For example, implementing a footway closure and a lengthy pedestrian diversion where there is a high footfall would not be desirable. This may result in pedestrians choosing to walk unrestricted in a live carriageway to navigate around the works, rather than follow an inconvenient and time-consuming diversion to cross the road.

Works promoters must be mindful they do not encourage unsafe road user behaviour such as pedestrians stepping into the carriageway, or cyclists accessing a works site by riding through cones, or deviating from a segregated cycle lane onto a busy footway.

The impact of works should primarily be mitigated through minimising the area of works while maintaining safety zones, and then seeking to provide the most convenient routes past or through the works areas. If a direct route cannot reasonably be maintained then robust measures should be put in place to segregate and guide road users as appropriate.

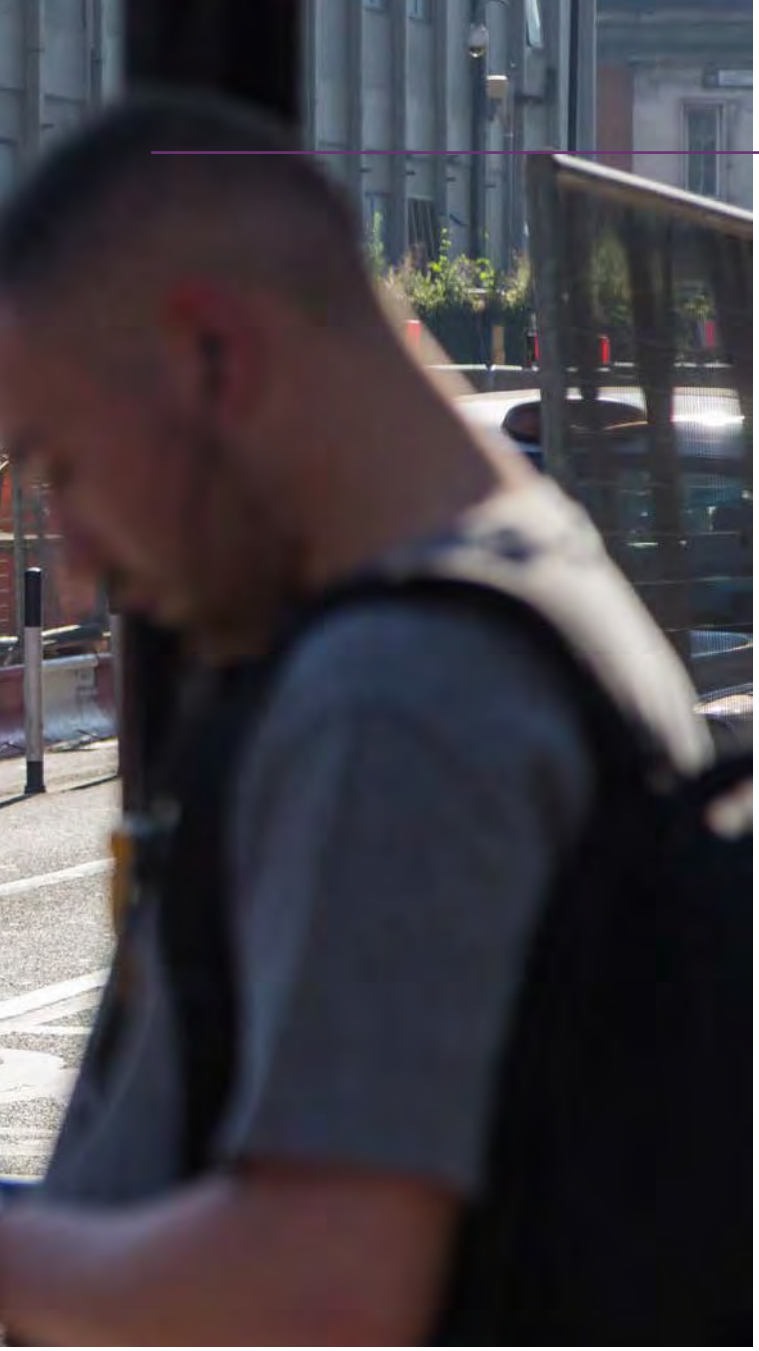
Routes past works sites must be suitable for all road users

Designers should be mindful that people may attempt to walk or cycle along routes with which they are familiar, even if their intended passage is made more difficult. This often applies when footways and crossing facilities are closed, but there remains a high demand from pedestrians; or when requiring cyclists to dismount when they could continue in the carriageway.

Signing should deliver information about the temporary conditions and should not solely be relied upon to direct behaviour. Consideration should be given to road users who are unable to read signs or comprehend English.

In addition to this handbook, stakeholders should also consider the following legislation:

4 https://www.legislation.gov.uk/ukpga/1974/37
5 http://www.hse.gov.uk/construction/cdm/2015/index.htm
6 http://www.legislation.gov.uk/uksi/1999/3242/contents/made
7 http://www.legislation.gov.uk/ukpga/1991/22/contents



- The Health and Safety at Work Act 1974, which ensures the safety of the public and employees at roadworks sites[4]
- Construction (Design and Management) Regulations 2015, which places legal duties on clients, principal designers and contractors to plan, co-ordinate and manage health and safety throughout all stages of a project[5]
- Management of Health and Safety at Work Regulations 1999, which establishes the need for work to be managed in a way that prevents accidents and ill health[6]

1.3 Designer's responsibilities

The recently released Chapter 8 (Part 3 U2.6) clarifies the roles, responsibilities and resulting risk-sharing of designers and authorities in planning works. It is for the designer to assess the site and produce designs to meet the requirements of Chapter 8 and the Safety Code, this guide and other nationally recognised industry publications.

TfL, under the New Roads and Street Works Act,[7] has a duty to co-ordinate and manage the impact of works on the TLRN and may request conditions relating to the works without taking on a designer's role before a permit is granted.

Each roadworks site will have variable characteristics to take into account, such as the geometry of the road network, hazards, and street furniture. It is essential that works promoters meticulously examine the nature of each site and do not just apply standard layouts that are not fit for purpose. Each option should be carefully considered and risk assessed.

Safe working methodologies and the design of the traffic management should, wherever possible, meet the needs of all road users, particularly the most vulnerable. If it is determined this is not viable, please contact the relevant TfL Assessor to look at alternative solutions.


BUS STOP
Westminster Stn
Westminster Pier
towards Waterloo
or Lambeth North
24 hour
148
211
UNDERGROUND

Chapter 2 – Pedestrians at roadworks

2.1 Walking in London

A new Walking action plan[8] will encourage more Londoners to explore the city by foot. The plan, launched by London's Walking and Cycling Commissioner in July 2018, sets out how London will become a city where walking, for those that can, is the most obvious, enjoyable and attractive means of travel for all short trips. This forms parts of the Mayor's Transport Strategy, which applies a Heathy Streets Approach to the whole of London for the first time.

Research shows many people are put off walking due to concerns about road danger. The purpose of this guidance is to ensure that roadworks are not considered as one of the deterrents to walking. Roadworks, and the temporary access arrangements around them, must therefore be carefully managed and designed to ensure alternative routes are clear, safe, and convenient.

London has higher flows of pedestrians than would typically be found in many UK urban centres. Many pedestrians are visitors and tourists from overseas who are unfamiliar with UK highways, traffic behaviour and signing. Works promoters need to be mindful of the risks this can generate and develop a safe system of work through a robust risk assessment.

2.2 Design principles

TfL applies seven key principles when designing for pedestrians, which jointly promote improved road safety and support a more attractive and better quality walking experience. These principles can be equally applied to temporary situations, and traffic management designers should give each principle due consideration when formulating a pedestrian strategy at works sites.

8 http://content.tfl.gov.uk/mts-walking-action-plan.pdf

Seven key principles when designing for pedestrians

Principle	Indicator	How it applies to traffic management
Safety	Walking environments should be safe to use and feel safe to spend time in	Ensuring routes are clearly communicated by design or signing; appropriate for wheelchair users and people who are visually impaired; safe from works and traffic hazards
Comfort	Walking environments should allow unhindered movement for all pedestrians and meet demand	Ensuring routes have good surfaces; are well-lit and 'open' to avoid ambush points and a fear of personal security
Inclusivity	Walking environments should support all types of pedestrians to improve accessibility by creating inclusive streets and places	Ensuring barriers meet chapter 8 requirements: correctly erected; free from trip hazards; ramps should be stable and with shallow gradients; where crossings are closed alternative controlled crossings are supplied to enable pedestrians to cross safely with adequate time
Directness	Walking environments should not be obstructive, allowing easy and convenient routes to create accessible and connected places for all pedestrians	Diversion routes should be convenient and as close to desire lines as possible. Designers should design to expected behaviours, not intended behaviours
Legibility	Walking environments should be legible for all pedestrians to know intuitively what places are for and who has priority at any given time	Pedestrians using the road should be able to understand exactly what is happening and what is expected of them. Signs should be carefully selected to avoid clutter but benefit the road user. Navigation should be initiated by the design layout as far as possible and supplemented by signs where needed
Attractiveness	Walking environments should be inviting for pedestrians to go through or spend time in	Segregation of traffic from pedestrian routes, reducing vehicle speeds, keeping the site and its surrounds clean and tidy. Plant and materials should be stored safely and in an organised fashion. Barriers, signs and cones should be well maintained and kept orderly. Barriers should be continuous and consistent and all equipment washed and repaired or replaced if damaged
Connectivity	Walking environments should support key walking routes to meet pedestrian desire lines. Street quality should be consistent to ensure attractiveness is not in isolated areas to support the permeability of places	Ensuring routes and signing cater for expected pedestrian traffic including commuters, tourists and surges in demand from nearby special events

2.3 Inclusive access

The Safety Code states:
'You must take into account the needs of children, older people and disabled people, having particular regard for visually impaired people'

and you must provide:
'a safe route suitable for people using wheelchairs, mobility scooters, prams or pushchairs'

Temporary situations without proper planning and robust risk assessments can result in reduced comfort to the public and place people at risk. Disabled pedestrians and blind or partially sighted people are particularly vulnerable.

Unlike drivers of motorised vehicles who are trained and tested to use a vehicle on the highway, in many cases pedestrians will not have the same knowledge of traffic signs. They are also permitted to use all areas of a highway. Their unawareness must be considered to ensure design proposals are as naturally intuitive as possible.

In circumstances where pedestrian flows are high or space is constrained, sign placement needs very careful consideration to avoid creating footway pinch-points or obstacles.

It is also important to ensure that signs are not obscured by the volume of pedestrians using the highway, and that traffic management proposals clearly demonstrate how this will be achieved.

In practice, this means that an inclusive design approach must be used for temporary arrangements and that reasonable adjustments must be made to help disabled pedestrians travel easily.

Every pedestrian should be able to use the street independently and with confidence at any time of day. Reference is made again to the two fundamental statements from the Safety Code that must always be kept in mind:

'Will someone using the road or footway from any direction understand exactly what is happening and what is expected of them?'

'Have I made the site safe to work in and for the general public?'

Chapter 8 (Part 3 UI.4.2) also states:
'Underlying the design of temporary traffic management arrangements should be the aim to achieve a level of safety and road user comprehension no worse than the rate for non-works conditions…'

Site-specific risk assessments must also consider the needs of visually impaired and disabled people

High pedestrian flows need careful consideration when planning signing strategies

Pedestrian comfort should be maintained in relation to predicted flows. TfL's Pedestrian Comfort Guidance[9] highlights the need to devise suitable space and recommends a two-metre-wide footway to allow two wheelchairs to pass each other if space permits. The Pedestrian Comfort Guidance ideal minimum width in low-use areas is 1.5 metres. However, this will depend on the length of the works. With longer work areas, provision for a waiting space may be required.

To assist designers in allocating space for walking, the Pedestrian Comfort Guidance defines a scale ranging from A-E (comfortable to uncomfortable) for footway comfort levels. Where it is achievable the benchmark for comfort is ideally class B+, but no less than B-.

As the Safety Code clarifies, traffic management must take into account the needs of children, older people and people with disabilities, particularly those with sight impairments. It must provide a safe route that is also suitable for people with small children, pushchairs, wheelchairs and mobility scooters. These issues must also be considered in the context of the Equality Act 2010,[10] which places a legal obligation on public bodies to have due regard to the need to advance equality of opportunity between persons who share a relevant protected characteristic and persons who do not share it.

9 http://content.tfl.gov.uk/pedestrian-comfort-guidance-technical-guide.pdf

10 https://www.gov.uk/guidance/equality-act-2010-guidance

Pedestrian comfort levels (PCL) for different localities

Scale	High street		Office and retail		Residential		Tourist attraction		Transport interchange	
	Peak	Ave of max	Peak	Ave of max	Peak	Ave of max	Peak	Ave of max	Peak	Ave of max
A	Comfortable		Comfortable		Comfortable		Comfortable		Comfortable	
B+										
B	Acceptable				Acceptable		Acceptable			
B-	At risk		Acceptable				At risk		Acceptable	
C+	Unacceptable / Uncomfortable				At risk		Unacceptable / Uncomfortable			
C-			At risk						At risk	
D					Unacceptable / Uncomfortable					
E										
	Peak and Average of maximum activity levels have similar guidance as people visiting retail areas stated they were particularly sensitive to crowding		The 'at risk' level is set at a lower PCL during the Average of maximum activity than peak flows. This is because of the greater number of single travellers and the short duration of maximum activity		The 'at risk' level is set at a lower PCL than peak flows in Residential Areas to reflect the short time this is likely to occur. A site visit to Residential sites is particularly important to check if there is school activity or a bus stand in the area		Peak and Average of maximum activity levels have similar guidance as people visiting tourist areas are likely to be particularly sensitive to crowding		The 'at risk' level is set at a lower PCL during the Average of maximum activity than peak flows. This because of the greater number of single travellers and the short duration of maximum activity	

2.4 Footway ramps and boards

The Safety Code gives advice on footway ramps and boards, however, in February 2018 the Highway Authority and Utilities Committee produced Advice Note (No. 2018/01), Specification and Operational Requirements for Footway Boards, Driveway Boards, Footway Ramps and Road Plates.[11]

This is a standard that facilitates wheelchairs and mobility scooters to transition over a kerb from footway to carriageway in temporary situations. The advice note gives supplementary guidance to the Safety Code, although it is acknowledged there are some variations when compared to the advice contained within the Safety Code. For clarity, TfL recognises and accepts the Highway Authority and Utilities Committee advice note (2018/01). Contractors are expected to demonstrate they are operating to this latest advice and the changes in standards to support site-based risk assessments by being less prescriptive to enable better design. They should not be seen as a lowering of standards.

Under the Equality Act 2010, works promoters are required to provide auxiliary aids or services to enable disabled people to continue to use a service or route, and to overcome physical features. It is not only people who are disabled who can find temporary situations more difficult to navigate - children, older people or those with injuries or luggage will also benefit.

When installing footway ramps to make kerbs accessible, special attention should be paid to ensuring the gradient is not too steep for wheelchair users to safely use. The gradient will be greatly influenced by the kerb height and it cannot be assumed that standard off-the-shelf products will meet the specification in all circumstances. Standard kerb heights range from 100mm to 140mm and specialised bus stop kerbs can be 220mm high.

The Department for Transport's (DfT) advice note on Inclusive Mobility[12] advises that ramps should ideally be 1:20 with a maximum length of 10 metres. Steeper ramps with a 1:12 gradient are acceptable at lengths less than two metres, and at 1:10 if no longer than 600mm.

11 http://hauc-uk.org.uk/publication/69/

12 https://www.gov.uk/government/publications/inclusive-mobility

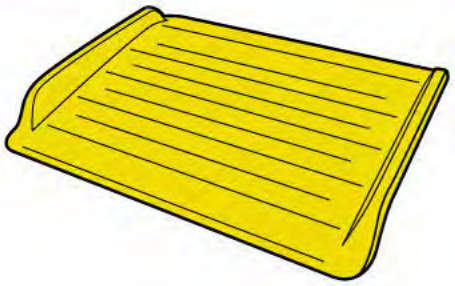
Temporary tarmac footway

Temporary plastic footway ramp

Designers will need to assess the height of the obstacle and therefore length of ramp to ascend/descend and the resulting carriageway intrusion/impact with turning space when required. Where a ramp protrudes into a live traffic lane, it is paramount the hazard to cyclists and motorists is clearly signed and guarded.

Duration of works and site attendance will also be fundamental to the design solution. For off-peak working and fully attended sites, a steeper ramp may be tolerable. However, for unattended works sites of extended duration, designers should ensure ramps are feasibly shallow.

Typical footway ramp



Kerb ramps help maintain accessibility for people who are disabled, or pushchair users

2.5 Safe routing

The Safety Code has a hierarchy for providing safe routes for pedestrians when works obstruct a footway, either in part or wholly, and makes it clear that a temporary walkway should only be provided in the carriageway if it is not possible to provide a safe pedestrian access on the footway.

However, when this process is applied to footways with high or very high pedestrian flows, which is typical of many central urban areas, designers will need to risk assess the impact of a total closure (or substantially restrictive partial closure) and the suitability of rerouting the pedestrian demand.

If crossings become overly congested, or the detour is significantly different to the pedestrian desire line, it is probable that a number of pedestrians may opt to ignore the signed instructions and walk outside barriers into the live carriageway adjacent to the closed footway. Mitigation will be required, by advanced planning (checking schedules of music/sporting events), modifying the traffic management at peak flows or supplying marshals.

It is a requirement of the Safety Code that someone on a footway approaching from any direction will understand exactly what is happening and what is expected of them. A pedestrian route should be intuitive through design and layout and not be confusing. Signing, which could include non-traffic signs, may assist with destination routing and reduce confusion.

A robust traffic management design should cater for expected public behaviour and not expect road users to behave as desired in a theoretical circumstance. Therefore it will frequently be the case in these situations that the safest solution to manage pedestrians is to provide a walkway of sufficient width in the carriageway. This will often retain pedestrians closest to their original desire line.

At temporary works, where there is a risk of pedestrians not understanding or disregarding signing to cross the road at the designated crossing points, pedestrian barriers should be considered to prevent crossing at less safe locations.

Some locations are subject to crowding, such as outside stadiums, concert venues and major transport hubs. The type of barrier used in these situations should be suitable for crowd management and safe for emergency evacuations of adjacent premises and facilities.

Supplementary non-traffic destination signs

Poor sign usage and clutter

2.6 Footway closures

In the majority of cases, a legal notice under the Highways Act is not required to formally close a footway if an adjacent pedestrian route is maintained, or an alternative pedestrian route is provided for the same section of highway. However, a legal notice will be required for that section of footway if:

- A pedestrian route cannot be maintained
- A subway is to be closed
- A footbridge is to be closed

This Highways Act notice is separate to any permit approvals that may be required for the works. In all situations, an alternative diversion route needs to be identified. The route must be as close to the original desire line as possible, accessible and considered reasonable for pedestrians with mobility impairments. By reasonable, it means the route has been successfully scrutinised with due regard to the footway surface condition and that it is free from slip and trip hazards.

Where the route is over a verge then it should be surfaced with a temporary covering or compacted granular material so that it is suitable for all pedestrians with special consideration for wheelchair users, visually impaired people and those with restricted mobility. Access to all affected properties must be maintained and assistance provided, where necessary, for pedestrians who may require it.

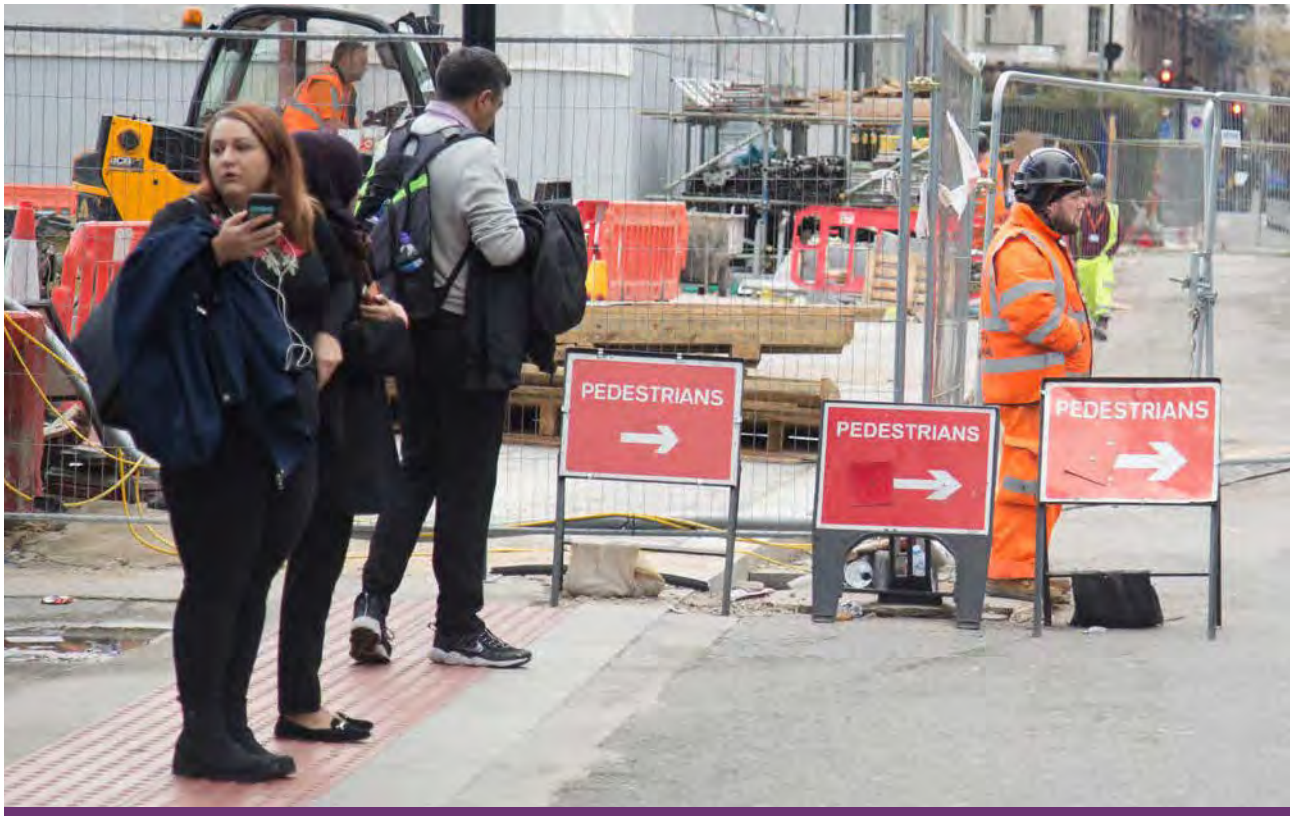
If a footway closure is necessary despite the likelihood of causing significant impact, marshals should be available in key locations to guide and assist pedestrians. Significant impact could be determined by a number of factors, including:

- High pedestrian flows
- Lengthy diversions likely to cause hardship to pedestrians with restricted mobility
- More complex diversions likely to cause confusion to visually impaired people

Further mitigation measures should be considered to lessen the impact of footway closures. Temporary pedestrian crossing systems such as portable traffic signals can avoid lengthy diversions and provide a significant local benefit, particularly in areas frequented by shoppers, commuters, tourists and schoolchildren.

