Streetspace for London

Social Distancing on High Streets

TfL Engineering Design Considerations Toolkit & Material Specification Guidance

June 2020

MAYOR OF LONDON

TRANSPORT FOR LONDON

EVERY JOURNEY MATTERS

SCOPE

This document provides a toolkit for highway design considerations and material specifications for TfL engineers developing interventions on the Transport for London Route Network (TLRN) associated to the Streetspace for London Plan.

Specifically, the guidance relates to the social distancing in High Street environments where additional footway space for pedestrians is desirable.

The guidance should be considered by London Highway Authorities and their highways contractors proposing similar measures at interfaces with the TLRN and at any locations controlled by traffic signals. It can also be used as a good practice guide when considering similar proposals on their own highway network.

The guidance is subject to change as further evidence on the success of the measures emerges and central government advice on social distancing changes in the future.

OBJECTIVES

1. To provide a toolkit for highway design considerations and material specification to TfL engineers to develop proposals that will promote social distancing at the identified High Street locations.
2. To ensure the proposed interventions are safe, consistent, deliverable, legal, flexible and maintainable.
3. To ensure the impact on existing highway assets and operation is understood and can be reasonably mitigated.
4. To identify opportunities to contribute to the Mayor's Transport Strategy objectives while responding to urgent social distancing needs.

GENERAL PRINCIPLES

The Streetspace for London Plan has generated an urgent need to provide interventions associated with the coronavirus lockdown to encourage social distancing and promote active travel.

Guidance identifying TfL's analysis regarding where social distancing is most needed is presented in TfLs Streetspace for London Plan and designers are encouraged to refer to this plan and its appendices to ascertain the balance of priorities for a particular location.

Given the urgent need, it has been assumed during the production of this guidance document that initial proposals will be temporary in nature and should be easily implementable using materials that are readily available.

Following initial implementation, further consideration could then be given as to whether the interventions should be consolidated using upgraded materials that may be more suitable to medium or long-term deployment.

Note that this guidance provides an additional palette of materials to that of TfL Streetspace for London Guidance with some materials not listed in existing guidance. In some instances, the temporary recommendations will supersede existing guidance in the short to medium term.

The structure of this guidance document is such that it provides a quick-reference guide for suggested highway interventions and associated considerations under both the short-term and medium-term scenarios.

These intervention types are:

1. Footway widening and pinch point removal
2. Bus stop relocations and access changes
3. Pedestrian crossing improvements
4. Signal-controlled junction amendments

The guidance document then describes common materials that could be considered appropriate for the highway interventions.

Finally, the guidance provides a suite of case studies that seek to demonstrate good practice related to the interventions in most of the scenarios.

HIGHWAY INTERVENTIONS & CONSIDERATIONS QUICK REFERENCE GUIDE

1. FOOTWAY WIDENING & PINCH POINT REMOVAL

Intervention	Short Term Interventions	Considerations	Medium Term Consolidation	Considerations
Pinch point removal through decluttering	Remove retail displays or A-boards on the footway Remove redundant or unnecessary traffic signs and posts	Liaise with retail premises owner/manager Remove traffic signs & posts rather than bag-over/cover Refer to Traffic Signs Manual, Chapter 1, Section 2.3	Remove or relocate street furniture	Review purpose of pedestrian guardrail and remove if pedestrian barriers perform same function Relocate cycle parking, benches and litter bins away from pedestrian desire lines and queuing areas
Pad parking & loading (P&L) bay suspension	Remove P&L signs to return full footway width to 24-hour use Provide alternative P&L bay if required and appropriate Provide TTM to stop vehicles from entering bay (if required)	Remove P&L signs rather than bag-over/cover Suspend Traffic Management Order Assess whether P&L bay can and should be relocated directly onto adjacent carriageway Review P&L bay utilisation and provide alternative location or consolidate with others if required and appropriate Ensure blue badge provision (as per local borough policy, e.g. parking on yellow lines) in the locality is sufficient to accommodate demand	Remove P&L sign post if on pedestrian desire line	Repave in material suitable for wheelchair and mobility impaired users (if required)
Inset P&L bay suspension	Remove P&L signs Provide TTM to stop vehicles from entering bay Provide alternative P&L bay if required and appropriate	Remove P&L signs rather than bag-over/cover Ensure TTM is aligned with existing kerbs either side of inset bay Ensure TTM doesn't affect highway drainage Suspend Traffic Management Order Assess whether P&L bay can and should be relocated directly onto adjacent carriageway Review P&L bay utilisation and provide alternative location or consolidate with others if required and appropriate Ensure blue badge provision (as per local borough policy, e.g. parking on yellow lines) in the locality is sufficient to accommodate demand Assess whether access to carriageway level is required for mobility impaired pedestrians	Remove P&L sign post if on pedestrian desire lines Consolidate TTM with semi-permanent kerbs Backfill inset bay to footway level with asphalt	Review gully locations and raise covers to new footway level if required Assess whether suspended P&L bay can and should be reinstated along new kerb line Continue existing stopping restrictions either side of suspended bay along new kerb line with temporary road markings/tape if P&L bay no longer required

Intervention	Short Term Interventions	Considerations	Medium Term Consolidation	Considerations
On-carriageway parking & loading bay suspension	Remove P&L signs Provide TTM to stop vehicles from entering bay Provide alternative P&L bay if required and appropriate	Remove P&L signs rather than bag-over/cover Ensure start of TTM has appropriate taper length and angle back to existing kerb Ensure TTM doesn't affect highway drainage Suspend Traffic Management Order Assess whether P&L bay can and should be provided in new nearside lane directly adjacent Review P&L bay utilisation and provide alternative or consolidate with others if required and appropriate Ensure blue badge provision (as per local borough policy, e.g. parking on yellow lines) in the locality is sufficient to accommodate demand Review whether footway widening on alternate side of carriageway will cause excessive chicaning for traffic Ensure remaining traffic lane widths are appropriate for the highway context and allow vehicles to pass in opposing directions (particularly buses) Consider relocating lane markings or centreline markings with temporary road markings/tape Assess whether access to carriageway level is required for mobility impaired pedestrians	Remove P&L sign post if on pedestrian desire lines Consolidate TTM with semi-permanent kerbs Backfill on-carriageway bay to footway level with asphalt Remove or relocate street furniture	Review highway drainage and gully locations and raise covers to new footway level if required Ensure taper length and angle to existing kerb is appropriate for semi-permanent layout Assess whether suspended P&L bay can and should be reinstated along new kerb line Continue existing stopping restrictions either side of suspended bay along new kerb line with temporary road markings/tape if P&L bay no longer required Relocate cycle parking, benches and litter bins away from pedestrian desire lines and queuing areas

