Guidance for the use of Traffic Wands with Cycle Infrastructure

EVERY JOURNEY MATTERS

Prepared by: TfL Engineering – Highways and Traffic Team

Address: 3rd Floor Palestra
197 Blackfriars Road
London
SE1 8NJ

	Name	Date
Author	Alan Thompson Senior Engineer	June 22
		June 22
Checker	Mark Artis Senior Engineering Leader	June 22
		June 22
Approver	Jason Wilton Principal Engineering Leader	July 22
		July 22
Board Approval	H&T Technical Authority & Technical Innovation	July 22

1. Introduction

1.1 Traffic wand definition

1.1.1 Traffic wand is a generic name for types of vertical, often flexible, features used on the highway to manage traffic movements. They have more recently been used to provide further protection to cycle facilities by discouraging other vehicles from entering cycle lanes, tracks, or from making prohibited turns.

1.1.2 Traffic wands can often be provided in different forms including:

- A stand-alone flexible post fixed directly into the ground,
- A post with fixing at base that creates a small upstand wider than the post, or
- A post placed on longer low-level pre-formed units.

1.1.3 Traffic wands are not considered to be traffic signs as prescribed by the Traffic Signs Regulations and General Directions 2016.

1.1.4 Traffic wands used on the Transport for London Road Network TLRN) will meet the requirements set out in TfL's Technical Specification - Cycle Wands for use as permanent highway infrastructure.

1.2 Purpose of guidance

1.2.1 Detailed guidance for the evaluation and design of cycle infrastructure can be found within TfL's London Cycle Design Standards (LCDS) and DfT's Local Transport Note 1/20 (LTN 1/20). This guidance note is intended to provide supplemental information to these documents in the form of suggested layouts where the designer has determined that traffic wands can be implemented.

1.2.2 The drawings in this guide indicate how traffic wands can be implemented depending on the road layout and provides advice for further considerations.

1.2.3 This note assumes the definition of traffic wands as singular posts that are fixed directly into the ground with no additional fixing that would be wider than the width of the post. Designers may refer to this guidance when using other products but should be aware that ancillary features representing more than a single vertical post may require additional design considerations not included within this document.

1.2.4 Designers should refer to the TfL advice note "Regulatory position for the use of vertical light segregation features to separate cycle facilities on the TLRN" for clarification on the legislative justification for use of traffic wands.

1.2.5 There may be scenarios where additional standards, guidance, and legislation that may influence the use and design of traffic wands is applicable, such as within

road tunnels, and whilst aspects of this guidance may still be applicable designers must refer to these in the first instance.

1.2.6 Whilst this guidance document is intended for permanent or temporary/ experimental cycle schemes it may be useful as a reference when designing for cyclists under Temporary Traffic Management (TM). TfL's Temporary Traffic Management Handbook should be the main point of reference for the design of TM and reference should be made to the relevant sections when designing for cyclists at road works. When choosing to use traffic wands additional consideration to the width requirements should be given owing to the potential impact of the adjacent vertical features. Additionally, should the expectation within the TM layout be that cyclists stay within their segregated space, closer longitudinal spacings of wands than those recommended in this document may be considered.

1.2.7 This document should not be referred to if TM designers are using prescribed signs to TSRGD 7102 and 7103 (traffic delineators and cylinders).

1.3 Typical highway layouts

1.3.1 The document shows a number of typical highway layouts where a designer might wish to implement traffic wands. The advice contained in this guidance note is not exhaustive, and other layouts may also be suitable.

1.3.2 The number of traffic lanes can be varied, and any cycle lane and track widths are shown as a guide with further reference to LCDS advised.

1.3.3 The designer can mix and match the typical layouts along a route or section of carriageway. Designers can potentially combine traffic wands with kerbed segregation or other forms of cycle lane design, such as mandatory lanes or stepped tracks, although should be mindful that this does not undermine a consistent design approach.

1.3.4 The following arrangements are discussed in more detail in this note.

- Cycle lanes
- Longitudinal spacing
- Cycle tracks
- Side roads and crossovers
- Pedestrian crossings
- Bus stops
- Parking and loading provision
- Signalised junctions

1.3.5 These arrangements are the most common to be found on a typical London road network where traffic wands might be considered. Other layouts specific to a location not covered in this document might still be suitable for traffic wands, and this list does not preclude the use in those circumstances.

1.3.6 All diagrams indicate a single lane in each direction, but traffic wands may be used with multiple lanes, and it is for the designer to determine the suitability of their use on these roads.

1.3.7 All dimensions are shown in metres and are suggested unless otherwise stated.

2. Key considerations for the use of traffic wands

2.1 General

2.1.1 Traffic wands have perceivable benefits when used to support the provision of cycling infrastructure although designers should also be aware of their limitations and constraints.

2.2 Perception of safety

2.2.1 Transport Research Laboratory (TRL) project report PPR704 "*Cycle Facility Trials: Alternative Separation Methods for Cycle Lanes*" made the following key findings: TfL

- Wands were found to offer improved perceptions of safety and usability over white line separation for all road users (except pedestrians where no significant differences were identified).
- Cyclists' perceived safety was greater with wand and kerb separation and it was concluded that intermittent wand separation and kerb segregation may offer the greatest benefits to cyclists.
- An implication of using wands was seen to be greater use of the allocated space by cyclists and that wands may be helpful where space is constrained. However, the potential for cyclists to be positioned closer to adjacent traffic, particularly where larger vehicle wing-mirrors may start to overhang the wands, and the implications of reducing the physical buffer between them would need to be considered.

2.2.2 It is worth noting that the TRL project tested a layout consisting of 1m high wands with set 2m spacing.

2.2.3 TfL customer pulse surveys (2021) indicate a positive tendency towards perception of safety by cyclists who have used facilities protected by wands. 55% of customers asked who had used such routes stated that they had made them feel more safe with 24% stating that they felt less safe.

2.3 Considerations for use of traffic wands

2.3.1 The main considerations when adopting the use of traffic wands on the highway include:

1. Safety – risk of injury or damage to persons and properties using the highway owing to the presence of the feature.
2. Access - Wands should not restrict access where it is permitted or be positioned in such a way that creates difficulty for intended users of the facilities and adjacent highway.

3. Failure to reasonably perform legal duties pertinent to the Equalities Act – does the provision of wands unreasonably impact on people with protected characteristics defined under the Equalities Act.
4. Maintenance – cost of ensuring features perform to the expected level and do not provide contribution to (1) above owing to their condition.
5. Enforcement – do the traffic wands enhance or undermine potential enforcement action.

Table 1 below summarises some of the benefits and constraints of traffic wands.

Table 1: Benefits and constraints of traffic wands

Possible benefits of the use of traffic wands	Potential constraints of the use of traffic wands
Enhanced perception of safety when compared to white line marking only	Higher maintenance requirements increase whole life costs
Lower implementation cost and speed of implementation compared to kerbed segregation	Potential impact on streetscene owing to perceived additional street clutter
Narrower space requirement potentially offering opportunity for physical separation when other, kerbed measures may not be viable	Potential for more illegal and legal encroachment into the cycle facility when compared to kerbed segregation owing to gaps in features
Flexibility of application enabling testing and refinement of schemes	Potential obstruction in road for other vulnerable road users

2.3.2 Cycle infrastructure design must follow the principles of inclusive design and the width of proposed infrastructure and spacing of wands must support the use of all types of cycles. The impact of the height of the wand features to users of different cycles should be understood when considering traffic wands. Further guidance on the potential impact of vertical features and how this influences positioning of cyclists in a facility can be found in LTN 1/20 (DfT) and LCDS (TfL).

3 Cycle lanes

3.1 Advisory cycle lanes

3.1.1 Traffic wands must not be used in combination with advisory cycle lanes. Advisory cycle lanes do not preclude the use of the cycle lane by any other road users and in such layouts the wands would become an obstruction and likely safety hazard.

3.2 Mandatory cycle lanes

3.2.1 Features should not be placed to de-legitimise any other traffic sign, so the features should not be placed directly on a mandatory cycle lane marking. DfT guidance states that they are placed on the inside / cycle side of the marking (LTN 1/20).

3.2.2 A 2m minimum mandatory cycle lane is recommended with the traffic wand placed directly inside the solid white line marking to TSRGD 1049B (Figure 1); the recommended absolute minimum width of the cycle lane is 1.7m, assuming the diameter of the wand is 80mm.