When pedestrians are diverted in close proximity to cycle tracks and lanes, extra steps may need to be taken to avoid conflict between cyclists and pedestrians. Examples include longitudinal barriers which can prevent pedestrians walking in to the carriageway, signs warning pedestrians to look in the correct direction, and monitoring pedestrian activity once the site has been installed to see if expected behaviour matches actual behaviour.

Closed footway with temporary walkway in carriageway



Marshals can help maintain a safe system of work and assist pedestrians

2.7 Personal safety and security

Section 17 of the Crime and Disorder Act 1998[13] places an obligation on local authorities and the Mayor to do all they reasonably can to prevent crime, disorder and behaviour affecting the local environment.

Pedestrian provision should feel safe and avoid creating environments that could lead to crime or antisocial behaviour. TfL has a duty to give due regard to crime and disorder and be satisfied that traffic management proposals have been assessed for security and personal safety, as well as the basic amenity required by the Safety Code. Consequently, designers should consider potential ambush points caused by hoarding, fencing, hidden corners or where a diversion route is implemented away from the public highway.

When rerouting pedestrians with high barriers or hoarding, street lighting needs to be sufficient to illuminate the footway surface to prevent slips and trips and, critically, to avoid casting shadows and dark ambush points which may facilitate crime. Barriers and hoarding should be chamfered, splayed and/or angled where necessary to prevent hiding places, which may encourage antisocial conduct.

Regular site inspections for general traffic management maintenance should also include inspecting areas where suspect packages could be concealed. All contractors and members of the public are reminded to remain alert to the danger of terrorism and report any suspicious activity to the police immediately on 999 or the anti-terrorist hotline: 0800 789 321.

Standard maintenance of works sites should also include regular inspections to ensure tidiness, with any accumulating litter properly disposed of within the confines. Public-facing boundaries of the site barriers in situ for prolonged periods can often trap litter, which is both unsightly and potentially an obstacle to pedestrians.

13 https://www.legislation.gov.uk/ukpga/1998/37/contents

Good example of site hoarding

Poor hoarding creating dark and foreboding footway

2.8 Pedestrian barrier selection

All pedestrian barrier systems should comply with the following standards:

- BS 8442:2015
  Miscellaneous road traffic signs and devices
- BSENI2899-I:2007
  Fixed, vertical road traffic signs
- The Safety Code
- Chapter 8
- TSRGD

Deviations from the above standards should only be in exceptional circumstances following a site-specific risk assessment that identifies there is a safer and appropriate alternative. Works promoters, designers and contractors must be aware that metal crowd control barriers or similar products are unlikely to be suitable as they do not comply with the national standards above.

Works promoters should be mindful of the differences between traffic and pedestrian barriers as the products often appear very similar.

Where footways are subject to high pedestrian flows/crowding, or where high winds could be prevalent, barrier systems should be reinforced with ballast in accordance with manufacturers' guidelines.

Alternatively, more suitably robust and heavy duty barriers should be provided to ensure stability under extraordinary conditions.

In exceptional or special circumstances a viable pedestrian route may be necessary on a dual carriageway or high-speed road. In these circumstances, consideration should be given to providing protection with a tested and approved vehicle restraint system. For all times of the day the design of the walkway must consider disabled pedestrians, particularly those with visual impairments.

It is not acceptable to use tape such as barrier or hazard warning tape, at the perimeter of a works site, or a rope/chain in place of an approved barrier system as it does not comply with the national standard.

Low-trip hazard barrier feet are recommended to better facilitate pedestrians with disabilities as they remove trip hazards and give greater visual awareness of potential trip hazards and add more space for comfort.

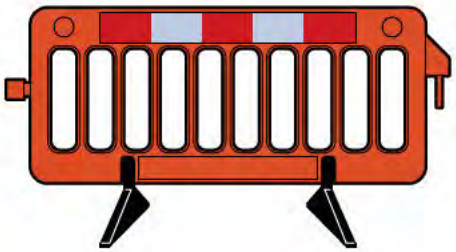
A designer must consider the site from a child's perspective. Children do not perceive danger in the same way as adults and they can often see works sites as fun places to enter out of curiosity. Where children can be reasonably expected to use the footway, it is unlikely that modular post- and plank-style barriers, as shown in the image on the right, will offer a sufficient barrier to children who could easily climb through the large gaps.

This is especially important for works near schools, parks, residential estates and similar environments where children may be unsupervised by adults.

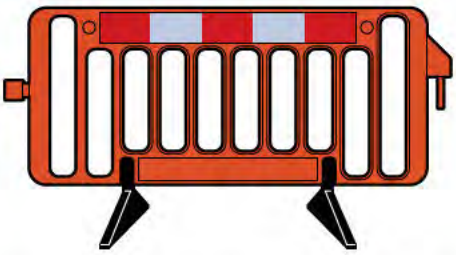
Unless a site-specific risk assessment shows otherwise, typical mesh site fencing, which is not compliant with the standards, should not ordinarily be used to secure site boundaries on the footway in place of pedestrian barrier systems compliant with Chapter 8 and the Safety Code. There are proprietary barriers systems on the market that afford the security of these fencing systems and that also comply with the requirements defined above.

Barrier systems with large gaps can easily be breached by children

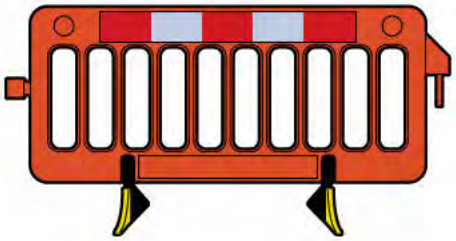
Traffic and pedestrian barriers



Pedestrian barrier has a tapping rail at its base for visually impaired people to follow with a walking cane



Traffic barrier without a tapping rail can be deployed in areas away from pedestrian routes



Pedestrian barrier with low-profile feet can reduce obstructive widths and tripping hazards

Example of supplementary information signs for pedestrians

2.9 Temporary pedestrian signing and information

Temporary pedestrian traffic signs that are not already prescribed should be white on red in accordance with the specifications detailed in Schedule 13 Part 9 of the TSRGD.

Where pedestrians are required to be redirected and diverted around the works area, the alternative route should be sensibly apparent to all pedestrians, especially those who are visually impaired – this means providing a continuous tapping rail. Therefore, signs alone must not be relied upon.

However, if a pedestrian route is visually less obvious, temporary pedestrian traffic signs can help provide an improved understanding of where to go. These traffic signs can be complemented by others such as Legible London wayfinding and map-based signs, which help pedestrians orientate themselves to their intended route or destination. Throughout, pedestrian behaviour should be regularly monitored by those undertaking the works, with assistance offered to people who need it.

If the shortest and most direct route is not always accessible to visually impaired pedestrians, an alternative route should also be provided. The constraints of the shorter route should be made clear to pedestrians: for example, if it is not suitable for wheelchair users.

Bad practice: confusing and non-compliant signs, with non-standard wording and sign clutter

Good practice: pedestrian sign communicating access to businesses is maintained

2.10 Working adjacent to or at permanent crossings

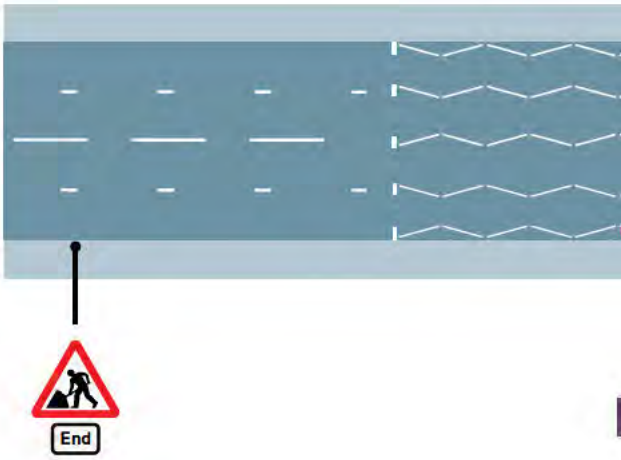
Where works encroach onto a crossing area or restrict a crossing point on the footway, but the crossing has space to remain open, barriers must be used to guide pedestrians and prevent the overall route length from being increased to more than the permanent arrangement. This will ensure traffic signal timings remain unaffected. If the overall crossing distance at a signalised crossing changes, TfL must be informed in order to alter signal timings to ensure they are safe.

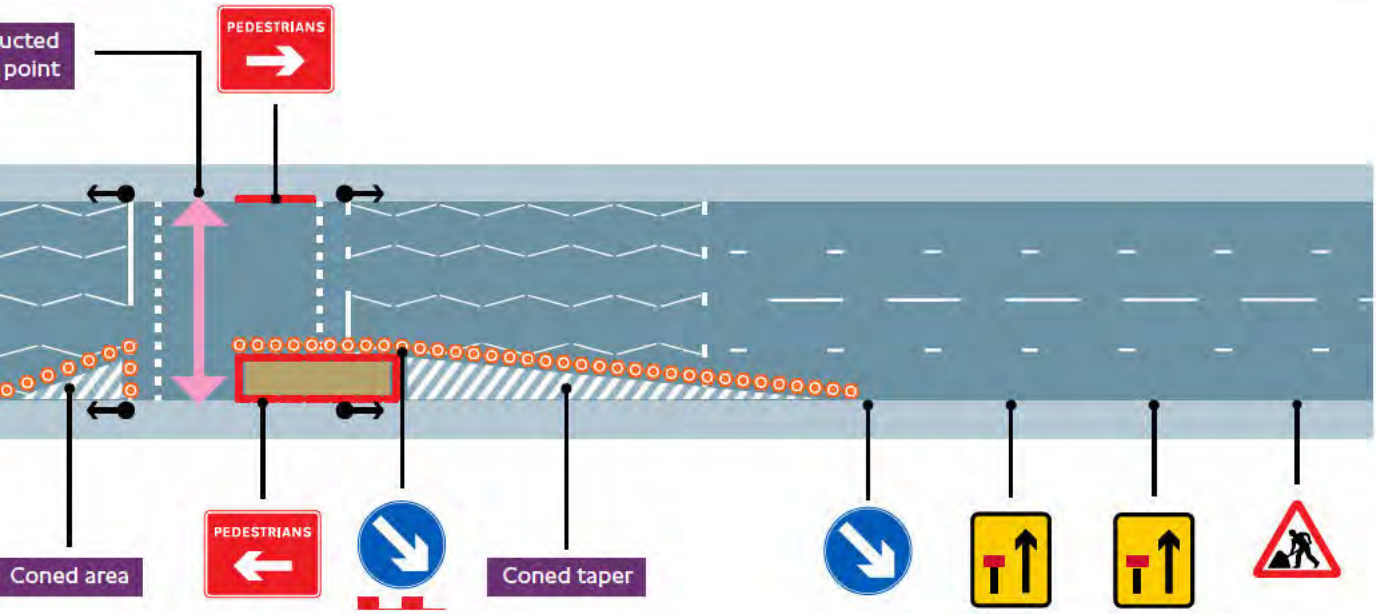
2.11 Portable crossing facilities

To minimise congestion and pollution from traffic, the setting for pedestrian crossing phases should be carefully considered and subsequently monitored. Manual control by operatives may be required for an 'all red' phase for vehicles when there are high numbers of pedestrians at peak times or on event days if the site is near an entertainment or sporting venue.

Where permanent signalised crossing facilities are required to be switched out to facilitate works, the designer should provide a safe temporary crossing for pedestrians. TfL expects temporary crossing facilities to meet pedestrian desire lines. If this is not practical, a risk assessment needs to identify alternative provision.

Partially obscured crossing




Key
Area of works
Segregated carriageway
Unobstructed crossing
Traffic cones
Signal head
Pedestrian barrier
ucted point
PEDESTRIANS
PEDESTRIANS
Coned area
Coned taper


CYCLE SUPERHIGHWAY CS3
Westminster 9 mins
Blackfriars CS6 1 min
SLOW
SLOW

Chapter 3 – Cyclists at roadworks

3.1 Designing for cyclists at roadworks

London's road network landscape is changing, with the introduction of more dedicated facilities to serve the increased number of cyclists. This has resulted in different types of cycles using the network, including those used as mobility aids and those for transporting goods or people. Current national guidance does not sufficiently cover recent developments in road user provisions such as segregated cycle lanes. This chapter expands on the currently published national guidance by setting out other considerations that should also be given to the needs of cyclists.

The Safety Code highlights the requirement for traffic management to take into account the needs of disabled and older people in the planning and execution of works. Not all cyclists can easily dismount, particularly when the cycle is used as a mobility aid. Some types of cycle are wider and longer than others (such as cargo/child-carrying cycles and tricycles), and some users are particularly sensitive to poor surface conditions.

In addition to national standards, this chapter should also be read in conjunction with the following documents to provide a framework for considering temporary traffic management for cyclists during street works and roadworks.

- Traffic Advisory Leaflet 15/99 Cyclists at Roadworks[14]
- The London Cycle Design Standards[15]

The London Cycle Design Standards provides useful information such as defining flow categories for cyclists.

Peak hour flow categories for cyclists

Peak hour flow category	One-way lane/track	Two-way track
Very low	<100	<100
Low	100-200	100-300
Medium	200-800	300-1,000
High	800-1,200	1,000-1,500
Very high	1,200+	1,500+

14 http://www.ukroads.org/webfiles/tal 15-99 cyclists at roadworks.pdf

15 https://tfl.gov.uk/corporate/publications-and-reports/streets-toolkit#on-this-page-2

3.2 General principles

The Safety Code states 'You should consider whether access on the carriageway can be preserved for cyclists, even if it needs to be closed to motor vehicles'.

Traffic management designs should retain or re-provide cycle facilities unless there are insurmountable barriers to doing so. This includes:

- Looking to preserve cycle access, even when the carriageway is closed to motor vehicles
- Preserving or introducing exemptions, contraflows and cycle gaps to maintain cycle accessibility during works
- Creating temporary dedicated cycle facilities where necessary

For designated cycle routes or streets with high cycle flows, a level of service reasonably equivalent to the permanent arrangement should be maintained. Where all or part of the highway is closed on such streets, alternative suitable quality provision should be found for cyclists.

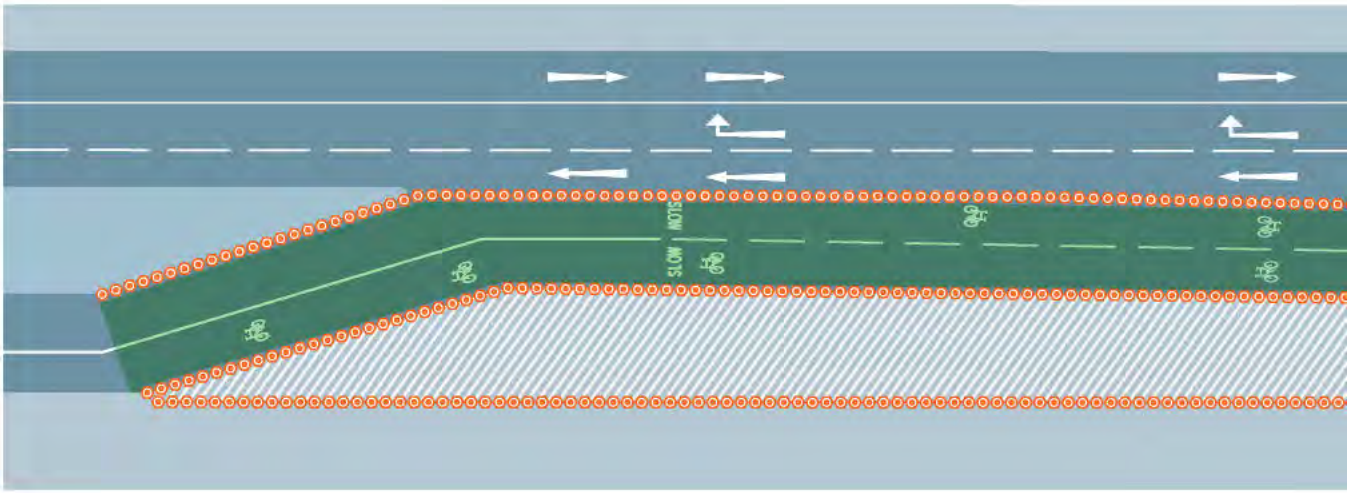
Where shared cycle facilities are temporarily closed, re-providing a similar standard facility may be challenging, but temporary facilities should be designed to work for all road users. Alternative cyclist provisions may be re-established by sharing general traffic lanes as part of temporary traffic management, but only where suitable lane widths exist, and only where speeds are appropriate for the purposes of sharing.

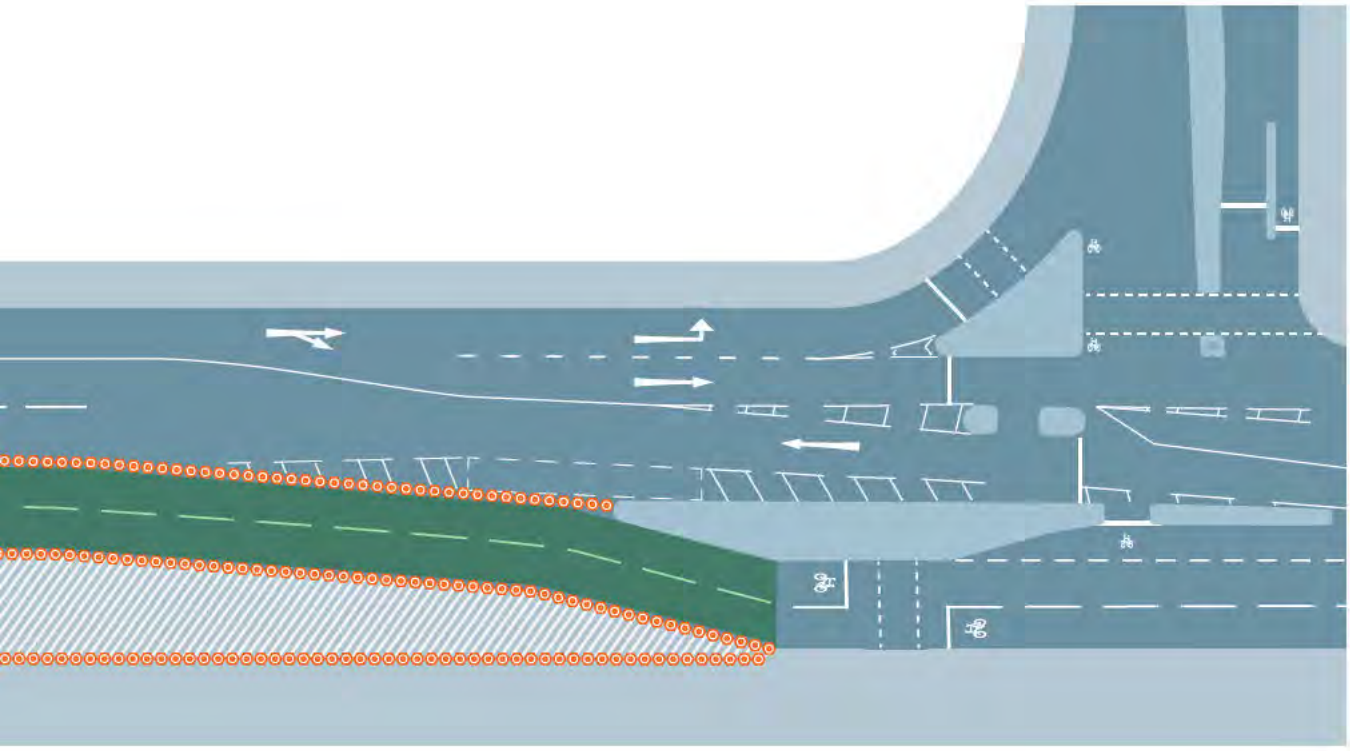
Footways may only reasonably be shared between pedestrians and cyclists if sufficient width is available and if traffic management has been designed to encourage courteous and responsible behaviour towards more vulnerable pedestrians.

Road closures impacting cyclists need careful consideration. Diverting cyclists onto other roads should only be necessary where it is not reasonably practicable to preserve cycle access. Diversions, if required, must not be unnecessarily long and should avoid mixing cyclists with heavy goods vehicles.