Intervention	Short Term Interventions	Considerations	Medium Term Consolidation	Considerations
Traffic lane removal	Provide TTM to stop vehicles from entering traffic lane	Review operational implications of lane removal including reduction in traffic capacity Ensure start of TTM has appropriate taper length and angle back to existing kerb Ensure TTM doesn't affect highway drainage Ensure TTM doesn't restrict access to trafficked private accesses Review whether footway widening on alternate side of carriageway will cause excessive chicaning for traffic Ensure remaining traffic lane widths are appropriate for the highway context and allow vehicles to pass in opposing directions (particularly buses) Possibly relocate lane markings or centreline markings with temporary road markings/tape Ensure visibility of traffic signals is maintained Ensure inter-visibility between pedestrians and vehicles is maintained at controlled and uncontrolled crossing points Assess whether access to carriageway level is required for mobility impaired pedestrians and provide access if necessary Carry out swept path analysis to ensure appropriate vehicles can safely use new arrangement	Consolidate TTM with semi-permanent kerbs Backfill previous traffic lane to footway level with asphalt Remove or relocate street furniture	Review highway drainage and gully locations and raise covers to new footway level if required Ensure taper length and angle to existing kerb is appropriate for semi-permanent layout Continue existing stopping restrictions along new kerb line with temporary road markings//tape Relocate cycle parking, benches and litter bins away from pedestrian desire lines and queuing areas

2. BUS STOP ALTERATIONS & RELOCATIONS

Intervention	Short Term Interventions	Considerations	Medium Term Consolidation	Considerations
Bus stop access improvements through decluttering	Remove retail displays or A-boards on the footway Remove redundant traffic signs and posts	Liaise with retail premises owner/manager Remove traffic signs & posts rather than bag-over/cover	Remove or relocate street furniture	Relocate cycle parking, benches and litter bins away from bus stop access areas
Bus Boarders	Widen footways on either side as per guidance in 1. Provide asphalted area in front of bus shelter with temporary kerbs Relocate bus stop flag to kerbside	Ensure 100-140mm kerb upstand is provided along the front of the bus boarder to allow bus ramp deployment, see materials section for further details Ensure built-out length can accommodate the expected number of hourly services Review drainage requirements as described in materials section	Similar to Short Term, but with more robust materials	
Full or partial bus stop relocation	Suspend bus stop for all or some existing services Identify alternate location nearby Provide temporary bus stop flag	Ensure new bus stop layout can accommodate all expected services Assess whether a bus boarder is required at alternate location Engage with TfL Bus Operations team as soon as known changes will be required	Provide shelter at relocated bus stop	Ensure shelter does not impinge on social distancing requirements at revised location

3. SIGNAL-CONTROLLED PEDESTRIAN CROSSING IMPROVEMENTS

Intervention	Short Term Interventions	Considerations	Medium Term Consolidation	Considerations
Traffic signal timing review	Increase pedestrian crossing green man time Reduce traffic signal cycle time			
Pedestrian crossing approach decluttering	Remove redundant traffic signs and posts	Remove traffic signs & posts rather than bag-over/cover	Remove or relocate street furniture	Relocate cycle parking, benches and litter bins away from pedestrian crossing access areas
Pedestrian crossing approach widening	See 1. for footway widening opportunities	Ensure pedestrian barriers and new signs do not obscure visibility to traffic signal heads and pedestrians waiting to cross	See 1. for footway widening options Relocate traffic signal infrastructure to reflect new kerb line Amend tactile paving to reflect new kerb line	Review underground services to mitigate possible clashes Ensure revised signal equipment does not impinge on social distancing requirements
Pedestrian crossing width increase	Increase width within which pedestrians are able to cross the carriageway, particularly if barriers are being used to widen the footway	Review traffic signal safety clearance timings and amend if required Assess impact on signal detector equipment and relocate/realign if required Ensure ease of access for disabled pedestrians	Relocate traffic signal infrastructure to suit revised layout	Review underground services to mitigate possible clashes Ensure revised signal equipment layout does not impinge on social distancing requirements Review and amend tactile paving and dropped kerbs

4. SIGNAL-CONTROLLED JUNCTION AMENDMENTS

Intervention	Quick Wins	Considerations	Medium Term Consolidation	Considerations
Traffic signal timing review	See 3.	Check conflict points to ensure safety timings are still appropriate		
Footway widening on approaches to junctions	See 1. for footway widening options	Ensure that traffic lane removal or reallocation does not contradict permitted movements at traffic signals Undertake swept path assessments to ensure new footway extents do not constrain all expected turning vehicles or bring highway assets into conflict	See 1. For footway widening options	
Pedestrian crossing width increase	See 3. for pedestrian crossing width increase options	Increase width of crossing into centre of junction where possible to minimise impacts on safety critical timings		

MATERIALS

BUS STOP BOARDERS

KERBS

All temporary bus stop boarders should have kerbs along the traffic side of the build out to both retain the backfill material, and provide a buffer between the boarder and the bus that may strike the boarder when it pulls in. Any current stopping or waiting restrictions road markings should be replicated along the new kerb line.

Bus boarder kerb heights facing the carriageway should have sufficient upstands to ensure accessible boarding in accordance with Equality Act 2010 and TfL's Accessible Bus Stop Design Guidance: preferably 125-140mm, minimum 100mm.

For the kerb 'returns' on the side of the boarders (at each end of the boarder), it may be difficult to use off the shelf products due to the variance in existing kerb heights – a 125mm kerb abutting a 140mm existing kerb for instance could cause a trip hazard.

For this reason, an alternative approach could be to construct a ramp at the end of each boarder, allowing a flush tie-in to the existing kerb. This becomes particularly relevant if the boarder forms part of wider social distancing measures, where the carriageway either side has been re-appropriated as footway, enabling those with mobility impairments and pushchairs to access the boarder more easily.

Unless a key-in is to be provided, the ramp will need to be reasonably steep to ensure the fine edge will not crumble over time.

