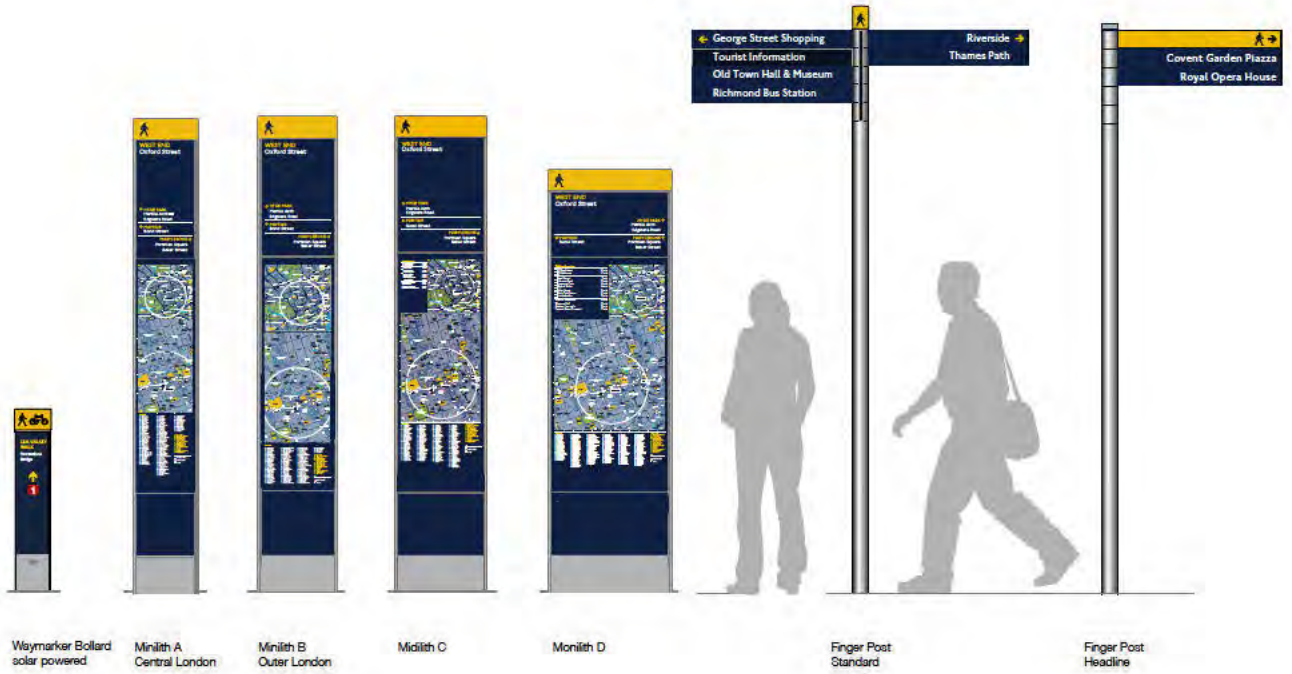
'Liths' should typically be located within the furniture zone, with the map face oriented down the street. Placement should be a minimum 450mm from the kerb edge, and increased to 800mm on flush surfaces or where road speeds are 40mph or greater. Designers should avoid locating signage where vehicle overrun is likely, such as near inset loading bays or on tight street corners.

Sufficient space should be provided on both sides of the sign for pedestrians to view the 'lith' from either side. 'Liths' should not be placed facing a wall, and this placement will only be approved in exceptional circumstances.

A temporary on-street cover should be provided once the placement has been agreed and the foundation has been installed. Heads-up mapping artwork can then be produced from this location and the sign installed once manufactured.

Figure 241: Legible London's wayfinding 'liths'/map-based totems product range

Legible London Product Range



Transport for London

Fingerposts

Fingerpost signs may be used in particularly complex urban environments at junctions, or as a simple route confirmation sign. However, map-based Legible London products are to be prioritised over fingerposts. Fingerslats can be installed on existing lamp columns where possible, or at low level on pedestrian guardrails.

Designers should ensure that the sign allows for a minimum clearance of 450mm away from the kerb edge for any part of the sign, including the fingers. This can mean that the pole for the sign needs to be mounted more than 1,000mm from the kerb edge, which will not be appropriate in many situations.

Figure 242: Legible London's finger post

The use of fingerposts is limited to areas with a sufficiently wide footway such that the post does not impede the footway clear zone or the sign overhang the carriageway.

Blue TSRGD approved fingerposts exist on parts of the TLRN and should be maintained until replacement is required. When replacement is required, Legible London branded signage should be used to maintain consistency across the TLRN, unless it forms part of a wider borough route signage strategy.

Information signage:

- Any third party information signage proposed for the TLRN which does not follow the Legible London template, requires Legible London programme team consent
- Non-standard products may be considered in exceptional locations for heritage areas, landmark sites, or to fit with adjoining signage strategies
- All information boards must be in accordance with TSRGD, Schedule 4

Authorisation

Only TfL has the authority to erect pedestrian signs on the TLRN. Permission should be sought from the property owner for erecting signs on to building frontages.

The safe operation of wayfinding signs should be assessed via the Road Safety Audit process to ensure the installation does not hinder visibility and sightlines.

Additional information

Legislation:

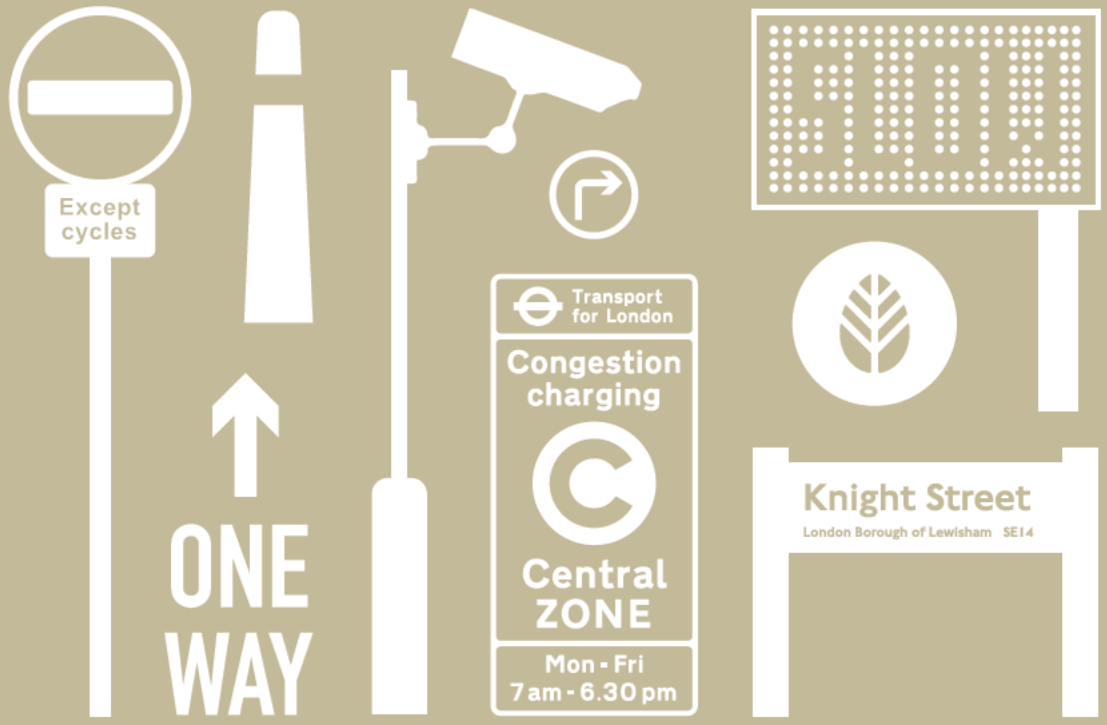
Traffic Signs Regulations and General Directions (TSRGD)

Transport for London:

Legible London Design Standards, 2010

Legible London: https://tfl.gov.uk/info-for/boroughs/legible-london

Part E Safety and functionality



12.1. Traffic signs

Ensuring the safe and reliable operation of London's road network for all users while reducing congestion and clutter is our prime focus. The quality and consistency of traffic sign design and their placement is vitally important for communicating a clear message to all road users, providing reliable directional information, traffic regulations and the warning of hazards.

Traffic signs referred to in this section have a fixed legend (directional and informatory signs) and/or a fixed symbol (warning and regulatory signs).

Technically, traffic signals and road markings can be described as traffic signs but are detailed separately:

- Road markings
- Traffic signals and control boxes
- Variable message signs
- Pedestrian wayfinding

Figure 243: The quality and consistency of traffic signage is imperative to communicating effectively to all users

Key streetscape aims

Design teams should aspire to implement a traffic sign system that embraces the significant innovations in traffic engineering and policy. Therefore all unnecessary signage should be removed from the network, especially where identified as a roadside distraction or visibility hazard. This will ensure that the road network is better managed and will enhance the quality of the streetscape.

The purpose of signage is to provide clarity for the user, it should have a clear purpose and convey necessary information.

