

DS.102 Cycle lanes in carriageways

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1 Introduction

1.1 Notes

- a. This standard explains requirements about the use and arrangement of cycle lanes. This includes unmarked contraflow advisory routes for cyclists within the carriageways of one-way streets.
- b. .See the Southwark Streetscape Design Manual webpages at <u>www.southwark.gov.uk/ssdm</u> about the design of streets and spaces.

2 Use requirements

Speed	One-way street	Two-way street		
20mph	Contra-flow required (unless one-way prohibition can be designed out). This should be an unmarked advisory route	No lane to be provided (though see note 1)		
30mph	Contra-flow required (unless one-way prohibition can be designed out) - type to be determined on case specific basis	Potential use of cycle lanes to be determined on a case specific basis. Where lanes are deemed appropriate then they should be advisory only.		
<u>NOTES</u> 1) See 2.2b about the potential use of brief sections of cycle lane to provide access around				

sections of cycle lane to provide access around mode filters.

Table 1 - Summary of use requirements for cycle lanes

2.1 Contra-flow cycle lanes on oneway streets

a. Where a one-way street is proposed (or existing instances are encountered within a project area) then a contraflow cycle facility should always be provided. Omission will require agreement to a level 1 departure for which it must be demonstrated that this is not feasible owing to either:

- i. Wider network management constraints.
- ii. Inability to reasonably meet the design requirements in this and other standards.
- b. For the purposes of 'a':
 - i. On 20mph streets the contra-flow facility for cyclists should be an <u>unmarked</u> advisory route.
 - ii. On <u>30mph</u> streets the type of contraflow facility will be agreed with approving officers on a case specific basis. This might be a marked or unmarked advisory route or a mandatory lane (though in the majority of instances it is most likely to be one of the two former).

NOTE: Potential instances include where contra-flow lanes pass side road junctions and on entry or exit at either end of the lane.

2.2 With-flow cycle lanes on twoway streets

a. With-flow cycle lanes should not generally be necessary on two-way 20mph streets. Other methods to improve the carriageway environment to make it safe and comfortable for cyclists should be used in preference. Introduction of new cycle lanes on twoway streets will therefore require agreement to a level 2 departure to ensure that alternatives have been fully explored. If existing with-flow cycle lanes are encountered in a project area they should be reviewed with the intention of designing them out if appropriate (see note - and see also 'b' for an exception to this). In order to ensure alternately that this review occurs and that existing cycle lanes are not removed without consideration. both retention and removal will require agreement to a level 1 departure. This will be subject to the details of the review findings. In order for retention to be approved it will need to be demonstrated either that:



- i. The improvements necessary to allow the lane to be designed out are not economically proportionate.
- ii. A legitimate safety reason exists for the lane that could not be otherwise addressed.

NOTE: It is important to appreciate the distinction between 'designing out' cycle lanes and simply 'removing' them without any thought. Cycle lanes will only be removed where:

- (1) The location has been assessed to see whether the issue that first required their introduction still applies. Where officers are satisfied that things have changed such that a lane is no longer required then they may proceed to remove the lane (though subject to road safety audit as below).
- (2) Other improvements are to be carried out (as necessary) to address any remaining issues so that the street can be used safely by cyclists without the need for a cycle lane.
- (3) A Road Safety Audit (RSA) audit of proposals has been completed.
- b. As a permitted exception to 'a', brief stretches of with-flow cycle lane may be provided on two-way streets that have a 20mph speed limit or which form part of a 20mph zone – but only for the purpose of allowing cyclists access around mode filters (entry restrictions affecting other vehicles, see note 2). They should not be longer than around 6-8m. However, in many instances other methods of providing access for cyclists are likely to be preferred owing to the lesser amount of signage related clutter they generate (see note 2).

NOTE 1: 'b' applies only to entry restrictions at junctions as the like. It does not apply to bypasses to traffic calming features such as speed tables, rumble strips or chicanes.

NOTE 2: One such alternative is to consider signing narrow bypass carriageways beside mode filters as prohibited 'routes for use by pedal cyclists only' through use of signs TSRGD diagram 955 and associated Traffic Management Orders.

- c. Where existing two-way streets are to remain as 30mph (see 'd') then no general restriction or prohibition on either introduction or removal of withflow cycle lanes exists, though some controls are still retained to ensure that cyclists' needs have been properly considered and the use of lanes is an appropriate response (see note 1). Accordingly:
 - i. Introduction of <u>new</u> advisory cycle lanes will require agreement to a level 1 departure. It will need to be demonstrated that the road conditions justify this and that, on balance, a lane is the best means of addressing the needs of cyclists. Mandatory cycle lanes should not be introduced (see note 2).
 - ii. Any <u>existing</u> instances of mandatory or advisory cycle lanes encountered within a project area should be reviewed to check that they remain both necessary and are still the best way of meeting cyclists needs. If removal is proposed then this will be subject to a level 1 departure to check that this has been properly considered. Where it is proposed to keep them, then lanes should be brought up to current design standards.