Asphalt ramp at the end of a bus boarder

To aid accessibility, kerb profiles should be either square edged, bullnosed or half battered.

If any curves are proposed, consideration should be made as to whether the bus can pull in closely to the kerb to allow safe boarding (ref Accessible Bust Stop Design Guidance).

Proposed kerb radii should consider what is produced by manufacturers as it is likely that only certain radii will be available as off the shelf products.

Consideration should also be given to the conspicuousness of build outs to avoid vehicles striking the kerb. Measures to increase driver awareness of the boarder may be required, for example a retroreflective self-righting bollard to BS 8442.

The three options for kerbing that this document outlines are:

1. Bonded kerbs
2. Bolt down kerbs
3. Traditional/ full construction kerbs

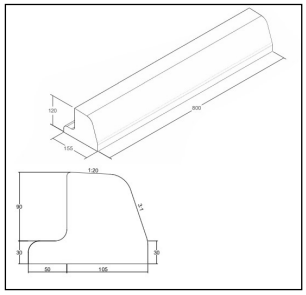
These will be assessed for their legislative compliance, maintenance, and removability.

BONDED KERBS

Where bonded kerbs are proposed, these should be in accordance with Specification for Highways Works (SWH) Clause 1101 (2).

Although bonded kerbs are surface mounted and require no excavation to install, they will require a mechanical device, such as an excavator with bucket, to remove. The underlying surface may suffer some damage from this process and localised repairs may be required.

The benefits of bonded kerbs include ease and speed of installation, no requirement for excavation, and the existence of a recognised material specification giving confidence of their longer-term performance. The main disbenefit is the potential need for minor repairs following removal. As such they are most suitable for medium to long term installations



Bonded Kerb traffic island

BOLT-DOWN KERBS

The bolt down kerbs currently available on today's market are not governed by any legislative or industry standards, and not subject to any recognised tests or Factory Production Control. Use of such products can therefore only be based on experience, manufacturer's recommendations and ongoing monitoring.

They are often made of rubberised materials, with bolts passing through the product and securing them to the surface making them quick to install. The kerbs are easily removed, and subsequent bolt holes should be filled with an appropriate material.

The main benefits of bolt down kerbs are that they are quick and easy to install, as well as remove, and do not require heavy plant or site excavations. The main disbenefit is that they are not produced to any recognised standard and may require ongoing maintenance for longer term installations. Experience has shown they do not stand up to regular heavy vehicle overrun, so may need to be replaced if buses regularly strike the kerb. As such, they are most suitable for short to medium term installations.

Bolt-Down Kerbs at a bus stop boarder

TRADITIONAL KERB CONSTRUCTION

Traditional kerbs and their construction should be in accordance with the appropriate clauses from the Specification for Highways Works (SWH) Series 1100.

The maintenance of traditional kerb construction will be no different from the existing kerb maintenance and is typically minimal.

To install traditional kerbs will require excavations into the carriageway, leading to a longer and more disruptive construction phase. Removal of the kerbs will also be more onerous, with remedial works required to reinstate the carriageway.

Traditional kerb construction is a proven long-term technique, with all the benefits being in its resilience and low maintenance. The disbenefits are due to this resilience – it is not a quick task to install or remove, being more costly and time consuming than other kerb methods. As such, traditional kerbs are most suited for long term installations that are not expected to be removed.

BUILD-OUT INFILL MATERIALS

BOLT-DOWN PRODUCTS

Whilst bolt down products are available to infill the area behind kerbs, these are typically more suitable for small areas such as traffic islands or splitter islands. The modular construction requires each unit to be secured to the surface individually and relies on a reasonably consistent carriageway profile which becomes more unlikely the larger the area becomes. Therefore, bolt down materials are not considered as a viable option for bus stop boarders.

ASPHALT

The recommended material for bus stop boarders is asphalt. This is due to the well-defined and understood material performance, ease and speed of manufacture, quick and easy to install in larger areas, and its suitability for any shape/profile without bespoke manufacturing.

Asphalt should be in accordance with the relevant sections of The Specification for Highways Works (Series 900) and BS EN 13108. The recommended surface course is AC6 dense 100/150.

There are two main options for recommended binder/regulating materials:

- Asphalt
    - For depths greater than 75mm, the recommended asphalt binder is AC20 dense bin 100/150, compacted in layers of no more than 50mm.
    - If the total binder layer is less than 75mm, AC14 dense bin 100/150 is recommended.
    - A tack coat should be used between all layers, unless a separation membrane (such as sand mat) is used

- Type 1 to SHW Clause 803.
    - A tack coat should be used between the Type 1 and surface course.
    - Type 1 offers advantages as it is inexpensive, easy to install and remove, and will provide required footway loading if laid on existing carriageway, however requires different plant from the surface course operation.

SAND MAT

If an asphalt binder is proposed but the build out is intended to be temporary, consideration could be given to laying a sand mat on the existing surface course prior to laying the new asphalt binder course. This will enable easier removal when the build out is removed in the future.

DRAINAGE

One of the key considerations when designing bus stop boarders should be the effect on drainage.

Often, both the carriageway and footway will fall towards the existing kerb where it runs along the front face of kerb until being picked up by a gully. However, this should be validated by checking levels on a topographical survey, if available. If no existing level information is available, assumptions may have to be made based on location of gullies, interpretation from street view images, and experience of local maintenance crews.

In the absence of any of this, a bucket/large bottle of water can give a quick indication of where the falls are. Unvalidated assumptions increase risk and should be clearly highlighted in the design.

Construction of a build out may interrupt drainage flows; the designer must ensure that appropriate mitigation measures are implemented to minimise risk of ponding on the footway and carriageway.

On the footway, ponding may discourage or prevent pedestrians from using the bus stop boarder; on the carriageway passing buses/ vehicles may splash waiting passengers. Furthermore, ponding in winter increases risk of ice formation which must be considered for medium to long term installations.

CARRIAGEWAY DRAINAGE

Consideration should be given to the potential opportunity to make use of existing drainage infrastructure – e.g. designing the bus stop boarder so it abuts existing gullies on the upstream side. This may require slightly relocating the bus stop which should be agreed with relevant stakeholders, particularly the bus operator.