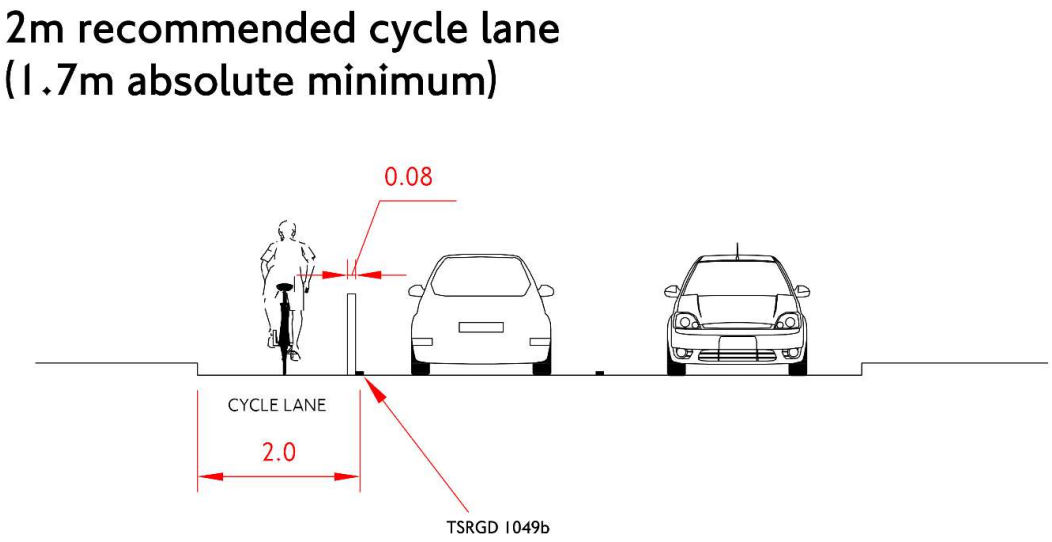


Figure 1: Basic layout for mandatory cycle lane with traffic wands

3.2.3 Below 1.7m the presence of the vertical features could become prohibitive whereby cyclists perceive the available cycle lane width as too narrow. If there are vertical features directly opposite on the footway or roadside a wider cycle lane will be needed, or consideration given to relocation of the features.

3.2.4 Narrower lane widths with traffic wands will reduce overtaking opportunities for cyclists and the expected volume of cyclists and desirability for providing for the need to overtake may influence the suitability of using traffic wands.

3.2.5 The sign to TSRGD 955 (S3-2-28) must not be used to sign mandatory cycle lanes unless at a point of restriction to other traffic, for example where a contraflow cycle lane starts in a one-way road, after which appropriate cycle lane signage is used.

3.2.6 TSRGD schedule 9 part 6 sets out the exemptions applicable for mandatory cycle lanes. A Traffic Order is not necessary, unless exemptions are required beyond those included. Traffic wands do not, themselves, require a traffic order. Mandatory cycle lanes can operate part-time, but this is not recommended, as space for cycling should be available at all times.

3.2.7 Traffic wands must not be used if a mandatory cycle lane only operates part-time.

3.2.8 The mandatory cycle lane marking prevents driving in the lane and additional waiting and loading restrictions will be needed to prevent parking and loading from taking place that could obstruct the cycle lane.

3.2.9 Any waiting/loading restrictions should be placed at the kerbside, inside the cycle lane.

3.3 Use of hatching

3.3.1 Use of excessive road markings, including hatching, is not generally supported, however, there may be locations where it is advantageous to provide wand separation for a cycle lane and artificially reduce the adjacent carriageway width. This may be to influence traffic speeds or where there are changes in the lateral carriageway width and cycle lane position.

3.3.2 Where the diagram 1041 marking is placed alongside a cycle lane, S11-5-51 requires the boundary line adjacent to that lane to be replaced by diagram 1049B (S9-67) as appropriate (Figure 2).

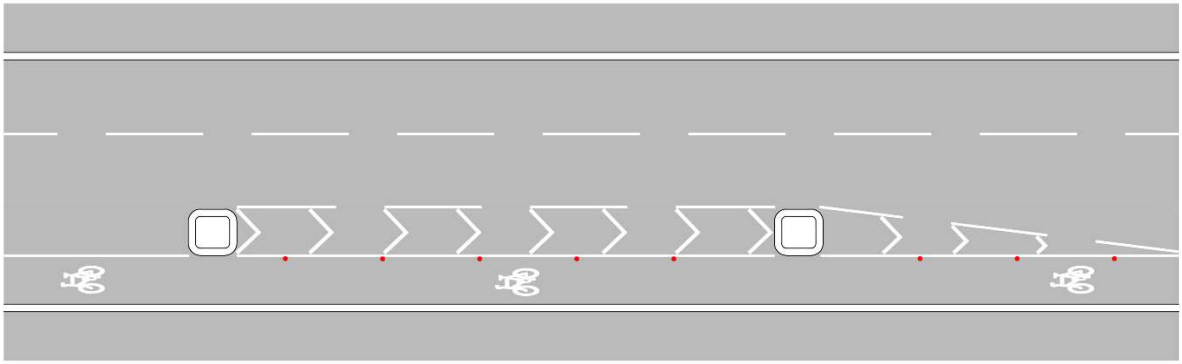


Figure 2: Example mandatory cycle lane with traffic wands and hatching

3.4 Longitudinal Spacing

3.4.1 A minimum 2m longitudinal spacing is recommended to deter use of the cycle lane by any road users other than cyclists (and e-scooters, where permitted).

3.4.2 Closer spacing is advised where there may be an enhanced need to deter encroachment, and where encroachment may perceivably be more likely and have a greater impact on the safety of the cycle lane users. Such locations could include, for example, on bends in the road, where illegal kerbside activity is experienced, or where traffic speeds tend to be higher and the adjacent traffic lanes are narrower.

3.4.3 Use of 4m spacing would provide sufficient deterrent to most motorists from using the cycle lane in most locations and is regarded as a suitable minimum spacing where encroachment into the cycle lane is less likely.

3.4.4 Use of 8m spacing is recommended for stretches of road where there is an overall constrained width and where higher likelihood of the presence of emergency response vehicles is expected (such as near or on main routes to hospitals) and where there could be periodic congestion creating stationary traffic that could reasonably be expected to provide undue delay to emergency responses.

3.4.5 Ambulance services identify 8m spacing on links is sufficient to enable other motorists to pull out of the traffic lane to enable their vehicles to pass. This is a useful guide when designing for other emergency service vehicles.

3.4.6 Where there are straight links with relatively low kerbside access requirements 8m spacing would likely be appropriate. 8m would be sufficient to deter accidental drift should vehicles laterally move into the cycle lane between gaps in the wands and only minor encroachment would be likely if this happened. Spacing above 8m may not provide sufficient deterrent to this as there could be enough space to travel further within the lane longitudinally before the next wand (particularly where the cycle lane is 2m or wider).

3.4.7 Figure 3 below shows the potential level of encroachment into the cycle lane for a driver of a large car travelling at 20mph where they can still exit the cycle lane and stay in their traffic lane.

3.4.8 This shows that spacings of 10m and higher start to provide motorists with opportunity to encroach into the cycle lane by 0.5m or above, which will likely reduce cyclists' perception of safety, particularly with narrower cycle lanes. 8m spacing and below limits the likelihood of encroachment.

3.4.9 Whilst this type of encroachment is unlikely in practice it highlights that once spacing is greater the speed at which encroachment is possible increases, which could influence road user behaviour (particularly motorcyclists who would have greater ability to weave in the wider space available) such as when undertaking stationary vehicles. Therefore, a balance needs to be made to enable deliberate

slow-moving encroachment if necessary and deter the ability for faster or accidental encroachment when unwarranted.

3.4.10 Forward visibility of subsequent wands is reduced with larger spacing in heavier traffic owing to the likely position of a preceding vehicle. With moving traffic and closer spacing the subsequent wands naturally emerge into visibility range; this effect is reduced with larger spacing.

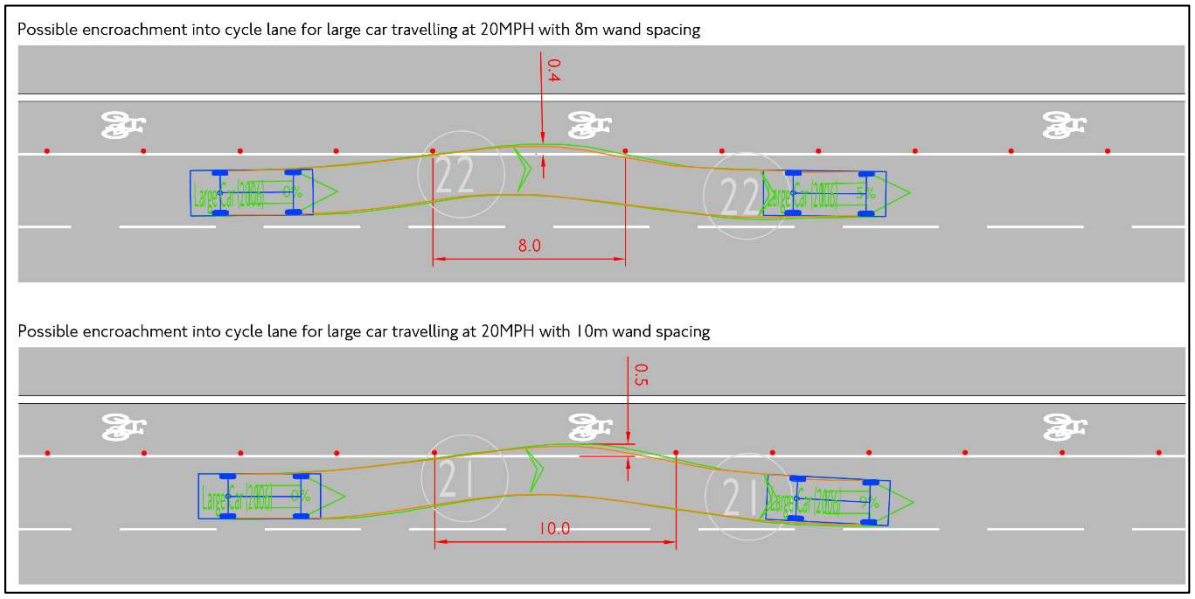


Figure 3: Assessment of level of possible encroachment between wand spacing for a large car travelling at 20mph

3.5 Start of facilities

3.5.1 Care should be taken that the first wand in a series is placed so that it can be clearly seen in advance and road users understand their intended meaning.