NOTE 1: Advisory cycle lanes should be considered as one of a tool kit of options that may be used by designers to provide for cyclists, accepting that this may not always be appropriate. Introduction of cycle lanes should be neither default nor dismissed without consideration. In many instances, providing wide nearside general traffic lanes of ~ 3.65m+ may be preferable.

NOTE 2: Mandatory cycle lanes are problematic in terms of cost, street clutter, order making and enforcement. They are also unlikely to provide substantial additional benefit compared with advisory cycle lanes.



d. For the purposes of 'c', before assuming that a street will remain as 30mph for the foreseeable future (and that providing cycle lanes is therefore an acceptable option for consideration) approving officers should be consulted. Where it is proposed to reduce the speed to 20mph in the future, officers will need to determine whether interim introduction of a cycle lane (or upgrading of an existing facility) is sensible. If that date is considered to be reasonably close, significant investment in lanes should be avoided. Funding should instead be held for implementation of the 20mph environment.

3 **Design requirements**

3.1 Lane widths

3.1.1 General

a. Cycle lanes should not be narrowed on the immediate approach to parked vehicles.

NOTE: This may encourage users to reposition themselves closer to those vehicles, so increasing risk of conflict.

3.1.2 Minimum effective widths

NOTE: The effective width of a cycle lane is the uninterrupted width that is available to users before accounting for the presence of vertical objects or features at the limits of the width. Where such objects or features are present then further clearance values as section 3.1.3 must be added to the effective width as cyclists will typically try to keep some distance to avoid collision. The extent of the clearance value that is required for a particular item or feature will vary with its height. Appropriate clearance values are explained elsewhere below. Some addition of clearance values to the effective width will almost alwavs be necessary within cycle lanes owing to the presence of up stand kerbs at the carriageway edge. Minimum effective width values below recognise this.

<u>General</u>

- a. All marked with-flow and contra-flow cycle lanes (i.e. all except unmarked contra-flow advisory routes) should have a minimum effective width of 1.8m (though see section 3.1.3). Where exceptional and unavoidable circumstances can be demonstrated then relaxation to a minimum of 1.3m for brief distances may be permitted by agreement of a level 1 departure (though see 'f'). It will need to be demonstrated that the width of the general traffic lane running alongside (and the nature of traffic using the road) is sufficient to prevent other vehicles from encroaching on users of the cycle lane.
- b. Where narrow carriageways for cyclists only are to be created by signing their lengths as prohibited 'routes for use by pedal cyclists only' (using signs as TSRGD diagram 955 and associated Traffic Management Orders) then other than where they are being created as brief bypass feature beside traffic islands or similar (for which see 'c') their minimum effective width should be 2.1m (though see section 3.1.3). Where flows are considerable then even greater widths may be necessary. Subject to agreement to a level 1 departure, their minimum effective width may be reduced to 1.6m where the carriageway passes through a space that is otherwise for pedestrians only (see note).

NOTE: This is likely to help encourage reduced speeds and greater caution from cyclists passing through the space.

Bypass features for cyclists

- c. Where cycle lanes or narrow carriageways signed as prohibited 'routes for use by pedal cyclists only' serve as brief bypass features (see note) beside traffic islands and access control aates (or similar) then requirements are the same as in 'a-b'. However, if levels of use are likely to be either:
 - i. Very low.



ii. Predominantly one-way (as may be the case when used beside traffic islands).

then, notwithstanding 'f', the absolute minimum effective width may be reduced to 1.1m subject to agreement to a level 1 departure (though see section 3.1.3).

NOTE: Such features should not generally be greater than 6-8m in length and should preferably be much shorter.

Bus lanes marked for use by cyclists

If a bus lane is to double-up us a cycle d. lane then the appropriate overall width of the lane will be agreed with approving officers on a case specific basis. Where the route is quiet and buses are easily able to move out of lane to overtake cyclists then widths beneath 4m may be appropriate. However, where the street is busy and/or it would be difficult for buses to move out of the lane to overtake (e.g. because of heavy queuing traffic in the general traffic lane running alongside it) then widths should generally be around 4.5m so that they can pass cyclists safely. This will also reduce the stress for cyclists of knowing they are being followed by a large vehicle that they may be holding up.

Unmarked contra-flow advisory routes to one-way streets

- e. Where <u>unmarked</u> contra-flow advisory routes are provided to one-way streets, the minimum <u>effective width</u> of the carriageway (excluding any areas of parking along the kerb edge) should be:
 - i. 4.05m for 20mph streets.
 - ii. 4.55m for 30mph streets (though see section 3.1.3 and see note 1).