Signage strategy

Signage is one of the main causes of clutter on our footways and where possible should be reduced. A well-designed strategy can be created by:

- Regularly conducting traffic sign audits to review the effectiveness of existing signage and identify signs that are obsolete or unnecessary. TSRGD should also be considered within the auditing process. For example, the ability to reduce the provision of regulatory signage required in certain situations. Where road widths are less than 5000mm, a single regulatory sign is now recommended, rather than providing a sign on both sides of the carriageway (note this does not apply to speed limit signs)
- Warning signs should only be provided where there is a specific safety issue or hazard
- In general we have a presumption against the provision of place name signs. However, should a convincing case be made for the need for a place name sign they should be simple and discreet. It is important to retain national consistency while developing bespoke solutions for local issues, such as place specific signs

In addition, signs can be combined with other street furniture, signals or mounted on buildings which can reduce clutter on the footway. However expert engineering advice should be sought as not all columns/structures are suitable for mounting signage on. The TSRGD and Traffic Signs Manual provide standards and guidance on what signs can be combined.

Post mounted signs

Design teams should minimise the number of posts used for each sign.

- Round posts are preferred with designers encouraged to use simple but robust support structures for the sign face
- Larger posts should be fixed within the footway using a bracket, while smaller posts should be installed with minimal infill between the post and the footway surface material
- Cantilevered signs from a single post can be used to maximise unobstructed footway widths. When cantilevering, the post should be located at the front, rather than the back of the footway with the sign towards the footway.
- Single posts are usually of greater diameter to ensure sufficient strength to accommodate additional wind loading

Alternative fixtures

To reduce the number of posts which contribute to street clutter, the design team should explore opportunities for mounting traffic signs on other highway furniture, structures or building frontages. Where traffic signs are not erected on dedicated posts, the adequacy and suitability of support must be checked.

Lighting columns and signal mounting

- Expert engineering advice should always be sought for any large sign, 600 square millimetres or above, that is proposed for attachment to a lighting column
- Smaller diameter 'no entry', 'no left' or 'right turn' and some other restrictive signs are allowed to be mounted on traffic signal heads
- Where practicable, smaller traffic signs (up to 0.3 square metres) should be mounted on lighting columns

Figure 244: Post mounted loading restriction signage

Figure 245: Signage and bus flag mounted onto existing street furniture

Figure 246: Signage mounted onto building facade

Building mounted signs

Before affixing a street lamp or traffic sign to a building, the authority will have to serve notice in writing on the building's owner no less than 56 days before the date on which they intend to commence the works. For further information please refer to the Code of Practice for Affixing Traffic Signs and Street Lighting to Buildings in London (2015) for exercising the powers set out in section 45 of the Public Health Act 1961 and section 74 of the Road Traffic Regulation Act 1984 as amended by clause 4 of the London Local Authorities and Transport for London (No. 2) Bill.

Low level signage

- Design teams should consider how to minimise the visual and physical intrusion of low level signage such as traffic bollards
- Integrating pedestrian and cycle signage within bollards can be an effective way of reducing the need for larger post mounted signs
- 'Keep left' signs should be provided only where a road safety audit has identified the need

Figure 247: Integrated bollard mounted cycle signage

Location

Placement standards	
Horizontal clearance width between sign assembly and the carriageway kerb edge	
Absolute minimum for roads subject to a 30mph speed limit or lower	450mm*
Absolute minimum for roads subject to a 40mph speed limit or more	650mm
Absolute minimum for flush surfaces (no kerb upstand)	800mm
Vertical sign clearance height above pedestrian only footways	
Absolute minimum	2,100mm*
Preferred minimum**	2,400mm

** Please refer to LCDS for guidance on sign placement next to cycle tracks*
***Clearance heights may be increased to discourage vandalism*

Repeater signs on posts should be mounted at uniform height across a given length of road.

Sign design

Sign dimensions

Design teams should refer to the Traffic Signs Manual and TSRGD to select the current size of regulatory or warning sign appropriate for the traffic speed. Refer to Appendix A of the Local Transport Note 1/94: Design and Use of Directional Informatory Signs for further information on directional sign heights and siting distances.

Illumination

Signs should not generally be illuminated unless legally required to, as specified in TSRGD.

Fonts

The smallest text size appropriate for the traffic speed should be used, to keep overall sign sizes to a minimum.

Figure 248: Signage content should be clear and legible for users

Content

Design teams should consider how signage can be simplified to include only essential information and optimise legibility, subject to any strategic or local signing requirements.

Finish

The finish of sign posts and the sign reverse should coordinate with lighting columns and similar street furniture within a given locality. The use of grey or yellow 'backing boards' behind signs should be avoided unless considered absolutely vital to road safety.

Legislation, statutory powers and consents

On the TLRN, only TfL has the statutory power to permit traffic signs to be erected or removed.

Figure 249: TLRN traffic restriction

All signs installed on the TLRN must comply fully with the standards outlined in the TSRGD. Expert advice should always be sought from a specialist to ensure compliance.

Statutory requirements and detailed guidance on the design of signing for the public highway are provided in the TSRGD. For sign legends not covered in TSRGD, separate special sign authorisation is required from the DfT. The proposals put forward in the DfT's policy paper, Signing the Way, give greater local flexibility and discretion in the design of non-standard signing and provide a framework for the removal of traffic signals. Further guidance is given in the TSM and the Local Transport Note (LTN) 1/94.

Signs requiring legal backing by road traffic orders can take up to three months to process and adequate time must be allowed in programmes to accommodate this.

Additional information

Legislation:

Traffic Signs Regulations and General Directions (TSRGD)

Department for Transport:

Traffic Advisory Leaflet 01/13 (2013): Reducing Sign Clutter

Signing the Way 2011: Traffic Signs Policy Paper

Traffic Signs Manual 1982 and 2013

Local Transport Note 1/94: Design and Use of Directional Informatory Signs

12.2. Bollards and low level traffic signs

Bollards tend to be overused or inappropriately located which can create clutter and pose a hazard for those with visual impairments. Bollards are used to discourage vehicles from encroaching on to pedestrian or cycle space, preventing vehicles from running over hidden basements, preventing damage to footway surfaces, street furniture and buildings while reducing the risk of pedestrian injury.

Bollards should be treated as a last resort solution and should only be used when all other alternatives have been exhausted. Other necessary street furniture or equipment should be reviewed to identify if it could be used instead to perform the same role as a bollard. Enhanced enforcement may also be a preferable solution to bollards to deter vehicles from encroaching on the footway.

Please consult the local authority conservation team when considering the removal or reuse of historic bollards.

Figure 250: Bollards protecting footway space

Alternatives

Design teams should consider where appropriate:

- Using street furniture or equipment to create a barrier using cycle racks, tree planting, seating, etc
- Using containment kerbs or high edge kerb upstands (140mm or more)
- Local strengthening of the footway where vehicles are known to mount the kerb

Layout considerations

For instances where it has not been possible to provide alternatives to bollards:

- Bollards should be arranged to minimise physical clutter while maintaining an appropriate defensive line; this may not necessarily be a straight line but could involve setting back bollards to align with other street furniture such as tree planting
- Filtered permeability, whereby motor vehicles are blocked but cycle access remains, can be achieved through the appropriate placement of bollards or street furniture across the carriageway
- Bollards are not required at side road entry treatments as they create additional clutter and do not provide protection for pedestrians

Safety

- Formal risk assessments may be required for the provision or retention of bollards
- Design teams should question any pre-existing arrangement of bollards and consider removal subject to safety advice

Bollard placement standards	
Minimum distance from kerb face	450mm
Recommended distance between bollards to prevent vehicle access	1,200mm (except for 'keep left' bollards)
Recommended distance between bollards for stopping vehicles from mounting the footway	At 3,000mm centres across width of footway
Bollard design standards	
Minimum bollard height	1000mm (except for keep left bollards)
Visibility bands	150mm band of contrasting colour

**Please note that these standards do not apply to security bollards which have their own defined manufacturer's specification and placement requirements*

Types of bollard

Bollards are available in a wide range of materials; where possible we have a general preference for bollards made with polymers that pass Head Injury Impact and Chest Impact tests.

Bollard designs should be selected based on the function they need to fulfil:

- The design should be appropriate for the character of the area
- Removal bollards may be appropriate for areas which are largely pedestrianised to restrict general vehicle access but allow for servicing vehicles
- A number of traditional historic bollards exist on the TLRN, some of which are listed, and should be retained
- The method of ground fixing should be detailed to minimise damage to the surrounding footway, should a vehicle collision occur, allowing for easy replacement of the bollard
- Bollards should not be linked with chain or rope

Options	General on footway	Removable posts	Security bollards
Image			
Application	Preferred design for urban areas	Where a street requires temporary vehicular access for servicing or maintenance	Station and building security
Dimensions	1,000mm height ±100mm Tapered Round	Minimum 1,000mm height	Must be specified and fixed in accordance with Publicly Available Specifications (PAS) 68 and 69 Round domed top
Colour	RAL coated black RAL signal grey	RAL coated black RAL signal grey	Silver grey
Material/finish	Flexible polymer	Flexible polymer	Stainless steel
Lighting	Unlit with white visibility bands	Unlit with white visibility bands	Unlit with visibility bands

Traffic bollards

Bollards can also be used as a mount for displaying traffic signs, but there is no legal requirement for a bollard to have a sign. Those which have a sign are classed as 'traffic bollards' and provide low level traffic signage through the use of permitted directional and pedestrian/cycle signs.