3.5.2 It may be advantageous to precede a series of wands with a kerbed traffic island and/or appropriate signage (possibly placed on a traffic bollard). Provision of a series of more closely spaced wands may also help identify the transition into the segregated facility.

3.5.3 At the start of a mandatory cycle lane a taper no sharper than 1:10 is recommended using the road marking to 1009A (S11-4-8). A shorter entry taper may be acceptable should the road layout already align traffic to the offside of the cycle lane.

3.5.4 LCDS Chapter 4, section 4.2.3, provides further guidance for the start of segregated cycle facilities.

4 Cycle Tracks

4.1 General

4.1.1 Unlike cycle lanes, there is no definition of how a cycle track can be physically delineated. When delineating a cycle track using traffic wands it may appear identical to cycle lanes but would likely require a sign to TSRGD 955 (S3-2-28) or a sign advising of a shared-use facility.

4.1.2 Cycle tracks are two-way unless made one-way, covered by a Traffic Order, and would require additional signage to indicate that they are one-way.

4.1.3 Cycle tracks can be for the sole use of cyclists or shared with pedestrians (and horses) and may be at the same or different levels compared to the adjacent footways and carriageway. It is assumed in the following section that wands would be used where the cycle track is at carriageway level, adjacent to traffic lanes.

4.2 Layout and signing

4.2.1 Although no additional road markings may be necessary for wand segregated cycle tracks the use of an edge of carriageway marking is helpful to further identify the presence of the wands to adjacent traffic.

4.2.2 The white line marking to TSRGD 1012.1 (S11-4-11) replaces the mandatory cycle lane marking TSRGD 1049B (S9-6-7). As the two markings look identical, provision of appropriate signage is important to ensure other road users are aware of the different requirements / access permissions.

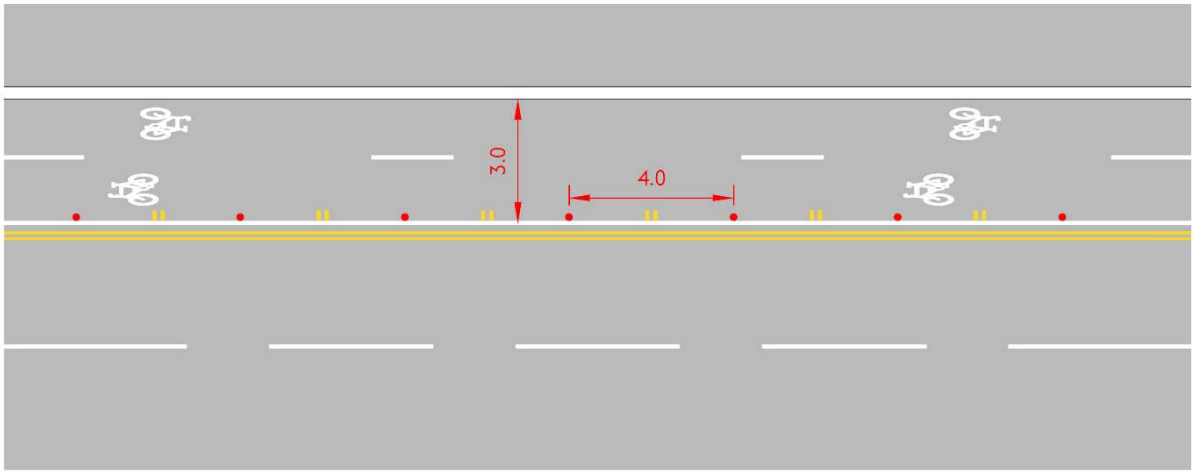


Figure 4: General layout for two-way track using traffic wands

4.2.3 A TSRGD sign to 955 (S3-2-28) is required at the start of the cycle track, and after larger junctions where there is an appreciable break in the segregated track.

4.2.4 Where the cycle track crosses smaller side roads and crossovers a new TSRGD 955 sign should not normally be necessary although designers will need to assess the traffic volume and characteristics to appraise whether a sign would be necessary, for example if the side road is a well-used route by non-local traffic unfamiliar with the layout of the cycle track, and where motorists may confuse the cycle track with their intended traffic lane.

4.2.5 One sign to TSRGD 955 should be sufficient at the start of the cycle track, either placed on the nearside or offside of the track although there may be benefit in providing additional road markings, such as TSRGD 1057, to further emphasise the route is only for cycles.

4.2.6 If the road layout is likely to cause motorists confusion that they cannot proceed past the sign, a TSRGD 955 sign placed only nearside should be considered, or two to create a “gateway” to the cycle track.

4.2.7 Should the wand segregated cycle track be a shared-use route the TSRGD 955 sign should be changed to a 956, 956.1, 956.2 or 957 as appropriate.

4.2.8 Stopping/waiting restrictions should be placed on the offside of the edge of carriageway marking, outside of the cycle track. This further helps to identify the different design layout and road user expectations (Figure 4).

4.2.9 Where loading restrictions are in place for the adjacent carriageway it is recommended that the loading markings are placed to touch the inside edge of the cycle track white line marking and 250mm units are used. Traffic Signs Manual Chapter 3 recommends use of a 300mm marking where no vertical kerb face is present however the use of the shorter marking helps to reduce the extension of the carriageway markings into the cycle track and is still considered clearly visible. An example layout is shown below in figure 5.

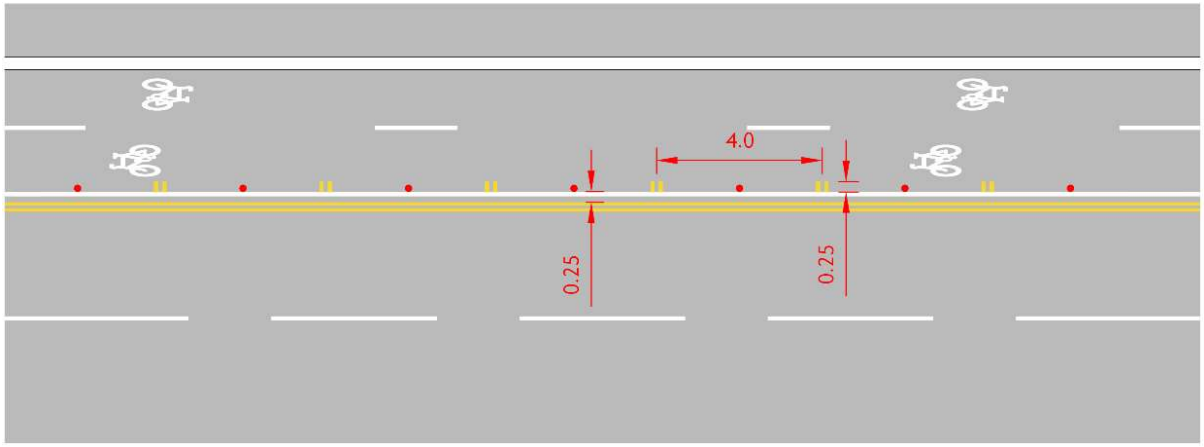


Figure 5: Loading and waiting restriction marking details

4.3 Wand Spacing for Cycle Tracks

4.3.1 Generally, the same wand spacing considerations apply for a cycle track as a mandatory cycle lane.

4.3.2 However, where the cycle track is two way, a maximum of 4m spacing is recommended which will help to ensure sufficient protection is provided for cyclists who may be directly facing oncoming traffic and where any encroachment could result in head-on conflicts.

4.3.3 All encroachment should be discouraged under a cycle track layout. Where there could be a need to provide for some additional space to enable motorists to move out of the way of emergency services the designer should first seek to provide sufficient carriageway width without the need to enter into the cycle track.

5 Side roads / crossovers

5.1 Give-way side roads

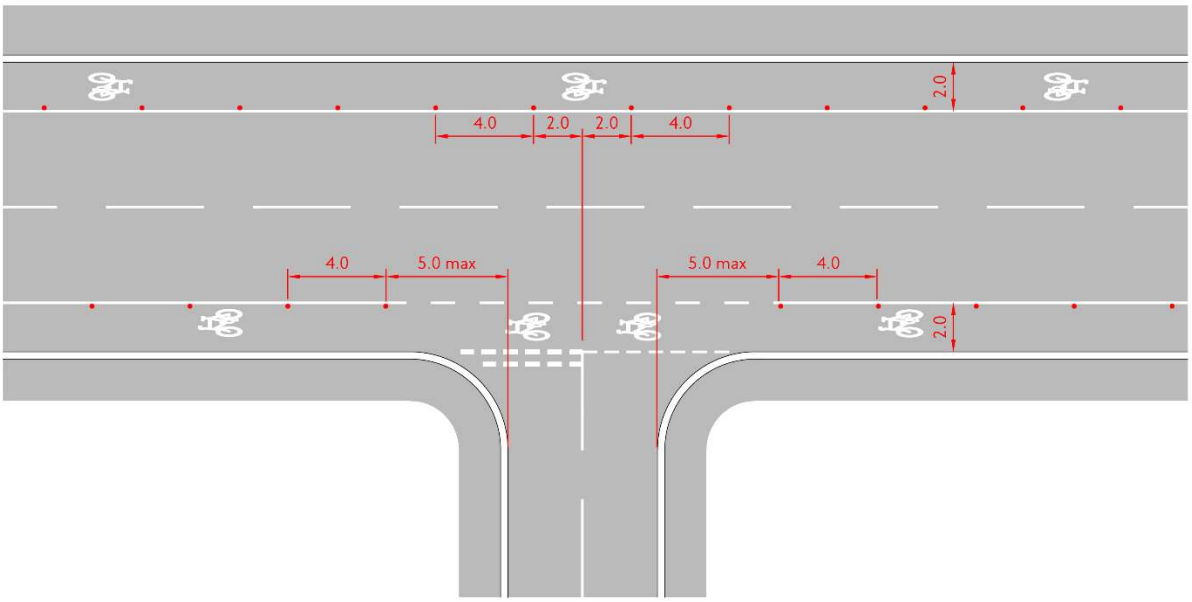
5.1.1 Where non-signalised side roads are located on the route, designers will need to consider how to accommodate vehicles turning into and out from the side road without encroaching into the cycle facility, whilst also minimising the conflict between turning traffic and cyclists, particularly the left turn into the side road.