Rerouting segregated cycle lane to maintain a dedicated cycle facility

Key	
Temporarily rerouted cycle lane	
Works area	
Traffic cones	





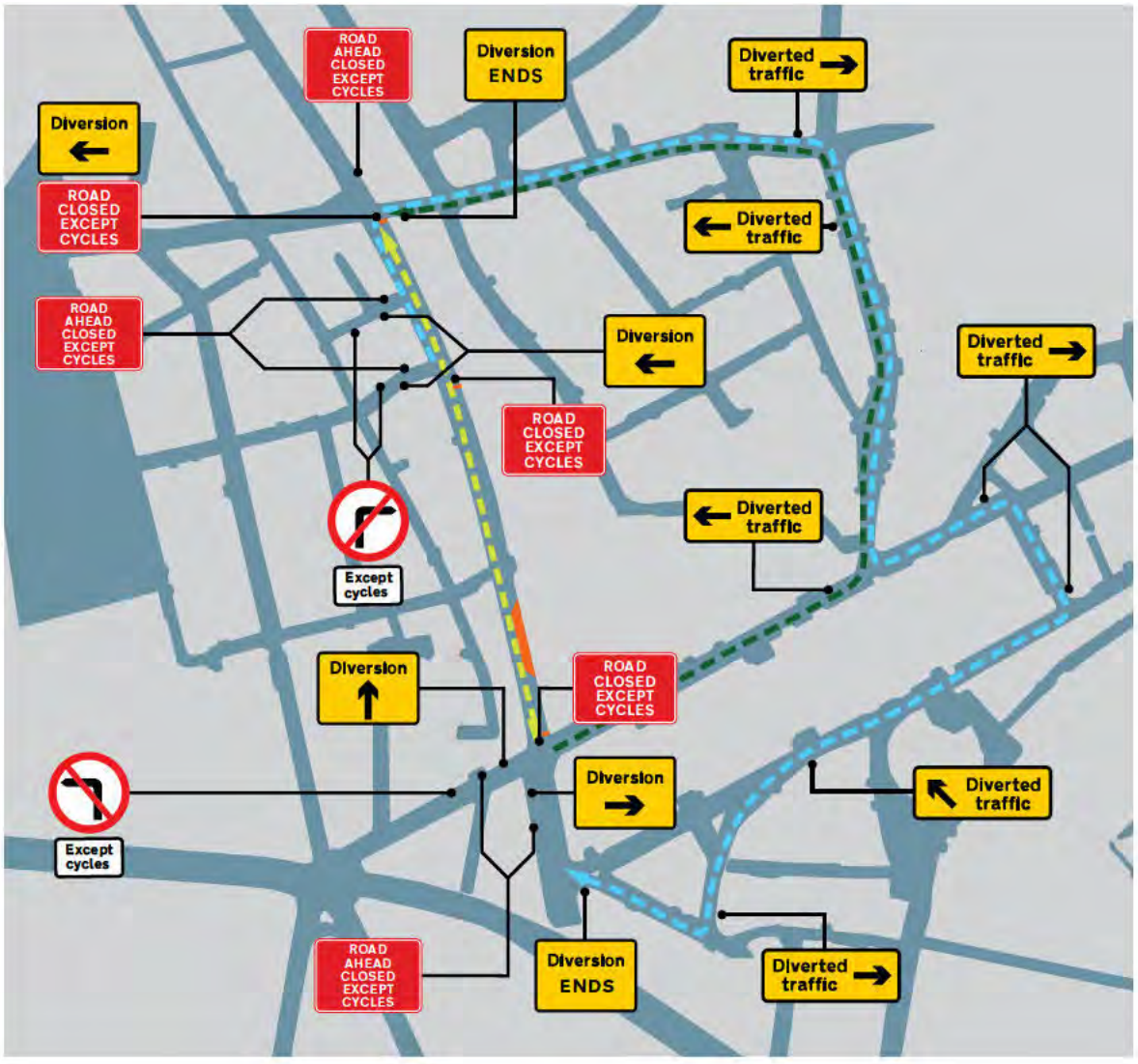
3.3 Maintaining access for cycling

Construction activities and temporary works impact all road users, but it is vital the needs of cyclists should be given appropriate consideration, particularly when considering lane widths and diversion routes.

Where it may be necessary to close the road for motor vehicles, wherever possible diversions should be avoided and access maintained for cyclists in both directions throughout the period of roadworks. Cyclists are unlikely to accept lengthy detours or long delays. In such conditions, some cyclists may attempt to access a road lane used by traffic travelling in the opposite direction or mount footways.

Asking cyclists to dismount should be avoided if access can be maintained

Maintaining cycle provisions through a road closed to motor vehicles

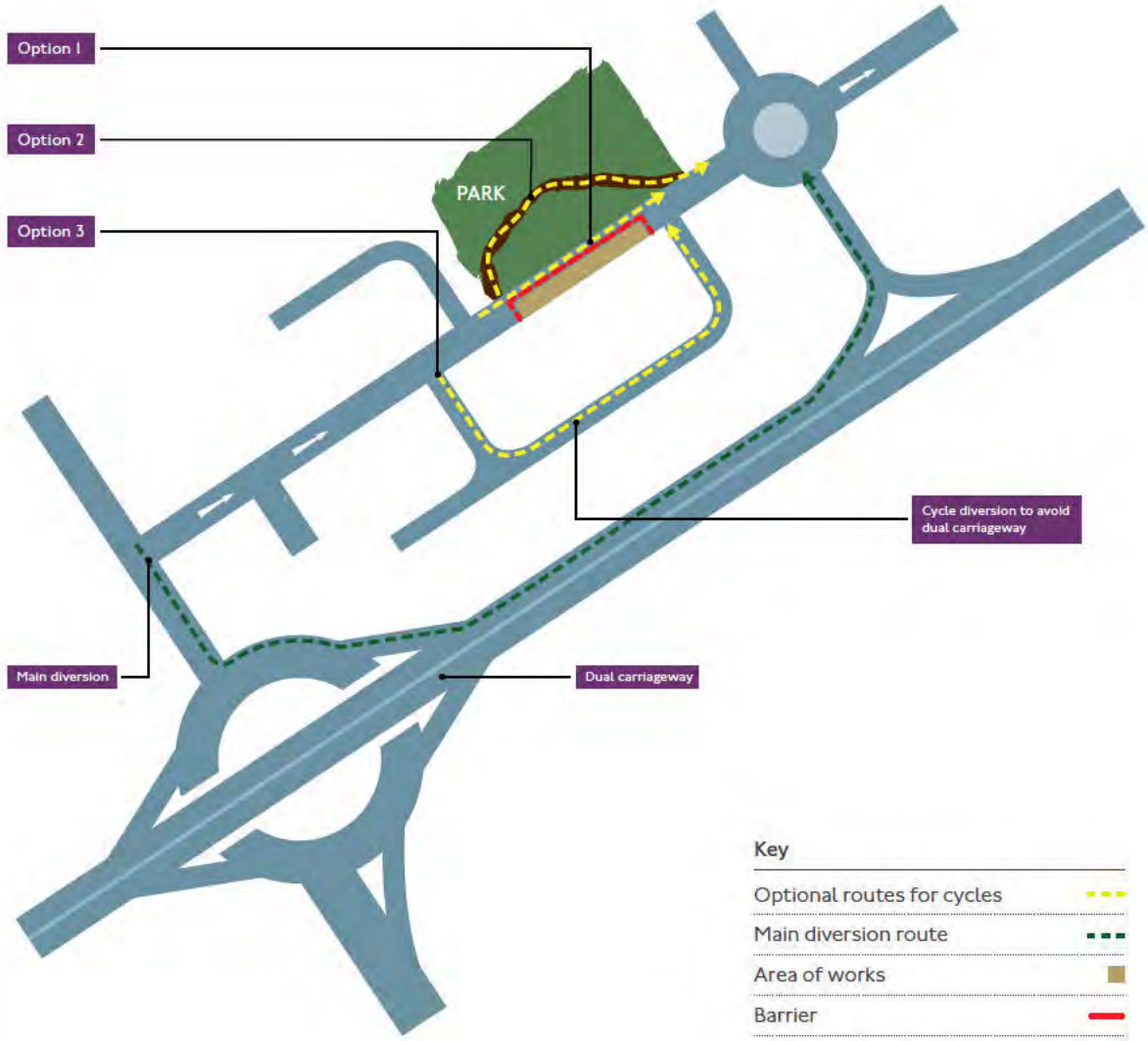


Options for maintaining cycling provision

Alternatively, closures can be avoided by providing a temporary segregated contraflow cycle lane, shared path or route away from the carriageway. This kind of provision will be particularly desirable to avoid sending cycles onto a diversion that includes dual carriageways. Please see page 62 (3.6 Road closures and the impact on cycling) for further guidance.

Cyclists are generally more at risk through roadworks because of risks associated with obscured sight lines, merging with mainstream traffic, and pinch-points. In such scenarios, limiting the length of the site should be considered. For example, if a scheme is to be constructed over a length of 100 metres and a dedicated cycle facility or traffic lanes wider than 4 metres cannot be provided, then the traffic management should be restricted to shorter sections to reduce the exposure of cyclists travelling through more vulnerable road conditions over a greater distance. Where there is significant cycle demand and the length of the works site cannot be adapted, alternative measures should be considered, such as provision of an off-road cycling facility, or a general vehicular traffic diversion while retaining dedicated cycle facilities through the works site.

Possible cycle routing options to avoid dual carriageway diversions



Key

- Optional routes for cycles
- Main diversion route
- Area of works
- Barrier

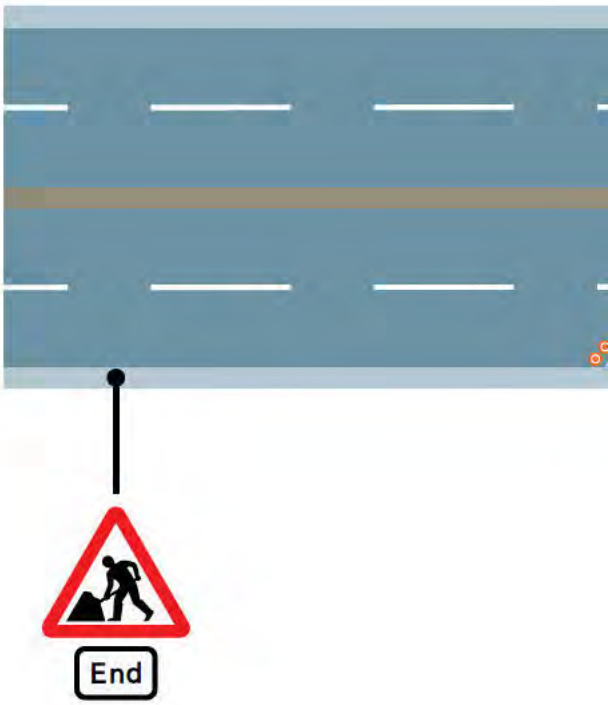
Option 1:
Via segregated lane / except cycles road closure

Option 2
Via route away from carriageway

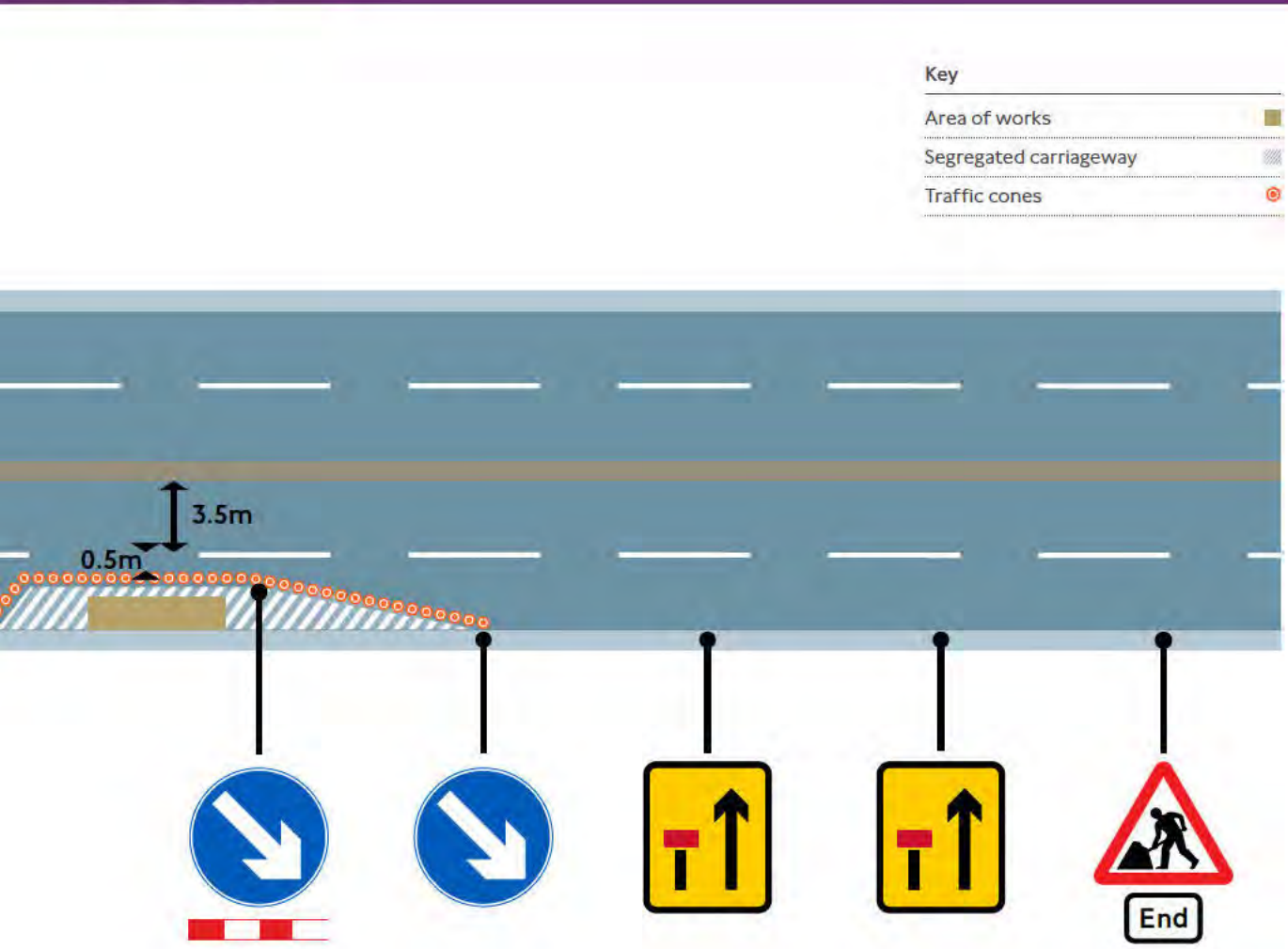
Option 3
Via local road diversion

Where site conditions allow, the cone line or outer edge of a full lane closure can often be narrowed/pulled back from the carriageway lane markings to create the preferred width to accommodate cycling. This approach is especially important for sites immediately on the approach to signalised junctions, where cyclists often filter through queuing vehicles in order to reach the stop/give way line.

Minimising the width of a full lane closure to



o allow space for cyclists



There are a number of potential hazards or impacts that must be considered when designing 'cycle friendly' temporary traffic management on the carriageway, including:

Impact

How will the traffic be managed where a cycle lane is removed or rerouted?

Can cycles enter the works site through widely spaced cones or other permeable traffic management segregation measures?

Can a cycle contraflow be maintained where a directional closure without cyclist exemption is proposed?

Has consideration been given to cycle-specific diversion routes separate to the motor vehicle diversion routes?

Is the traffic management for a full road closure without cyclist exemption robust enough to prevent cyclists breaching the blockade?

Will a cycling dismount area be safe and clear of flowing traffic?

How will cyclists who are less able to walk manage on foot if required to dismount?

Signing and guarding

Is it necessary to use 'cyclists dismount' signs if an alternative route is available, eg in the carriageway?

What measures have been considered to avoid conflicts between cyclists and pedestrians (including short, temporary route alterations or sharing space)?

Are existing and temporary cycle lanes free from obstructions, including roadworks signing?

Geometry

Will the traffic management proposals obstruct cyclist sight lines?

Have pinch-points been identified that may 'squeeze' cyclists?

Where there is a single lane, will a challenging steep incline of the road cause cyclists to unreasonably compromise vehicle movement?

Surface condition

Has the condition of the road surface been assessed to address any imperfections such as raised ironwork, potholes and surface debris that might cause skidding?

Are all proposed temporary measures safe for cyclists, including raised cable protectors, hoses or road plates?

3.4 Temporary signing for cyclists

All temporary signs at roadworks must meet the requirements of the TSRGD. Further guidance is supplied in the DfT Traffic Advisory Leaflet 01/14[16] (Temporary white on red signs at roadworks).

Designers must use prescribed signs where they exist before they design other temporary signs that are covered in Schedule 13 Part 9 of the TSRGD 2016. Where designers need to create temporary signs for cyclists under this provision they must be white text on a red background. If the sign contains a more general message then it will be black text on a yellow background.

As Schedule 13 Part 9 provision of the TSRGD allows designers a more flexible approach to producing signs, there is scope to use different terminology to describe a cycle facility, ie, cycle lane, cycle track, cycle route and cycle path. These terms do not mean the same thing, and are frequently misused. This inconsistent messaging creates road user confusion, especially when passing through multiple works areas.

In order to promote consistency in terminology when designing signing the following table should be used to define cycle provisions:

Cycle lane	Part of a carriageway marked with a formal lane marking and allocated for use by cyclists. Cycle lanes can either be advisory ('dashed') or mandatory ('solid') 
Cycle track	A right of way for pedal cycles with or without right of way on foot. It can either be: • Part of a public highway adjacent to a carriageway, or • A separate highway in its own right Pedestrians and cyclists may be separated by physical barriers, by level, or by markings only
Cycle route	A continuous, linear series of links and junctions, signed and/or branded as a coherent facility from A to B; usually planned and delivered as a single facility or in identified phases. For roadworks that are local in nature, signing should make reference to cycle lanes or tracks as appropriate. Only when a substantial section of a defined route is diverted on to an alternative road would reference be made to a route
Cycle path	A non-specific term and should not be used on road traffic signs

16 https://www.gov.uk/government/publications/temporary-white-on-red-signs-at-road-works

Bad practice: designers must ensure they use the right signs and choose the right colours to ensure traffic management is compliant and consistent

Good practice: when signs are correct and appropriately used road users are more likely to comply with the instructions

Temporary routes and other facilities for the exclusive use of cyclists should be clearly signed well in advance of the roadworks.

Only when all other reasonable possibilities have been exhausted is it acceptable for a works promoter to utilise 'Cyclists dismount and use footway' signs. In the vast majority of cases, the network can be reconfigured to retain space for cycling and the use of this sign is very much a last resort option.

Where the 'dismount' signs are unavoidable, works promoters should consider the impact of cyclists who wilfully ignore the signed instruction and potentially compromise pedestrian safety. They should equally be mindful that not all cyclists can easily dismount and proceed on foot, especially those using cycles as mobility aids.

Forcing people with disabilities to proceed on foot or assisting them to dismount could cause accidental injury to either party. In these scenarios, the provision of marshals on site can assist disabled cyclists to find the best possible solution to navigate around the works without having to dismount. It is recommended marshals receive disability equality training to assist in these situations.

Alternative sign mounting reduces trip hazard and sign maintenance

Where a cycle lane is closed within the carriageway and cycles are directed to join the traffic by blue and white arrows and cone tapers, there is no requirement for additional 'cycle lane closed' or 'cycle lane closed ahead' signs. However, if the works necessitate the closure of a cycle lane and motor vehicles are necessarily directed to use the lane, then the signs would be expected to notify all road users that motor vehicles will need to enter the cycle lane. When signing is required to give instructions or information to cyclists (eg 'Cycle lane closed'), designers must consider the need for advance signing (eg 'Cycle land ahead closed'), so that cyclists may alter their road position in good time. This is especially important on declines and sections of road with high cycle demand.

Where cyclists are required to merge back in with motor vehicle traffic because a cycle lane or cycle track is closed ahead, it would not be necessary to sign a cyclist diversion route. It should be clear to cyclists approaching from either direction where the facility is closed, where they can safely join the carriageway and where the facility is re-opened. Excessive signing contributes to clutter and creates potential obstructions and maintenance issues.

For longer duration works, semi-permanent sign installation may be preferable to conventional temporary A frame signs. These reduce trip hazards and maintenance and ensure the signs remain visible and effective at all times.

Cycle lane closure signs

3.5 Shared-use footways

Providing a temporary shared footway between cycles and pedestrians is not generally desirable when determining traffic management solutions for roadworks. Efforts should be made to accommodate cycles safely on the track or carriageway. Where it is deemed necessary, an assessment of the cycle and pedestrian flows will need to be made to ensure the design is robust and viable for the anticipated demand. Local Transport Note LTN 1/12[17] 'Shared use routes for pedestrians and cyclists' is a useful reference guide, as is the London Cycling Design Standards,[18] which gives indicative pedestrian and cycle flow ranges for shared facilities.

The characteristics of shared-use footways can vary significantly and will influence the optimum traffic management design solution. A local risk assessment must therefore be undertaken to understand:

- The locality of street furniture
- Access to properties
- Flows of cycles and pedestrians when the works are taking place
- Whether the route has any form of segregation
- The length of works
- The nature of the adjacent carriageway and available space

On partially separated (ie where the separation is not continuous along the route) and shared routes, cycle flow must be considered relative to pedestrian flow – the categories in the table at the bottom are specified in the London Cycle Design Standards.

A width of 3 metres is the desirable minimum for a shared path with two-way cycling, but this is dependent on user flows. On low-usage footways with a short works length and duration this may be reduced to an absolute minimum of 2.2 metres. On shared-use routes with single-direction cycle routes, the desirable minimum width is 2.5 metres. However, with low-usage footways, this may be reduced to an absolute minimum of 1.5 metres if the works are of a short length and duration.

Designers proposing shared-use facilities will need to also factor in the requirement for a Temporary Suspension Request to authorise the shared use and a detailed traffic management assessment.