Low level signs permitted for use on bollards, DfT, TAL 03/13: Traffic bollards and low level traffic signs.

Options	'Keep left' – hoop bollard	Bollards with additional signage	Bollards with additional signage
Image			
Application	Preferred design for central urban areas and town centres	Preferred design for urban areas	Rural, suburban and conservation areas only
Dimensions	800mm height ±200mm 400mm width ±100mm	1,000mm height ±100mm Tapered Round	Recommended 1,000mm height Square diamond top
Colour	RAL coated black RAL signal grey	RAL coated black RAL signal grey	
Material/finish	Flexible polymer	Flexible polymer	FSC accredited wood
Lighting	Unlit	Unlit	Unlit with etched visibility bands

Figure 251: Signage types. Traffic signs are Crown copyright

'Keep left' bollards

There is no highway authority requirement to provide a 'keep left' bollard (TSRGD diagram 610) on a traffic island. Designers should assess whether a traffic bollard is required on a site-by-site basis.

Self-righting retroreflective 'keep left' bollards should be used as an alternative to illuminated bollards on the TLRN to improve safety and reduce maintenance.

Retroreflective coating, or coloured panels, should not be used on the rear face of bollards.

The luminance requirements for traffic bollards are set out in BS EN 12899-2:2007.

Additional information

Department for Transport:

Traffic Advisory Leaflet 03/13: Traffic bollards and low level traffic signs

Legislation:

Traffic Signs Regulations and General Directions (TSRGD)

Equality Act 2010

British Standards:

Publicly Available Specifications (PAS) 68 and 69

BS EN 12899-2:2007 Fixed, vertical road traffic signs. Transilluminated traffic bollards (TTB)

12.3. Street nameplates

The effective design and installation of street nameplates is essential for assisting the general public in navigating the road network, while also ensuring more efficient functioning of postal and emergency services.

This guidance is directed at local authorities to ensure a high standard of application for a feature that is present on almost every street in London.

Placement

Street nameplates should be positioned as near to street corners as possible to be easily read by all street users. Recommended placements should consider the context of the street and the relationship of adjoining streets.

Street nameplates should be mounted on to walls, buildings or other boundaries at the back edge of the footway where practical. Nameplates at major junctions should be positioned so as to receive illumination from adjacent street lights.

Post-mounted nameplates should only be used in exceptional circumstances where the sign would otherwise be obscured.

Figure 252: A street name plate

Acceptable mounting height	600-3,600mm
Preferred height	1,000mm
Preferred height where low level obstructions are likely	2,500mm
Major crossroads	Fixed at each street corner
Minor crossroads	One plate on each side of the street adjacent to the emerging traffic
T-junctions	Main street nameplate positioned directly opposite side road
Change in street name on same street	Sign both street names with arrows if desired
Long stretches without an intersection	Repeater signs at reasonable intervals and opposite entrances to places such as rail stations

Design

Street nameplates are commonly viewed from an acute angle and so the size and choice of font and spacing should be as legible as possible. Lettering is recommended to be at a height of between 75mm and 90mm. The minimum spacing between words should be approximately 50 per cent of the height of the lettering. Top and bottom borders should be approximately 40 per cent of the lettering height.

Street nameplates should provide strong visual contrast between the lettering and the sign background. The most effective colour contrast is black lettering on a white background. The preferred material for the plate is box-formed vitreous enamel.

Figure 253: Street name plates should provide strong visual contrast between lettering and the background

Most local authorities have a particular style of nameplate that they adopt for the majority of streets in their area. In many boroughs a coloured postcode and borough name has been introduced to provide additional information. The postal area and direction of house numbers may also be included to assist navigation. If district names are to be included on the street nameplate, reduced lettering heights should be used.

Where historic signage contributes to local character these should be retained and refurbished wherever possible.

Authorisation and maintenance

Local authorities are responsible for the installation and maintenance of street nameplates. Any proposal to move or erect street nameplates, should involve the relevant local authority.

It is recommended that the London boroughs regularly monitor the quality of street nameplates and building numbering in their area to ensure they are of a good standard, prioritising street nameplates at junctions.

Renaming

Any proposal to rename a street as part of a major streetscape improvement project requires authorisation by the local authority. Where approved, the old name should be crossed out and remain clearly legible below the new name. It should be retained for one to two years, before being considered for removal. Street nameplates with historic interest should be preserved wherever possible.

Additional information

Legislation

The Local Government (Miscellaneous Provisions) (Northern Ireland) Order 1995. No. 759 (N.I. 5). Part 11: Street names and numbering of buildings

Sections 64 and 65 of the Towns Improvement Clauses Act 1847 (TICA)

Sections 17-19 of the Public Health Act 1925 (PHA)

Local Government Act 2003

Joint Mobility Unit:

Sign Design Guide, 2000

London Transport Users Committee:

Where am I? Street name signs in London, 2003

12.4. Barrier free footways

Pedestrian guardrails

Pedestrian guardrails are known to give the impression of vehicle dominance, clutter, reduce kerbside activity, increase maintenance and block major pedestrian desire lines.

We have a presumption against the use of pedestrian guardrails in new schemes and will investigate removal where safe to do so.

The Local Transport Note LTN 2/09 – Pedestrian Guardrailing (PGR) notes that, 'there is no conclusive evidence that the inclusion of PGR at any type of pedestrian crossing or junction has any statistically significant effect on the safety record'.

Designers are encouraged to look at our Guidance on the Assessment of Pedestrian Guardrail for additional advice.

Figure 254: Guardrailing often restricts free movement by non motorised users

Guardrail removal

Streetscape Guidance promotes the removal of existing guardrails where a proven safety requirement cannot be demonstrated. Road safety audits should be undertaken in any guardrail removal assessment to determine the safety implications.

Partial removal of guardrails may be recommended to alleviate pedestrian pinch points. Guardrails on side roads adjacent to the TLRN may be located within the borough boundary, and so approval with the borough should be sought when requesting removal.

A cycle parking audit should be undertaken before removal to ascertain if the guardrail is used for cycle parking. Sufficient replacement cycle parking stands should be included accordingly as part of the removal process.

Monitoring

Periodic reviews should be undertaken to record any problems with guardrail removal, especially relating to collision numbers. This should be entered into the Traffic Accident Diary System (TADS) for long-term collision monitoring.

Guardrail retention

- The reinstatement of existing guardrails requires SDRG approval. Guardrails may be retained where a road safety audit confirms that pedestrian desire lines put pedestrians at risk, or on signalised pedestrian crossings. Please refer to the Guidance on the Assessment of Pedestrian Guardrail for additional advice.

Figure 255: Junction of Lancaster Place and the Strand before and after guardrail removal

New provision of guardrail

We will not support the installation of new guardrails except where a road safety audit has demonstrated a clear need. SDRG approval must be sought for any new pedestrian guardrails. Any new guardrails must be black.

Additional information

Transport for London:
Guidance on the Assessment of Pedestrian Guardrail, 2012

Department for Transport:
Local Transport Note (LTN 2/09): Pedestrian Guardrailing, 2009

12.5. Barriers

Vehicle restraint systems in the form of safety fences and barriers are installed on major arterial routes where vehicles travel at high speeds to contain vehicles on-carriageway and prevent collisions with oncoming traffic or roadside hazards.

Safety should always be the primary factor in deciding whether to install restraint barriers; however, the design, scale and build of the barrier should also be carefully considered to minimise the detrimental visual impact this kind of infrastructure can have on the overall streetscape.

Location

Designers should be conscious of streetscape considerations relating to the character of the road network and how road restraint systems create a visual and physical barrier between either side of the street.

Designers should acknowledge pedestrian desire lines and aim to reduce unnecessary severance caused by barriers by implementing alternative means to complete their journey.

Figure 256: Barrier provision is essential on certain roads across the network

Figure 257: The correct placement of barriers within the streetscape should be carefully considered

Design

Many types of safety fences and barriers are available to provide containment of vehicles. These include tensioned and untensioned corrugated beams, open box beams and concrete safety barriers; concrete providing the most robust treatment. A safety expert should always be consulted to select an appropriate product and detail the placement to best meet the requirements for the road environment and the hazard.

Safety fences and barriers are usually galvanised and should not be finished in black.

Where a safety barrier is provided in a busy pedestrian setting, designers are encouraged to provide a treatment on the reverse face which conceals fixings and has a smooth textured finish.

The placement of safety fences on grassed verges on higher speed roads should take account of the need to cut vegetation around the fence supports. It may be appropriate to incorporate a hard surfaced strip to remove the need to cut around the fence supports.

