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8. Safety and functionality

8.1. Traffic signs

8.1.1. Ensuring the 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, by providing reliable directional information, traffic regulations and the warning of hazards.

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

8.1.3. 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



Key streetscape aims

8.1.4. With the advent of the new TSRGD, 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.

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

Signage strategy

8.1.6. Signage is one of the main causes of clutter on our footways and where possible should be reduced through the creation of signage strategies with well-designed signs and careful placement. A well-designed strategy can be created by:

- Removing any sign that has not been authorised or prescribed within TSRGD
- Regularly conducting traffic signs 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 5.0 metres, 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

8.1.7. In addition, signs can be combined with other street furniture, signals or mounted on buildings which can reduce clutter on the footway.

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. The post should be located at the front edge of the footway to reduce the risk of vehicles mounting the kerb and striking an overhanging cantilevered sign
- Single posts are usually a 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 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 0.6 square metres) should be mounted on lighting columns



Building mounted signs

- Permission should always be sought from the property owner for the installation of signs on to building frontages, with agreements made to allow for access and maintenance



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



Location

Placement standards

Horizontal clearance width between sign assembly and the 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	800mm
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

*Clearance heights may be increased to discourage vandalism.

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

Sign design

Sign dimensions

- 8.1.9. Design teams should refer to the Traffic Signs Manual (TSM) in order to select the current size of regulatory or warning sign appropriate for the traffic speed.

Illumination

- 8.1.10. Signs should not generally be illuminated unless legally required to, with relaxed requirements in the revised TSRGD 2015.

Fonts

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

Content

- 8.1.12. 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

- 8.1.13. The finish of sign posts and the sign reverse should coordinate with lighting columns and similar street furniture within a given locality; black in central London and town centres, and grey on arterial routes. 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

- 8.1.14. On the TLRN, only TfL has the statutory power to permit traffic signs to be erected or removed. 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.
- 8.1.15. Statutory requirements and detailed guidance on the design of signing for the public highway are provided in the TSRGD 2002 and 2015. For sign legends not covered in TSRGD, separate special sign authorisation is required from the DfT. The proposals put forward in the DfT's Signing the Way policy paper 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 1982 and 2013 and the Local Transport Note (LTN) 1/94.
- 8.1.16. 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 Signal Regulations and General Directions (TSRGD) 2002 and 2015

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

8.2. Bollards and low level traffic signs

- 8.2.1. 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.
- 8.2.2. 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.

Alternatives

8.2.3. 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

8.2.4. 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

Bollard placement standards

Minimum distance from kerb face	450mm
Recommended distance between bollards to prevent vehicle access	At 1,500mm centres across width of footway
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	800mm (except for bell bollard)
Visibility bands	Required in areas of high pedestrian flows

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




Types of bollard

8.2.5. Bollards are available in a wide range of materials; cast iron, steel, and aluminium are most commonly used on the TLRN. The type of bollard selected for a scheme should be appropriate for its location and fulfil acceptable physical and visual requirements.

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

- The design should be appropriate for the character of the area




- Telescopic posts 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. Any design of this nature requires SRG approval

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

Lighting	Unlit with white visibility bands	Unlit with white visibility bands	Unlit with visibility bands
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Traffic bollards

- 8.2.7. 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.
- 8.2.8. Low level signs permitted for use on bollards, DfT, TAL 03/13.

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	Coated stainless steel	Cast iron/mild steel	FSC accredited wood
Lighting	Retroreflective or internally illuminated	Unlit	Unlit with etched visibility bands

Keep left bollards

8.2.9. 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.

8.2.10. We have DfT approval for the use of retroreflective 'keep left' bollards as an alternative to illuminated bollards sited on traffic islands which are lit by street lights, in the following circumstances:

- Mounted on a central island or reservation for a zebra crossing with two Belisha beacons
- Mounted on a traffic island and facing the same direction as traffic signals



8.2.11. Retroreflective coating should not be used on the rear face of bollards.

Illumination

8.2.12. Where a bollard is fitted with a regulatory sign (diagrams 606, 610, 611, 616, 951, 955, 956, 957), internal illumination is required, except for a retroreflective 'keep left' bollard in certain locations, as detailed above.

8.2.13. The luminance requirements for traffic bollards are set out in BS EN 12899-2:2007. Bollards with plain faces are not constrained by TSRGD and there is no requirement for them to be directly illuminated.