5.1.2 TRL off-street trials of cycle segregation (TRL Project Report PPR 703 “trials of cycle segregation setbacks at side roads”) identified that an immediate to 5m set-back from the start of the side road helped reduce vehicle turning speeds, and a setback 20m in advance of the side road enabled cyclists to re-join traffic and enable motorists to adapt to their presence. Distances in between were found to provide insufficient distance and time to enable motorists to adapt to their presence.

5.1.3 To help ensure that motorists do not encroach into the cycle facility the shorter distance is preferred with the closest traffic wand being placed 5m in advance of the side road (Figure 6), subject to appropriate swept path assessment. This further helps to reduce the speed at which motorists turn across the cycle facility into the side road.

5.1.4 Subject to swept path assessment the first traffic wand after a side road should be placed approximately 5m from the exit of the side road.

Give-way priority side road with 5m traffic wand setback and wand placement opposite



Give-way priority side road with 20m traffic wand setback

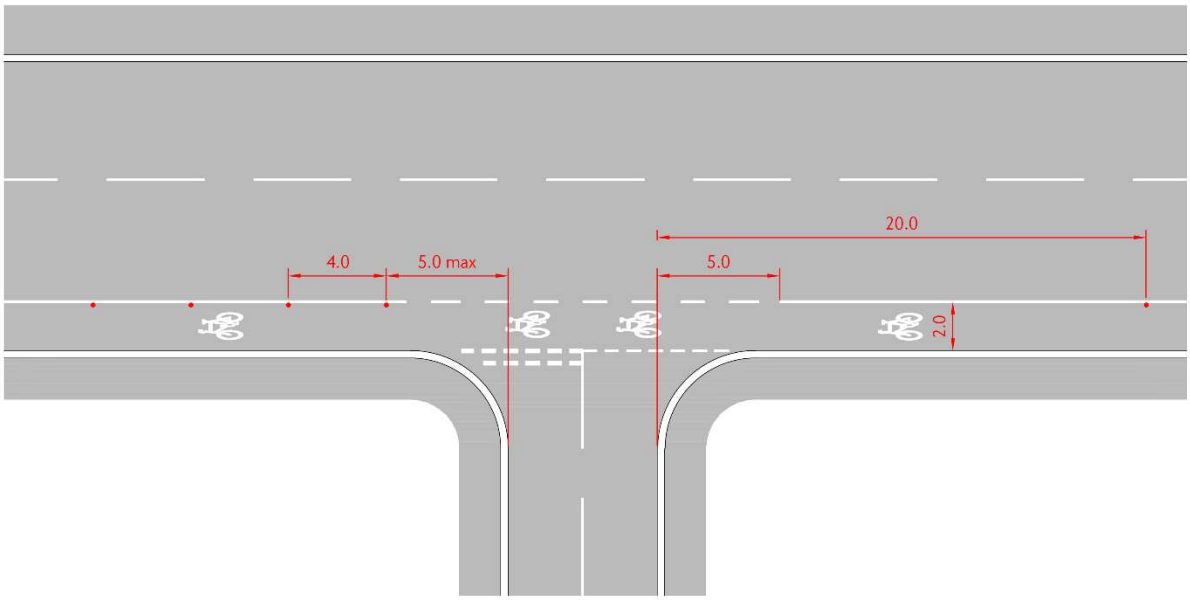


Figure 6: Give-way priority side road layouts with different wand setbacks

5.1.5 Should a two-way track pass directly across a side road, with no or little set back from the main carriageway, termination of the wands 20m in advance of the junction is not recommended as this would create a significant length of cycle track where cyclists would have no physical protection from traffic approaching head-on directly adjacent to them. If swept paths do not allow for wand placement close to the side road an alternative layout will be needed.

5.1.6 Additional warning of the first traffic wands after a side road should not generally be necessary when there is a consistent series of wands on the section of road. However, appropriate assessment of likely swept paths exiting the side road should be carried out to ensure the first traffic wand is not placed in a position likely to be struck.

5.1.7 This is likely to require more consideration when the side road is larger and/or larger vehicles are expected to be present.

5.1.8 The designer should also carefully consider the placement of the wands on the opposing side of the carriageway, taking into account the following:

- Cyclists turning right into the side road
- Cyclists accessing the cycle facility from the side road
- Vehicles attempting to pass stationary vehicles waiting to turn right

5.1.9 To help ensure that vehicles do not encroach into the cycle facility, it is suggested that two traffic wands are placed 4m apart, directly opposite the side road, approximately 2m either side of the centre line of the side road, or that the series of wands passing opposite the side roads have maximum 4m spacing where it is

considered that vehicles may have the potential to encroach into the cycle facility. See Figure 6 for general layouts.

5.1.10 Other road features, such as closely associated side roads or traffic islands may influence traffic wand placement and should be assessed on a site-specific basis to appreciate the impact on the overall spacing. It is acknowledged that the arrangement between the traffic wands becomes more complex with other features and might not be able to be placed in the ideal location.

5.1.11 In these instances, the designer will need to determine which wands are the most important to ensure the safety of cyclists. In most situations this will be the wand placed at the start of the cycle lane/track at the distance of 5.0m (Figure 7).

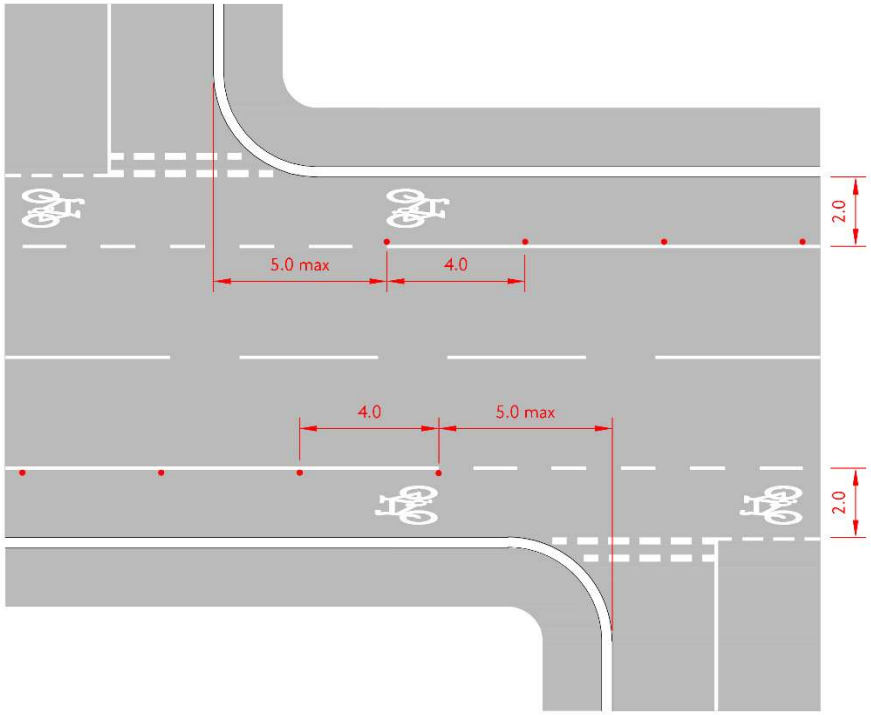


Figure 7: Example staggered side road junction layout with traffic wand positions

5.2 Vehicle crossovers

5.2.1 Vehicle crossovers require clear access and exit. In some areas they can be numerous and closely spaced, such as on residential streets with off-street parking. In such areas a consistent spacing may be more difficult to maintain and designers should use their judgement as to where best to place traffic wands or whether an alternative type of provision would be more suitable.

5.2.2 The basic recommended distance from the edge of each domestic crossover is 1m. It may be possible to reduce this to 0.5m if necessary, to maintain a series of wands; placement is subject to swept path analysis of expected vehicle requirements.

5.2.3 Closer placement to a crossover will require more carriageway width for vehicles to access/egress the off-street parking and so the volume of traffic on the road will also be a determining factor for when wands are suitable.

5.2.4 Industrial crossovers are likely to support access/egress for larger vehicles and the approach for give-way side roads is likely to be more appropriate, unless a two-way track is passing the crossover.

5.2.5 Where two-way cycle tracks pass a number of closely positioned crossovers care must be taken that sufficient protection is maintained for the track. Longer spacing between wands potentially exposes cyclists in the track to oncoming traffic immediately adjacent to the cycle track and alternative design options may be more appropriate.

6. Pedestrian crossings

6.1 Cycle lanes and controlled crossing facilities (Zebra or signal controlled crossings)

6.1.1 Where there are controlled crossing facilities - which can be zebra controlled or traffic signal controlled, regardless of the type of facility, the traffic wands should not encroach into the controlled area.