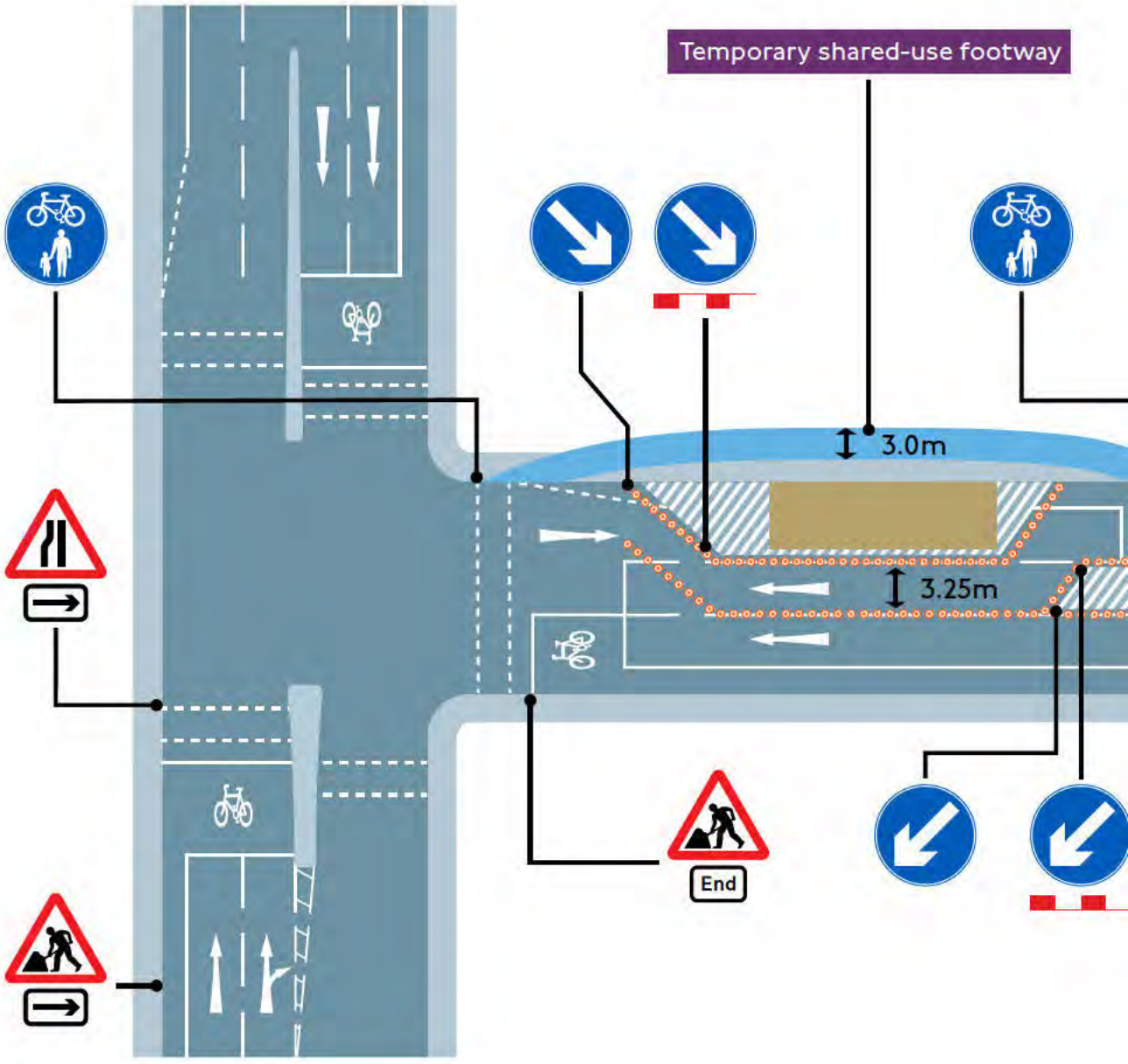
17 https://www.gov.uk/government/publications/shared-use

18 https://tfl.gov.uk/corporate/publications-and-reports/streets-toolkit#on-this-page-2

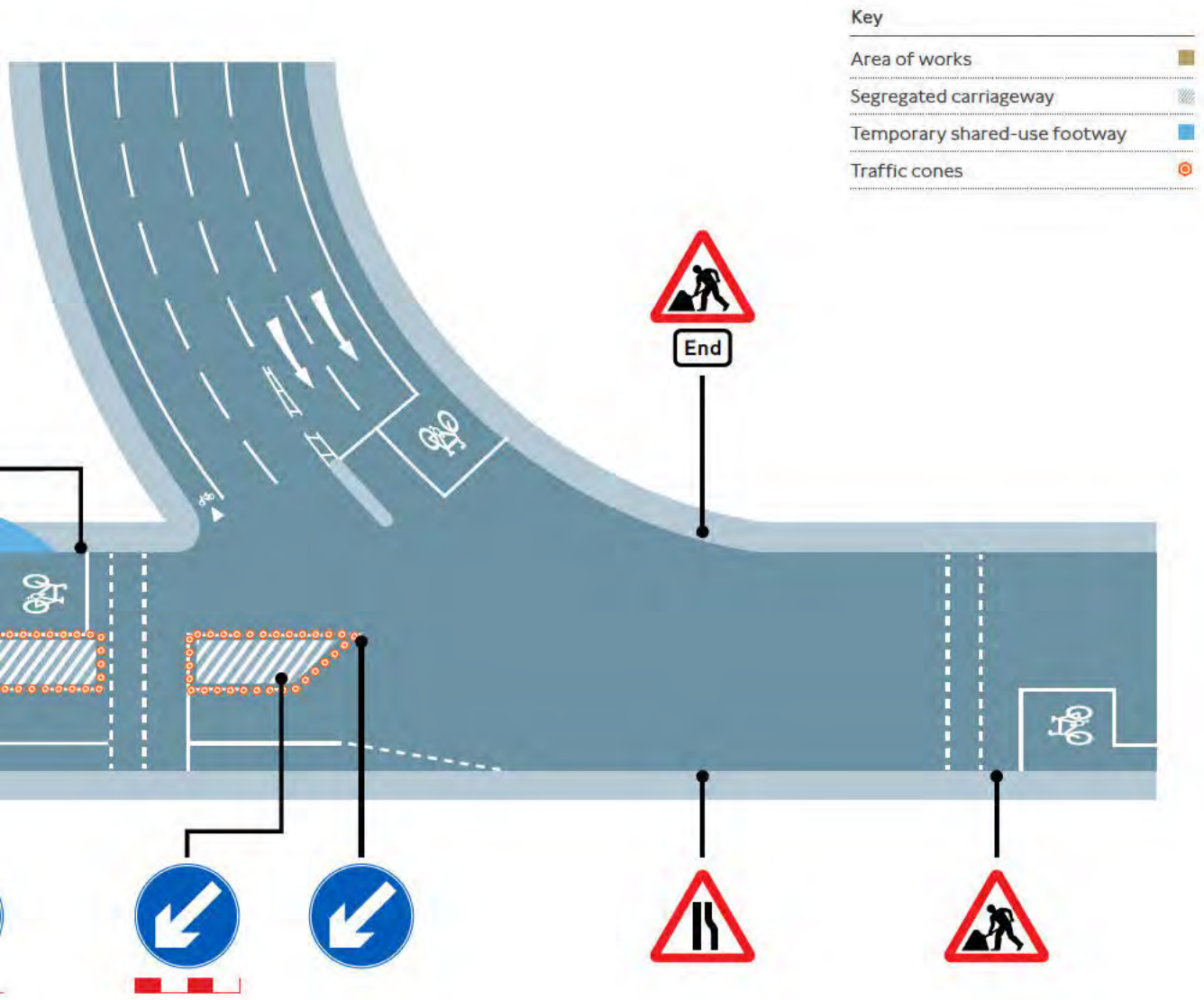
Flow categories for partially separated and shared routes

Peak hour flow category	Pedestrians per hour	Cyclists per hour
Very low	0-120	0-60
Low	120-200	60-150
Medium	200-450	150-300
High	450-900	300-450
Very high	900+	450+

Example road layout of a temporary shared-use footway to enable cycles to safely transition pa



st a works site segregated from traffic



3.6 Road closures and the impact on cycling

Full road closures can present unique issues for cyclists, which may be particularly important on routes with high cycle flows.

This will be especially necessary where a diversion route fulfils one or more of these conditions:

- Involves significantly greater effort to the diverted cyclists owing to new, unreasonably extensive distances and gradients
- If it is a heavily used cycle commuter route and the intention is to close the road during peak hours
- Put cyclists at greater risk due to the road layout and traffic conditions on the diversion route
- The temporary works will be required for a prolonged period

Diversion routes must be assessed for their suitability for cycling as well as motor vehicles because, from a cyclist's perspective, they may appear to be overly long or arduous. If some cyclists find an apparently shorter route more

Bad practice: designers should avoid the need to request cyclists to dismount if they can safely continue in the carriageway

attractive, this may result in unsafe movements through junctions and prohibited or illegal footway riding.

In the first instance, the site should be assessed with the aim of maintaining a safe route for cyclists past the works. While a closure to motor traffic may be necessary, exceptions can often be made for cycles, which can use relatively narrow widths (but ideally no less than 1.5 metres). The London Cycle Design Standards gives useful guidance on defining effective widths.

Where a road is fully closed to motor vehicles in both directions, yet a route is retained for cycles, signing stating 'Road closed except cycles' or 'Road closed except for access and cycles' should be used. Where a road is partially closed ie closed in a given direction to motor vehicles only, with cycles permitted through a closure point, then it may be preferable to use a 'No entry' sign with an 'Except cycles' sub-plate.

Care must be taken to ensure the design makes it clear to all road users, especially pedestrians, that cycles are permitted through a closure point. Where cycles pass through a closure point that prohibits motor traffic or in contraflow situations, it should be clear to pedestrians to expect cycles, particularly at crossings. Barriers and other methods of separation may well be required to mitigate any risk and designers should consider sight lines.

Cycle signs used at road closures

No entry sign except cycles

Diverted cyclists sign

Contraflow cycle lanes or tracks should be a recommended minimum of 1.5 metres, or an absolute minimum of 1.2 metres wide where providing the desirable width would compromise facilities for other road users. A site-based risk assessment may identify that physical segregation from opposing traffic may be required. Opposing traffic must have sufficient lane width not to encroach in this facility.

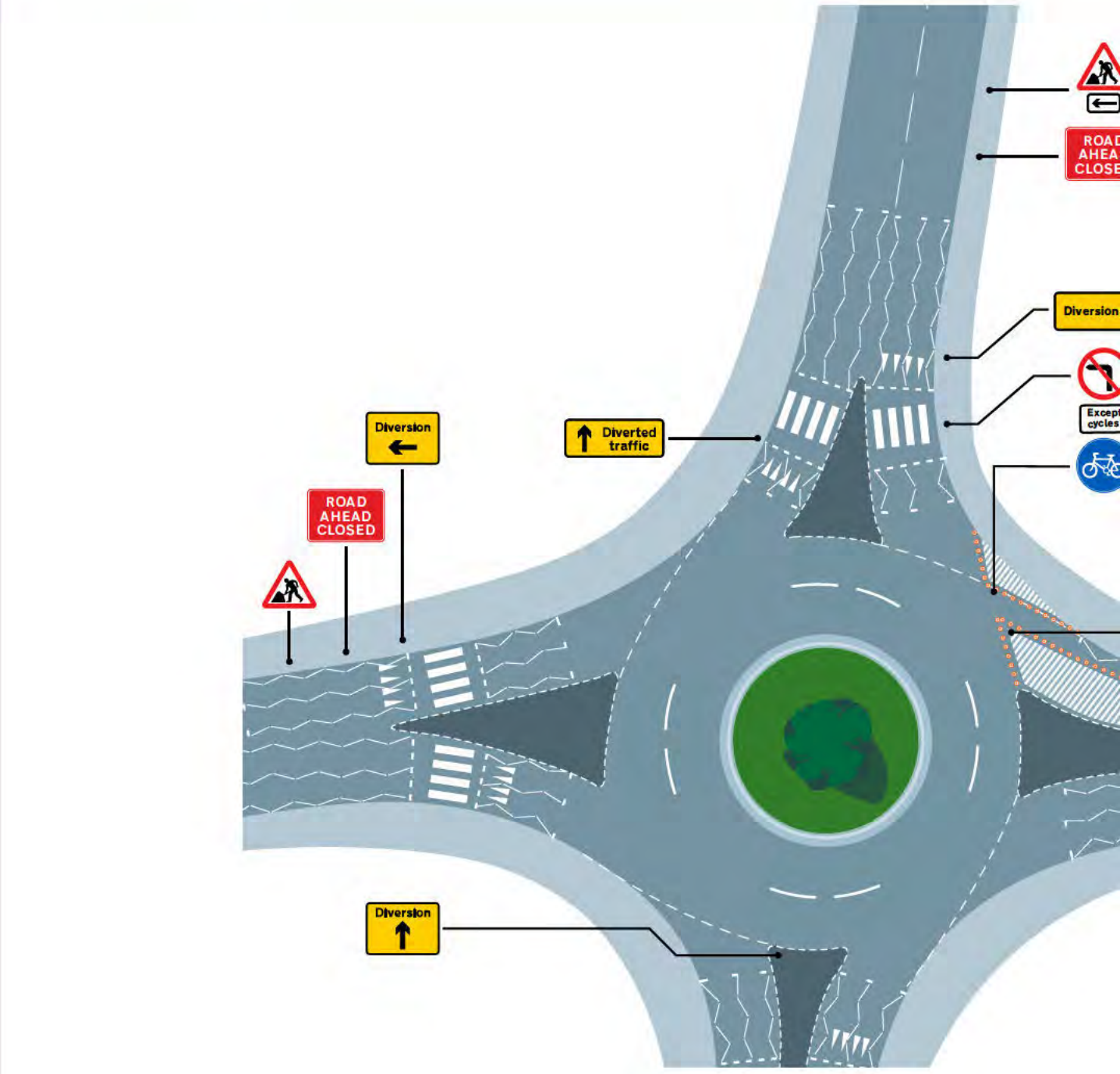
Contraflows of any vehicles can be confusing to pedestrians who may instinctively not notice approaching traffic if they are not expecting it. Pedestrian barriers should be considered along the length of the contraflow to prevent pedestrian encroachment other than at crossing points. Further mitigation measures should be considered to warn people crossing the contraflow cycle lane to look out for cycles in both directions and also cycles approaching in the temporary contraflow lane. Designers should acknowledge that some cyclists may decide to remain on the carriageway if the diversion is too long.

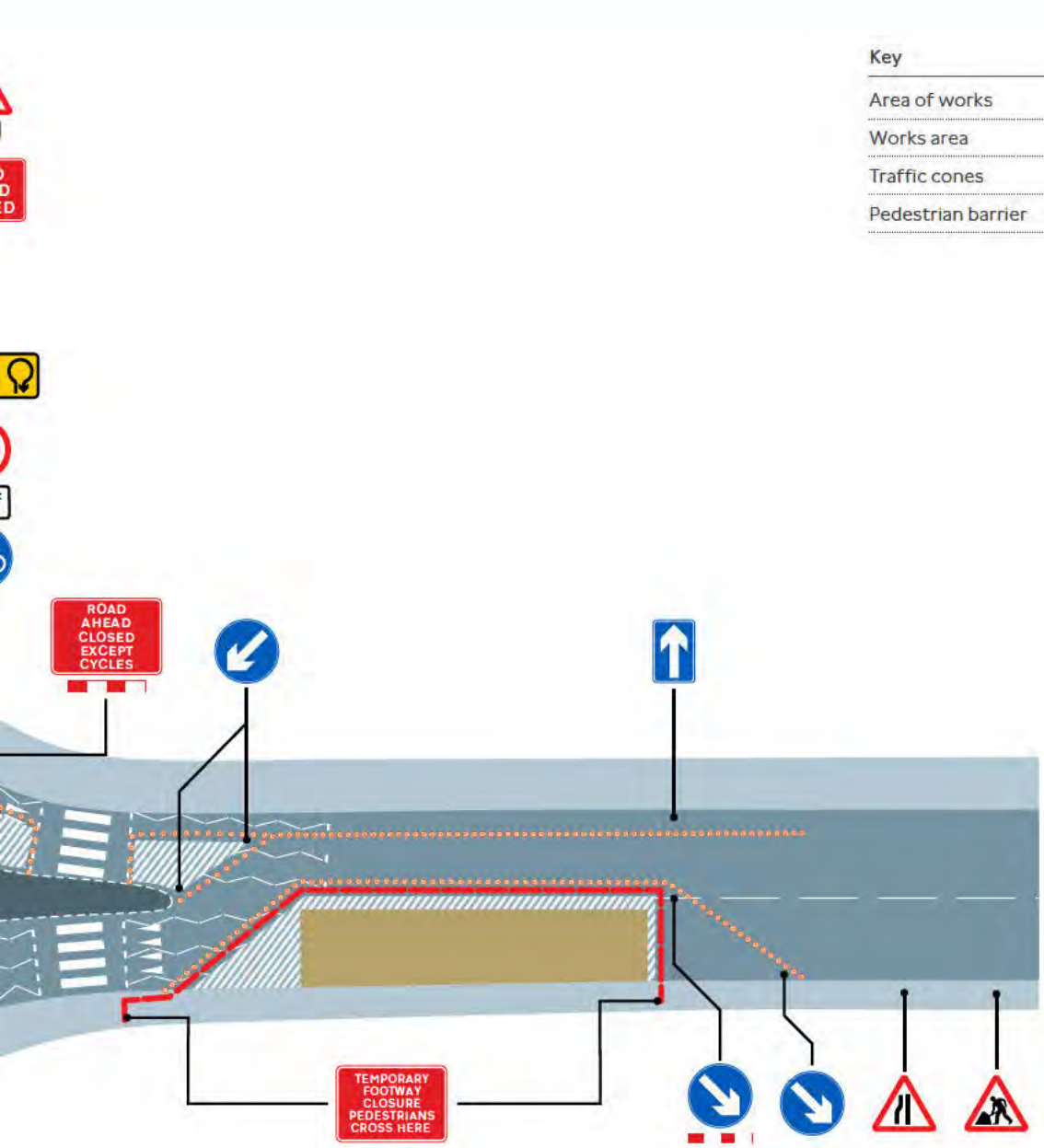
If it is not possible to retain space for cycling on a road closed to motor vehicles and the primary diversion route is likely to be too arduous or hazardous for cyclists to use, a cycle-specific alternative route should be considered, which could be shorter, on quieter roads and signed accordingly.

Where cycle diversion routes are necessary they must be as short as practicable to desire lines and clearly signed, preferably using routes with light traffic flows. Often cycles can legally pass through routes prohibited to motor vehicles such as roads with filtered permeability, eg bollard-protected cul-de-sacs.

Cycle diversion routes should make use of roads with filtered permeability

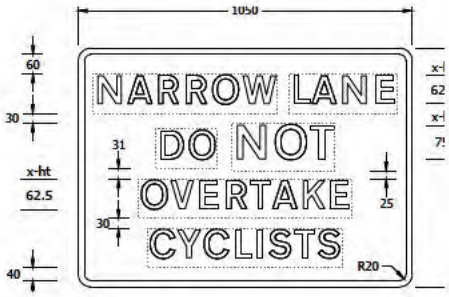
Cycle contraflow system




Key
Area of works
Works area
Traffic cones
Pedestrian barrier
ROAD AHEAD CLOSED EXCEPT CYCLES
TEMPORARY FOOTWAY CLOSURE PEDESTRIANS CROSS HERE

Cycle safety at roadworks

Sign warning of narrow lanes affecting cyclist safety



Sign face dimensions

3.7 Lane widths and temporary speed limit reduction

The TLRN comprises London's major roads and carries around a third of all the city's traffic. Therefore, it is used by large goods vehicles, buses and cars, along with large numbers of pedestrians and cyclists.

The first priority of any traffic management designer is to design out risk and remove the hazard and consequential need for additional signing. Retaining or re-providing facilities for cycles that are equivalent to the pre-existing level of service are the preferred options. However, it is acknowledged that maintaining the same level of service may not always be feasible due to the physical constraints of the highway. This is especially the case where cycles are accommodated on-carriageway. Where cycles are required to share space with motor vehicles as they pass the works site, it is essential to ensure adequate lane widths can be provided.

Warning sign should not be black and yellow

Correct warning sign

Running lane widths must be suitable to cater for all vehicle types likely to be using the lane, which could mean that certain widths are hazardous to cycles sharing space with motor vehicles. In these circumstances, TfL expects the risk to be mitigated with signing if the hazard cannot reasonably be designed out.

To minimise the risk arising from cyclists being overtaken too closely in a narrow lane and to promote increased comfort levels for cyclists, the 'Narrow lane do not overtake cyclists' sign should be used.

The sign must be manufactured in accordance with the specification above.

Straightforward narrow lanes may not be the only reason why a sign to instruct drivers not to overtake cyclists might be required. Greater risk at bends, pinch-points and corners may also justify a 'do not overtake' sign.

The sign should be placed on all approaches to the narrow lane, normally after the road narrows sign or lane closure (wicket board) signs and prior to the first cone, and only be used where all of the conditions apply:

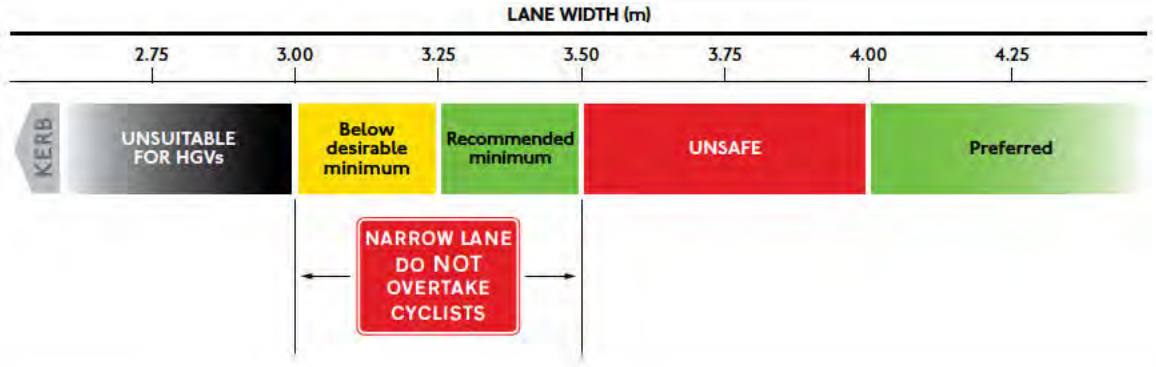
- Where cycles are required to share a lane with motor vehicles as no suitable alternative facility is achievable
- Where the carriageway is either a single carriageway of any speed limit or a dual carriageway where the permanent road speed limit is 30mph or less
- Where there is only a single lane available for traffic in the given direction
- Where the available lane width is 3 metres to 3.5 metres

The sign should not be deployed in other situations as inappropriate use dilutes the message and its effectiveness in scenarios where it would be appropriate and required.

Lane widths of four metres or more enable cars and wider vehicles to overtake cyclists safely. Therefore, where possible, designers should look to maintain or create lane widths of at least 4 metres on carriageways where high cycle flows exist.