Additional information

Department for Transport:

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

Legislation:

Traffic Signal Regulations and General Directions (TSRGD) 2002 and 2015

The Equality Act, 2010

British Standards:

Publicly Available Specification (PAS) 68 and 69

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

Flexible wands to delineate cycle lanes	Bike lane delineator London, UK
Image permission pending	Opportunity
	Flexible wands are a physical and visual barrier between cycle lanes and motor vehicle carriageways.
	Benefits
	Bases are sleek and low profile to provide maximum safety while providing the psychological barriers needed to keep bike lanes safe.
	Implementation
	Candlestick uprights provide 360° visibility and reflectivity, while the curbing system uses glass bead technology for long lasting, highly visible ground reflectors.
Applying in London	
Flexible wands are ideal for use in conventional bike lanes, buffered, contra-flow, raised-cycle tracks and even two-way cycle tracks. We are currently trialling these on the TLRN.	
Key functions:	
   	

8.3. Street name plates

- 8.3.1. The effective design and installation of street name plates is essential for assisting the general public in navigating the road network, while also ensuring more efficient functioning of postal and emergency services.
- 8.3.2. 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

- 8.3.3. Street name plates should be positioned as near to street corners as possible to be easily read by street users. Recommended placements should consider the context of the street and the relationship of adjoining streets.
- 8.3.4. Street name plates should be mounted on to walls, buildings or other boundaries at the back edge of the footway where practical. Name plates at major junctions should be positioned so as to receive illumination from adjacent street lights.
- 8.3.5. Post-mounted name plates should only be used in exceptional circumstances where the sign would otherwise be obscured.

Acceptable mounting height 0.6-3.6 metres

Preferred height 1.0 metre

Preferred height where low level obstructions are likely 2.5 metres

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 name plate 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

- 8.3.6. Street name plates 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.



- 8.3.7. Street name plates 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.
- 8.3.8. Most local authorities have a particular style of name plate 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 name plate, reduced lettering heights should be used.

Authorisation and maintenance

- 8.3.9. Local authorities are responsible for the installation and maintenance of street name plates. Any proposal to move or erect street name plates, should involve the relevant local authority.
- 8.3.10. It is recommended that the London boroughs regularly monitor the quality of street name plates and building numbering in their area to ensure they are of a good standard, prioritising street name plates at junctions.

Renaming

- 8.3.11. 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 name plates with historic interest should be preserved wherever possible.

Additional information

Joint Mobility Unit:

Sign Design Guide, 2000

London Transport Users Committee:

Where am I? Street name signs in London, 2003

8.4. Barrier free footways

Pedestrian guardrails

- 8.4.1. Pedestrian guardrails are known to cause 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 are actively removing guardrails where evidence from a safety audit demonstrates they are not required.
- 8.4.2. The Local Transport Note LTN 2/09 – Pedestrian Guardrailing (PGR)



suggests 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’.

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

Guardrail removal



Before



After

New Bridge Street/Fleet Street

- 8.4.4. Streetscape Guidance promotes the removal of existing guardrails where a proven safety requirement cannot be demonstrated. Road safety audits should be implemented in any guardrail removal assessment to assess the safety implications.
- 8.4.5. 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.
- 8.4.6. 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

- 8.4.7. 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

- 8.4.8. The reinstatement of existing guardrails requires SRG approval. Guardrails may be retained where a road safety audit confirms that pedestrian desire lines put pedestrians at risk, or on signalised pedestrian crossings with:
- A reverse stagger arrangement
 - Insufficient pedestrian space on the central refuge
 - A lack of tonal contrast between carriageway and central refuge surfacing
 - Staggered crossings should not include pedestrian guardrails unless there is a proven need as identified by a road safety audit

8.5. New provision of guardrail

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

Design considerations

- 8.5.2. Advantages - Guardrails are designed to:

- Prevent or discourage pedestrians from walking into the carriageway
- Offer an alternative to bollards to discourage vehicles using the footway

- 8.5.3. Disadvantages - Guardrails have been shown to:

- Visually clutter the streetscape, detracting from the quality of the public realm
- Reduce visibility at crossings when viewed from acute angles
- Physically sever either side of the road to the detriment of pedestrian desire lines
- Reinforce high traffic speeds by segregating pedestrians and vehicles
- Constrain cyclists particularly at corners and junctions
- Restrict kerbside activity: access to buses, loading bays, servicing and emergency services
- Be a maintenance liability and when damaged can pose a risk to road users
- Attract informal cycle parking

Design criteria

- Guardrails must contain offset vertical railings to enhance visibility of pedestrians
- Guardrail panels must be screw-fixed to posts, not welded, to facilitate replacement
- All fixings across the unit should be countersunk to provide a flush surface
- The colour of the railing should be black or signal grey to match existing street furniture

Contact

- 8.5.4. The programme of guardrail removal in TfL is led by our Outcomes Design Engineering team and supported by highways route managers. Contact this team for additional information.