6.1.2 The controlled area is that as defined by the zig-zag markings. The end of the wand unit needs to be placed at least 100mm from the end of the zig-zag markings to ensure that these markings are not obscured by the unit.

6.1.3 Designers are able to vary the length of the controlled area, and individual zig zag extents if they consider that the protection afforded by the wand placement is required closer to the crossing point.

6.2 Cycle tracks and controlled crossing facilities

6.2.1 A with-flow cycle track will usually run directly up to the stop / giveway line of a crossing facility still demarcated by the edge of carriageway line. Wands would be positioned on the inside of the line.

6.2.2 Wands should be place at least 2.0m from the giveway or stop line. This will help to deter pedestrians from partially crossing and waiting in the cycle track behind the traffic wands. Figures 8 and 9 show indicative layouts at stand-alone crossings. Signalised crossing facilities will be subject to further design assessment for the requirement of traffic signal infrastructure.

6.2.3 Two-way tracks will likely have a different layout at Zebra crossings owing to the need to provide a refuge island between the cycle track and main carriageway. At signal-controlled crossings a nearside primary traffic signal will likely be needed for both sides of the cycle track which may be placed on an island. At these locations wands are more likely to be placed up to the other infrastructure in place.

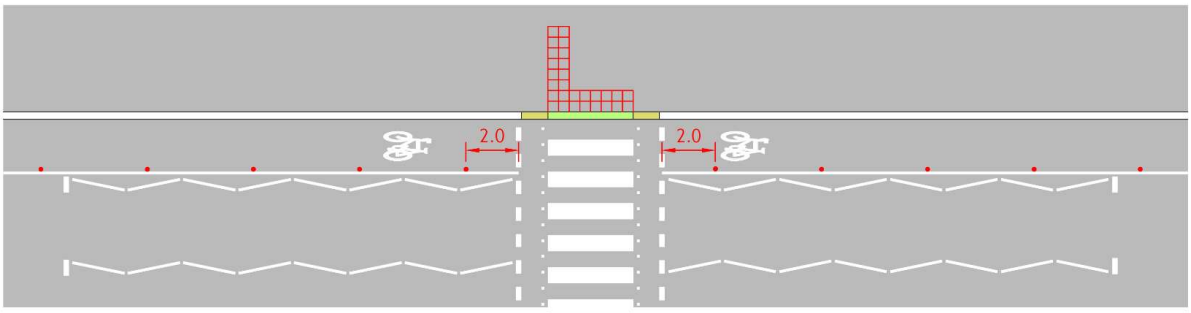


Figure 8: With-flow cycle track at Zebra crossing

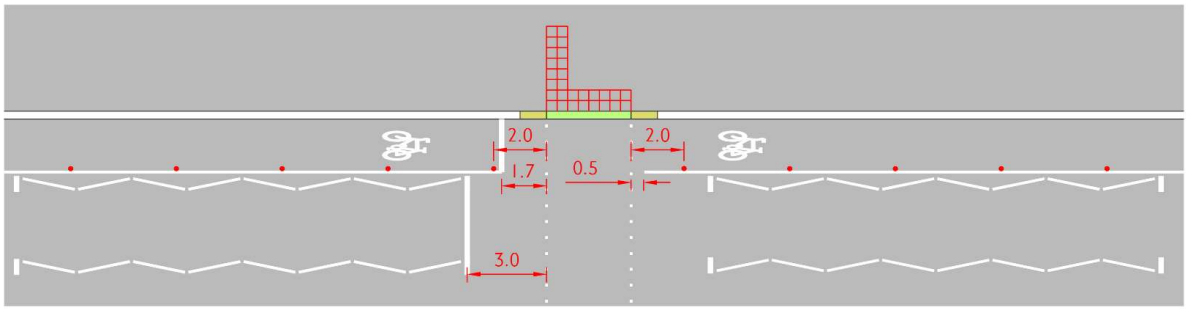


Figure 9: With-flow cycle track at signalised crossing

6.3 Informal crossings

6.2.1 Where pedestrians cross the cycle facility away from a formal crossing, the placing of the traffic wands needs to be carefully considered to ensure that pedestrians crossing the road do not unintentionally trip over the unit. Traffic wands must never be placed in line with pedestrian movements at crossings.

6.2.2 Where there is a refuge island provided, the wands should be place at least 2.0m from the edge of the island (Figure 10), where there is a continuation of the cycle facility past the island. This will help to deter pedestrians from partially crossing and waiting in the cycle lane behind the traffic wands.

6.2.3 Where there is a pinchpoint created by a refuge island, and there is insufficient carriageway width for a cycle lane/track and adjacent traffic lane, designers should consider where best to terminate and restart the placement of traffic wands to enable cyclists to take an appropriate position in the carriageway when passing the island or assess alternative design measures to enable consistent provision of the cycle facility.

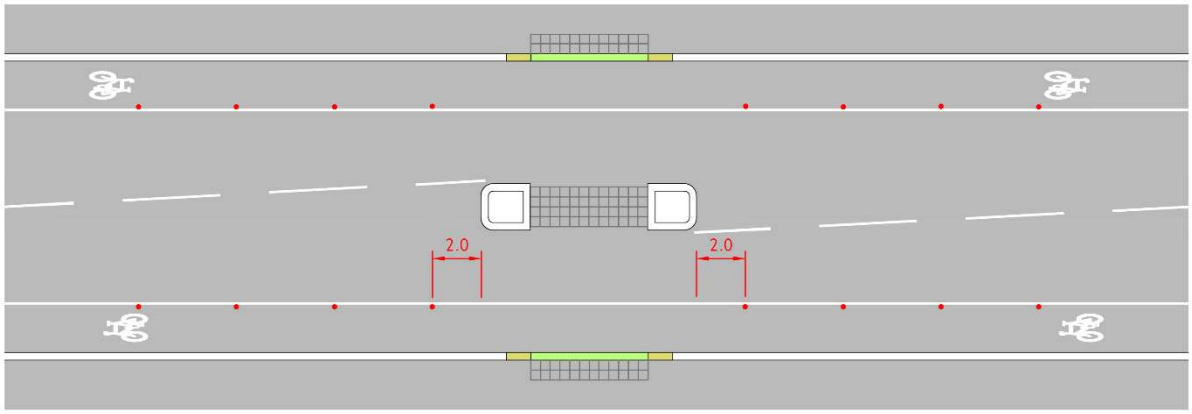


Figure 10: Traffic wand placement near informal pedestrian crossings

6.2.4 Consideration should be given to intervisibility between pedestrians waiting to cross and approaching traffic, on both sides of the road, when placing traffic wands

close to any form of crossing and the cumulative impact of closely spaced wands. This may be further influenced by the geometry of the road.

6.2.5 Where a two-way cycle track is provided a refuge island is more likely to be provided between the cycle facility and the main carriageway enabling pedestrians to wait before crossing each part.

7 Bus Stops

7.1 General

7.1.1 Wand separated cycle facilities may interact with bus stops in two ways:

- With a break in provision of the cycle lane / track
- With continued separation through/behind the bus stop

7.1.2 Breaking a cycle lane / track and encouraging cyclists into the adjacent traffic lane will only be acceptable should the adjacent traffic conditions meet the requirements set out in LCDS for integration with traffic.

7.1.3 The mandatory white line marking (or cycle track edge marking) will extend to and from the bus stop cage however wand placement needs to consider the likelihood that cyclists will need to leave and re-enter the cycle facility should stationary buses be present.

7.1.4 To provide cyclists with an opportunity to move out passing a stationary bus, traffic wands should not be positioned closer than 20m to the front of the cage and 8m from the exit side of the cage. A 20m cessation prior to the bus cage aligns with findings from the TRL studies into cycle segregation which enables road users to appreciate the end of a protected facility and adapt to the presence of cyclists (Figure 11).

7.1.5 A distance of 20 metres provides cyclists travelling at 30km/h approximately 2.5 seconds before they arrive at the bus cage.

Figure 11: Bus stop cage in line with cycle lane

7.1.6 To provide cyclists earlier opportunities to exit the cycle facility should no traffic be present, 8m spacing could be considered further in advance of the bus cage.

7.1.7 Owing to the degree of protection afforded to cyclists by the traffic wands there should be a preference to maintain separation through bus stops or else there would be an inconsistency in the level of protection given by the cycle facility which could undermine the perceived safety and level of service provided.

7.1.8 A bus cage must not be provided that creates a break in a two-way cycle track as this would require cyclists to pass a stationary bus directly into oncoming traffic. Separated facilities must therefore continue through the bus stop area.

7.1.9 For provision of separated cycle facilities at bus stops refer to LCDS, TfL Accessible Bus Stop Design Guidance, LTN 1/20, Guidance on Shared Use Bus Boarders (TfL Engineering 2022), and TfL guidance note “Pedestrian crossings at Bus Stop Bypasses”.

8. Parking and Loading provision

8.1 General

8.1.1 Providing traffic wands in mandatory cycle lanes introduces an additional consideration where there may be a legitimate requirement for vehicle access into the lane which is impeded by the presence of the traffic wand.

8.1.2 Use of traffic wands and mandatory cycle lanes should not preclude the use of the cycle lane to vehicles if permissions to do so exist. It is likely to be difficult to reconcile this conflict and the following **hierarchy of action is recommended**:

1. Where no vehicular access is permitted to the cycle facility wands can be provided. To achieve this, it may be necessary to provide additional or enhanced kerbside restrictions, removal of pre-defined exemptions to a mandatory cycle lane, or provision of a cycle track. Alternative design solutions may also be required.