Where equipment is located behind a barrier, adequate vehicle access must be provided to give a position behind the barrier to allow safe operation of a mobile elevating work platform (MEWP). Alternatively, consideration must be given to changing a fixed CCTV column to a trolley head column where only a car size vehicle is required for maintenance.

Assessment process

A Road Restraint Risk Assessment process should be conducted on all trunk roads with speeds of 50mph or more, as detailed in DMRB Volume 2, Section 2, Part 8: Requirement for Road Restraint Systems. The assessment is also required on trunk roads with lower speed limits, where a potential roadside hazard has been identified.

The assessment process provides a framework to support designers in making the optimal site specific design decision on restraint requirements, while using a robust safety methodology.

Additional information

Department for Transport, Highways Agency:

Design Manual for Roads and Bridges: Volume 2, Section 2, Part 4, TD19/85: Safety Fences and Barriers

Design Manual for Roads and Bridges: Volume 2, Section 2, Part 8, TD19/06: Requirement for Road Restraint Systems

Manual of Contract Documents for Highway Works, Volume 1, Series 400: Road Restraint Systems (Vehicle and Pedestrian)

Manual for Streets (2007)

British Standards:

BS 7669-3: Guide to the installation, inspection and repair of safety fences

12.6. Utility cabinets

Utility cabinets (including signal controller cabinets) are generally located above ground to minimise installation costs and provide convenient access for maintenance.

We recognise the necessity for utility companies to have safe and efficient access to services; however, the proliferation of utility equipment within the street environment increases the visual impact on the streetscape and, if unchecked, can create additional unnecessary obstructions on the footway. Therefore, utility cabinets should be kept to a minimum.

Figure 258: Utility boxes placed at the back of the footway

Location

When utility companies seek to introduce a new cabinet on the road network, clear footway width must satisfy footway clear zones as described in Streetscape Guidance.

Cabinets should preferably be located at the back of the footway, away from windows or walls where they could assist in unlawful entry into properties. Cabinets must not physically or visually obstruct loading bays, service access points or crossovers. Exceptionally, if a utility cabinet is to be installed adjacent to the kerb, it must be positioned within the furniture zone.

Where a utility cabinet is to be located within a planted or grassed area, a minimum 500mm wide hard surface must be provided around the cabinet to allow for adequate access and to facilitate the maintenance of shrubs and grass.

Where a cabinet cannot be located against the back of the footway, doors should open so that utility operatives face towards the carriageway or oncoming traffic

Design

- Utility companies should be encouraged to use cabinets of a consistent and simple design
- The colour of the utility cabinet should be a black finish throughout London. Consideration may be given to the provision of non-standard finishes, such as green or beige, where there is an alternative palette of surrounding street furniture or if the utility cabinet is situated next to a listed building or structure
- Low-profile clear matt anti-graffiti finishes should be applied to facilitate the removal of graffiti and flyposters
- In exceptional circumstances and upon approval from both the utility company and the SDRG, bespoke covers or finishes can be provided to reduce the visual impact of the utility cabinet

12.7. Feeder pillars

Electrical feeder pillars are cabinets located within the highway boundary, designed to manage and distribute power to local electrical assets such as traffic equipment.

Always consult an electrical engineer when locating and specifying a feeder pillar unit. For instance, where the nearest supply source is not readily accessible it may be necessary to install additional isolating pillars.

Location

Pillars should be located at the back of the footway, adjacent to a wall or fence, where the likelihood of damage from vehicular collision is reduced, but away from locations where they could assist in unlawful entry into properties. They should be positioned to avoid creating a trip hazard, obstructing private property, doorways, accesses, shop windows or footways. All pillars should be oriented so that the door is easily accessible for a maintenance engineer.

The distance from a feeder pillar to the equipment it serves should generally not exceed 20 metres, due to electrical and fusing requirements. More than 20 metres can be used, but needs careful consideration by a suitably qualified electrical engineer.

Figure 259: Pillars should be placed away from pedestrian desire lines

Feeder pillars within grass verges should have a hard standing paved surround to enable convenient access.

Design

- Designers are encouraged to use cabinets which minimise the visual and physical intrusion of the feeder pillar in the street
- The size and type of pillar should be selected based on its functional requirements: small pillars for where a site supply is not metered, large pillars where it is metered, and generator connect pillars where supported by an external generator
- The colour of the feeder pillar should be a black finish throughout London. Consideration may be given to the provision of non-standard finishes, such as green or beige, where there is an alternative palette of surrounding street furniture or if the utility cabinet is situated next to a listed building or structure
- All hinges and locks should match the colour and finish of the main unit
- Pillar doors must be fitted with standard keys to allow distribution network operator (DNO) and maintenance engineer access
- Where equipment is fixed to a shared column and systems contain low voltage circuitry, for electrical safety reasons this will require the power for all equipment to be supplied from the same source, with each having a separate isolator
- A large feeder pillar may have to be used to accommodate the extra equipment

Additional information

British Standards:

BS 7671: Requirements for Electrical Installations

12.8. Variable message signs

Variable message signs (VMS) are designed to provide greater flexibility than standard road signs to inform users of changing network conditions. The display of temporary information can be used to alter customer behaviour, assist in improving traffic flow and network operation, alerting customers to:

- Congestion conditions along a corridor
- Construction and maintenance schedules
- Special event notifications
- Weather warnings
- Incident notifications

The variable messaging system is controlled remotely and enables the sign to show mandatory and/or advisory information depending on local, real-time requirements.

VMS are now being installed as permanent structures across major arterial routes and high roads. They may also be installed on a temporary basis during roadworks or planned events.

The installation of these signs can positively influence behaviour and may assist them to achieve quicker and safer journeys.

Figure 260: Variable message sign (VMS) when not in use

They are particularly effective for roads which provide an important strategic function on the network, helping to maintain good network performance by offering useful information.

Location

VMS are generally large units which can significantly impact on the visual character of the streetscape. Design teams should consider the scale of the signage relative to other streetscape elements and identify whether the network performance benefits of integrating a VMS into the street are outweighed by the impact on quality of place. When locating signs in conservation areas please consult with the local authority conservation officer.

VMS are costly to install and should be prioritised where issues of safety have been identified on the network. In conservation areas the use of VMS should be limited. On arterial motorway routes, with road speeds of 40mph or more, two VMS signs displaying the same legend should be implemented where possible.

The location should be selected based on site specific data collection requirements regarding safety, traffic speeds, existing signage, road capacity and the location of utilities. VMS units can be attached to existing structures.

Design of unit

- The material and finish of signposts should coordinate with other street furniture
- The sign face should be black when a message is not being displayed
- Controller cabinets should be located within 30 metres of the VMS display and should be black, positioned at the back of the footway or adjacent to the VMS
- Cantilevered signs are preferred to two post footway mounted signs on high roads, to minimise the number of poles used
- Gantry signs are large, overhead structures that should only be considered on high capacity arterial roads. The overhead position is more readily visible and legible for high speed roads; however, the large size of the structure is only appropriate for wide carriageway dominant settings
- Consideration should be given to combining VMS with electronic advertising boards with reference to statutory limitations on the use of VMS signs for this purpose
- Footway mounted sign heights should be increased to 3000mm where signs are adjacent to cycle or equestrian routes

The design of the unit and the mounting position determines the separation standards for placement of VMS on the network:

Mount	Height	Context
Overhead gantry sign	Minimum 5,500mm from carriageway surface	Arterial routes only
Cantilevered sign	Minimum 2,400mm from footway surface, 600mm from the kerb edge to any point on the sign	Arterial, high roads, city hubs
Verge sign/footway mounted	Minimum 2,400mm from footway surface	Arterial, high roads, city hubs

VMS placement standards	
Minimum distance between two verge mounted signs	200 metres
Minimum distance between two gantry mounted signs	300 metres

Types of display

Three types of display may be considered for use on the TLRN, with certain pros and cons for each medium. It is possible on larger signs to combine technologies within the same sign. Designers should select the display type based on how the sign is anticipated to be used, the type of information to be displayed, and if a wide range of information is required with symbols:

- Electro-mechanical – rotating planks with two or three faces or prisms can be used to give additional versatility to a standard fixed-faced traffic sign
- Reflective flip-disk – matrix of disks, one side black, the other fluorescent, flipped magnetically by electrical current. These signs are well suited to showing combinations of letters or symbols as a message
- Light-emitting – fibre optic or light-emitting diode technologies. The major advantage of these signs is that a greater range of messages can be displayed than for reflective technology signs

Sign design considerations

Sign designers need to consider a number of factors including:

- Sign sizes
- Character height
- Legibility
- Contrast and viewing angle
- Ambient illumination levels and expected approach speeds

Messaging

- Messages, symbols and abbreviations used on VMS shall conform to Regulation 58 and Schedule 15 of the TSRGD
- Standard messaging shall be from the Transport alphabet typeface prescribed in Regulation 13 and illustrated in Schedule 13 of the TSRGD
- Signs should never contain more than 10 words nor provide conflicting messages on any one sign
- When VMS are used as warning signs, it is usual for them to be fitted with four amber-flashing lanterns, subject to the provisions of Regulation 58
- Where a second sign is provided on a central reservation, it should only ever duplicate the message displayed on the verge sign

Authorisation

The appearance and legend of VMS signs should conform to Regulation 58 and Schedule 15 of the TSRGD. Sign designs and formats not conforming to the TSRGD are required to be authorised by the Secretary of State.