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

8.6. Barriers

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

- 8.6.2. 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

- 8.6.3. TLRN 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.
- 8.6.4. Consideration should especially be given to locations where footways are next to the carriageway and a road restraint system is being considered. Generally these will be lower speed road environments which have localised hazards. Introduction of a restraint barrier in this situation could significantly impact on the quality and character of the road, reinforcing vehicular dominance. There will be a reduction in intervisibility between pedestrians and vehicles, and so vehicles are likely to drive faster.
- 8.6.5. Where a restraint barrier is being located across a hazard, such as adjacent to an embankment or on a sharp bend, designers should aim to minimise the length of barrier used.
- 8.6.6. Designers should acknowledge pedestrian desire lines and aim to reduce unnecessary severance by implementing barriers where people wish to cross.
- 8.6.7. Adequate space should be provided for cyclists adjacent to the carriageway, so they are not completely penned in by the restraint system. This is especially important on the approach to junctions.

Design

- 8.6.8. Many types of safety fences and barriers are available to provide containment of vehicles. These include tensioned and untensioned corrugated beams, open box beams, wire rope fences 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.
- 8.6.9. Wire rope safety fences are less visually intrusive than other forms of safety fence and may be suitable in lower speed environments. Safety fences and barriers are usually galvanised and should not be finished in black.
- 8.6.10. 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.
- 8.6.11. 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.

Assessment process

- 8.6.12. 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.
- 8.6.13. 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 Pedestrians)

British Standards:

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

8.7. Utility cabinets

- 8.7.1. Utility cabinets are generally located above ground to minimise installation costs and provide convenient access for maintenance.
- 8.7.2. 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.



Location

- 8.7.3. When utility companies seek to introduce a new cabinet on the road network, a minimum clear footway width of 2,000mm must be maintained. If a utility cabinet is to be installed adjacent to the kerb, a clear distance of 450mm must be maintained from the kerb face.
- 8.7.4. Cabinets should preferably be located at the back of the footway, away from windows or walls which could assist in unlawful entry into properties. Cabinets

must not physically or visually obstruct loading bays, service access points or crossovers.

- 8.7.5. 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.
- 8.7.6. 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 coordinated with the surrounding street furniture palette, such that a black finish is provided in central London locations and town centres, and a grey finish provided where cabinets are located adjacent to arterial routes
- 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 SRG, bespoke covers or finishes can be provided to reduce the visual impact of the utility cabinet

8.8. Feeder pillars

- 8.8.1. Electrical feeder pillars are cabinets located within the highway boundary, designed to manage and distribute power to local electrical assets such as traffic equipment.
- 8.8.2. Always consult an electrical engineer when locating and specifying a feeder pillar unit. For instances where the nearest supply source is not readily accessible it may be necessary to install additional isolating pillars.

Location

- 8.8.3. 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. They should be positioned to avoid 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.
- 8.8.4. Cables from feeder pillars to equipment should generally not exceed 20 metres, due to electrical and fusing requirements, and so the location of the feeder pillar relative to the electrical asset that it serves is limited. More than 20 metres can be used, but needs careful consideration by a suitably qualified electrical engineer.
- 8.8.5. 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
- Cabinets should match the standard TLRN street material colour palette for the area
- All hinges and locks should match the colour and finish of the main unit
- Pillar doors must be fitted with standard keys to allow UKPN and maintenance engineer access

Additional information

British Standards:

BS 7671 Requirements for Electrical Installations

8.9. Variable message signs

- 8.9.1. Variable message signs (VMS) are designed to provide greater flexibility than standard road signs to inform customers 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 events listings
- Weather warnings
- Incident notifications

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

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

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

- 8.9.5. 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.
- 8.9.6. 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.

- 8.9.7. 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 on the TLRN
- 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

Mount	Height	Context
Overhead gantry sign	Minimum 5.5 metres from carriageway surface	Arterial routes only
Cantilevered sign	Minimum 2.3 metres from footway surface, 600mm from the kerb edge to any point on the sign	Arterial, high roads, city hubs
Verge sign/footway mounted	Minimum 2.3 metres from footway surface	Arterial, high roads, city hubs

- Footway mounted sign heights should be increased to 3.0 metres where signs are adjacent to cycle or equestrian routes

- 8.9.8. The design of the unit and the mounting position determines the separation standards for placement of VMS on the TLRN:

VMS placement standards

Minimum distance between two verge mounted signs	200 metres
Minimum distance between two gantry mounted signs	300 metres

Types of display

- 8.9.9. Three types of display may be considered for use on the TRLN, 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

8.9.10. 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

- 8.9.11. 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.
- 8.9.12. Applications for authorisation should in the first instance be addressed to the relevant Government Regional Office or the Highways Agency for trunk roads in England.