2. If vehicular access is deemed necessary and cannot be accommodated in an alternative design layout, seek to limit kerbside access and provide a design rationale for wand positioning and cycle lane design that would permit necessary access. The layout should consider reducing risks associated to collisions with the features and where people using the cycle lane may not expect encroachment.

8.2 Parking and Loading inside cycle lanes

8.2.1 Parking and loading that takes place in the cycle lane significantly reduce its intended usefulness and should be avoided. If cyclists need to leave a wand segregated lane, re-joining an adjacent traffic lane, owing to the presence of kerbside activity it could create conflicts with passing vehicles and undermine the performance of the cycle lane ultimately deterring its use.

8.2.2 Parking/loading can take place formally, in designated bays, or could be permitted informally by the presence of parking and loading restrictions.

8.2.3 The following design layouts are provided for consideration.

8.2.4 Formal provision of parking/loading bays within a cycle lane requires breaking of the mandatory cycle lane marking. Traffic wands should be placed no closer than 20m from the start of the parking bays to provide cyclists with sufficient time and space to move into the adjacent traffic lane. On exit from the bays the first wand should be placed at 5m (Figure 12) subject to swept path assessment of expected vehicles.

Figure 12: Parking bays positioned in-line with cycle lane

8.2.5 As this option requires cyclists to re-join the adjacent traffic lane it would only be acceptable should the traffic conditions of the adjacent lane meet the requirements identified in the LCDS for integration with other traffic, and critical lane widths identified in LCDS are provided.

8.2.6 An alternative option could be to continue the cycle lane outside of formally designated kerbside parking/loading bays with 0.5m minimum safety buffer.

8.2.7 The wand segregation should stop in advance of the parking bays and the cycle lane would then pass the parking/loading bays on the off-side, with an additional 0.5m buffer space to reduce the risk of car doors opening into the cycle lane. The cycle lane would be marked as an advisory lane adjacent to the bays. Traffic wands should not be placed where traffic would need to cross the cycle lane to access the kerbside bays (for the extents of the advisory cycle lane markings). The cycle lane should deflect to the offside of the bays with a 1:10 taper and return with a 1:5 taper after the bays end (Figure 13).

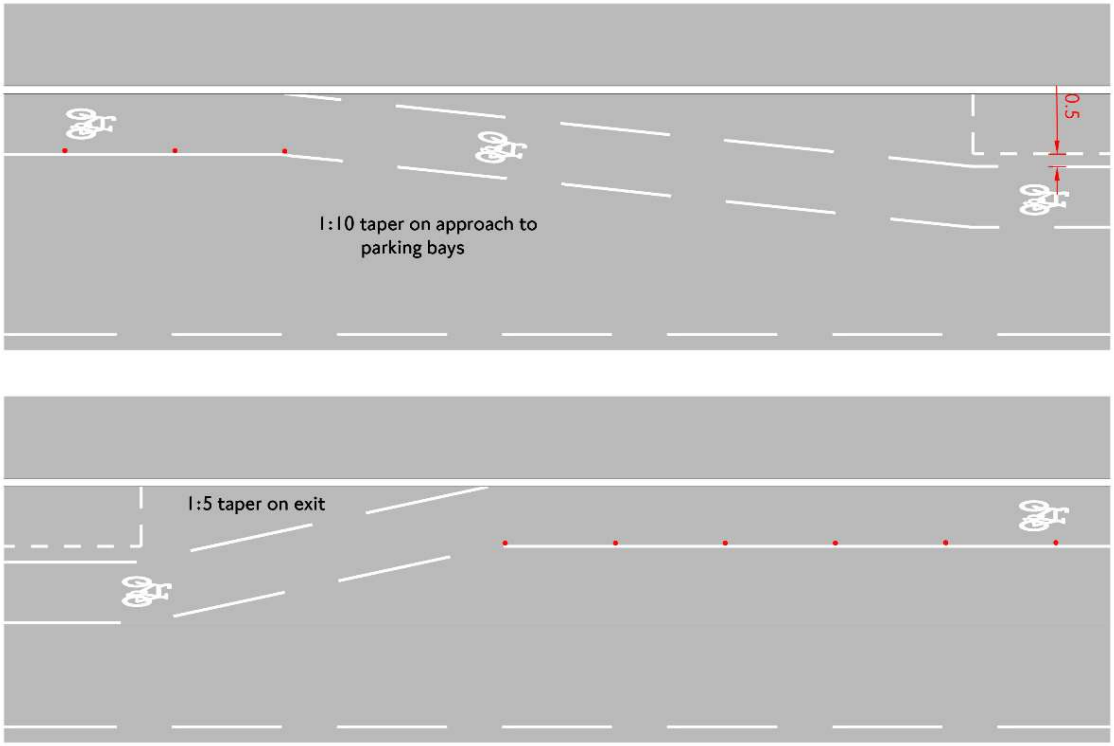


Figure 13: Cycle lane passing offside of parking bays

8.2.8 An alternative option could be to consider inset parking bays, or partially inset parking bays which reduce the overall width required on the carriageway and reduces the entry and exit taper lengths.

8.2.9 Where no formal parking provision is made, but kerbside access is permitted, wand spacing could be increased to enable the permitted access. This could require cyclists to re-join the adjacent traffic lane. This option is only acceptable should the traffic conditions of the adjacent traffic lane meet the requirements identified in the LCDS for integration with other traffic and, critical lane widths identified in LCDS are provided.

8.2.10 Taxis require a spacing of 8m-12m to access and egress from the kerbside with large cars requiring approximately 12m-16m (Figure 14). These larger spacings may be acceptable if the adjacent traffic conditions support integration with traffic otherwise they reduce the perceived safety benefits of the wand segregation.

8.2.11 If timed no stopping (waiting/loading) restrictions are present, there is likely to be a demand outside of the operational hours which will need to be considered. Further assessment would be needed to identify whether this could be accommodated within the lane or whether alternative designs, or changes to the restrictions, are needed.

8.2.12 As a guide, a pantechnicon (Rigid 2-axle vehicle approx. 11m long) stopping kerbside is likely to require a spacing of approximately 40m with an articulated 16m vehicle requiring 45-50m spacings. Provision of wand segregation spaced at these distances is not supported and alternative loading provision would be needed.

8.2.13 Figure 14 below shows indicative required spacing for different stopping / loading requirements which would influence wand spacing should these be designed for kerbside.

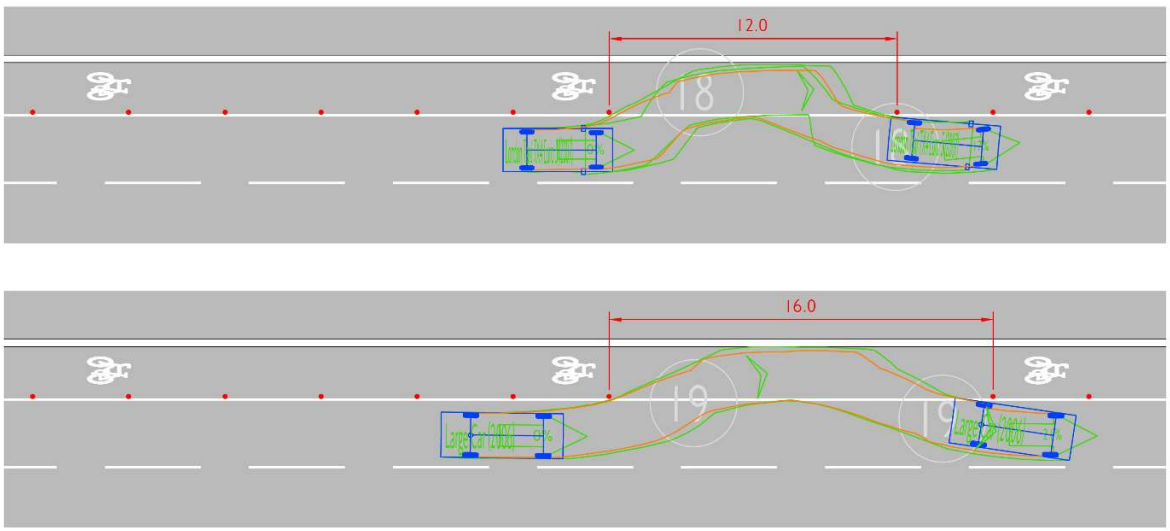


Figure 14: Indicative space required for a taxi (top) and large car (bottom) to access and egress to kerbside

8.2.14 These options are likely to be determined by the likelihood that kerbside activity will take place. Where there is no obvious stopping demand and double red lines are present it is reasonable to assume only taxis or infrequent stopping will take place and a wand spacing that does not obstruct this may be more acceptable.

8.2.15 The effectiveness of wands will likely reduce with an increase in the frequency of permitted kerbside activity. Caution is needed where spacing is at a point where the wands appear as individual items rather than a series of features, which may have greater implications in terms of their visibility and risk.

8.3 Parking / Loading outside of cycle lanes

8.3.1 A more favourable option may be to continue the cycle lane provision behind the parking/ loading bays.

8.3.2 In this situation wands should continue through the parking/loading extents to deter encroachment into the cycle lane. 4m spacing should be adequate to maintain access across the lane to the kerbside. Additional provision of dropped kerb access to adjacent footways could be required.