Occasionally, the length of the bus stop boarder may require it to be proposed on top of existing gullies. Where this is the case, and assuming there is sufficient longitudinal fall, consideration should be given to raising the drainage gullies to the new finished footway level to improve footway drainage.

If gullies are raised, the designer should replace the grates with pedestrian friendly grates with a loading class (to BS EN 124) appropriate for the expected loading, and B125 as a minimum. Note that raising gullies from the carriageway may affect the flow width at the new kerb face, which in turn may result in buses splashing passengers waiting at the stop. Consideration should be given to the risk of this, especially if multiple consecutive gullies are raised.

If the existing drainage cannot be effectively used, then consideration should be given to methods which will allow the carriageway runoff to bypass the build out. For temporary build outs, this will likely be a piped drainage channel along the front face of the existing kerb at carriageway level. See section on Channel Drains below.

FOOTWAY DRAINAGE

Consideration should be given to the directions and gradients of falls introduced on the footway.

If a backfall is introduced, there will likely be a hinge along the existing kerb line at footway level, which will become a surface drainage channel along the length of the bus stop boarder. The length of the build out and the longitudinal fall should be considered to determine whether ponding will likely occur along this hinge. Note that longitudinal fall should be considered at regular intervals along the footway, not just at the start and end of the build out as there may be low points which may need additional consideration.

If footway ponding is identified as potential risk, then consideration should be given to potential linear drainage solutions along the front face of the existing kerb, such as channel drains.

CHANNEL DRAINS

Unless there is a gully directly upstream of the proposed build out, the bus stop boarder may require a drainage design to prevent ponding on the carriageway upstream of the build out.

Although new gullies could be installed, these are fairly intrusive interventions for a temporary build out. A more suitable solution is to provide a linear drainage solution along the front face of the existing kerb, ensuring that the footway is continuous for pedestrians traversing it. Note that leaving a gap between the existing kerb and the build out will not be acceptable, as this introduces a trip hazard and is not inclusive/accessible for all users.

The design for a temporary drainage channel should consider the following:

- Existing longitudinal fall of the footway. As shallow longitudinal footways may have increased risk of ponding, a system which drains the footway and carriageway simultaneously (e.g. slot drain) may be required
- Existing upstand of kerbs (as this will dictate the depth available for the drain)
- Drainage catchment area (as this may influence required size/capacity)
- Slip/skid resistance and ‘pedestrian friendliness’ of the proposed drainage channel if the channel itself will be at finished footway level
- The loading class of the proposed channel (to BS EN 1433) should be appropriate for the expected loading, if required
- Method of installation and fixing detail, including any excavations required. Removability should be a factor of the solution.
- Maintenance requirements; especially if frequent jetting may be required to clear debris and ensure effective flow

Some examples of linear drainage channel are shown below:


Piped drainage system (carriageway drainage only)


Solid top channel system (carriageway drainage only)


Perforated channel system (footway and carriageway drainage)

RAMPS

Ramps may be desired to provide an easy transition for those with mobility impairments, buggies, or carrying luggage. There are three main types of ramp this document covers:

1. Asphalt ramp
2. Traditional construction dropped kerb
3. Ramp plates

These will be assessed for compliance to standards, ease of construction, maintenance and removability.

ASPHALT RAMPS

Ramps can be easily constructed from asphalt in varying sizes and profiles to suit bespoke site characteristics. The proposed materials should be in accordance with the Specification for Highway Works, and therefore should provide an adequate level of slip resistance.

Dimensions and gradients can be altered to meet site requirements. If the ramp potentially may be used by wheelchair users, the dimensions should enable safe manoeuvring up and down the ramp, as well as turning onto an off. Guidance on this can be found in Section 9.2 of BS8300-1 *Design of an accessible and inclusive built environment* and Section 8.4 of Inclusive Mobility guidance.

Consideration should be given to drainage, as the location of the ramp may interrupt flow along the kerb channel and cause ponding on the carriageway. To alleviate this issue, the installation of a drainage pipe along the existing kerb edge at the back of the ramp should be considered. A simple uPVC pipe of a diameter appropriate to the kerb height should suffice.

The maintenance requirements of an asphalt ramp should be low; however, a shallow gradient may cause issues at the finer end of the ramp where it feathers out and the asphalt crumbles away. This can be avoided if the ramp is keyed into the existing carriageway, however this becomes more of a permanent measure. In most cases a shallow ramp with a small bullnose will likely be the best option. The drainage pipe will require semi-regular cleaning, with leaves a particular issue during Autumn.

Asphalt ramps are likely relatively easily removed, but some minor remedial works may be required to the surface of the existing carriageway.

Asphalt Ramp

TRADITIONAL DROPPED KERB CONSTRUCTION

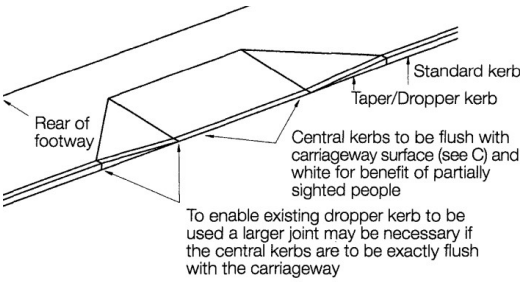
Traditional dropped kerbs could be considered in locations which are expected to be in place for an extended period of time. Dimensions and gradients can be altered to meet site requirements. If the dropped kerb may potentially be used by wheelchair users, the dimensions should enable safe manoeuvring. Guidance on this can be found in Section 3.13 of DfTs Inclusive Mobility guidance.

Tactile paving could be considered depending on the location of the ramp, however, if the purpose is to transition from existing footway to a newly designated footway area there is no tactile warning required. Tactile paving in this circumstance could potentially lead to confusion that it may be a crossing point.

Dropped kerbs would require works in the footway to ramp down to carriageway level, as well as excavations for kerb works. Usual design checks for statutory undertakers' equipment should be carried out and covers avoided or adjusted as necessary. The materials for the dropped area could be the same as the existing materials in that area if aesthetics are important, or a quicker installation could be done with an asphalt surface.

The maintenance of these will generally be low, however an asphalt surface without edge restraint may deteriorate over an extended time period.

If dropped kerbs are to be removed, these will require full construction to bring the footway levels back to the original levels. Therefore, this option is considered the most permanent and most suitable for long term/permanent measures.