Additional information

Legislation:

Traffic Signal Regulations and General Directions (TSRGD) 2002 and 2015 (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

8.10. Environmental monitoring equipment

- 8.10.1. Monitoring of local environmental conditions is important for quantifying the quality of the environment across the TLRN. TfL and other authorities capture air quality and other environmental data to help inform policy and drive environmental improvements across the network.
- 8.10.2. 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

- 8.10.3. 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.
- 8.10.4. 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.
- 8.10.5. 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.
- 8.10.6. Units do not necessarily need to be located directly next to the carriageway and so may be installed back of footway, within building recesses or integrated with another facility. Site operators should be able to access all parts of the unit.
- 8.10.7. 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

8.11. Roadside cameras and CCTV

Introduction

- 8.11.1. 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 Charging scheme
 - To provide information on traffic congestion
 - To assist the police with enforcement duties
- 8.11.2. 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

- 8.11.3. The location of cameras is almost entirely governed by the function they are required to perform and the area of view they are required to record. All cameras impact on the streetscape when mounted on columns. Wherever possible, cameras should be attached to adjacent buildings or structures, combined with lamp columns or traffic signals to reduce clutter.
- 8.11.4. 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.
- 8.11.5. When mounting CCTV cameras on existing lamp columns it is vital to ensure that columns are sufficiently rigid to minimise camera shake.
- Using dome style CCTV cameras on existing lamp columns is recommended due to their low weight

- 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 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
- 8.11.6. Where CCTV and roadside cameras are located on poles, the control equipment should be located separately in a cabinet on the footway, in accordance with the guidance on traffic signal control cabinets. Camera poles should be aligned in the furniture zone, especially in urban areas.
- 8.11.7. Low-level roadside cameras can be situated on a standard 76mm pole. A standard column height is 8.0 metres, however poles also come in 6, 10, 12 and 17 metre heights.
- 8.11.8. As a short-term CCTV solution, 3G CCTV cameras are available and can be mounted on existing infrastructure only requiring power supply.

Design criteria

- 8.11.9. 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 not be subject to camera shake.
- 8.11.10. Roadside cameras require an electrical supply and a clear, unimpeded view of the highway. Speed enforcement cameras also require associated carriageway markings to support information recorded by the camera.
- 8.11.11. Fixed speed camera housings must be coloured yellow either by fully painting the front and back of the housing or fully covering both the front and back with retroreflective 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

- 8.11.12. The function that the camera must perform often dictates the type of camera chosen:
- **Pan tilt zoom (PTZ) camera in shoebox housing** – allows for high optical zoom therefore best used when monitoring from a distance of above 350 metres. PTZ 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 350 metres or less. It is commonly used for monitoring traffic conditions and is less expensive than a PTZ 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.
 - **Speed camera** – used to capture traffic violations.



Pan tilt zoom (PTZ) camera in shoebox housing



Dome camera



Automatic number plate recognition (ANPR) camera



Speed camera

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

8.11.14. Fixed pole:

- Cheaper installation costs but more expensive to access and maintain
- Carriageway may need to be closed to access and service the camera

8.11.15. Wind down trolley head:

- Eliminates the use of mechanical lifts for servicing thereby reducing maintenance costs
- Area required to service the camera is reduced
- Combined with lights
- Visual impact is reduced
- Light column must be more rigid
- 3G camera could be used
- Mechanical separation of power supply is required
- Must ensure that light flares do not interfere with the operation of the camera

8.11.16. 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

Mounting options

**Fixed pole****Wind down trolley head pole****Combined with lights****Mounted on buildings**

**Image courtesy of
WEC Group Ltd**

Data collection

- 8.11.17. 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.
- 8.11.18. 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.



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

8.12. Planned events infrastructure

- 8.12.1. 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.
- 8.12.2. As a general principle, streets should be designed for flexible use so that they can serve as focal points for activity when required.
- 8.12.3. 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

- 8.12.4. 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.
- 8.12.5. **Any other non-standard permanent item of street furniture should be approved by the SRG.** Bespoke features should be integrated with the streetscape palette to minimise the visual impact.

Additional information

Legislation:

The Highways Act 1980

License 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