Introduction of such contra-flows where carriageway widths are less than the above will require agreement to a level 1 departure. This is only likely to be acceptable on 20mph streets and only then away from points of immediate entry/exit from the contra-flow route (see note 2). In order for such departures to be permitted it will need to be demonstrated through provision of traffic volume and speed survey information that levels of vehicle traffic coming in the opposite direction are appropriately low and that 85th percentile speeds on the street are beneath 24 mph. In addition, any such sub-standard narrowings should be the exception rather than the rule, with the majority of the street meeting normal minimum effective width requirements (as above) and the overall arrangement of the street encouraging equal priority between cyclists and the road users coming in the other direction (see notes 3 and 4).

NOTE 1: If the street has more than one opposing general traffic lane then this distance should be applied to the opposing lane closest to the contra-flow route.

NOTE 2: See also section 3.9 for related requirements about the minimum distance required after the start of a contra-flow lane or route before protrusion at the edge of carriageway may be introduced such as build outs or kerb-side parking.

NOTE 3: For instance, on a street where the existing width was constrained by kerb side parking to either side of the street (and this couldn't be removed) then it would not acceptable to simply remove a single 6m long bay to the contra-flow side of the street every 50m or so. Cyclists would be extremely unlikely to spot these gaps (see note 4) whilst - even were they to, this would require them to dash between gaps, judging the time between approaching vehicles coming in the other direction. The overall road layout would also encourage those other vehicles to assume priority. This would likely be intimidating for cyclists.

NOTE 4: When considering inserting passing gaps between lengths of kerb side parking then designers must put themselves in the position of the cyclist on the road and consider the likely visibility of such gaps. By definition the carriageway along the street will be relatively narrow and cyclists are therefore likely to proceed fairly close to vehicles parked at kerb side.



This will restrict their cone of forward visibility. On straight streets, In order for them to be able to spot any forthcoming passing gaps between parked vehicles, these will generally need to be at least 15m long.

Further limitations on minimum effective widths in specific circumstances

- f. Neither cycle lanes (excluding unmarked contra-flow advisory routes) nor carriageways signed as prohibited 'routes for use by pedal cyclists only' should have an effective width less than 1.8m (though see section 3.1.3) where either:
 - i. They proceed up a hill that is steeper than 1:20 (5%) for a distance > than 5m.

ii. They are immediately bounded to one or more sides by parked motor vehicles.

3.1.3 Further clearance values for addition to the effective width to permit avoidance of vertical items

a. Where vertical items (including all but the smallest of kerb steps) bound a side of a cycle lane (including unmarked contra-flow advisory routes) or a carriageway that is a signed as a prohibited 'route for use by pedal cyclists only' then, unless a level 1 departure is agreed, the additional <u>clearance values</u> given in Table 2 should be added to the minimum effective widths given in section 3.1.2.

Feature located within cycle lane or along its edge (see note 1)	Additional value to be added to effective width to that side (see note 2)
Flush surface or kerb step that is ≤ 25mm high.	None.
Kerb step that is > 25 to \leq 150mm high.	200mm / or distance required by Use Envelope of item (see note 3) – whichever is the greater.
Vertical feature that is > 150mm to ≤ 600mm high.	250mm / or distance required by Use Envelope of feature (see note 3) – whichever is the greater.
Vertical feature that is > 600mm high.	500mm / or distance required by use envelope of feature (see note 3) – whichever is the greater.

<u>NOTE</u>

- 2) In the case of unmarked contra-flow advisory routes, the additional clearance values should only be provided in relation to features that are located along the side of the carriageway that the route proceeds along. For instance, were a cyclist to be proceeding in contra-flow down the western kerb line of a 20mph street, then it would appropriate to add a further 200mm clearance value to the usual 4.05m minimum effective width to make allowance for the carriageway edge kerb step to that side, or a further 500mm owing to a parked vehicle to that side. However, it would not be appropriate to add such values owing to kerbs or parked vehicles along the eastern kerb line.
- 3) See standard DS.208 for further information about Use Envelopes and Effective Widths.

¹⁾ Examples of vertical features include bollards, lighting columns, benches and seats, litter bins, cycle stands, hedges, walls, railings and parked cars.

Table 2 - Clearance values (or additional widths) to be added to minimum effective widths for cycle lanes and prohibited 'routes for use by pedal cyclists only'



3.1.4 Widths at access restriction features

NOTE: Occasionally it may be necessary to provide access restriction features within cycle lanes or carriageways that are signed as prohibited 'routes for use by pedal cyclists only' in order to deter improper use by other vehicles.

a. Where width restrictions created by vertical items of street furniture are required within either cycle lanes or carriageways that are signed as prohibited 'routes for use by pedal cyclists only', then widths when navigating them should be as explained in standard DS.203.