Traditional Dropped Kerb Construction

FOOTWAY RAMP BOARDS

Ramp boards should be considered to be a Temporary Traffic Management (TTM) measure, and therefore should be in accordance with:

TfL Temporary Traffic Management Handbook Section 2.4

Chapter 8 Sections D3.32.4 and D3.32.5

Safety at Street Works and Road Works: A Code of Practice and Highway Authority and Utilities Committee Advice Note (No. 2018/01), which state the following for ramps to be fit for purpose:

- be fixed in position and at least 1 metre wide (1.2 metre wide if possible);
- be constructed from materials strong enough to support pedestrians and mobility scooter users;

- have a slip-resistant surface and edging to prevent wheelchairs etc. slipping over the edge. [Note recommended slip resistance can be determined from Annex F of BS8300-1. As a rule of thumb, a PTV of 40 when tested in accordance with BS7976-2 would the absolute minimum expected, with greater than 55 ideal due to the gradient.];
- slope gently enough to enable people using manual wheelchairs to mount the kerb without undue difficulty, and to avoid grounding by mobility scooters (some of which have low ground clearances and long wheelbases); and
- allow for rainwater to run along the gutter.

Temporary ramp boards are available in a variety of designs, materials and sizes. The ramps currently available on today's market should meet HAUC Advice Note No. 2018/1 *Specification and Operational Requirements for Footway Boards, Driveway Boards, Footway Ramps and Road Plates*.

Most ramps are surface mounted, and some have the possibility of being bolted down. As these are surface mounted, they are prone to becoming dislodged and require a thorough inspection and maintenance regime to ensure correct installation is retained.

Temporary ramp plates are more suitable for short term TTM (days rather than weeks or months) and should not be the preferred option for use over extended periods of time.

Temporary Traffic Management Ramps

LONGITUDINAL MEASURES

To provide longitudinal segregation on the carriageway, there are numerous products available. This document will only cover a small amount of solutions considered suitable for short to medium-term use on the public highway.

It is recognised that most short-term and some medium-term interventions, are likely to consist of Temporary Traffic Management (TTM). Designs for TTM should be carried out by a person appropriately qualified to design TTM via the relevant National Highway Sector Scheme.

Existing guidance for TTM include:

- TfL Temporary Traffic Management Handbook
- The Safety at Street Works and Roadworks: A Code of Practice (the Safety Code)
- Chapter 8 of the Traffic Signs Manual (Chapter 8)
- The Traffic Signs Regulations and General Directions (TSRGD)

The longitudinal measures that will be considered in this guidance can be separated into permeable (i.e. does not restrict pedestrians passing through) or non-permeable (i.e. forms a continuous barrier which prevents pedestrians passing through). Each system will be compared for legislative compliance, visibility, resilience to tampering, and maintenance.

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.

PERMEABLE LONGITUDINAL MEASURES

Permeable longitudinal measures may be considered in locations which require a greater freedom of pedestrian movement, such as to improve connectivity, minimise impact on pedestrian desire lines, and to permit access for loading if the segregation separates the shop and the loading bay.

Any permeable measures should comply with the above legislation and guidance, as well as BS EN 13422:2004.

ROAD MARKINGS

Road markings form the simplest form of permeable longitudinal measure, but often the least effective. It will generally not be acceptable to rely on road markings to separate pedestrians from live traffic. Regardless of the chosen longitudinal measure, it is likely that changes will be required to the road markings in the vicinity.

Redundant road markings that need to be temporarily obscured should be masked rather than removed. Masking material should comply with BS 7962.

Proposed temporary white road markings should generally be installed using tape (rather than thermoplastic) and specified as ‘removable’ under BS EN 1824. An alternative material if tape is not available is a water or solvent based paint to BS EN 1871. This is more difficult to remove than tape, but not as difficult as traditional thermoplastic materials. All markings

should have the minimum performance requirements as described in the National Annex to BS EN 1436.

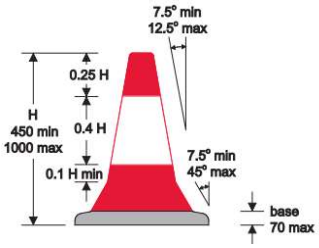
TRAFFIC CONES

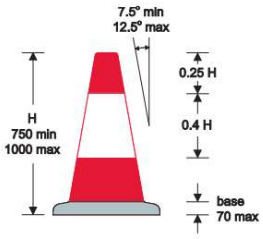
If traffic cones are proposed, they must be in accordance with the abovementioned legislation and guidance, specifically TSRGD Diagram 7101.1 or 7102 and comply with BS EN 13422. This will ensure that the size/ colour/ retro-reflectivity is suitable for use on a public highway and that visibility is good in all conditions, including wet/ dark. Cones can be augmented by warning lights at night if required.

Traffic cones should be regularly inspected and maintained to ensure that the integrity of the segregation is retained, and to prevent road user confusion. As cones are easily displaced, removed or knocked over the required maintenance regime is relatively burdensome.

Individual cones or a short length of cones may be required in combination with other longitudinal measures, for example to affix signs, demarcate extents, or provide a taper.

However, as traffic cones have low resilience to tampering, they not considered the preferred method for longer stretches of permeable longitudinal measures.





Note that cones connected with tape or similar are non-compliant with the requirements of the safety code and Chapter 8 and should not be used.

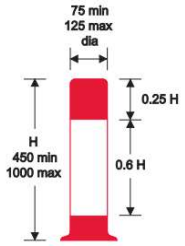
TRAFFIC CYLINDERS

If traffic cylinders are proposed, they must be in accordance with the abovementioned legislation and guidance, specifically TSRGD Diagram 7103 and comply with BS EN 13422. This will ensure that the size/colour/retro-reflectivity is suitable for use on a public highway and that visibility is good in all conditions, including wet/ dark.

The preferred method of installation for traffic cylinders is to be installed in a base which is either bolted to the carriageway or applied using an adhesive. The specific product should be a tamper resistant one that requires a special tool to remove the cylinder. This ensures that the cylinders are resilient to theft and require minimal maintenance as they are not easily dislodged, yet are readily removeable.

For delineating pedestrian areas, the cylinders should not be used in conjunction with other forms of ‘light segregation’ common on cycle routes such as flat-topped separators. These could present a trip hazard to pedestrians, particularly visually impaired users.