8.3.3 A 0.5m (min.) buffer is required between the cycle lane and parking bay to provide a buffer from opening vehicle doors. This should be widened to 1m (min.) should loading be expected. If designated disabled badge holder parking is provided wider separation/buffer area may need to be considered to ensure access/egress from vehicles adjacent to the wands is possible.

8.3.4 Where applicable waiting/loading/stopping restrictions should continue along the kerbside and appropriate exemptions for the bay extents included within the relevant traffic order.

8.3.5 The parking bay marking to TSRGD diagram 1028.4 can be considered using layout B, as shown in the TSRGD. Layout A is likely to be inappropriate as this option should be offset from the edge of carriageway by a maximum of 0.6m. The design layouts in Figure 15 and 16 are provided for consideration although other layouts may be appropriate.

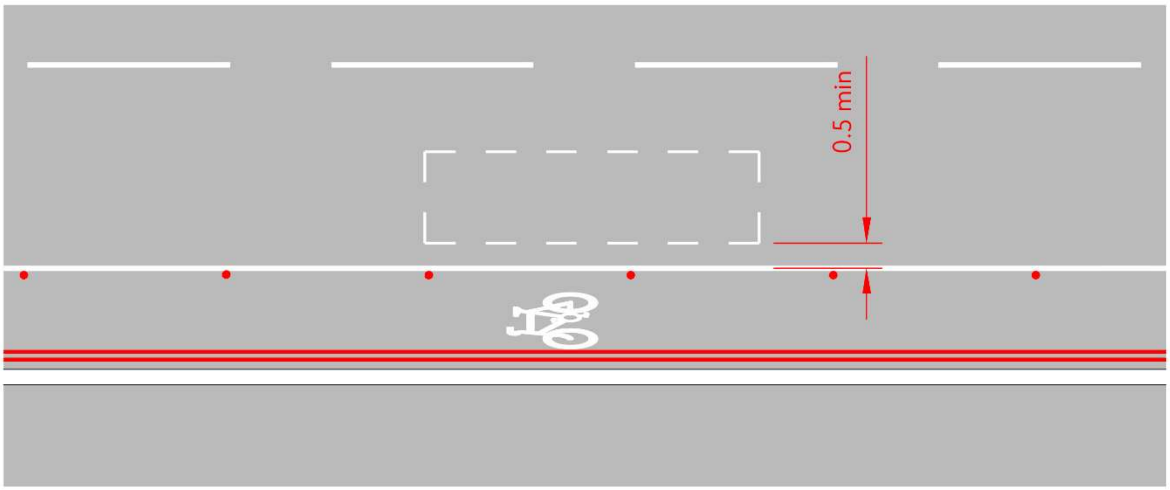


Figure 15: Floating parking bay using TSRGD diagram 1028.4b (S7-4-6) with cycle lane passing kerbside

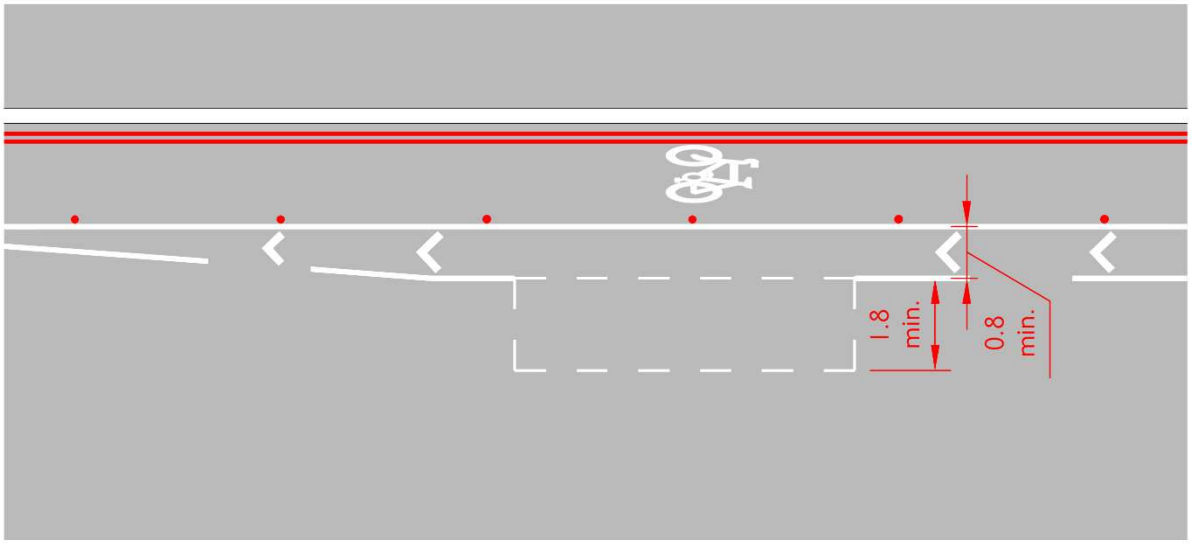


Figure 16: Floating parking bay with hatching using TSRGD diagram 1028.4b (S7-4-6) (cycle lane passing kerbside)

8.3.6 If footway parking/ loading is provided a suitable gap in the wand placement will be needed to ensure access. Depending on the length of the bay and likely route of access it may be possible to provide wands part way through the bay. This is unlikely to be suitable should the bay be part on the footway and part on the carriageway owing to the likely reduced width of the cycle lane.

8.4 Parking and Loading with Cycle Tracks

8.4.1 A difference between cycle tracks and cycle lanes is that the white line used for cycle tracks, rather than the kerb edge, will define the edge of the main carriageway.

8.4.2 The parking bay marking to TSRGD diagram 1028.4 can be considered using layouts A and B as the marking layout A can be provided to the edge of carriageway marking.

8.4.3 The consideration for designers is how to guide motorists using the parking bay to position vehicles whilst maintaining a 0.5m (minimum) buffer between the parking bay and cycle track edge to help protect cyclists from opening of vehicle doors. There may be a number of ways of doing this including the following design layouts in Figures 17 – 19 which are provided for consideration.

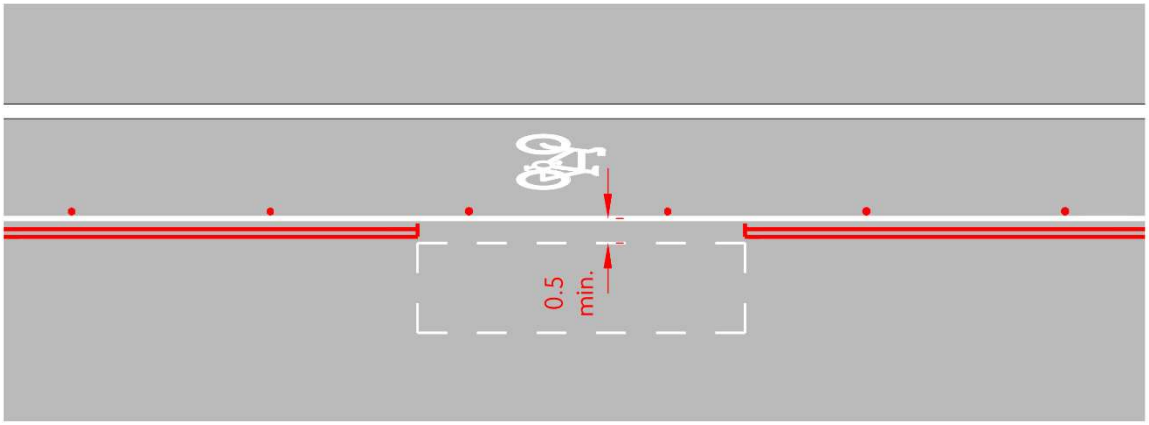


Figure 17: Loading and waiting restriction marking details using TSRGD diagram 1028.4b (S7-4-6)

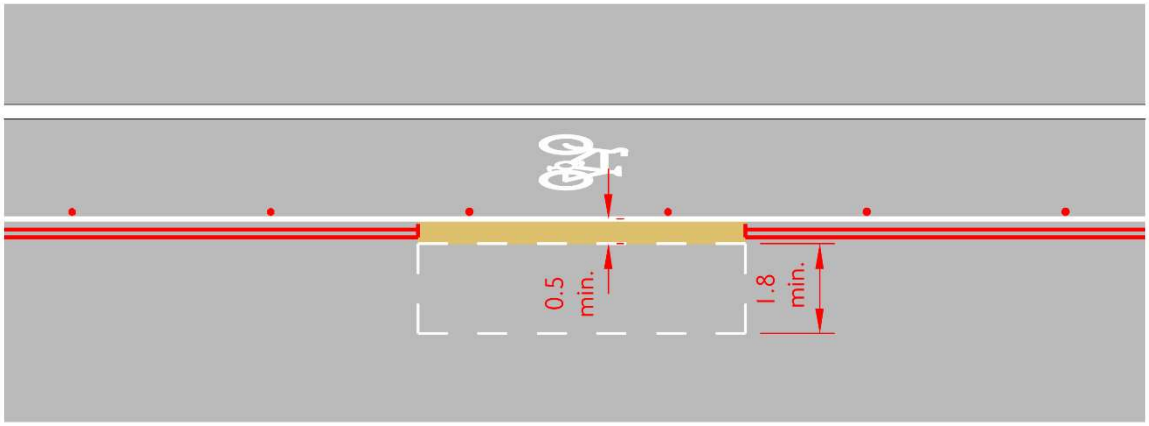


Figure 18: Parking bay on offside of cycle track using TSRGD diagram 1028.4b (S7-4-6) and coloured surface treatment