If a 4-metre-wide lane is not achievable, then the straight narrow lanes design objective must be to deter overtaking cyclists because it cannot be achieved with safe clearance. Therefore, the lane width should be reduced to a maximum of 3.5 metres because lane widths greater than 3.5 metres and less than 4 metres must be avoided to discourage wider vehicles attempting to overtake cyclists when there is insufficient space to do so.

Lane width guidance for cycles in carriageway



Widths between 3.25 metres and 3.5 metres will allow buses and HGVs to use the lane but it will not be possible for them to overtake cycles.

The desirable minimum lane width in temporary situations for buses and HGVs is 3.25 metres, but in exceptional circumstances the lane width may be reduced to an absolute minimum of 3 metres as per the Safety Code. If this narrow lane is on a bus route you will need to liaise with the TfL Bus Operations team to discuss the restrictions and possible impact on the bus services.

The lane widths specified above are based on straight or near-straight traffic management layouts. For traffic management layouts incorporating bends or geometry that are not linear in nature, the designer should consider undertaking swept path analysis to establish if vehicle tracking is viable to pass the works and alter the lane widths as necessary.

Where HGVs and buses are on diversion, lane widths can be reduced to an absolute minimum of 2.5 metres.

However, research shows that traffic lane widths between 3.2 and 3.9 metres where there is no dedicated cycle lane are an inherent risk to cyclists as they can lead to uncomfortably close passes of cyclists because drivers are left uncertain about whether it is safe to overtake.

Reducing speed limits must be considered in situations where lane widths are less than 3.5 metres and motor vehicles are unable to pass cyclists safely. These reductions can be either in an advisory form or regulatory depending on the circumstances, such as the duration of the traffic management phase. Speed camera enforcement should also be considered where deemed appropriate, which should be discussed with the traffic management assessment team.

Where possible, the available lane width will encompass the normal running lane but it may also include hatched areas where traffic is permitted to enter for short duration works. For longer duration works or where the road layout may lead to road user confusion, it may be necessary to modify the existing markings.

Two-way working on single carriageways with available remaining carriageway width of 6.75 metres or above will not necessarily require physical segregation between opposing lanes.

Site-specific risk assessments will determine the need for segregation and will be based on factors such as the duration of works, traffic flows – particularly the number of cycles and HGVs – and road geometry and features.

3.8 Barriers and cyclists

When selecting barrier products for longitudinal runs along which cyclists may pass, designers must ensure the feet or bases of the barrier do not introduce a hazard to pedals of the bicycles.

3.9 Surface quality

Designers should be mindful of the particular vulnerabilities that cyclists encounter such as uneven, slippery or excessively rough surfaces. Risk assessments should be undertaken to ensure that cyclists are not being guided into hazardous surfaces and raised ironwork.

If cyclists are to be signed via a diversion route, then the surfacing on this alternative alignment should be assessed and made safe if necessary before the diversion is deemed adequate.

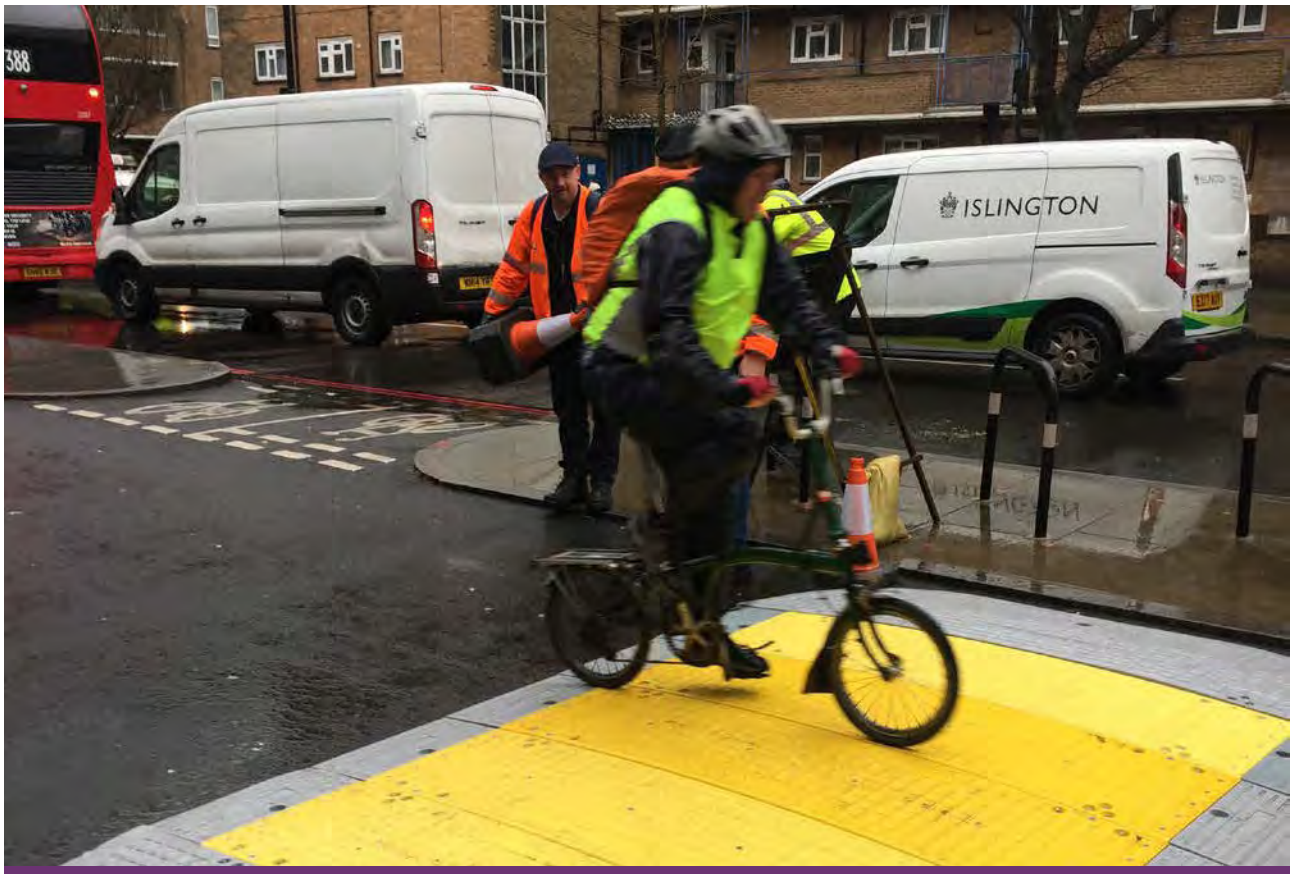
Barriers are often the best product to guide cyclists

3.10 Cycle track ramps and boards

London has a variety of cycle tracks with different characteristics that require assessing before deciding on the correct type of temporary ramps or boards to install. In most circumstances where cycle tracks are on footways, either shared-use or segregated, conventional footway boards will be sufficient.

Segregated cycle tracks, however, do have vehicular crossings and transitions. In these locations, a higher-specification road plate may be required. Emergency vehicles sometimes access segregated tracks so works promoters should ensure any temporary covers are adequately signed and visibly stand out.

Boards, humps or ramp approaches that are greater than 50mm high should be sinusoidal in profile to minimise rider vibration and avoid deterring cyclists from using the route (see Road hump profiles diagram on page 75). If a sinusoidal ramp is not achievable, leading edges of ramps should be clearly highlighted or clearly marked so they can more easily be anticipated by cyclists.



Cycle track road plating system

The London Cycling Design Standards advise that maximum linear ramp gradients should normally be between 1:10 and 1:20. It is recommended that the new surface of the hump is continued 500mm beyond the ramp into the existing carriageway surface to produce a smoother profile.

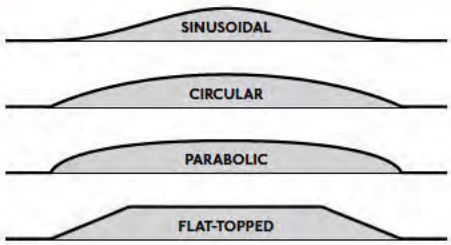
In instances where extended or multiple ramps are needed, they should preferably avoid 'L' and 'T' shape configurations, or run parallel with the general direction of cycle travel. Turning circles of larger cycles and of mobility scooters should also be taken into account when considering the use of ramps and landing areas.

Leading or tail edges of ramps should be installed avoiding acute angles so that the edges are as far as practicable to be perpendicular to the approach/exit route of cycles.

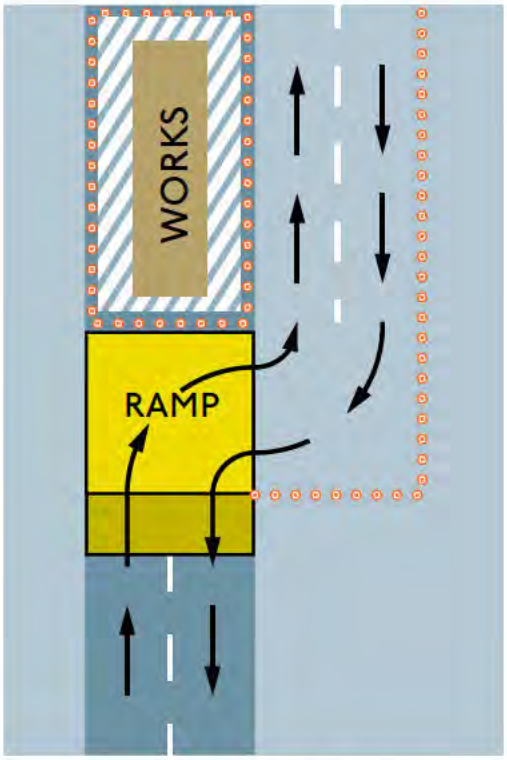
Temporary ramps should have high friction surfaces and should avoid adverse cambers as certain cycles are more prone to tipping over, such as disability cycles, tricycles and cargo cycles.

All temporary ramps should be signed with 'Ramp' signs to highlight the hazard. Where advanced visibility is fully or partially obscured or it could reasonably be expected to be obscured during high cycle flows, a supplementary 'Ramp ahead' sign is advisable.

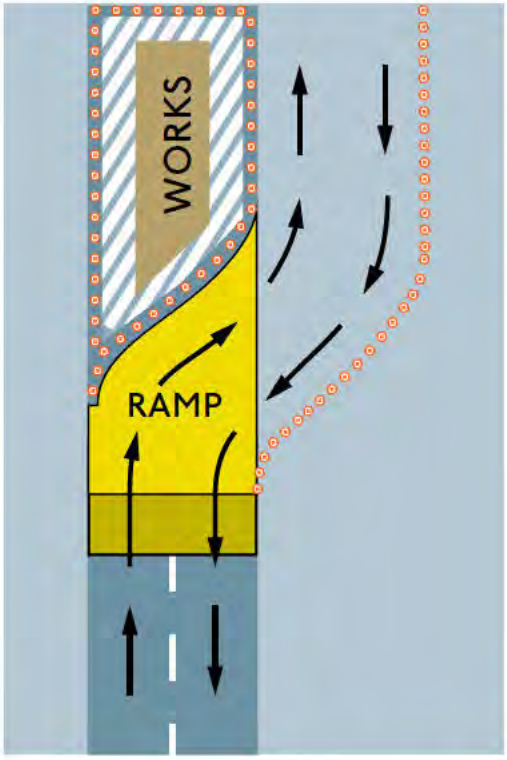
Road hump profiles



Cycle ramps must take into account turning circles of various types of cycles



Ramp with 90° bend



Ramp without 90° bend

3.11 Temporary traffic signals

Temporary traffic signals should give cyclists sufficient opportunity to pass safely through roadworks with the appropriate intergreen times used to prevent collisions or unsafe passing with oncoming motor vehicles in a shuttle lane. When specifying the most appropriate arrangements, consideration should be given to clearance times for cyclists, particularly on steep hills.

When a traffic management drawing is submitted with portable traffic signals, the drawing and location will be assessed and signal timings may be supplied by TfL to the designer for implementation. Otherwise, the contractor will be expected to operate them as agreed or in line with the recommendations of the DfT 'An Introduction to the use of Portable Vehicular Signals'[19] booklet, which is also known as the 'Pink Book'.

19 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/509198/introduction-use-portable-vehicular-signals.pdf

3.12 Works on the carriageway without cycle lanes

Where works occupy an area in the carriageway where there is no permanent provision for cycles (this may include bus lanes), either at the location or in close proximity to the approaches to the site, it is not normally expected that a temporary cycle lane would be required for the works. This is unless the road layout and/or workspace requirements place cyclists into a significantly more vulnerable position as identified in a risk assessment.

Where there is an identifiable increased risk to cyclists, consideration should be given to providing a facility through temporary carriageway markings or physical segregation. Risks may include heavy traffic flows, poor surface quality, construction traffic movements, or just the high volume of cyclists. A key consideration in addition to the risk will be the available space on the carriageway and the resulting lane widths available. For further information please see 3.7 regarding lane widths.

This scenario is more likely to be identified in outer London boroughs, where the mix of cycles in relation to motor traffic is lower when compared to inner London. However, sections of the road network exist in many locations where no extra provision is required provided lane widths are generous and hazards are low.

In these circumstances the traffic management may look typically generic with no extra measures for cyclists, except for signing to warn of narrow lanes when the width is 3.5 metres or less.

The works site length should be kept to a minimum to reduce the impact on general traffic and discomfort for cyclists. Long stretches of traffic management can become intimidating for cyclists and frustrating for motorists. When considering the length of traffic management arrangements, designers will also need to be mindful of the likely speeds of cyclists passing through the works as their speed may be adversely affected by gradients. Consideration should be given to phasing the works for reduced lengths of road space occupation, and storing materials and plant away from cycle routes with a high demand.

Cycling in works without cycle lanes

3.13 Works on the carriageway with cycle lanes

Where there is a cycle lane within the carriageway that will become obstructed by the safety zones or working area, then it will be expected that the facility will be re-provided past the temporary works, unless the risk to cyclists has been deemed acceptably low.

Where the temporary segregation terminates, care needs to be taken to ensure cyclists re-join the carriageway in a safe manner and location. Both drivers and cyclists need good visibility of each other and the alignment of their respective approaches so as to ensure a smooth transition.

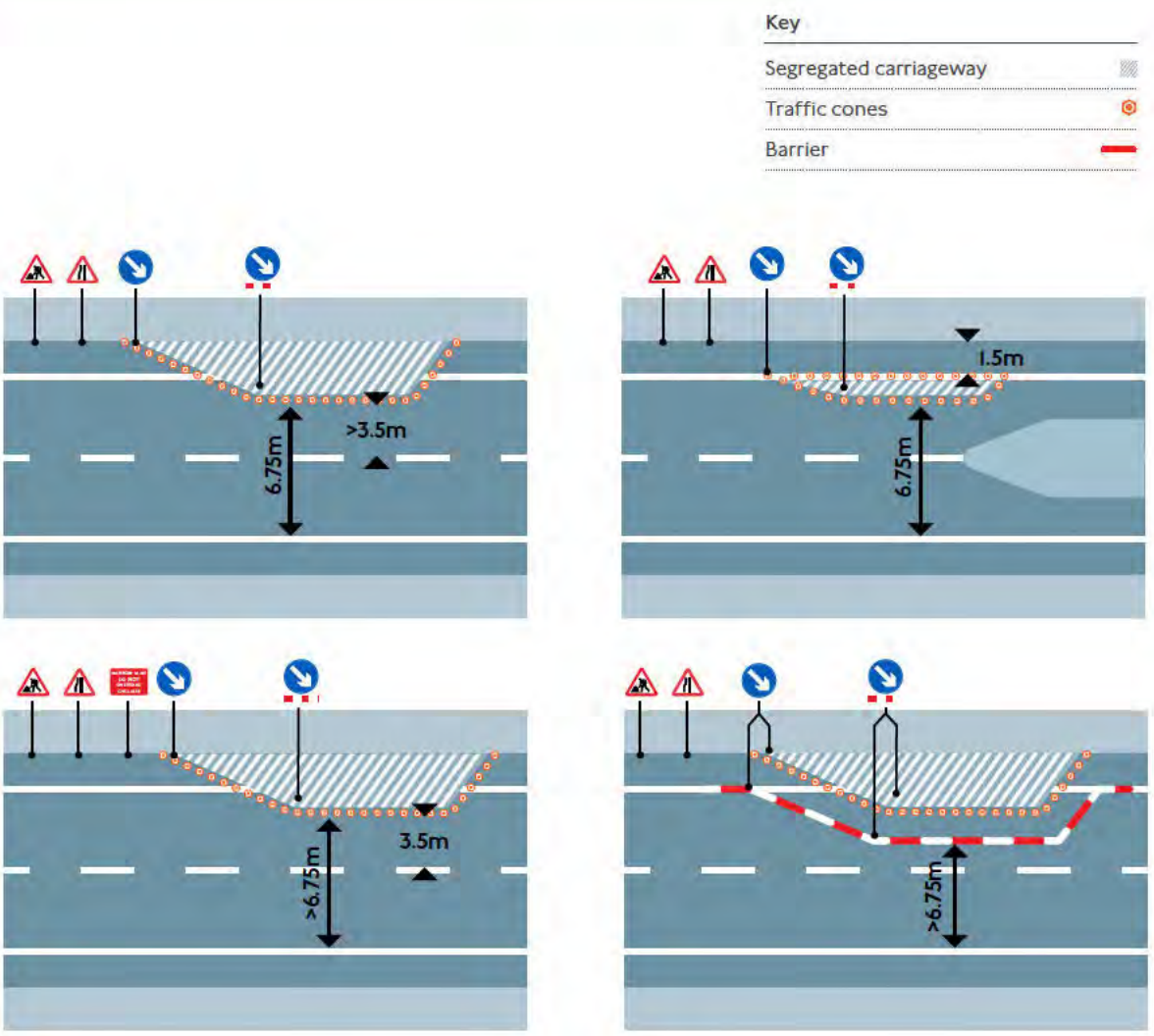
If it is not viable to provide delineation or segregation, it would be expected designers consider risk mitigation using other measures, such as using hazard warning signing, separation of road users by diverting motor vehicles, or cyclists via different routes, or speed reduction.

Designers need to be mindful of cyclist behaviours and the possibility of cyclists entering and exiting the facility between cylinders. Where it is desirable to retain cyclists in a lane or prevent access/egress along the lane, then continuous barriers are advised.

3.14 Cycle lane closure

Cycle lanes are classed as being in the carriageway and therefore subject to Lane Rental charges in accordance with the charges for the adjacent running lanes. Cycle tracks are specifically covered by Lane Rental charges but shared-use paths may not be chargeable if an alternative route is provided. TfL's Assessment team should be contacted if clarification is required.

Alternative examples for works in or adjacent to cycle lanes



3.15 Works on cycle tracks

Segregated cycle facilities feature on many sections of the TLRN and provide a vital network for cyclists on key routes.

Segregated cycle tracks, particularly bi-directional tracks, present challenging issues for traffic management designers as considerations need to be given to managing the passage of pedestrians, cycles and motor vehicles, all with separate facilities that will frequently intersect. Signalised junctions will need detailed consideration, and consultation with TfL will be required to ensure traffic management designs can be operable and safe in conjunction with the phasing of the lights.

Where partial obstruction of the segregated cycle tracks is required for works, the same sign sequence and signing principles apply to cycle traffic in the track as to general vehicular traffic in the carriageway.

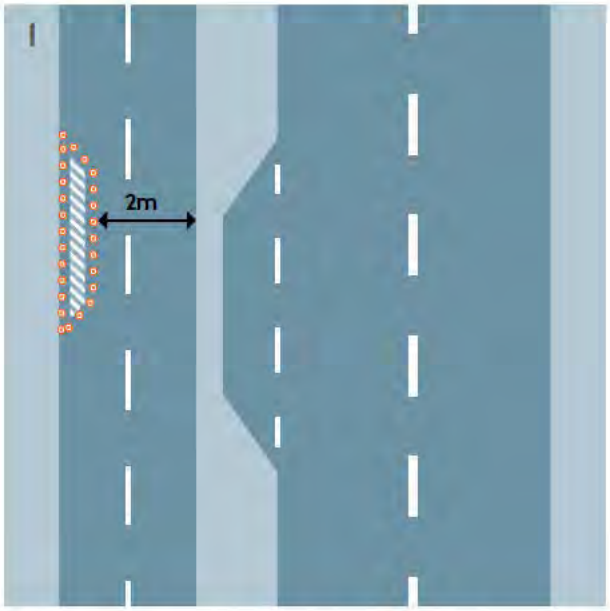
The necessary space remaining open to cycling will be dependent on several factors, including the predicted cycle flows, the day and time of works, and the duration of works. TfL expect track widths to adhere to the following:

- Bi-directional tracks: 2 metres desirable minimum total track width
- Single direction tracks: 1.5 metres desirable minimum total track width

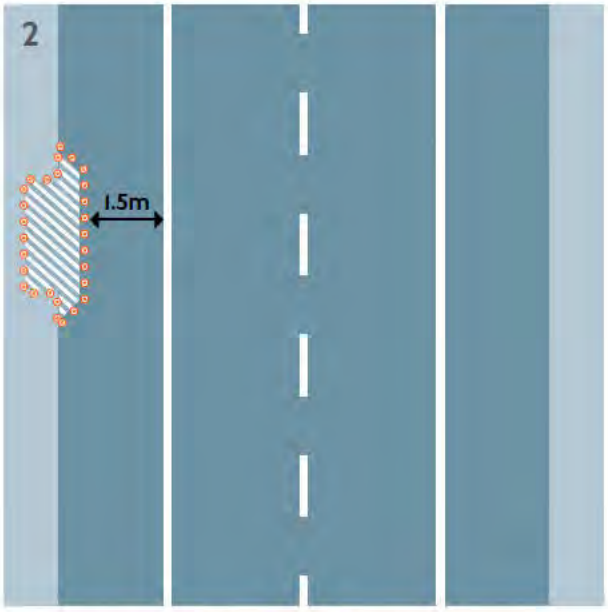
It is paramount that cones or barriers marking the segregation boundary are in good order and well maintained. Barriers with protruding feet should be avoided as there is an increased risk to cycilists, who may snag pedals.