Applications for authorisation should in the first instance be addressed to the relevant government regional office or Highways England for trunk roads in England.

Additional information

Legislation:

Traffic Signs Regulations and General Directions (TSRGD) (Regulation 58)

Department for Transport, Highways Agency:

Design Manual for Roads and Bridges (DMRB), Volume 8, Section 2, Part 2 TD 33/05 The Use of Variable Message Signs on All-Purpose and Motorway Trunk Roads

12.9. Environmental monitoring equipment

Monitoring of local environmental conditions is important for quantifying the quality of the environment across the network. TfL and other authorities capture air quality and other environmental data to help inform policy and drive environmental improvements.

While environmental monitoring equipment may be necessary, it is vital that the placement and design of the equipment does not detract from the quality of the streetscape, safety or functionality.

Location

The position and size of the monitoring equipment will generally be determined by data collection requirements. Roadside monitoring is most common for emissions analysis; however, there are many considerations in locating environmental equipment within the street environment. From a strategic perspective, analysers must be suitably distributed to capture the data required for the study. They should not be located at point sources of high pollution unless that is a particular aspect to the study.

Smaller equipment should be mounted on existing columns and can be powered by batteries. Larger units will require a direct power supply, which may be able to be drawn from a nearby facility without extensive ducting. A broadband line may also be required to monitor data capture remotely.

The physical and visual impact of the unit should be considered such that any larger units avoid obstructing footways and sightlines. Special consideration should be given to the location of the equipment if it is required within a conservation area.

Units do not necessarily need to be located directly next to the carriageway and so may be installed at the back of footway, within building recesses or integrated with another facility. Site operators should be able to access all parts of the unit.

Designers should acknowledge the impact that the duration of study will have on siting the monitoring equipment. In certain situations, indicative monitoring may be sufficient over a few months, but in other cases more detailed monitoring will be required for a year or more.

Design

- A range of analyser types are available to capture data for different kinds of particulates and pollution
- To minimise the impact on the streetscape, a simple, clean, modern design of housing unit is preferred, matching the colour of adjacent street furniture
- Anti-graffiti and flyposting finishes should be applied, as used for control boxes and other utility cabinets
- The equipment being used determines the size and type of housing unit
- In most situations, monitoring equipment would benefit from being in an enclosed temperature controlled unit. This will however increase costs and the size of the unit required
- It may be useful to install meteorological sensors to capture local conditions and complement other datasets
- Planning consent may be required by the local authority for larger monitoring units

Additional information

Department for Environment Food & Rural Affairs:
Local Air Quality Management: Technical Guidance, 2009

Figure 261: Discrete monitoring equipment

12.10. Roadside cameras and CCTV

Introduction

Cameras are used by TfL and other authorities for several purposes:

- To enforce traffic regulations such as speed limits
- To enforce bus lane restrictions
- To enforce the central London Congestion Charge scheme
- To provide information on traffic congestion
- To assist the police with enforcement duties
- To monitor journey time

We share some cameras with London local authorities to reduce proliferation by promoting sharing and multitask equipment. When installing or replacing cameras a priority should be given to renewing or creating partnerships between suppliers to work towards reducing clutter.

Placement

The type and location of cameras is almost entirely governed by the function they are required to perform and the area of view they are required to cover. All cameras impact on the streetscape when mounted on columns. Wherever possible, cameras should be combined with lamp columns or attached to adjacent buildings or structures to reduce clutter, however, expert advice must be sought from an engineer prior to undertaking the work.

Prior to installing a camera on a building, the owner must first give consent and planning and listed building consent must also be sought if necessary. Installing a camera on a building may also require associated legal costs, annual rentals, maintenance agreements and bespoke mounting devices.

When mounting CCTV cameras on existing lamp columns it is vital to ensure that columns are capable of accommodating the additional load and are sufficiently rigid to minimise camera shake.

Where new lamp columns are being installed, consideration should be given to combining lighting with CCTV and roadside cameras. This will require a more rigid column (240mm diameter standard) than is typically installed for lamp columns and mechanical separation of the electrical supply. Designers should also consider the impact of light flare from the adjacent lighting unit

Where CCTV and roadside cameras are located on columns, the control equipment should be located separately in a cabinet on the footway, in accordance with the guidance on traffic signal control cabinets. Camera columns should be aligned in the furniture zone, especially in urban areas.

Figure 262: Enforcement cameras

A standard column height is eight metres, but poles also come in six, 10, 12 and 17 metre heights, however, safety cameras have their own requirements – please speak to our Traffic Infrastructure team for further information.

Design criteria

While some CCTV cameras may be attached to buildings or structures, many are located on high masts. CCTV cameras should be mounted on the most slender poles possible but must not be subject to camera shake.

When placed on grass areas there must be adequate hard stand around the column and a hard access route across the grass area, this must also be provided for the cabinet and power supply.

Roadside cameras require an electrical supply and a clear, unimpeded view of the highway. Safety cameras also require associated carriageway markings to support information recorded by the camera.

Fixed safety camera housings must be coloured yellow either by fully painting the front and back of the housing, or fully covering both with retro-reflective sheeting. The location of low level roadside cameras for speed, traffic signal or bus lane enforcement also needs to be conspicuous to avoid any claims of entrapment.

Materials

The function that the camera must perform often dictates the type of camera chosen

- **Shoebox camera** – allows for high optical zoom therefore best used when monitoring from greater distances. Shoebox cameras are commonly used for enforcement duties and perform better in low light conditions. They tend to be more expensive than a dome camera
- **Dome camera** – uses digital zoom therefore best used when monitoring areas of shorter distances. It is commonly used for monitoring traffic conditions and is less expensive than a shoebox camera
- **Automatic number plate recognition (ANPR) camera** – used to capture detailed shots of licence plates and the vehicles that have committed traffic violations. Also used to measure average vehicle speeds over several points
- **Safety camera** – used to capture traffic violations

Dome camera

Shoebox camera

Automatic number plate recognition (ANPR) camera

Safety camera

There are several types of column that can be used to mount a camera. The location, maintenance requirement and the speed and volume of traffic will influence the type of column used. Please contact our Traffic Infrastructure team for further information.

Fixed column

- Cheaper installation costs but more expensive to access and maintain
- Carriageway may need to be closed to access and service the camera
- Can be combined with other street equipment more readily therefore reducing clutter

Wind down trolley head

- Eliminates the use of mechanical lifts for servicing thereby reducing maintenance costs
- Area required to service the camera is reduced

Mounted on buildings

- Visual impact is reduced
- Require the permission of the building owner to access
- Require a maintenance agreement with the building owner
- Installation and operation costs can be more expensive

Figure 263: Mounting options

Fixed pole

Wind down trolley head pole

Combined with lights

Mounted on buildings

Data collection

Most street improvement projects will require some degree of on-street data collection, which may include pedestrian flow counts and classified vehicle counts. While some of this process can be conducted manually, more extensive data collection will require the temporary installation of cameras to capture movement data.

Cameras should be fixed securely to existing columns and should not obstruct the footway or impair roadside operational requirements. Contractors should ensure that any fixtures will not damage the adjacent street furniture. The temporary equipment and the mounting stands should match the colour of the surrounding street furniture.

Figure 264: Data collection cameras

Authorisation

Legislation:

Section 63 of the Road Traffic Regulation Act 1984 as amended by the Transport Act 2000 (Section 75)

Additional information

British Standards:

BS 7671 Requirements for Electrical Installations

12.11. Planned events infrastructure

Designing in permanent infrastructure to support planned events may be considered in exceptional circumstances for the delivery of certain key services on roads which regularly serve as a focus for significant citywide events. This may include reinforcing designated areas of footway for planned HGV overrun or for locations where generators will be accommodated during events.

As a general principle, streets should be designed for flexible use so that they can serve as focal points for activity when required.

In all cases we have a duty to 'assert and protect the rights of the public to the use and enjoyment of any highway for which they are the highway authority' (Section 130 of the Highways Act 1980) and so any temporary or permanent infrastructure to support a planned event should uphold this bond.

Other permanent event infrastructure

Design teams may wish to include additional services such as power sockets and fixtures to assist in the hosting of major events. Post mounted banner arms may be considered for lamp columns on roads which serve as major event routes.

Any other non-standard permanent item of street furniture should be approved by the SDRG. Bespoke features should be integrated with the streetscape palette to minimise the visual impact.