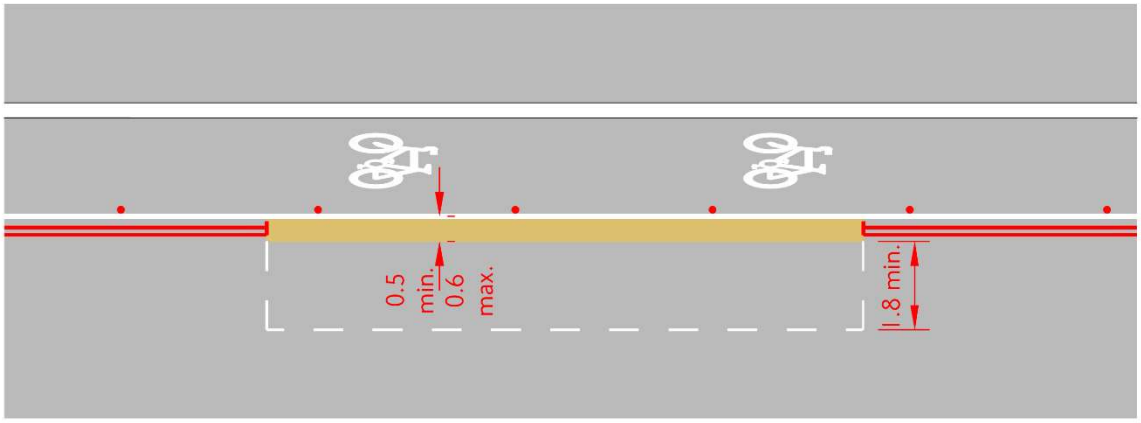


Figure 19: Parking bay on offside of cycle track using TSRGD diagram 1028.4a (S7-4-6) and coloured surface treatment

8.4.4 All parking and loading provision should be positioned on the outside of the cycle track unless there is an unavoidable need to provide footway parking/loading on the footway side of the track. In this situation a suitable gap in the wand placement will be needed which will increase the potential for encroachment into the cycle track by other vehicles.

8.4.5 Parking and loading provision should not be made in a cycle track.

8.4.6 Where parking/loading is provided on the outside of cycle tracks and lanes further consideration to the wands placement will be needed to ensure they do not impede access to/from the adjacent vehicle.

8.4.7 Additional dropped kerb provision may be required to ensure the parking/loading bays are accessible.

9. Signal Controlled Junctions

9.1 General

9.1.1 Signalised junctions will often create larger gaps in the continuity of the cycle provision and will be designed and treated with differing levels of interventions.

9.2 No designated cycle lane on approach to the junction

9.2.1 Where a cycle lane tapers out on approach to a junction stop line, owing to lack of available carriageway width, the integrated lane width should meet the critical lane dimensions as stated in LCDS.

9.2.2 Ideally the wand segregation should not end directly where the carriageway width narrows and should provide cyclists with space to integrate with adjacent traffic.

9.3 Mandatory cycle lane leading to advanced stop line for cyclists

9.3.1 When a mandatory cycle lane continues up to a stop line, or on entry to an advanced stop line for cyclists the wand segregation should end 20m prior to the stopline (Figure 20).

9.3.2 This distance enables cyclists to re-join traffic if necessary and enables motorists to adapt to their presence prior to the likely presence of a turning conflict (potentially with left turning vehicles at the junction).

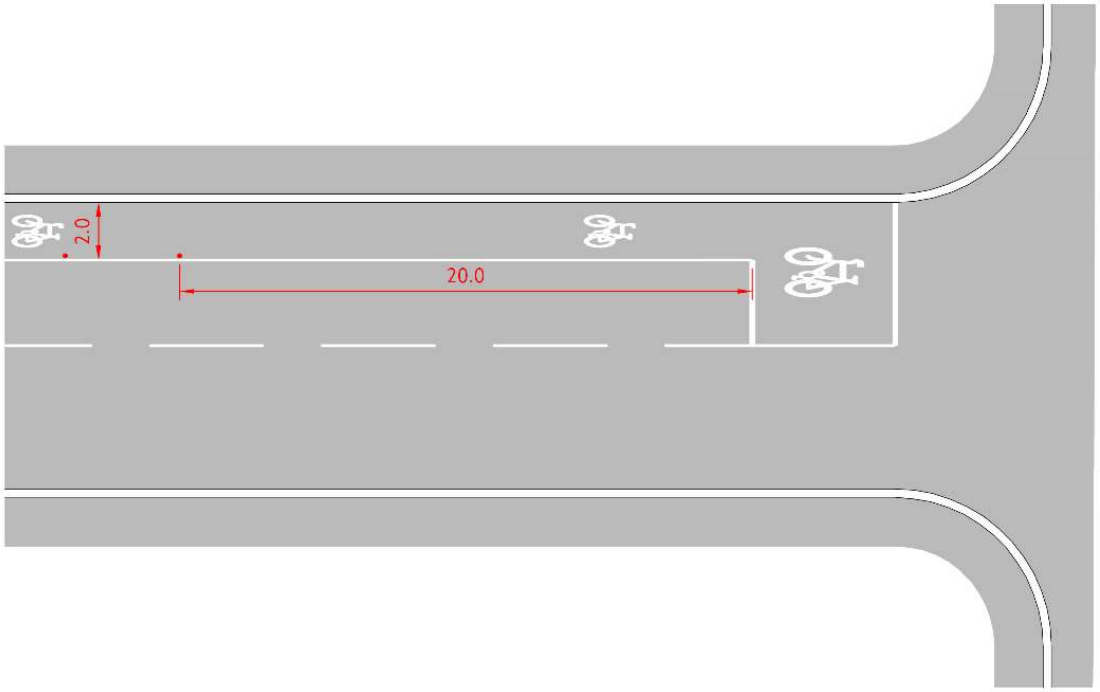


Figure 20: Wand spacing in advance to signalised ASL

9.4 Segregated facility at junction

9.4.1 These facilities would usually have a segregating island to enable positioning of relevant traffic signal infrastructure for the adjacent traffic flow and/or cycle flow. The island should preferably extend at least 2m in advance of the cycle stop line to discourage a cyclist from abruptly joining the adjacent traffic lane at the stop line.

9.4.2 In advance, 4m wand maximum spacing is recommended for at least 20m from the island (Figure 21) to also discourage faster transitions from the cycle facility to the adjacent traffic lane, which could happen should cyclists perceive there to be a benefit in passing through the junction with general traffic.

9.4.3 If this is expected, owing to possible perceived delays, or phasing of traffic, consideration to extending the physical island or reducing wand spacing further should be given to further deter movement into the traffic lane on the approach to the junction.

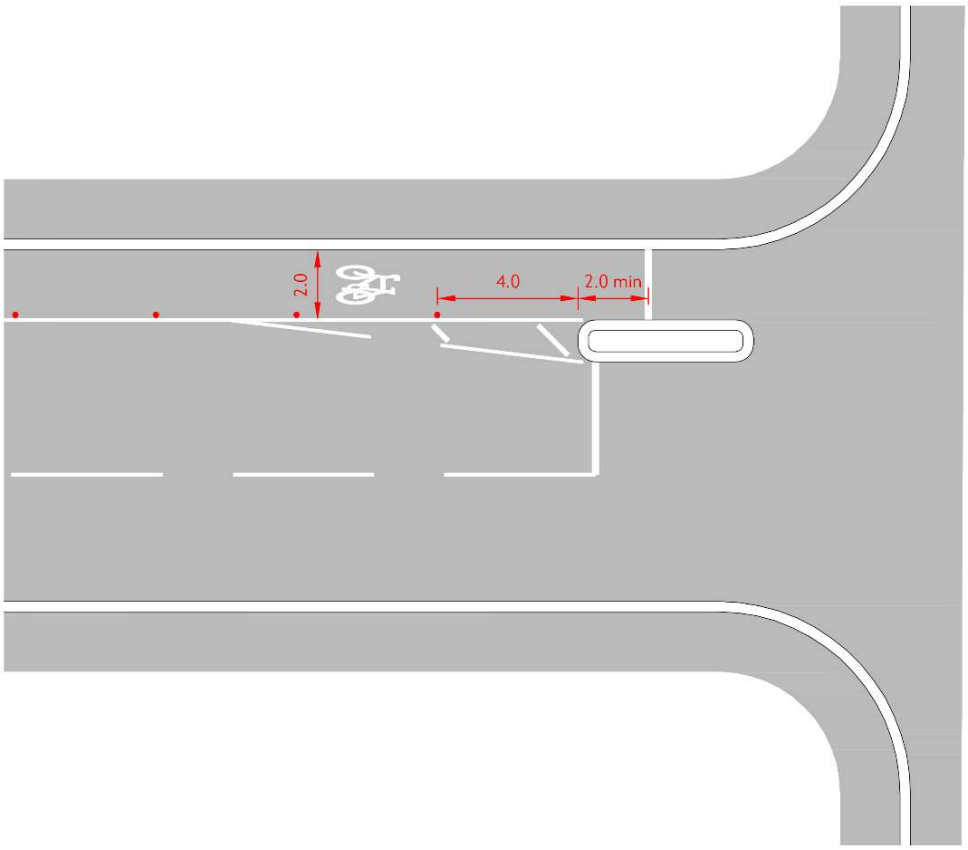


Figure 21: Wand at separate cycle provision at signal facility