Due to their standardised performance, visibility, ease of installation, and low maintenance, traffic cylinders are considered the preferred method for permeable longitudinal measures.



Note that both TSRGD and BS EN 13422 require traffic cylinders to be orange/red in colour. It is recognised that many highway authorities have installed, and continue to install, products that do not meet this colour requirement. Aesthetic considerations have often resulted in a black cylinder with white retroreflective banding being the product of choice. It should be recognised that TfL is not aware of an identified safety issue with the use of black cylinders, and the proposed use in this document is unique and could not have been thought of in any current legislation or standard, however orange/red remains the prescribed colour.

When forming a policy on which colour product to use, each highway authority should satisfy themselves that they have considered all relevant factors and risks.

NON-PERMEABLE LONGITUDINAL MEASURES

Non-permeable longitudinal measures may be considered in locations which require a continuous barrier to prevent pedestrians from accessing the carriageway.

Any non-permeable measures should comply with the TTM requirements in the longitudinal measures section, as well as BS EN 12899 (fixed vertical road traffic signs) and BS EN 8442 (wind stability). Barriers should be capable of resisting Class B wind speed as a minimum, with Class A strongly recommended for any medium to long term installations.

Barriers should be linked to prevent tampering, whilst allowing a range of connecting angles.

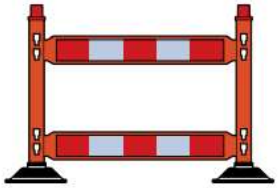
All continuous barriers will require inspection and maintenance to ensure they remain correctly installed

PLASTIC PEDESTRIAN BARRIERS

Plastic pedestrian barriers should comply with the TTM requirements in longitudinal measures section. Traffic barriers (which do not have a tapping rail) should not be used. Further details can be found in TfL’s Temporary Traffic Management Handbook.

Pedestrian barriers will require frequent inspection and maintenance to ensure they remain correctly installed. Any dislodged barriers should be repositioned. Resilience of pedestrian barriers may be increased by connecting sections with cable ties or clamps.

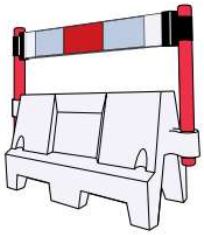
While a basic plastic pedestrian barrier similar to the image below meets the minimum requirements, it is not recommended because of the large opening between barrier boards and posts.



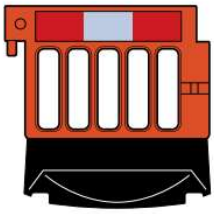
Basic pedestrian barrier system

Barriers with smaller gaps and greater protection to mitigate the risk of unauthorised access are preferable, especially where small children are expected. Examples of more robust barrier systems which are likely to be considered suitable are:

- Water filled barrier systems (not designed to BS EN 1317)
- Self-weighted barrier systems (with or without water)



Water-filled barrier system



Self-weighted barrier systems

These systems have been used regularly on the TLRN and offer a lower maintenance more robust solution for continuous longitudinal barriers.

Any continuous barriers which have a solid face at floor level may require additional maintenance to remove build-up of debris, and the installation should be checked during periods of rainfall to check if any drainage issues arise.

CRASH TESTED TEMPORARY VEHICLE RESTRAINT SYSTEMS

The designer will need to make an assessment on how and where to provide systems that offer protection to both the travelling public and pedestrians and, if necessary, consider barriers to a crash-tested specification to restrain errant vehicles in the event of a collision. Any barriers which are installed to contain an errant vehicle should be tested in accordance with BS EN 1317.

Temporary safety barriers should be designed in accordance with CD337 Section 9.

Containment level should be appropriate for the bespoke road characteristics and traffic composition. For short to medium term installations, ‘low angle’ containment safety barriers systems with minimum containment of T2 or T3 may be considered acceptable - contrary to CD377 Paragraph 9.6.

Containment Level	Acceptance Test	Impact Speed (km/h)	Impact Angle (degrees)	Total Mass (kg)	Type of Vehicle
T2	TB22	80	15	1300	Car
T3	TB41	70	8	10000	Rigid HGV
	TB21	80	8	1300	Car
N1	TB31	80	20	1500	Car
N2	TB32	110	20	1500	Car
	TB11	100	20	900	Car
H1	TB42	70	15	10000	Rigid HGV
	TB11	100	20	900	Car
H2	TB51	70	20	13000	Bus
	TB11	100	20	900	Car

The working width should be carefully considered as, typically, vehicle restraint systems should be designed to ensure hazards fall outside of the working width. The risk assessment should assess whether it is acceptable for hazards to be within the working width, especially if the road speed is less than the tested impact speed.

The impact severity level should be either level A or B.

Consideration should be given to removability; some systems (and their terminals) may require anchoring and/ or fixing into the road and may be more appropriate for longer term installations. Alternatively, there are some systems which have no permanent fixing and are completely free standing.

A non-exhaustive list of BS EN 1317 compliant temporary barriers can be found here, not inclusive of barriers tested to be T2 or T3.

Examples of suitable systems can be seen below. These include steel, concrete and water filled systems.