Additional information

Legislation:
The Highways Act 1980

Licence application:
http://www.tfl.gov.uk/info-for/urban-planning-and-construction/

Transport for London:
Highway Licensing and Other Consents, 2011
Network Operating Strategy, 2011

Figure 265: Some of London's streets regularly serve as a focus for major events

Part E Street environment

13.1 Street environment

London's street environment is influenced by a range of features which contribute significantly to the creation of distinctive and successful places. These features shape the look and feel of our streets, and vary between more obvious streetscape items, such as lighting columns and trees which should be positive attributes of the streetscene, to largely unnoticed or hidden structures such as drainage systems which are critical in the operation and management of it.

The importance of these features cannot be understated as they often 'set the scene' for life to take place on a street. They can also improve the experience of the street by providing tangible benefits such as pleasant, green social spaces for the enjoyment of local communities, and by improving surface runoff and water quality through an integrated sustainable urban drainage system (SuDS) network; to more intangible benefits such as enhancing the perception of safety in an area during the evening.

Figure 266: Trees can reinforce movement patterns and also provide a comfortable place to wait for the next bus

13.2 Growing a greener London

Vision

Much of the green infrastructure (GI) in London – including street trees, woodland, planted areas, grass and wildflowers – can be found alongside the road network. It is hugely important that these assets are properly planned, maintained and managed by the relevant arboriculture and landscape professionals. Delivering a cleaner, greener streetscape is central to achieving the

Figure 267: All public realm schemes should contribute to increasing the amount of green infrastructure across London

strategic goal of tackling climate change and enhancing the built environment.

Our vision is to ensure that the greening of our streets is an integral part of scheme development, optimising the potential of our streets for contributing to the GI agenda. There are a wide range of benefits associated with GI including improving air quality and human health, surface water runoff, mitigation of the urban heat island effect, increased biodiversity and ecosystem variety, and amenity value through creating beautiful and visually interesting streets and spaces for people to enjoy. All schemes within London – ranging from footway renewal to the wholesale redesign of a street – should ensure that all opportunities for improving and introducing new GI elements are fully explored.

Trees

New tree planting should be considered wherever appropriate within schemes. Working with trees means that designers are using a living organism that will grow, change and develop over time, it is therefore vital that the relevant arboricultural specialist is engaged at all stages of a scheme involving proposed trees.

Location

It is important that a range of considerations are taken into account when determining the location of a new tree. In some instances, trees have been planted in locations inappropriate for the development or lifetime maintenance of the tree, or without considering alterations to its immediate surroundings over time. Factors to consider when locating new trees include (but are not limited to):

- Street signs and traffic lights
- Proximity to dropped kerbs
- Footway width
- Proximity to carriageway

Figure 268: Working with trees requires taking into account the growth, development and maintenance of the tree over its lifetime

- Designated parking bays
- Proximity to other existing GI
- CCTV splays and equipment
- Proximity of buildings
- Heritage features
- Risk of subsidence
- Underground/overhead utilities
- Advertising hoardings
- Accessibility for future maintenance

Where possible, trees should be located within the furniture zone so as to provide the maximum footway clear zone for pedestrian movement (refer to 'Footway zones' in this guidance for further information). As with many street furniture items, the placement of trees should also help to reinforce public realm design elements such as:

- Strengthening movement patterns and corridors
- Connecting spaces and providing visual continuity across them
- Aiding the reinforcement of space and boundaries
- Providing character and a sense of place
- Enhancing architectural elements
- Screening to vehicle corridors and undesirable views

Figure 269: It is important that careful consideration is given to providing the optimum location for trees within the public realm

Species considerations

Once a suitable location has been identified, the relevant highway authority arboricultural specialist must be engaged to determine the appropriate tree species and specification to be used. The tree species planted should take account of existing trees and the long-term aspirations for the area, and should give due consideration to:

- Ultimate height, crown spread, stem diameter and habit
- Honeydew from aphids
- Fruit fall
- Ability to cope with a changing climate
- Pests and diseases
- Maintenance requirements
- Water requirements
- Scale of setting; Wildlife and Countryside Act 1981 Schedule 9
- Climate change adaptation benefits, including shade

Tree pits and surface specification

There are many different tree pit specifications of varying complexity, but no one design will be suitable in all situations and options should be agreed with the highway authority's arboricultural and landscape officer. Elements of the tree pit which must be considered include:

- Pit dimensions
- Soil specification
- Anchoring method
- Edging material
- Use of root cells/root barriers

While organic bark mulch is typically used as a surface material around newly-planted trees in hard landscapes, there are a range of surface materials which can be used depending on individual circumstances.

It must be remembered that newly-planted trees require an appropriate programme of irrigation to establish and thrive. This might involve hand watering or an automatic system; the relevant arboricultural and landscape specialist must be

Figure 270: A range of tree pit and surface materials are available and should be chosen based upon the location and specific requirements of the tree

Selection criteria	 Gravel: Resin bound	 Gravel: Self binding	 Grilles	 Mulch: Inorganic	 Mulch: Organic	 Rubber crumb	 Soil	 Asphalt
Tree criteria								
Permeability for air and water to reach the rooting medium if correctly maintained	**High**	**Medium**	**High**	**High**	**High**	**High**	**High**	**Low**
Flexibility of material	**Medium**	**High**	**Low**	**High**	**High**	**High**	**High**	**Medium**
Risk of damaging young tree health if incorrectly installed	**High**	**High**	**Medium**	**Low**	**Low**	**Medium**	**Low**	**High**
Risk of damaging established tree health if incorrectly installed	**Low**	**Low**	**High**	**Low**	**Low**	**Low**	**Low**	**Medium**
Risk of damaging young/established tree health if unmaintained	**Medium**	**Low**	**High**	**Low**	**Low**	**Medium**	**Low**	**Medium**
Potential to improve soil fertility	**Low**	**Low**	**Low**	**Low**	**High**	**Low**	**Medium**	**Low**
Suitability for installation up to the base of a young tree	**Low**	**Medium**	**Low**	**High**	**High**	**Medium**	**High**	**Low**
Site criteria								
Tolerance to regular pedestrian traffic	**High**	**Medium**	**High**	**Low**	**Low**	**High**	**Low**	**High**
Resistance to street sweeping machines/animal excavation	**High**	**Low**	**High**	**Low**	**Low**	**High**	**Low**	**High**
Effectiveness at suppressing weed growth	**Medium**	**Medium**	**Low**	**High**	**Medium**	**Medium**	**Low**	**High**
Availability of different colours/styles	**High**	**Low**	**High**	**High**	**Low**	**High**	**Low**	**Medium**
Installation and maintenance criteria								
Suitability for installation immediately after tree planting	**Medium**	**Medium**	**High**	**High**	**High**	**Low**	**High**	**Low**
Likelihood of requiring a subbase prior to installation	**High**	**Low**	**High**	**Low**	**Low**	**High**	**Low**	**High**
Level of experience/competence required to correctly install and maintain	**High**	**Medium**	**High**	**Low**	**Low**	**High**	**Low**	**Medium**
Expected lifespan of material	**Medium**	**Medium**	**High**	**Low**	**Low**	**Medium**	**Low**	**High**
Whole life cost of material, including purchase, installation, maintenance and disposal	**High**	**Medium**	**Medium**	**Low**	**Low**	**High**	**Low**	**Low**

engaged to determine what system/specification is most appropriate. Further guidance concerning irrigation can be found in the London Tree Officers Association (LTOA) guidance document Sustainable Water Management: Trees are part of the solution.

For existing trees, a range of surface materials can be used including (but not limited to):

- Gravel: Resin bound
- Gravel: Self binding
- Mulch: Inorganic
- Mulch: Organic
- Rubber crumb

Each surface material has its advantages and disadvantages and no one surface treatment is suitable for all situations. Guidance for material selection can be found in the LTOA document 'Surface materials around trees in hard landscapes'. The table (below) from the LTOA document should be read in conjunction with it.

If planting trees directly into the ground is not possible then it might be appropriate to use raised planters. Many different designs of planter are available and the relevant arboricultural and landscape specialist must be consulted in the selection of the appropriate product. It should be remembered that using planters could have implications on tree health, may attract litter/vandalism, require a higher degree of maintenance and will constitute an increased irrigation burden.

Maintenance

Trees differ from other assets in that they often appreciate with age and have less predictable life spans and maintenance regimes than built assets. They must be adequately protected when worked around in accordance with the principles set out in the documents National Joint Utilities Group Guidelines 4 (NJUG4) and British Standard 5837 – Trees in relation to design, demolition and construction.

In cases where tree roots are conflicting with footway materials the relevant arboricultural specialist must be consulted to find a suitable solution. This may involve extending the tree pit or manipulating or pruning the roots, although the latter is only to be undertaken on instruction from the relevant arboricultural specialist.

Removal of any item of green infrastructure is to be considered only when all other

Figure 271: Mature trees on Victoria Embankment

practicable solutions are not viable. If removal is considered necessary, this must only be undertaken with the consent of the arboricultural and landscape officer and may require planning permission, permits and licences, or senior management approval.

Lights in trees

The installation of lights in trees can be problematic and is generally not encouraged. However, if unavoidable then a suitable design must be developed which does not damage the tree. The relevant arboricultural and electrical specialists must be involved in this process.