Where works require the total obstruction of the cycle facility, it will be incumbent upon the designer to seek, in the first instance, to re-provide a segregated facility of similar level of service past the works. This will most likely require routing the cycle track into the carriageway, but if this is not possible, cycles could potentially be directed onto the footway by the creation of a shared-use footway to enable cycles to continue without dismounting. If neither of these options is possible, cyclists should be redirected to join the carriageway at a safe location.

Desirable minimum cycle track and cycle lane widths



Bi-directional cycle track



Single direction cycle track


133
HA37
ENVIRO400 CITY
EY03 VYP

Chapter 4 – Other road users at roadworks

4.1 Introduction

Although safety at roadworks is a top priority, it is also important that we continue to deliver a good transport experience for all of our customers.

London buses transport more people than any other public transport mode. They can move 70 people in the same amount of road space occupied by three cars. People using public transport typically do between eight and 15 minutes of active travel per day, which supports the Mayor's Healthy Streets Approach.

In 2018, lorries and vans account for around one fifth of road traffic in London. As London grows the volume of freight and servicing trips is forecast to grow – delivering economic and commercial benefits to London.

Therefore, it is important that disruption caused by roadworks to motorised vehicles is minimised, and that these road users have confidence in the reliability of their journey choice.

Advising powered two-wheelers of uneven road surface

4.2 Powered two-wheelers and mobility scooters

The safety of motorcycle and mobility scooter users also needs to be considered when designing traffic management. Maintaining clear sight-lines and smooth road and footway surfaces to minimise incidents is paramount. On-site wheel cleaning and road sweepers should be available to restrict muck transferring to the road space outside the site area.

4.3 Bus passengers

Sustaining bus services while roadworks are being undertaken is a key priority for TfL, given the high number of passengers that can be transported by this service. Therefore, every effort must be made to ensure services remain unaffected. Where that is not possible, temporary measures should be considered, including:

- Planning traffic management phases to avoid bus stop closures. Temporary bus stop facilities should be provided where this is not possible
- Continuation of a dedicated bus lane. Where there are a high number of bus services, consideration should be given to retaining a dedicated facility for buses only and placing other motorised vehicles on diversion.
- Keeping diversion routes to an absolute minimum
- Supplying an alternative shuttle bus service. This may be using a smaller-sized mini-bus that is able to navigate around the roadworks site, or a smaller bus on a short local diversion away from the works

Developers and contractors will need to understand the impacts to both journey times and the cost implications to the operators when designing proposals. TfL assessors are able to provide information on the predicted number of bus passengers who may be impacted by restricting bus journeys. Access to the site during construction may also be a cause of delay to London's bus passengers, whether along the route or by suspending bus stops and bus lanes.

Separate approvals are required for suspending bus stops and bus lanes. Bus lanes can be suspended by a temporary suspension request – see Chapter 2 (page 16). Requests for bus stop suspensions are made through the Bus Operations (see 4.4 Timescales for bus service changes).

All vehicle types should be able to negotiate a site layout. TfL may require swept paths to prove this is possible, especially where long wheel-based rigid and articulated vehicles are involved. As with cycles, there are minimum widths set in place so buses can negotiate traffic management layouts. A minimum width of 3.5 metres is required.

4.4 Timescales for bus service changes

The table below sets out typical notice periods where changes to bus services are required:

Service	Notice period
Bus stop suspensions	2-3 weeks
Bus diversions	6-8 weeks
Temporary stops	7-10 days
Publicity / communications	4-6 weeks
Countdown / iBus (changes to routes)	2 weeks
Bus shelter relocation	16-18 weeks

Contact details for Buses can be found at the end of this document.

4.5 Freight

TfL is committed to improving road safety. London's continued growth and associated construction activity means that vulnerable road users, such as pedestrians and cyclists, together with construction traffic, are sharing roads more than ever, and therefore increasing the risk of collisions.

Between 2008 and 2013, HGVs were involved in 55 per cent of all cycling fatalities in London. Analysis of these figures found that construction-related HGVs, such as tippers, were overrepresented within these figures. In 2011, seven of the nine HGVs involved in cyclist fatalities were construction-related vehicles.

Developers and construction clients have a responsibility to manage the impact of their activities on road users and the wider community. The construction industry can take positive steps to take ownership of road safety and reduce the risk of collisions in their supply chain.

The Construction Logistics and Cyclist Safety (CLOCS) programme is a construction industry-led initiative which aims to achieve a visionary change in the way the construction industry manages work-related road safety.

As part of CLOCS, a document has been developed called CLOCS Standard for construction logistics: managing work related road risk.[20] This is a common national standard for use by the construction logistics industry. Implemented by construction clients through contracts and adhered to by vehicle operators, it contains 16 requirements around the safety of fleet operations, vehicles, drivers and the management of construction sites.

Each requirement has been developed with the aim of reducing the risk of a collision between HGVs and vulnerable road users such as cyclists and pedestrians. Responsibility for application of the standard lies with both clients and vehicle operators.

TfL encourages developers and construction companies who have not already done so to implement and ensure compliance with the CLOCS standard.

4.6 Working near TfL tram infrastructure

When works are in the vicinity of trams or other guided transit systems, the designer will need to consult with operators in the planning phase. This is to ensure their requirements are fully met and ensure risks are as low as reasonably practicable to the operation of trams or road users. Any agreed requirements must be effectively communicated to the designers, the commercial team and the contractors or principal contractors who will be delivering these works.

Further information on TfL trams can be found here.[21]

20 https://www.clocs.org.uk/page/clocs-standard

21 https://tfl.gov.uk/modes/trams/

Chapter 5 – Guarding and segregation

5.1 Introduction

This chapter of the handbook is intended to provide assistance to those who are designing, planning or preparing a works site on the TLRN where there is a potential risk to the safety of those undertaking the works activity, road users navigating past it, or adjacent properties or infrastructure. It should also help those either assessing traffic management proposals or those responsible for checking compliance on site.

To support the Mayor's objectives and the Healthy Streets Approach to encourage active travel, there is renewed focus on ensuring pedestrian routes are well signed and guarded, and that works sites in London are safe, look tidy, and are consistent across London. This will help road user familiarity where roadworks are taking place.

Appropriate, well-maintained, correctly installed barriers will not only ensure increased safety of the workforce and public, but as barrier equipment will invariably form a boundary to which the public have access, the appearance of barriers plays a significant part in how the works site and contractor are portrayed to the public.

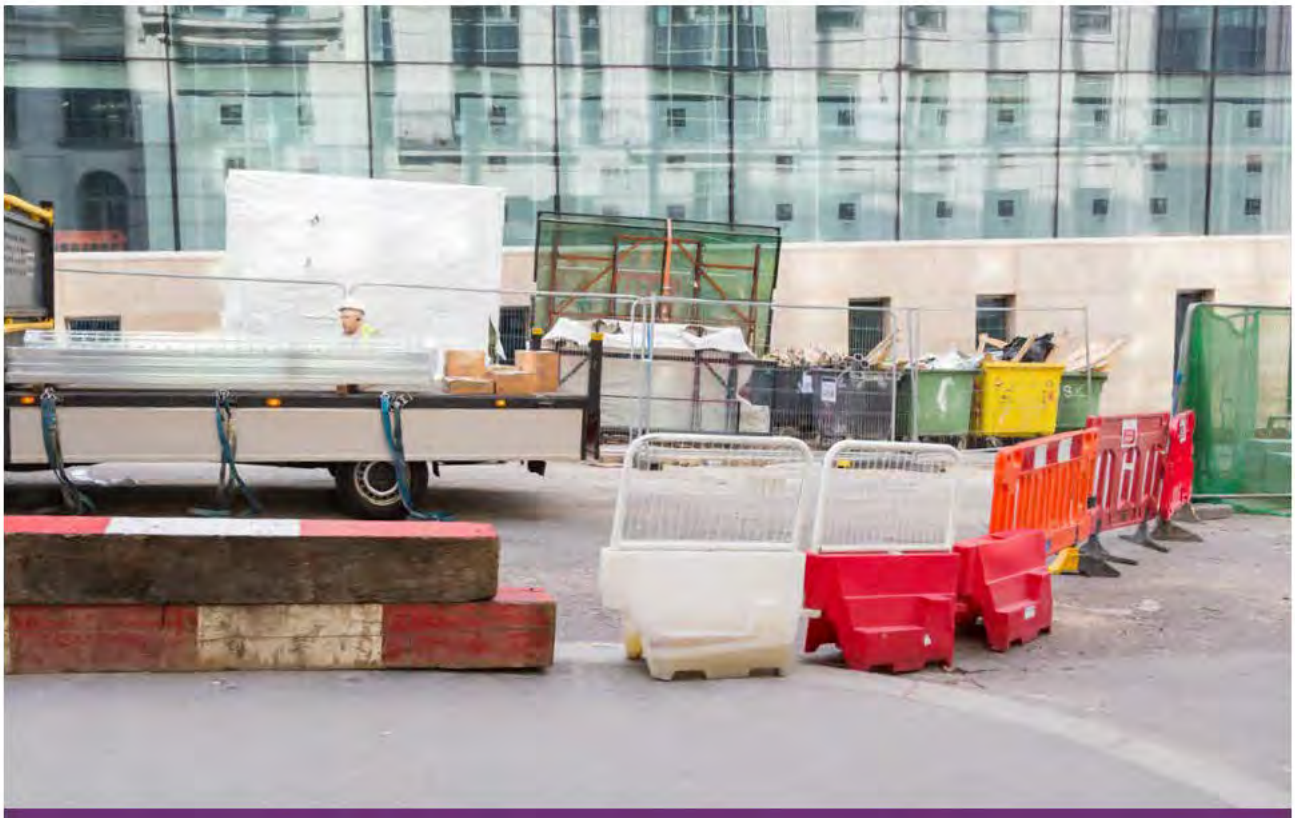
The minimum standards required for segregation of vehicles and pedestrians from work areas are described in the Safety Code, although it does not cover dual carriageways with a speed limit of 50mph or more. Further guidance on segregation for these higher-speed carriageways should be sought from Chapter 8 and Highway England's Interim Advice Note 142/11 (Temporary Barrier Decision Tool).[22]

The need, type and nature of works site segregation and guarding will be determined from the designer's risk assessment. This will establish the nature and magnitude of the risks associated with the location and work activities being carried out, before they can be mitigated and controlled. The designer will need to make an assessment on how and where to segregate and guard road users from hazards and, if necessary, consider barriers to a crash-tested specification to restrain errant vehicles in the event of an accident.

A significant determining factor in barrier product selection will be whether a barrier is required to provide lightweight, physical and visual segregation; or whether, due to an increased risk from crowds or vehicles, a crowd or vehicle restraint barrier is necessary.

22 http://www.standardsforhighways.co.uk/ha/standards/ians/pdfs/ian142.pdf

Good practice: tidy, correctly assembled and well-maintained barrier



Bad practice: multitude of mixed barrier types, which are not assembled into a continuous barrier

Works promoters are expected to deliver a high level of service to road users, particularly the most vulnerable, ensuring works sites are set out in accordance with the Safety Code. A robust risk assessment providing full justification must be provided where compliance with the Safety Code is not achievable and an alternative product or design is being considered.

Innovation is welcomed where it improves road user experience and enhances the temporary works environment so that road users are not deterred from making their usual journeys. Any new approaches should be discussed with the relevant TfL traffic management assessment team before works begin.

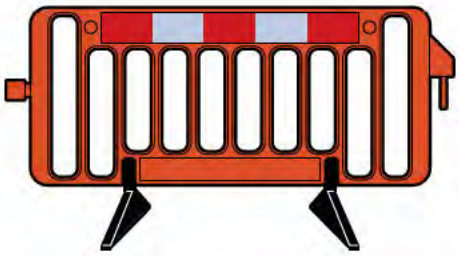
Well-maintained and appropriate barrier

5.2 Choosing the correct type of works site guarding

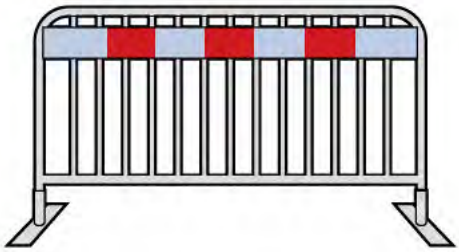
Traffic barriers segregate the works site from traffic by providing an advance warning though their retroreflective design, whereas pedestrian barriers provide a separation from the works site solely for pedestrians. Each barrier system serves a very specific purpose, but can sometimes be confused as they are similar in appearance. Traffic barriers do not have a 150mm deep tapping rail across the base of the product, which is used by visually impaired and blind people who rely on the use of a stick to navigate around works site obstructions. Traffic barriers must not be used where pedestrians are likely to interact with them.

Pedestrian barriers in their most simplistic form consist of a post and board-style product that is usually assembled on-site (see image).

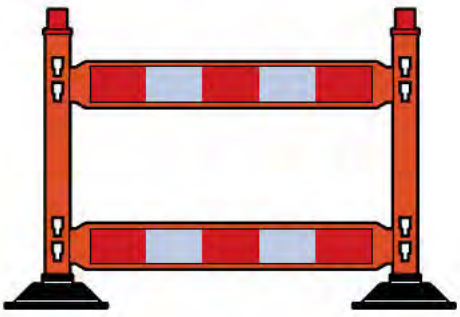
Typical barrier products



Plastic traffic barrier



Metal traffic barrier

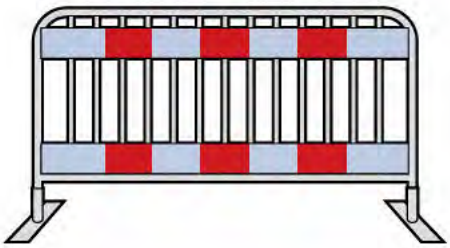


Basic pedestrian barrier system

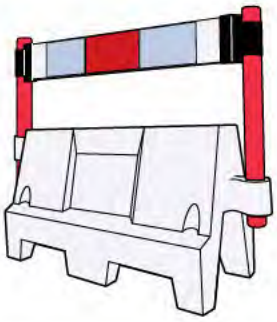
While the basic post and barrier system (see previous graphic) meets the minimum requirements, it may not always be suitable for all locations because of the large opening between barrier boards and posts. Barriers with smaller gaps and greater protection to mitigate the risk of unauthorised access (see figure to the right) should be considered, especially where high numbers of small children are expected.

More robust pedestrian barrier systems should be used where increased footfalls are predicted or known (such as busy high streets, near event venues, stadiums, etc). They should be able to withstand more physical pressure and are less likely to be dislodged.

Barrier systems offering increased protectio



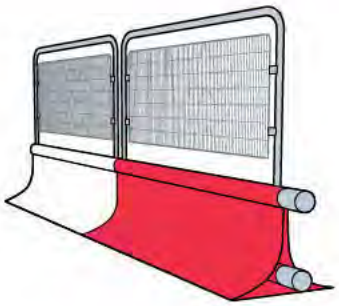
Metal pedestrian barrier



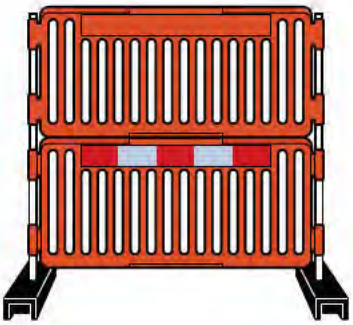
Water-filled barrier system

Ballasted pedestrian barrier

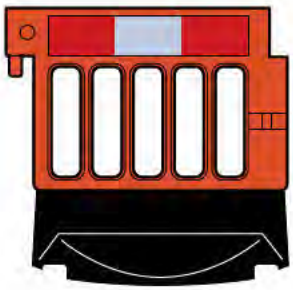
n from works



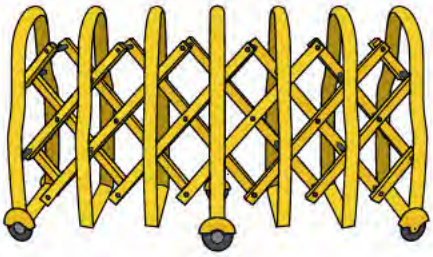
Crash-tested pedestrian barrier



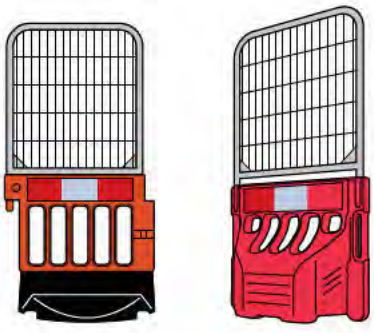
High barrier system



Self-weighted barrier systems



Retractable barrier



Weighted high barrier systems

Weighted high barrier system with vertical support

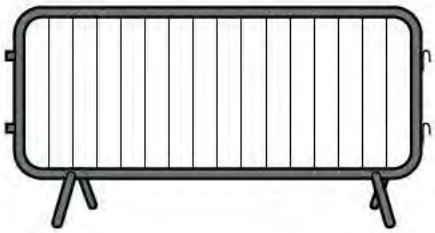
Where there is further risk of individuals climbing over the barrier and to improve the security of the site, it may be necessary to increase the height of the barrier (see examples in previous graphic on page 97), particularly where deep excavations (more than 1.5 metres deep) are required.

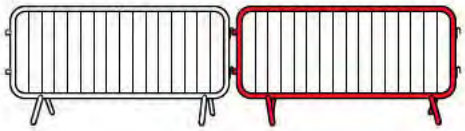
The non-compliant barrier systems shown on page 99 are not favoured for protecting or guarding works sites as they do not fully meet the requirements of the Safety Code or Chapter 8.

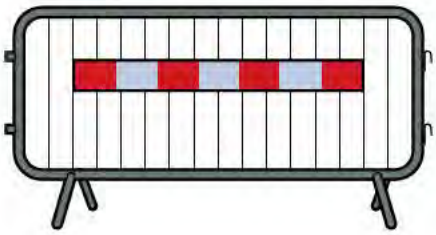
The use of retractable barriers (see page 97) is only acceptable where the barrier is fully marshalled and only used for short durations for temporary footway closures to allow works vehicles access/egress to construction sites or similar situations. When marshals are not present, the barrier system must be locked in its closed position.

All barriers should be in a conspicuous colour and signed if required so that road users are clear about what is expected of them as they approach the barrier.

Non compliant barrier systems







5.3 Barrier stability

Barriers must be installed correctly to suit the prevailing conditions otherwise they are likely to become defective and present a hazard or obstruction to road users, with the potential to cause injury.

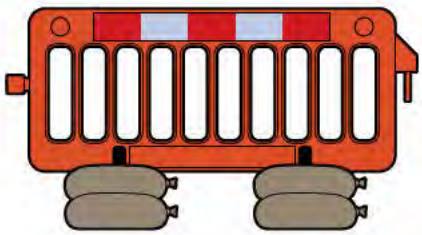
The first duty of the contractor is to ensure the location is safe to install the barriers and that their placement does not become an intrinsic hazard when installed. The ground must be clear of debris, stable and suitably level so that the barrier is secure to the ground. Certain barrier systems do not readily adapt to sudden changes in gradient. This can be a particular issue when running along the edge of a footway where there are dropped kerbs.

Contractors must be aware of the limitations of some barrier systems. Barriers can vary in specification and the degree of wind loading they can tolerate. Where higher winds are forecast or when barriers are in place for longer-duration works when higher winds could reasonably be expected, the barrier system should be upgraded to a weighted variety with a vertical supporting mechanism accordingly.

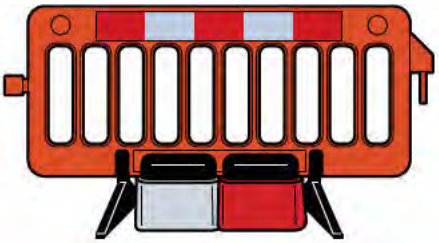
Traffic/pedestrian barrier products must meet standard BS 8442:2015 (Miscellaneous road traffic signs and devices. Requirements and test methods) which, among other requirements, defines categories of wind speed for barriers to withstand.

Class of wind speed / barrier	Effective wind speed
Class A: Tested to withstand wind speed to a maximum 26.3m/s (58mph) – excludes highly exposed sites	Designed to meet a wind speed likely to be experienced on any one day across the whole year. Best suited for longer-term works
Class B: Tested to withstand wind speed to a maximum 17.6 m/s (39mph)	Designed to meet a wind speed likely to be experienced on any one day in the months of May, June and July. Best suited for unattended sites at less windy times of the year
Class C: Tested to withstand wind speed to a maximum 8.7 m/s (19mph)	Best suited for short-term works where operatives are present, or for emergency situations that would not require Class A or B.

Approved methods of ballasting pedestrian and traffic barriers

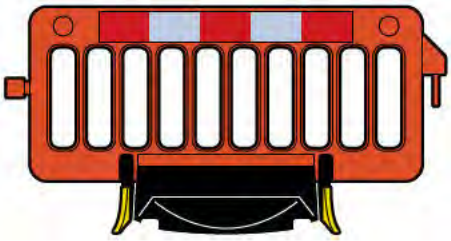


Sandbags placed on barrier feet

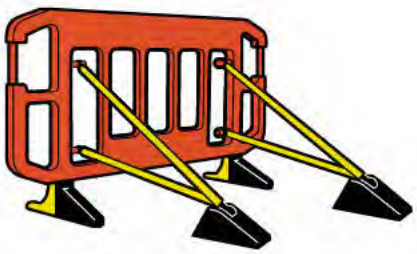


Weighted barrier base

Clip-on ballast trays



Weighted barrier base



Barrier with vertical support system

A secure and well maintained site

5.4 Security and protection

The minimum standard of guarding for works undertaken on or adjacent to a footway is a continuous pedestrian barrier system. This may be required to be supplemented with pedestrian signs. Beyond the basic need for minimum guarding requirements, it may be necessary to provide enhanced protection for members of the public from hazards, or to increase protection for the workforce from vehicles.