Concrete system


Steel systems

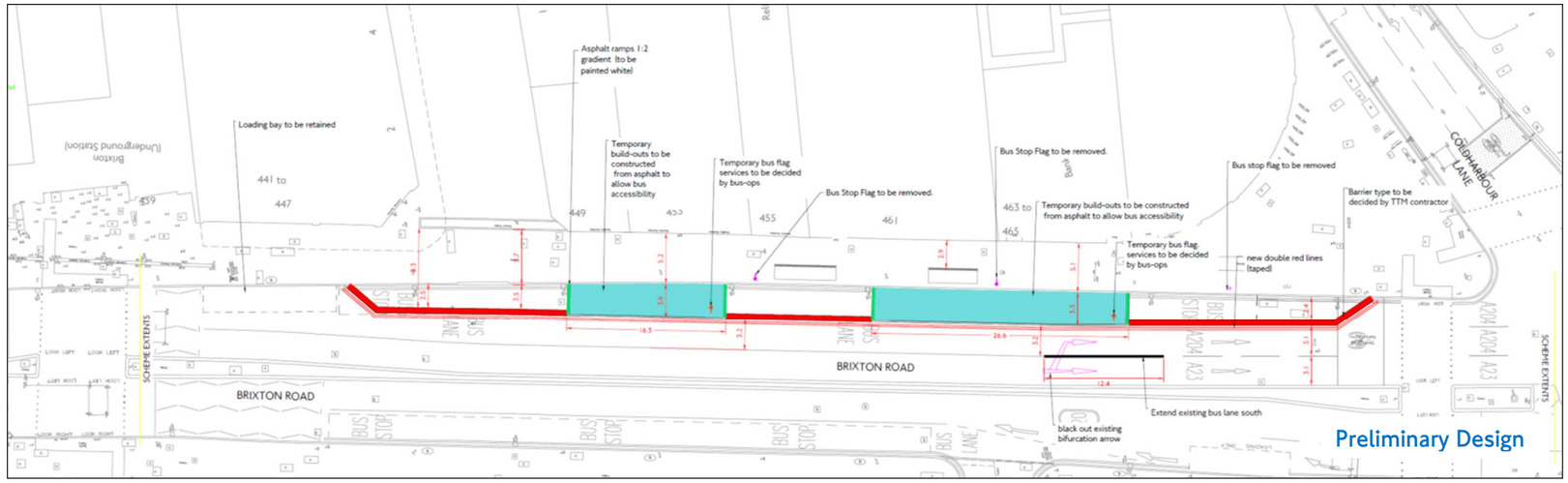
Water filled systems

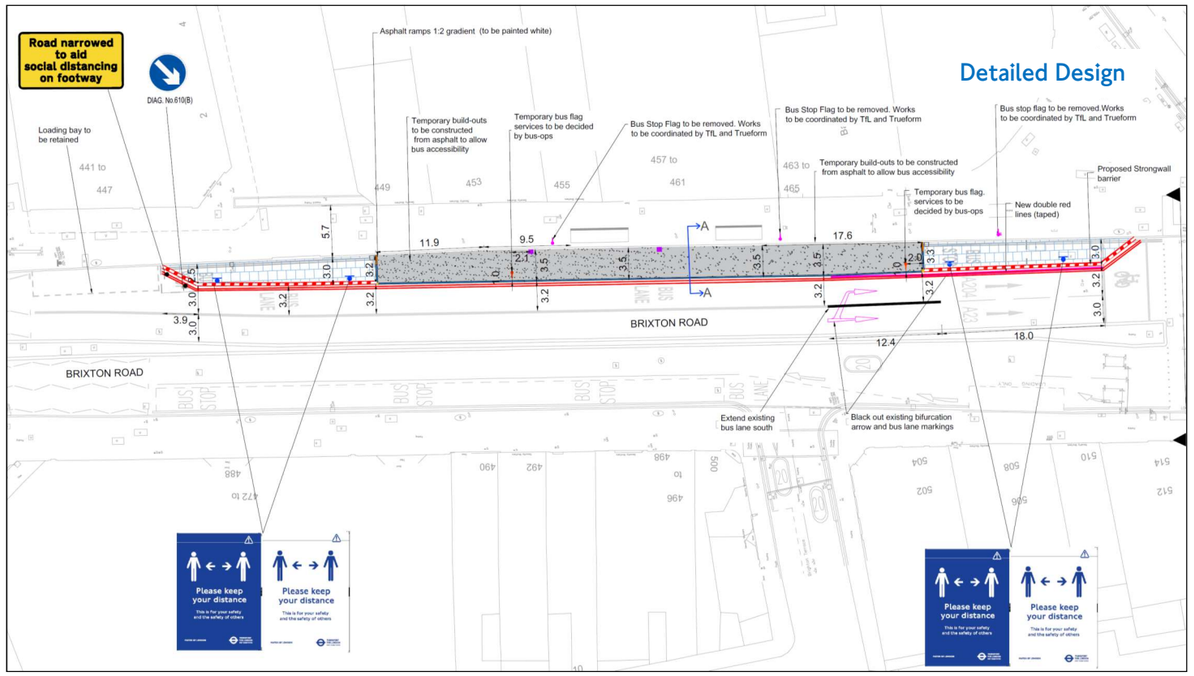
These systems are regularly used for temporary safety barriers and offer the lowest maintenance solution providing highest levels of safety for continuous longitudinal barriers. They are most suitable for medium to long term solutions.

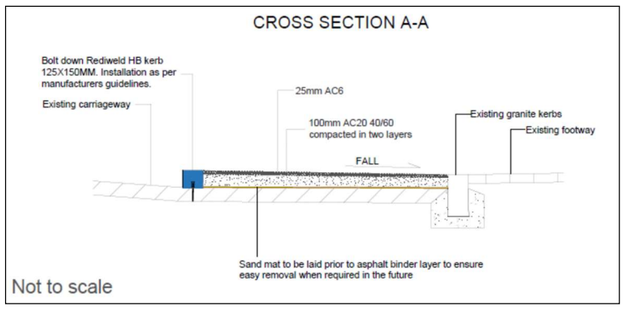
Any continuous barriers which have a solid face at floor level may require additional maintenance to remove build-up of debris, and the installation should be checked during periods of rainfall to check if any drainage issues arise.