Lights may require regular removal to inspect or maintain the tree. When installing lights in trees consideration must also be given to the location and installation of any feeder pillars. These must not have a detrimental impact on either the tree and in particular the root system, or pedestrian movement through the area.

Figure 272: Tree lighting should be carefully considered with relevant arboricultural specialists

Trees on the TLRN

Trees on the TLRN are the responsibility of TfL's arboriculture and landscape maintenance managers (A&LMM), who work in accordance with our Green Estate Management Plan (GEMP).

We require a minimum three-year guarantee on all new trees planted on the TLRN. Advice on planting of new trees, irrigation and maintenance must be sought from the A&LMM.

Tree removal on the TLRN is taken very seriously and is subject to a robust tree removal procedure. The removal of healthy trees is generally considered a last resort and should only be considered when appropriate to do so.

All trees on the TLRN are inspected on an annual basis for defects with work undertaken as necessary in accordance with the GEMP and best industry practice. Data pertaining to trees on the TLRN is held on the Network Asset Management System (NAMS) database.

All street trees on the TLRN have been assigned a monetary value using the Capital Asset Value for Amenity Trees (CAVAT) system as hosted by the LTOA. TfL will seek to secure compensation based on the CAVAT valuation for any damage which is caused to our trees.

Planted areas

Planted areas include woodland, shrub beds and hedges which can comprise a variety of deciduous and evergreen, native and non-native species. Each is managed according to function, species mix, age, condition and location. Species choice is vital to the success of any planting scheme and must take account of site factors and management requirements, including the following aspects:

- Function, for example screening
- Maintenance (access and frequency of operations)
- Tolerance to pests and diseases
- Tolerance to drought
- Tolerance to pollution and the ability to trap particulate matter
- Tolerance to road salt
- Tolerance to light or shade
- Life expectancy
- Seasonal interest (flower, fruit, foliage, stem colour)
- Biodiversity and wildlife objectives
- Ultimate natural size of plants
- Habit/form
- Antisocial considerations, as advised by the community safety officer

The ability to cope with a changing climate is also essential for all new planting schemes. Fixed irrigation systems are generally not sustainable due to ongoing maintenance and costs, and often cannot be used during hosepipe bans.

Green infrastructure may provide a sustainable urban drainage system function where surface water is dispersed through the soil rather than discharged into the highway drainage system. The replacement of hard surfaced areas with new grassed or planted areas can also contribute to SuDS, landscape integration, enhancing the built environment and visual amenity, nature conservation and biodiversity, and providing areas to support larger trees. Where new grassed or planted areas are proposed over old hard surfaces, such as footway or carriageways, it is essential to break out the old roadbed. Unless specifically designed as a SuDS measure, planted and grassed areas should not be relied upon as the main measure for the discharge of surface water.

Planted and grassed areas must be designed with consideration of existing and proposed pedestrian desire lines. Shrubs with thorns and spikes can act as a deterrent but must not be relied upon as the main measure to stop inappropriate access and can collect litter.

Planted areas should be designed with careful consideration of the realities of urban life and avoid the creation of concealed places close to pedestrian areas. Raised planted areas close to seating can become hotspots for needle disposal and litter accumulation. Raised planted areas are also discouraged in new schemes as they may require more regular watering over the lifetime of the planting scheme.

Occasionally, some areas of herbaceous and bedding plants or special horticultural features will require special maintenance operations. Hanging baskets are permitted, subject to appropriate licence approval.

Grassed areas

Grassed areas comprise highway verges, embankment and cutting slopes, central reserves and traffic islands. Some grassed areas have significant biodiversity interest and habitat value, supporting protected species of flora and fauna.

Any works on or around grassed areas must be in accordance with industry best practice. If it is necessary to track over a grassed area for construction or maintenance purposes, protection is required to limit the impact of heavy equipment to the satisfaction of the highway authority's arboriculture and landscape officer. Full reinstatement will be required to make good any damage.

Reinforced grass (plastic or concrete) measures may be used, following approval by the highway authority's arboricultural and landscape officer, to aid in reinforcement of grassed verges where residential off-road parking or access to properties is permitted.

The following are essential design considerations for newly grassed areas:

- Achieve the intended maintenance regime and required permits
- Avoid placing street furniture in grassed areas as additional trimming will be required
- Maintain sightlines, visibility and access where low frequency and wildflower grass verges are proposed
- Planting of seeds or plants of local provenance where existing habitats and wildflower areas might be compromised by the introduction of non-local species
- Should be of sufficient width to allow effective maintenance and avoid edges and corners becoming easily degraded
- Ensure that grassed areas are located away from strong pedestrian desire lines to avoid the grass becoming downtrodden
- Choose more drought tolerant grass species to limit irrigation regimes

Grassed areas on the TLRN

There are three broad grass maintenance regimes used on the TLRN:

A. Regular cut grassed areas with a high, medium or low frequency depending on the location. High frequency areas are high profile spaces and include 'town streets' and 'city places'. A medium frequency maintenance regime is usually more appropriate for verges in locations characterised by slower speed and higher residential populations such as 'local streets' and 'high roads', while a low maintenance regime is appropriate for higher speed road verges and central reserves on 'connectors' and 'arterial roads'.

B. Grassed areas with bulbs add seasonal interest and local colour. They are maintained as regular cut grass with the exception that the areas containing bulbs remain uncut for six weeks after flowering to allow energy reserves to return to the bulb underground. During this period the verge can appear unmanaged, but regular cuts to adjacent verges indicate that maintenance is active.

C. Wildflower (species-rich) grasslands have historically been limited to high-speed arterial roads but improved establishment and maintenance techniques have led to an increase in popularity and use in higher profile urban areas. They can add long periods of flowering and create habitat for insects, but the lower maintenance regime leads to longer grass which can appear unsightly if not carefully designed for succession flowering. Wildflowers grow best on nutrient-poor soils where competition from weeds is reduced. Understanding the soil conditions before sowing wildflowers is essential as weed control on fertile soils can be very difficult and expensive.

Figure 273: Planted areas form a large part of London's green infrastructure

Wildflower areas require one or two visits per year which reduces the need for permits and the emissions from cutting machinery. Litter collection, usually by the local authority, is a more difficult task in longer grass but is essential to ensure that the site is safe and litter-free before grass cutting.

Our A&LMMs are responsible for the management of all aspects of the Green Estate including planted areas in accordance with the GEMP. They must be consulted and approve all works and proposals which may affect it.

Passeig de St Joan Boulevard Barcelona, Spain

Creating a vibrant urban green zone using permeable paving and tree planting

Key functions

Opportunity

A wide, hazardous and unsightly footway in Barcelona has been transformed into a sustainable and vibrant green zone that better uses the available space.

Benefits

Through unobtrusive intervention this development has revitalised the social value of the boulevard, catalysing commercial and recreational use of the area while improving biodiversity.

Implementation

The poor condition of the Passeig de St Joan Boulevard was becoming a hazard for pedestrians. Instead of resurfacing the footway, an ambitious remodelling was undertaken. Space was allocated between pedestrian, recreational and cycle use. This was achieved by reducing the space allocated to traffic and by segregating the cycle lanes. Two new rows of trees were planted to improve the aesthetic quality of the boulevard. Adequate drainage into subsoil was an issue; this was facilitated through the use of a permeable pavement system which added to the appeal and sustainability of the site.

Images courtesy of Adrià Goula

Applying in London

Where wide footways allow, shared space can be created for pedestrians, cyclists and those wishing to stop and sit.

Chelsea Fringe London, UK

Making the most of existing infrastructure

Key functions

Opportunity
The Chelsea Fringe is an open source and largely free festival that runs for about three weeks every year from mid May to early June.

Benefits
The open access principle of the fringe ensures that almost anything goes from temporary to permanent installations, community-led garden initiatives, exhibitions, events, experiences, exhibits and talks and walks across London.

Implementation
The Chelsea Fringe, although independent from the RHS Chelsea Flower Show, runs with its support. The fringe is largely volunteer run and hosts a wide range of events. These are generally free and centred on plants and gardens.

Applying in London
With such a broad scope of potential events, the Chelsea Fringe has the ability to reach more Londoners than many other events. TfL has provided a platform for some Chelsea Fringe events that are sponsored by a third party or the applicant. All future events are subject to approvals from asset owners and the SDRG.