Example situations that would necessitate enhanced barrier systems include:

- Deep excavations
- Unattended excavations within 2 metres of a pedestrian route, depending on risk assessment
- Sites situated in high pedestrian footfall areas
- High volumes of traffic flow adjacent to the works site
- Width restriction across the highway at the works site that increases the risk profile to a level where additional protection is required
- Longer-duration static work
- Plant operational activities adjacent to the highway or walkway
- Protection of sites involving vulnerable excavations or structures

Separate to the requirements relating to protection is the need to guard against the threat of intentional intrusion with menace. The site-specific risk assessment may indicate that a higher level of security is required supplementary to the protection requirements.

Example situations that would necessitate a higher level of security include:

- Sites situated in areas known for antisocial behaviour. These may include areas frequented by protesters, near venues selling alcohol, stadiums and public events
- Works located near high-risk or high-security locations such as government buildings, military facilities, or railway lines
- Works with exceptionally high risks to members of the public if they were to access the works area, such as exposed utility services
- Sites where plant and materials are left on site and are vulnerable to theft

There should be suitable access points through the barrier system and into the workplace to allow personnel and vehicles to enter the works site safely and without affecting the security of the site, or the passage of road users.

All site access points should be closed and secured as soon as possible after the need for their use has ended.

When barriers are left open for contractors to enter and exit without further controls, the integrity of the barrier system and the safety and security of the site is compromised.

It is unacceptable to have barriers that are not secured into a continuous interlocking system. Correctly installed barriers not only increase site security, but also stabilise each panel.

Where an excavation is to be left open for a long period of time, consideration shall be made to cover the excavation with a 'road plate' or other proprietary plating system. Plates must be secured from inadvertent movement.

When deploying barriers to protect trees and other sensitive structures, ensure the placement of the barrier does not itself become a hazard to the tree or root system.

5.5 Pedestrian barriers

Further guidance on pedestrian barriers and the management of pedestrians is covered in Chapter 3 of the handbook.

Retractable barrier system marshalled to allow site access

5.6 Carriageway barriers

When deciding on the need for barriers at a works site, designers must assess their intended purpose. Barriers should comply with BS EN1317 (Road Restraint Systems) if they are required for containment or restraint to protect the workforce, vulnerable structures, or to ensure the public are not placed in grave danger. A list of compliant road restraint systems approved for use on the TLRN can be found here.[23]

Subject to a site-specific risk assessment, it may be acceptable to use non-approved proprietary barrier systems where they are required to segregate traffic or provide delineation on single carriageway streets that are well lit and have speeds of 40mph or below, or on dual carriageways of 30mph or below.

Barrier units should be installed in an alternate red and white sequence and installed in accordance with the manufacturer's instructions, making sure end sections and connectors are not left exposed in a hazardous way to road users. If the barriers are water filled, care must be taken when considering discharging the water onto the highway to ensure road users are not placed at risk.

Care must be taken when installing higher barrier systems with top panels to ensure safety-critical sight lines for road users are not obstructed, particularly in the proximity of traffic signals, pedestrian crossings, junctions or on bends.

Prior to any barrier installation, the designer should consider the impact on lighting and avoid inadvertently creating locations that could become ambush points or introduce antisocial behaviour.

Barrier systems are intended to make works areas inaccessible, but where barriers are placed to segregate vehicles in areas where there are high numbers of pedestrians (who could previously freely cross the road) they may now be prevented from doing so, which could lead to footway congestion. Supplementary measures or barriers may consequently be needed to ensure pedestrians are kept safe. Examples of where this may occur are near stadiums and parks where a large number of pedestrians may pass in a short space of time.

23 http://www.standardsforhighways.co.uk/ha/standards/tech_info/en_1317_compliance.htm

Barriers providing good delineation


Diversion

Chapter 6 – Temporary traffic signs

6.1 Introduction

Traffic signs must be clear, concise, legible and consistent. With so many works on the road network delivered by hundreds of different contractors, a significant amount of inconsistency has evolved over the years when implementing traffic signs for temporary works and events.

Where a journey passes through multiple works locations undertaken by different contractors, it is important that signing is consistent and to a high standard. This will reduce confusion by enabling road users to understand messages more readily, and make decisions in good time.

It is essential that signs are not used excessively and only where required to ensure unnecessary risk is not introduced for road users. Their placement must be considered carefully to prevent a site becoming non-compliant by reducing road user widths below the minimum required standards.

6.2 Temporary traffic sign face colours

Where a designer requires a temporary sign for a situation that is not an already prescribed sign in the TSRGD, Schedule 13 Part 9 of the regulations allows designers to create temporary signs within certain parameters. Traffic management designers should familiarise themselves with these regulations, especially to avoid using unlawful signs.

Incorrect use of colour on signs is a common issue. Chapter 8 gives guidance on the use of colour coding temporary signs.

White characters or symbols on a red background must be used for any signs that are:

- Hazard warning signs
- Information signs for pedestrians, cyclists (or horse riders)
- Works access/exit signs

Traffic Advisory Leaflet 01/14[24] (Quick guide to temporary white on red signs at road and street works), serves as a very useful guide to designers creating temporary signs, although some of the references to the TSRGD are now outdated.

Black characters or symbols on yellow signs should be used for any signs conveying temporary information relating to roadworks, or information about checkpoints.

Temporary traffic signing for special events should also comply with the TSRGD, and the Traffic Advisory Leaflet 04/11[25] (Temporary Traffic Signs for Special Events) serves as a useful guide. It allows for four variations of traffic sign face colour, but references to the TSRGD are now outdated.

24 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/305857/tal-temporary-white-on-red-signs.pdf

25 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/4393/4-11.pdf

Sign face colours

Hazard warning signs

Roadwork information signs

Example event signs

6.3 Duplication of prescribed signs

Sign designers are not permitted to create a temporary sign that is already provided for by the TSRGD. The examples shown below illustrate commonly seen signs on the road network and are shown alongside images of the correct signs prescribed by the TSRGD.

Duplication of prescribed signs

	Incorrect signs	Correct signs
Slippery road signs	  	
Signing for works access points	 	
Signing for cyclist dismount situations	  	

6.4 Traffic signs with the TfL logo

The TSRGD permits the use of traffic authority logos on certain traffic signs, but no sign may contain the logo without the permission of the highway authority. If a traffic management designer intends to place the TfL logo on traffic signs for a scheme or works, they should ensure they have the approval to do so from the relevant TfL Assessment team (see Contacts chapter on page 180). There are a range of design standards available for use by staff, suppliers and design agencies involved in graphic design and layout.

Although some guidelines apply across different modes and business areas, key differences between them mean it is essential that the correct set of standards is applied.

The correct logo to use for TfL for traffic signs is the 'mark', which consists of the TfL roundel with the TfL logo type. To ensure clarity and impact when producing the mark, no other graphic elements should be placed within the minimum margins around the logo.

No other TfL roundels should be used that represent different modes of transport, or marks containing the 'Every Journey Matters' strapline on traffic signs.

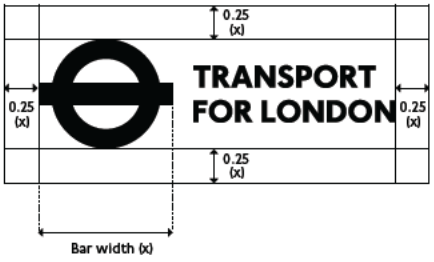
Further information on TfL design standards can be found here.[26]

26 https://tfl.gov.uk/info-for/suppliers-and-contractors/design-standards-and-licensing

Examples for using the TfL logo on traffic signs

End of works sign

Logo used in a top panel



TfL logo design standard

Signing for local businesses

Typical sign that can be used to highlight access is maintained for businesses.

6.5 Business names on traffic signs

TfL does not permit the inclusion of business names on temporary traffic signs.

Where works have the potential to disrupt normal traffic flows and it may not be clear to the public that access to local businesses is maintained, signs may be placed with the legend 'Businesses open as usual'. This ensures TfL is not seen to promote a particular business.

6.6 Other general temporary signing principles

The following guidance is provided to tackle the most common errors TfL has encountered with the use of traffic signs.

- Static signs should have no more than 12 units of information with a unit defined as a word, name, date or symbol
- Messages should be concise and clear and be appropriate to the speed of traffic to enable drivers to understand the message and minimise distraction
- Days of the week may be abbreviated as appropriate and times of the day must always be in the 12-hour format – the 24-hour clock must not be used
- Web addresses must not be used on traffic signs
- Diversion route signing may use sign Ref: 2703 in advance of junctions and/or sign Ref: 2704 at junctions, but there is no expectation that designs must always use both in the vicinity of all junctions. Surplus signs contribute to sign clutter and have the potential to restrict footways
- Map-based diversion signs are not required for works where the directed route can be clearly signed using sign Ref: 2703. If the road network or roundabout is more complex, then their use can be justified

Different types of diverted traffic sign

Sign used in advance of a junction to indicate the direction diverted traffic should take at the junction ahead (Ref: 2703)

Sign used to indicate the direction diverted traffic should take at a junction (Ref: 2704)

6.7 Portable Variable Message Signs

Variable Message Signs (VMS) are used widely across the TLRN, particularly where major or long-duration works are taking place. They are an effective advance warning mechanism to road users about potential disruption upstream.

They are usually trailer-mounted and towed or craned into position.

Where there is adequate width to place VMS units on the footway, they should be sufficiently guarded with pedestrian barriers to Chapter 8 standards to protect pedestrians from colliding with them, particularly blind or partially sighted pedestrians.

Care should be taken to ensure VMS do not present a hazard at head height, and where necessary barriers should be extended to prevent people walking underneath the signs if they cannot be raised to a safe head room height for pedestrians and/or cyclists.

VMS should be positioned where tow hitches point downstream where possible or are secured in the upright position where allowed, which will minimise the hazard in the event of a vehicle collision.

Wherever possible, VMS units should be located behind any existing or temporary crash barriers.

VMS units should be clearly referenced to the connected works site to enable the highway authority or the police to identify the organisation responsible for its placement.

Messages for planned works should conform to the following format:

- Time/Date
- Where
- What
- Advice

Where signs are utilised for emergency situations, the following format should be applied:

- Location
- Direction
- Cause

Messages should not normally contain more than eight words or six units of information.

VMS units must be compliant with TOPAS 2516C[27] (Performance Specification for Discontinuous Variable Message Signs). Chapter 8 Part 3 Section U5.16 gives further information on the use of temporary VMS.

27 http://www.topasgroup.org.uk/MyFiles/Files/specifications/2516C v3 draft uploaded.pdf

Variable message sign


4-WAY CONTROL
WAIT HERE
UNTIL GREEN
LIGHT SHOWS

Chapter 7 – Traffic signals

7.1 Introduction

TfL is responsible for the maintenance, management and operation of London's 6,000+ permanent sets of traffic lights and processes more than 2,000 sets of portable and temporary signal applications a year.

Keeping London moving is a key TfL responsibility. Due to the large volume of road users in central London and the sensitivity of the TLRN to delays, managing the large volumes of temporary works in London is complex. The use of portable traffic signals helps to control road user movement at works and they are a vital tool in making sure the network remains safe.

Portable traffic signals (PTS, or sometimes referred to as Portable Light Signals (PLS)) are distinct from temporary traffic signals, which are permanent signals mounted in a temporary fashion. They are connected to power and a central traffic signal control system, and were conventionally mounted into barrels, although lately have a more sophisticated base.

Portable signals typically have their own power source, usually battery powered, and are manoeuvrable in nature. The decision on what type of facility to provide rests with TfL as the traffic authority.

Works promoters should consult with TfL's traffic management assessment teams (see Contacts chapter on page 180) when planning works that propose the use of portable signals before seeking formal permission to install them on the TLRN.

7.2 Equipment standards and specification

Portable traffic signal control equipment must comply with the Traffic Open Products and Specifications (TOPAS), most notably:

- TOPAS 2502B[28] (Performance Specification for Portable Traffic Signal Control Equipment for use at Roadworks)
- TOPAS 2504A[29] (Performance Specification for Vehicle Detection Equipment for Vehicle Actuated Portable Traffic Signals)
- TOPAS 2537A[30] (Performance Specification for Portable Traffic Signal Control Equipment with Pedestrian Facilities for use at Roadworks)
- TOPAS 2538A[31] (Performance Specification for Portable Traffic Signal Control Equipment for a Standalone Pedestrian Facility)

Traffic signal equipment not meeting the required TOPAS specifications is not authorised for use on the TLRN.

Traffic management contractors should check with their traffic signal suppliers that the equipment meets the required standard.

Contractors should ensure their staff are suitably trained and readily available to adjust timings or introduce manual control (stop and go board in case of failure) where necessary. Operators and designers require specialist training, particularly with pedestrian-controlled facilities. Contractors working on behalf of TfL are required to operate to the National Highway Sector Scheme 12D.[32] It is strongly recommended this standard be adopted by all works promoters using multiphase signals and pedestrian crossing systems.

Manual control of traffic signals refers to the continual presence of a suitably qualified operative actively controlling the phasing of the signals in real time. This method enables the controller to manage demand and respond to traffic flows to help mitigate delays and disruption on the road network. TfL will need to consent or may impose conditions for the use of manual control.

28 http://www.topasgroup.org.uk/MyFiles/Files/specifications/2502B v4 170415.pdf

29 http://www.topasgroup.org.uk/MyFiles/Files/Specifications 2016/TOPAS 2504A 11316.pdf

30 http://www.topasgroup.org.uk/shop/topas-2537a-performance-specification-for-portable-traffic-signal-control-equipment-with-pedestrian-facilities-for-use-at-roadworks/

31 http://www.topasgroup.org.uk/MyFiles/Files/Specifications 2016/TOPAS 2538A 11316.pdf

32 https://www.ukas.com/download/publications/publications_relating_to_certification_bodies/NHSS 12D 9001 2008 - Issue 10 November 2016.pdf

Manual control should be a method of last resort in controlling traffic signals. In some locations and situations, pre-set or pre-agreed timings may not be deemed responsive enough to sensitive locations or in instances when a sudden surge of traffic can be predicted, such as when people are leaving large events. Manual control can have the capability to flush traffic through an area to prevent sections of the road network becoming gridlocked. Furthermore, it is likely to be required in locations near emergency service stations and Accident and Emergency departments, or security sensitive parts of the road network.

Traffic management proposals with portable traffic signals will be required to show:

- Proposed method of control – manual, fixed, vehicle actuation, Urban Traffic Control (UTC)
- Stage diagram including pedestrian phases with green, vehicular and pedestrian red and blackout duration
- Distance between 'Wait Here' signs or 'Wait Here' and the datum point
- Traffic signal manufacturer and model with confirmation traffic signal equipment is TOPAS approved

7.3 Standard and UTC PTS systems

Temporary works with traffic signals, if not carefully managed, can disrupt London-wide operations. Therefore, standard portable signals, which are widely used throughout the country, are not suited to all locations within London.

TfL has developed the technology to control PTS through London's UTC system, which centrally controls the traffic signals in London. PTS can now be operated using the following methods:

- Full UTC: This is achieved by commissioning the PTS onto a UTC system and operating the site with plans and a timetable, allowing the PTS to be coordinated with the surrounding network. TfL is able to control these signals remotely and override deployed plans when required. A communication line is required for the Full UTC and downloadable software plan to connect with the on-street equipment. It should be noted that not all available systems in the UK are able to interface with TfL systems so the contractor will need to ensure they source compatible products
- Indirect control: Downloadable plans, signal timing plans and timetables are sent to and operated by the PTS controller. This is in isolation of UTC so the timings will not be coordinated to the surrounding signalled sites, but will be operating the required green times as per the signal timing plans. This can either be delivered by TfL or by the traffic management contractor. It must be possible for these systems to respond to updated signal timings within 15 minutes of a request from TfL
- Standalone: PTS can be operated independently by the traffic management contractor. TfL will provide suggested green timings but the operation/timings are the sole responsibility of the works promoter. In London, these systems are more suited for use in non traffic-sensitive and non-complex locations without UTC

7.4 When to use UTC PTC systems

During the design phase, the works promoter will assess the site and the traffic management/traffic control arrangements and submit a design proposal to TfL. This will include details of the chosen system and method of communicating with the signals.

The proposed traffic management will be assessed and will look at the following considerations in determining whether the implementation of a UTC system is appropriate:

- Planning and notification: Unless special circumstances dictate, TfL requires the decision to use UTC (with all the necessary documentation complete and in place) 10 working days in advance of the works start date
- Works duration: Due to cost and complexity of operations in the mobilisation and demobilisation of the systems, it is recognised they are generally not suited to works that are less than two days in operation except in extraordinary circumstances
- Peak time operations: UTC systems are well suited to heavy demand situations. Off-peak setups and low flow periods during school holidays and Christmas Day/New Year's Day are less likely to warrant UTC systems
- Road layout type: Certain types of road layout such as a roundabout or a gyratory will require rigorous and careful planning and implementation
- Location: If the works are in a sensitive/strategic location or if they could contribute to secondary congestion into sensitive/strategic areas
- Traffic flows: If traffic flows are considered moderate/high, or where abnormal queues are predicted that cause congestion above acceptable levels either in the local area, or cause secondary congestion at other adjacent sensitive/strategic locations
- Modal usage: Minimising disruption to sustainable modes such as buses is an influential factor, particularly if there are more than 30 buses per hour over all arms of an intersection in the vicinity of a works area

7.5 UTC PTS systems assessment and commissioning

When assessing traffic signal applications, the traffic management proposals are assessed to determine the requirement for UTC systems in the following steps:

1. Works promoter (or their traffic management designer) submits a traffic management proposal to TfL for assessment

2. TfL will respond to the works promoter with their traffic management assessment decision including if UTC is required, which must be included in their permit application

3. Works promoter completes a UTC portable request form

4. The method of control and communication to the signals is agreed, bearing in mind resilience in problematic locations

5. UTC portable request form is updated to enable UTC commissioning

6. Several tasks by TfL and the works promoter are required before the UTC PTS is ready for use, which is generally within 10 working days of an order being placed

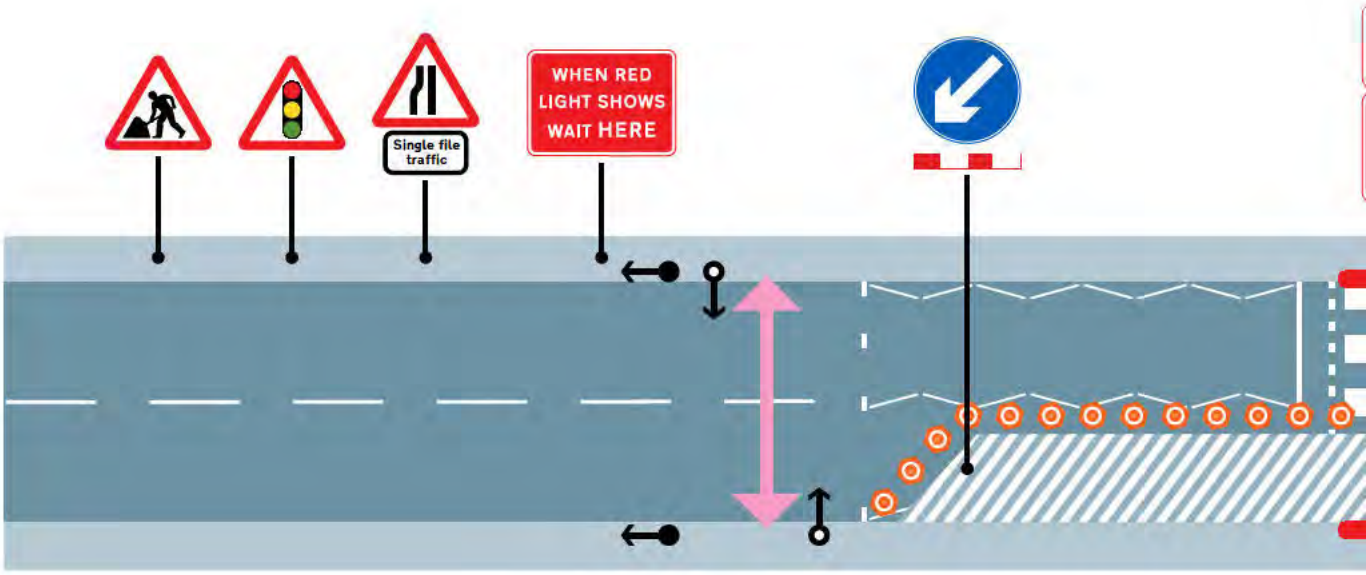
7.6 PTS signal timings

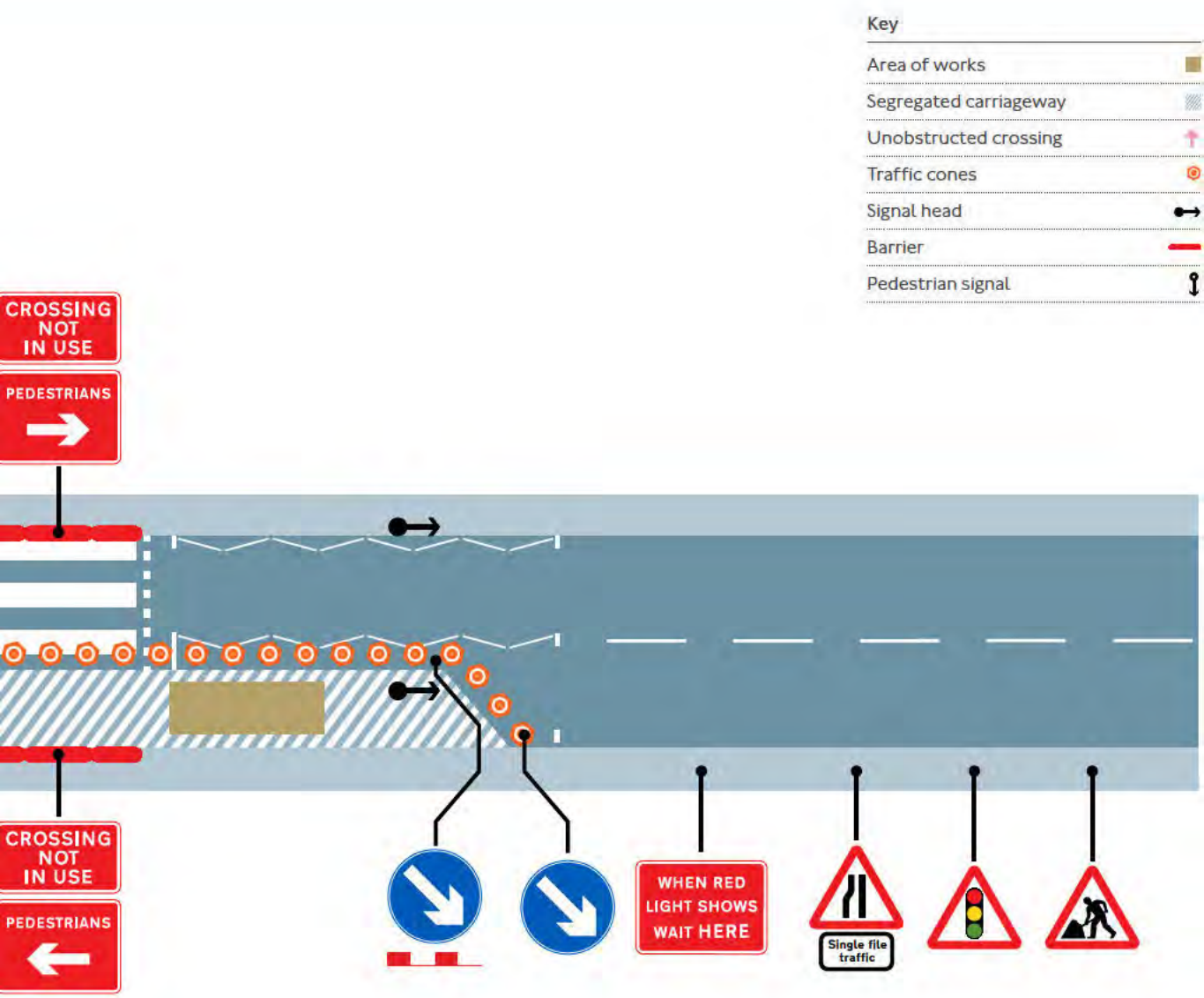
TfL may provide signal timings to contractors, but when they are not supplied, the contractors will need to propose their own timings. It is important that the designer ensures the cycle times are reasonable and not excessive. Long cycle times lead to significant frustration from all road users due to the long wait times for each movement. Research shows that pedestrians are less likely to wait for the green man after 30 seconds, so shorter cycle times are preferable.