CASE STUDIES

BRIXTON ROAD: Bus stop boarder with widened footway



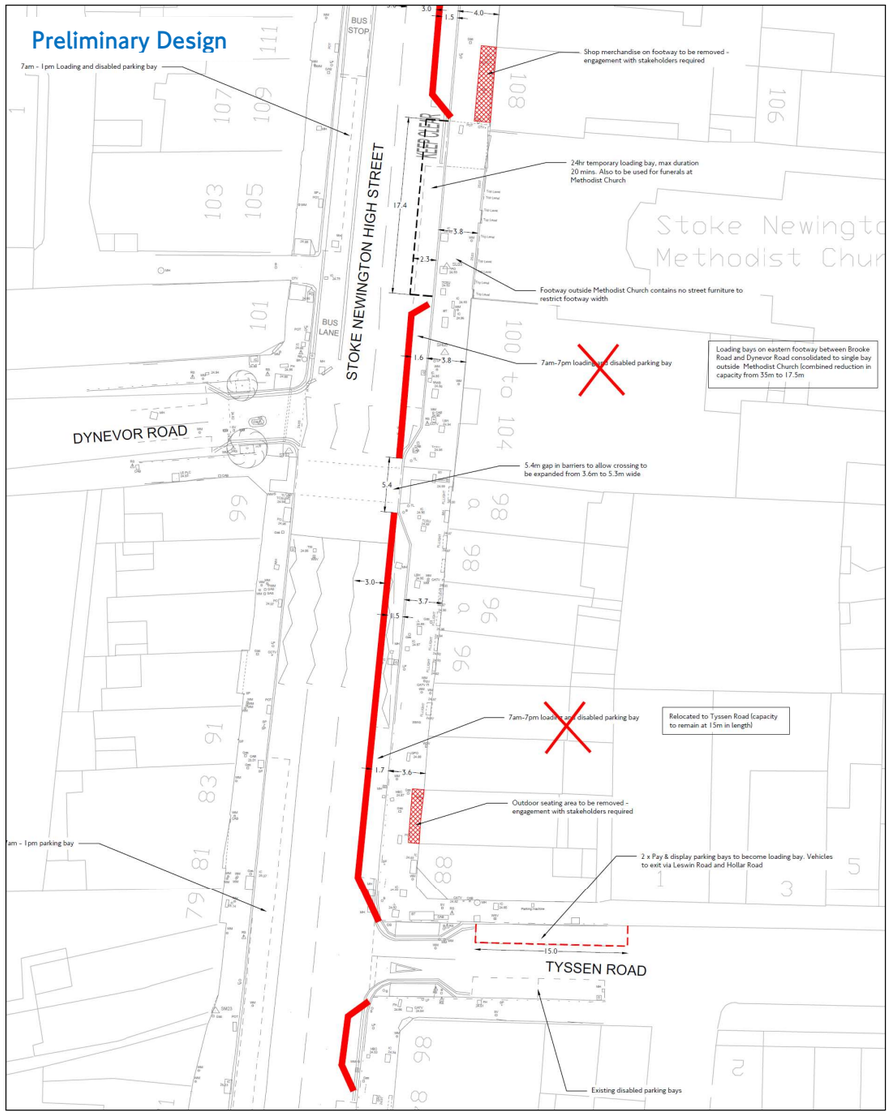


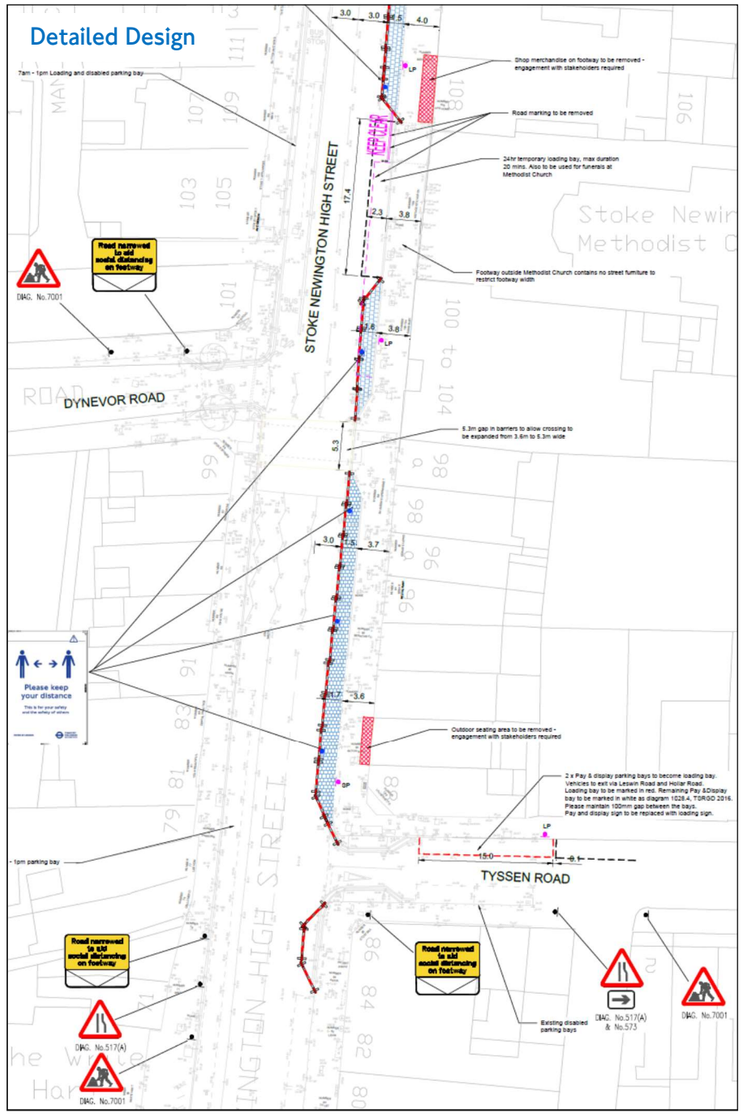


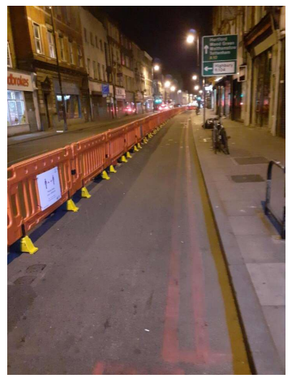
MAYOR OF LONDON

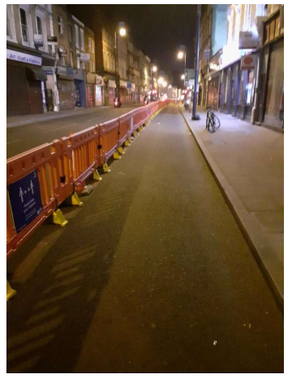
TRANSPORT FOR LONDON
EVERY JOURNEY MATTERS

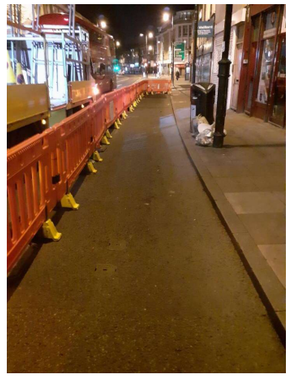
STOKE NEWINGTON HIGH STREET: Widened footway with suspended on-carriageway loading and on-street retail displays removed. Loading bays relocated to side road.











Document Control

Version	Prepared by	Checked by	Approved by
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