Additional Information

British Standards:
BS 5837:2012 Trees in relation to design, demolition and construction – Recommendations (BSI)

BS 4428: Code of practice for general landscape operations

Forestry Commission
Right Trees for a Changing Climate: (www.righttrees4cc.org.uk)

Greater London Authority:
Greenspace Information for Greater London (GiGL) (www.gigl.gov.uk)

Highways Agency (HA):
Design Manual for Roads and Bridges (DMRB): Volume 10, Environmental Design and Management, HA, Section 3: Landscape Management

DMRB: Volume 10, Environmental Design and Management, HA, Section 0, Part 2: Environmental Functions

DMRB: Volume 10, Environmental Design and Management, HA, Section 0, Part 3: Landscape Elements

London Tree Officers Association (http://www.ltoa.org.uk/):
Surface materials around trees in hard landscapes

Sustainable Water Management: Trees are part of the solution

National Joint Utilities Group:
NJUG Guidelines for the Planning, Installation and Maintenance of Utility Apparatus in Proximity to Trees, 2007

Susdrain (http://www.susdrain.org/)

Transport for London:
Green Estate Management Plan

Trees and Design Action Group:
Trees in Hard Landscapes: A Guide for Delivery, 2014

UK Roads Liaison Group:
Well-maintained Highways, 2013

New York City Department of Transportation:
Street Design Manual

13.3 Keeping London dry

Intense rainfall puts London at risk of localised flooding from surface water running off ever increasing impermeable surfaces. Effective rainwater management is vital to the functioning and enjoyment of London's road network.

With greater focus on the need to manage surface water runoff, we encourage designers to consider water-sensitive design principles and to explore opportunities for incorporating sustainable urban drainage systems as an approach to managing rainfall. For highway runoff, we will consider SuDS measures designed in accordance with the SuDS Manual (CIRIA C697) on a site-by-site basis.

Overview

London's drainage system is a complex interconnected arrangement of private and public drains and sewers, with public ownership in the hands of multiple highway and drainage authorities. Much of London's drainage assets are out of sight, hidden deep beneath our streets, but are nevertheless critical to keeping Londoners' feet dry. If these assets are poorly designed or not maintained in optimum condition, the effects can be devastating to local communities, disruptive to traffic flow and damaging to other highway assets.

Highway drainage systems must be designed to ensure minimal maintenance and a long life in terms of hydraulic and structural requirements. In addition, designers need to account for the potential impacts of extreme weather events, take steps to assess the risk of flooding, and take every opportunity to increase resilience.

The remainder of this section will focus on surface water drainage at the local level.

Types of drainage systems

There are many types of drainage systems available to manage rainwater. The size, shape, gradient and geology of a catchment area are all factors which can influence the type of system and materials used. London's highway drainage systems include:

- Attenuation tanks
- Balancing ponds
- Drainage pipes
- Filter drains
- Grassed surface water channels
- Kerbs and gullies
- Oil and petrol interceptors
- Soakaways
- Surface flow wetlands
- Surface water channels

Figure 274: A typical highway drainage system. There are features visible on the surface, such as covers and gratings as well as those buried and out of sight such as pipes and chambers

Typically drainage systems on the road network will consist of kerbs, channels, road gullies, and drainage pipes. The profile of the road surface forms an important function of this type of drainage system by guiding water towards gullies, minimising aquaplaning and splashing and maximising the longevity of the pavement and its associated earthworks.

Layout

Within the highway there are multiple elements which may influence layout and material choices. These include available outfalls for new systems, surface profile and steepness of gradients, pedestrian desire lines, constraints resulting from the location of utility services, the likelihood and impact of systems becoming blocked by detritus, trees and street furniture. All of these elements have knock-on effects to drainage systems above and below ground, so will influence the drainage design. For example, road gullies should be sited to intercept surface water immediately before a pedestrian crossing point and drainage pipe runs should avoid tree root systems.

Drainage systems need to have a minimal physical impact on the carriageway or footway. A well-designed and maintained road drainage system ensures:

- Safe conditions in all weather
- Minimal nuisance to pedestrians via splashing
- Minimal environmental impact
- Durability and robustness of the carriageway surface
- Minimal disruptions caused during regular maintenance

Where possible, drainage and possibly utility apparatus should be laid in 'corridors' in the footpath. This will improve ride quality and facilitate the future maintenance of the services with minimum impact on road closures. Refer to the NJUG Guidelines on the Positioning and Colour Coding of Underground Utilities' Apparatus (2007) for further information.

Cyclic maintenance activities are generally carried out without road space permits, hence thought needs to be given to positioning of gullies based on access and traffic flows.

Design criteria

The following is an overview of the requirements for typical drainage systems on the highway:

- New or upgraded drainage relating to highways shall be designed in accordance with the Design Manual for Roads and Bridges, the Specification for Highway Works, and Sewers for Adoption
- The principle adopted for all highway drainage should be the use of straight sections of pipe serving trapped gully pots. Pumping of surface water should be avoided
- Where it is not possible to install a gully pot due to depth of construction, a catch pit connected to a gully is permissible
- Designers should avoid the practice of connecting gully to gully as a means of transferring flows. Each gully pot should ideally have its own connection to the carrier pipe
- In exceptional circumstances short lengths of highway rider sewer will be allowed
- Preference should be given to flexible jointed pipes
- All access chambers shall be designed and constructed in accordance with Sewers for Adoption 7
- Gully pots shall be constructed in accordance with the appropriate standard detail and be of high performance concrete

- Gully covers shall be hinged, not lift out
- Cyclic maintenance activities are generally carried out without road space permits, hence thought needs to be given to positioning of gullies based on access and traffic flows

Trees and drainage systems

Trees, like drainage, are an essential element of any good street. Care must be taken when working with planting and drainage infrastructure to ensure that one does not affect the other causing increased maintenance requirements.

Tree roots are attracted to moisture leaving drainage infrastructure through defects, cracks and displaced joints. Slow flowing drainage and standing water at the surface may indicate a blockage due to root infiltration. If the defects are not detected and addressed by routine maintenance the roots will continue to grow, expand and exert pressure at the crack or joint where they entered the pipe. The force exerted by the root growth will over time break the pipe and may result in its total collapse, attracting a higher cost to bring the asset back to an acceptable level of service. Therefore all new drainage systems near existing or newly planted trees must be designed to prevent root infiltration.

Topography of carriageway profiles

The size and shape of a drainage area, as well as the length and gradient of the surface have an effect on the surface water runoff. CCTV surveys may be required to confirm whether existing drainage facilities are underperforming and whether new drainage facilities are required. Topographic surveys will need to be provided along with a localised gully catchment plan for any required remedial works as well as to support the positioning of new drainage assets.

The combination of topographic surveys and local gully catchment plans can be modelled to show how effective the spacing of features such as gullies and carriageway profiles are and used to develop improved layouts to reduce ponding and aquaplaning.

This analysis can be refined when looking at specific locations such a crossing points, turning circles and bus stops where there is a higher potential of ponding and nuisance.

Cambers and falls

Gradients at building frontages should prevent surface water from entering buildings, basements or station entrances. Surface water should be intercepted before bus stops, pedestrian crossings and junctions. Falls should be encouraged to direct surface water into gullies as collection points. Please refer to HD39/01 Footway Design of the DMRB for further information on the design of crossfalls and longitudinal gradient.

Low point should be at the gully and not located at the crossing otherwise localised ponding will occur at the crossing. If the road cannot be profiled to create a gully low point additional/alternative drainage arrangements will have to be made.

Materials and maintenance

Regular maintenance can have a positive impact on the life of assets. For example, well-maintained road drainage will reduce the risk of water-logged foundation layers resulting in improved ability to withstand loading and minimise reactive repairs or premature failures.

It may be false economy to choose materials on cost alone as there may be high maintenance costs if proprietary products or special maintenance activity is necessary to maintain an asset. Key to an excellent drainage system is ensuring that the need for disruptive traffic management during maintenance is kept to a minimum. Therefore it can be cost effective to invest in high performance materials at the outset.

Installation of ironworks and covers needs appropriate consideration and material specification. The following items need to be considered when installing a cover:

- Potential loading and strength of materials
- Manual handling limitations
- Noise generation
- Friction
- Seating
- Differential settlement
- Milling when resurfacing is carried out

The use of traditional covers and their associated construction methods have resulted in a history of failure without any warning, often resulting in lane closures at peak times and significant disruption to journey times. Taking appropriate consideration at design stage reduces the potential for high cost reactive defects and the risk of potential third party claims for compensation.

Grates

A gully grate is a slotted cover to a gully pot. Grates prevent objects from washing into gullies, thereby reducing the risk of blockages and flooding. Designers need to select the correct grating type and positioning of gullies. It is not good practice to position gully gratings adjacent to crossing points where they are a potential trip hazard.

Cycle friendly grates: In any location where there is a possibility that cycle wheels will cross gullies, the grate slots should be at right angles to the direction of travel. Alternatively, non-slot 'pedestrian style' gratings should be provided.

Pedestrian friendly grates: In any location where there is a high likelihood that a pedestrian will walk directly across the gully, this form of grate should be provided. These grates should be slip resistant and also prevent narrow heels from getting trapped. The grate should be at right angles to the direction of travel.

High volume grating: These may be used on the network where cycles are not permitted. High volume grates are at risk of capturing cycle wheels in the grating due to the large gaps required to capture higher rates of rainwater.

Slot channels: Consideration should be given to the maintenance implications of slot channels which can block with debris unless routinely cleared.

Channels: In some instances designers may need to install channels in the footway. Dished channels should be avoided as they do not provide a level walking surface. Due consideration should be given to their positioning and surrounding surfaces.

Figure 275: Cycle friendly grate on TLRN

Figure 276: Channel and pedestrian friendly gully