7.7 Portable crossing systems at zebra crossings

Where traffic management with a shuttle lane is required to span a zebra crossing, it will be necessary to provide a controlled crossing facility to replace the zebra crossing so that it may operate in sync with the signals. However, it should not be placed in exactly the same location as the zebra crossing as this may lead to road user confusion in terms of who has right of way. The zebra crossing should be closed with pedestrian barriers and the signalised crossing located in a nearby convenient location between the main signal heads.

Closed zebra crossing at roadworks




Key
Area of works
Segregated carriageway
Unobstructed crossing
Traffic cones
Signal head
Barrier
Pedestrian signal
CROSSING NOT IN USE
PEDESTRIANS
CROSSING NOT IN USE
PEDESTRIANS
WHEN RED LIGHT SHOWS WAIT HERE
Single file traffic

7.8 Portable pedestrian crossing facilities

If it is necessary to close a pedestrian crossing facility, it will be expected that an alternative route using an existing crossing point be available via a short diversion route or a replacement facility provided. Reasonable facilities to provide accessible routes to all pedestrians must be maintained, including those in wheelchairs, mobility scooters, pushchair users, or those less able to walk. The aim should be to ensure no one is disadvantaged by achieving a similar standard of safety as at a permanent site.

The Traffic Advisory Leaflet (TAL) 3/II[33] (Signal-controlled Pedestrian Facilities at Portable Traffic Signals) gives advice to designers for temporary pedestrian crossing facilities. It states 'audible and/or tactile signals can be used. Ramps from the footway to the carriageway should be provided, which are also expected to be provided if existing drop kerbs or a carriageway level location are not available – this requirement shall be established as part of the permit conditions on NCT06a'. Chapter 3 (on page 40) of the handbook has further information on the requirements for footway ramps.

TAL 3/II also gives advice on how to manage uncontrolled side road and driveways in shuttle lanes when a pedestrian crossing facility is present. It indicates a supplementary signal and a 'Wait here' sign should be placed within the shuttle lane in order to capture traffic approaching the crossing when the green man is showing. Not all proprietary PTS systems may conform to this design functionality as standard. Designers must therefore design out this situation wherever possible.

33 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/482503/3-II.pdf

7.9 PTS and cycle facilities

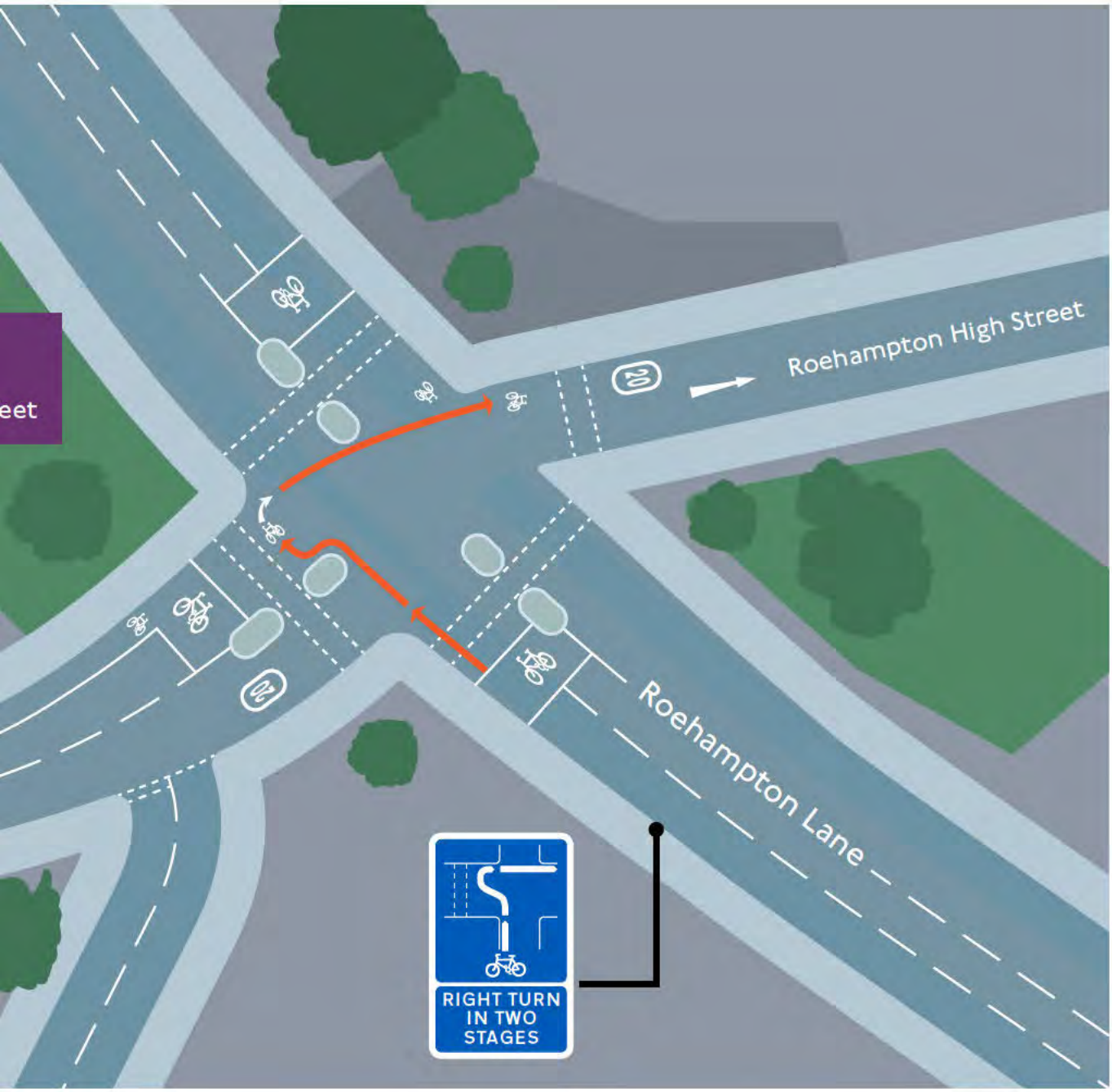
When placing signal heads at junctions with advanced stop lines, care must be taken not to obstruct dedicated facilities for cyclists. Traffic signal heads should be placed after the advanced stop lines line with the 'When red light shows, wait here' or 3/4 control variant located at the advanced stop lines.

Ensure signal heads and 'Wait here' signs do not prevent cyclists using advanced stop lines

When using portable signals at traffic light-controlled junctions with segregated cycle tracks, designers will need to plan very carefully how all approaches are managed, including the cyclists. Many junctions will have two stage right turns (as shown below). Phasing can be complex and the stages must be managed to ensure traffic is not enabled to pass through pedestrian crossings that have a green man. Uncontrolled approaches are unacceptable.

Example of a road layout with a two-stage ri

ght turn for cycles



7.10 PTS Cable Protection

Most PTS systems are self-contained units, however for systems that have external cables at ground level, the signals should be set up in a way so the cables are free from interference and do not present a trip hazard. Cable shrouds offer a tidy and safe method to hide and protect cables. If shrouds cannot be used, the temporary signals should be behind barriers to avoid trip hazards. Push buttons to call the pedestrian green phase must be accessible at all times.

7.11 Maintenance of PTS

In accordance with TAL 3/11, daily inspections of traffic signals are required as a minimum. TfL's network carries large volumes of traffic and is sensitive to network impacts, so TfL would expect more frequent inspection regimes and in the most sensitive locations a constant presence on site during sensitive times. When traffic signals stop working or have inappropriate timings set, unnecessary congestion and delay can occur.

PTS units should be secured and locked to prevent controls being tampered with, and to deter battery theft.

PTS cables should not be easily accessible

7.12 Changes to permanent traffic signals

Where the developer requires changes to be made to the existing highway layout, including the traffic signals, or where new traffic signals are proposed, modelling will be required to understand the combined effects of both the traffic management and construction traffic on the road network.

If proposals significantly impact the network, it may be possible to mitigate any disruption caused through revised traffic signal timings, revisions to the road layout or a new signal installation. In these instances, the developer should seek to optimise proposals through the use of traffic modelling. Traffic models enable proposals to be designed to achieve the right balance for all road users at a particular location.

Where modelling is required, developers or contractors will need to liaise through TfL Assessors (see Contacts chapter) to have the modelling checked and validated by specialists. The timescale for validating traffic signal modelling depends on the size, complexity and ultimately the quality of the model. Guidance on modelling can be found here.[34]

To alter existing traffic signals, a new programmable read-only memory chip, known as a PROM (which goes into the controller box located near to the traffic signals) may be required. This is arranged with TfL's Engineering Services via the TfL assessor.

It is important that the developer makes contact with TfL as soon as possible to enable the above tasks to fit in with their desired delivery programme, as these processes can take up to three months.

34 http://content.tfl.gov.uk/traffic-modelling-guidelines.pdf

7.13 Modelling and traffic infrastructure timescales

Before a traffic management proposal is submitted for assessment, the developer should make contact with the TfL Assessment team to share the proposals. This enables collective agreement to be made on what work will need to be undertaken to understand the impact of the proposal, which will subsequently inform the timescales for design.

Below is an indication of typical timescales for each of the processes that may be required.

Requirement	Time
Base model assessment and audit of proposed layout	4 weeks for each iteration
Proposed model (including inter-greens)	4 weeks for each iteration
Scheme impact report	4 weeks
Manufacturing a new PROM	Up to 3 months
Provision of a new controller (if required)	6 weeks advance notice

7.14 Existing traffic signal switchouts

Where permanent traffic signals need to be switched out, contractors will initially need to get agreement from TfL's traffic management assessment teams before submitting a request to the TfL Fault Control Centre:

Call: 0845 606 1005
Email: atsswitch@tfl.gov.uk

The standard notice period is three days, although more urgent requests can be completed for a higher charge.

Any developer-promoted scheme that includes new, or changes to existing, traffic signals on the TLRN will require the developer to progress the scheme as part of a Section 278 agreement under the Highways Act.

Email: S278SufaceDP@tfl,gov.uk

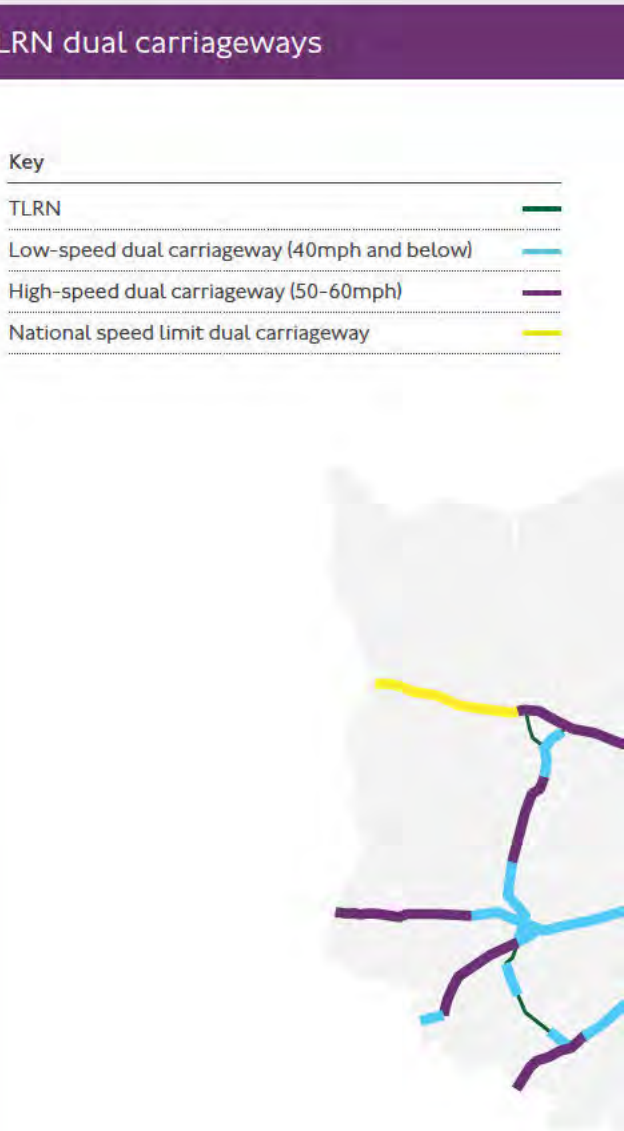
Chapter 8 – Working on dual carriageways

8.1 Introduction

A total of 295km (51 per cent) of the TLRN comprises dual carriageways, of which 122km are classified as high-speed roads (50mph +), and 16km have the national speed limit. Much of the network is considerably complex with many constraints and hazards imposed on the traffic management design. Large sections of the network have a high density of flyovers, underpasses, traffic signals, guardrail and barriers, off and on slip roads, cycle tracks, footways, access roads and driveways. As a result, signing strategies and taper positions for lane closures need to be very carefully considered to ensure minimal risk for the workforce and public during works. This means that site-specific risk assessments are needed for operating the traffic management.

This section of the guidance aims to bring clarity around some of the issues in designing and operating on the dual carriageway and high-speed sections of the network.

TLRN dual carriageways



8.2 Highways England Interim Advice Notes

Guidance is issued by Highways England (HE) on a range of topics relating to its motorway and trunk road network in the form of Interim Advice Notes (IANs), although other highway authorities may also adopt their use. Several of these cover traffic management design and operational techniques permitting innovative ways of operating to improve road safety and network performance. Detailed here are selected IANs that predominantly apply to the high-speed dual carriageway network, and have been reviewed by TfL and authorised for contractors to use on the TLRN subject to a site-specific risk assessment.

Interim advice notes (IANs) authorised by TfL for use on the TLRN

IAN publication title	TfL comments
I15/08:[35] Guidance for works on the hard shoulder and roadside verges on high-speed dual carriageways	Application of the method and techniques are authorised and approved for use on the TLRN
I37-10:[36] The use of stepped speed limits at roadworks	
I50/16:[37] Guidance on alternative temporary traffic management techniques for relaxation works on dual carriageways	
I63/12:[38] Alternative entry taper at relaxation scheme temporary traffic management on high speed roads	
I79/14:[39] Guidance on the use of vehicle-mounted, high-level VMS to provide advance warning of lane closures for relaxation works on dual carriageways with a hard shoulder	
I81/14:[40] Guidance on the use of impact protection vehicles for temporary traffic management	Application of the method and techniques contained with the IAN and the HTMA guidance are authorised and approved for use on the TLRN
Read in conjunction with: Highways Term Maintenance Association (HTMA)[41] guidance on temporary traffic management vehicle selection and operation	
I87/15:[42] Use of a convoy vehicle for controlling traffic through guide islands at relaxation works on dual carriageways	Application of the method and techniques are authorised and approved for use on the TLRN
I88/16:[43] Guidance on omission or warning lights (road danger lamps) for relaxation works on dual carriageways	

8.3 Dual-vehicle working

In recent years, there have been significant advances in the methodology of works operations to prevent harm occurring to the public and road workers. In 2014, the Health and Safety Executive (HSE) gave clear support to the IAN 181/14 and the HTMA guidance temporary traffic management vehicle selection and operation.

> 'HSE will expect vehicles carrying operatives in an unsecured position should be "protected" by a second vehicle, a dedicated impact protection vehicle, positioned 75 (+ or – 25) metres upstream of the works vehicle. In effect, combined traffic management vehicles, with operatives working on the rear, could not be used on their own whilst in a live lane.'

It is recognised that installing traffic management in some restricted locations with dual vehicles may not provide the safest method of working. This should be identified in the robust risk assessment. Routine operations should allow for a dedicated impact protection vehicle, separate to the vehicle from which operatives are working, during the installation and removal phases of works.

TfL strongly recommends that the above techniques are considered for dual carriageways below 50mph where the 85th percentile speed exceeds the signed speed limit.

8.4 Short-duration works and inspection stops

Contractors wishing to undertake short-duration works or inspection stops on the TLRN should ensure the method of operation is in accordance with Chapter 8. If an operator wishes to use alternative techniques, the method should be discussed with TfL prior to work starting.

TfL will require notification of the works through the appropriate channels for network management purposes in the usual way.

8.5 Works site encroachment

There is a persistent risk of members of the public entering the safety and works zones at works sites, which creates an inherent risk to the workforce as well as to themselves. There are three circumstances where this occurs and each requires a different approach to risk mitigation:

Unintentional encroachment: will occur where either the information given to motorists is unclear or where the boundary of the vehicular route is not clearly defined. The resulting road user confusion can lead to pedestrians, cyclists or motor vehicles unwittingly entering the perimeter of the traffic management and potentially into working areas. At the design stage, designers should ask themselves the first of the key questions in the Safety Code – 'Will someone using the road or footway from any direction understand exactly what is happening and what is expected of them?' Advance and information signs should be clear, the correct size and well positioned to be effective. The edge of the vehicular route must also be clear from all approaches and the whole site should be regularly maintained and inspected. Physical and visual barriers can be used to help communicate what is expected of the road user.

Designers should not rely on marshals or gatemen as an effective method of communicating with moving traffic.

The placement of personnel needs to be carefully considered as the sight of a workforce near a road closure point or in close proximity to moving traffic can act as a magnet for vehicles to stop in dangerous locations to engage in conversations.

Intentional encroachment: is the wilful decision of a road user to ignore signs and barriers to enter a prohibited section of carriageway or works site. This could be the result of intoxication, frustration or criminal intent. Contractors should consider the security of their works sites and the danger they pose to the public and have procedures in place to manage incidents as and when they occur. Barriers and physical obstructions should be considered appropriate to the assessed risk on a site-specific basis. Lone working risk assessments should be reviewed, particularly in areas where disruption can be expected in town centres, close to events and night clubs.

Incident encroachment: occurs as the result of road accidents, or during emergency or major incidents. Working to the required safety zone margins and risk should be assessed on a site-specific basis. Designers will need to assess emergency access arrangements for emergency vehicles and ensure escape routes to adjacent properties are maintained and managed. The following stages in the table on page 144 should be observed to safeguard the risks posed by works sites.

Five key stages to ensuring works sites and closures are effective and risks minimised

Stage	Actions
1	**Giving advance notice to road users** For road closure and other disruptive or major works, consider installing advance warning signs deployed several days in advance of the works along with communications via press releases or media outlets. This will allow motorists to plan ahead and alter journey plans. Encountering unexpected delays or having a journey hindered is a frequent source of frustration to road users. The installation of these signs can reduce motorist frustration and consequently the desire to breach a closure point.
2	**Approach zone signing** On the approach to the lane closure or road closure, ensure signing informs the motorist of what is happening and what is expected of them, so that they can process the information in good time and make better decisions on how to reroute past the works. Notification of the works upstream of the site at key junctions allows people to take alternative routes. Without this time to digest, some motorists are likely to panic or get frustrated more easily and again try to breach a closure point.
3	**Maintenance of signs** Most inadvertent breaches of closures occur when the signs, barriers or traffic cones have been displaced or knocked over. Regular inspections and maintenance will ensure the integrity of the works site is retained and prevent road user confusion.
4	**Barriers and visual deterrents** Despite clearly signed approach zones and well maintained traffic management, the risk remains that some people will still attempt to encroach into safety and working zones, particularly when the works area is not visible from the closure point. Reliance on traffic cones may not be sufficient and in problematic locations it is recommended supplementary traffic barriers be deployed across the full width of the potential access route. Gatemen or traffic marshals may also be considered to allow controlled access, although designers must be aware of the risk of vehicles stopping to verbally engage with marshals which could cause an obstruction to the flow of traffic.
5	**Restraint systems** For works with higher risk, such as excavations, works near railway lines, major works or where security must be tighter, then more robust barriers should be considered or traffic management vehicles parked broadside to physically block routes.

8.6 Gantry and fixed signing for temporary works

Certain sections of the TLRN have gantry and permanently fixed signs for use in temporary situations and closures, particularly on approaches to tunnels and underpasses. Works promoters should seek to use these where possible and ensure the gantry signing does not conflict with the temporary traffic management arrangements.

If there is the potential for a conflict, the traffic management should be discussed with TfL for resolution.


Diverted
Traffic
VIC
EMB
WESTM
BDG
L'BETH