3.1.5 Widths of neighbouring general traffic lanes

Where marked cycle lanes a. are provided (e.g. 'advisory' or 'mandatory' lanes) then the general traffic lanes that run parallel to them should be wide enough to ensure vehicle users do not come too close to the cycle lane (see note 1). The appropriate width to achieve this is likely to vary from site to site and with local traffic conditions. Widths will therefore be agreed with approving officers on a case specific basis (though see section 3.1.6 about when lanes pass traffic islands). See '3.1.2e' about widths where contraflows for cyclists that are unmarked advisory routes are provided along one-way streets

NOTE 1: This is particularly important since research suggests that cycle lanes encourage motorists to pass closer to cyclists than they would otherwise.

NOTE 2: On 20mph streets, in some instances use of a narrower two-way general traffic running lane without centre line markings may be considered to permit wider cycle lanes to each side.

3.1.6 Widths where cycle lanes pass traffic islands in the centre of the carriageway

- a. See '3.1.2c' about widths where cycle lanes or carriageways signed as prohibited 'routes for use by pedal cyclists only' pass beside *brief* traffic islands as part of bypass features (no lanes for other vehicles being provided to that same side of the island).
- b. If both a cycle lane and a general traffic lane pass together to the same side of a traffic island then the width of the general traffic lane next to the lane should be ≥ 3m but ≤ 4.25m (see note 1). The width of the cycle lane should be as described elsewhere in this standard.

NOTE 1: The necessary width is likely to depend on proximity to side road junctions. Where the island is located close to a junction then a width closer to 4.25m is likely to be necessary in order to allow large turning vehicles to pass the island without significant overrun of the cycle lane.

NOTE 2: In many instances, these width requirements are likely to make introduction of cycle lanes and traffic alongside islands one another incompatible. This will also significantly reduce any speed reduction that the island might promote. In these circumstances, the need for the island should be reviewed else the cycle lane should be discontinued past the island with 'cycle symbol' road markings provided on the carriageway as an alternative measure to make other riders and drivers aware of the needs of cyclists. See standard DS.113 for further information.

3.2 Times of operation of cycle lanes and associated waiting and loading prohibitions

3.2.1 With-flow lanes

- a. Where 'advisory' cycle lanes are provided then
 - i. waiting restrictions that operate



between 7am and 7pm (minimum) should be introduced to prevent other vehicle users from parking in them when they are most needed by users

- ii. the need for loading restrictions will be determined with approving officers on a case specific basis but is likely to be resisted in most instances due to the impact this can have on businesses.
- Where with-flow 'mandatory' cycle lanes are provided they should be operational between 7-10am and 4-7pm as a minimum in order to prevent other vehicle users from parking in them when they are most needed.

NOTE: In town centres and close to local shops or businesses this is likely to mean providing positive loading space elsewhere so that businesses can continue to operate (as loading is prohibited within mandatory lanes during their hours of operation). Whilst operation between 7am and 7pm is desirable, provisions within statutory traffic order procedures related to prohibition of loading between the periods of 10am and 4pm will make this impractical in many instances.

3.2.2 Contra-flow lanes

- Where marked contra-flow advisory a. routes for cyclists are provided that run directly adjacent to the edge of carriageway (as opposed to where they pass marked parking bays) then waiting restrictions that are operational between 7am and 7pm (minimum) should be introduced to deter parking in these during times of peak use. Designers must also ensure that the minimum street widths discussed in section 3.1. can be met at those times of day when the waiting restrictions are not operational (assuming the presence of parked vehicles at kerb side).
- b. Where mandatory contra-flow cycle lanes are provided they must be operational at all times (statutes not

permitting anything else). Consequently, where access to kerb-side parking or vehicle crossings is required then the mandatory lane must be broken and that section marked as an advisory route.

3.3 Use of coloured surfaces to lanes

a. Generally, this is only likely to be permitted where cycle lanes on 30mph roads pass side road junctions and an evidenced safety need that could not otherwise be avoided (else addressed via less visually intrusive means) can be demonstrated. Normally this will be via the findings of a Road Safety Audit and subsequent consideration of these in a following Quality Audit.

3.4 Continuation of lanes past/through junctions

3.4.1 Signalised junctions

a. Cycle lanes should not extend through signalised junctions (see note). If designers wish to draw the attention of motorists to the presence of cyclists and provide for lane continuity then introduction of cycle symbol road markings may be considered.

3.4.2 Side road junctions

a. See standard DS.304 about the continuation of contra-flow cycle lanes and advisory routes past side road junctions with priority arrangements.

3.5 Cycle lanes at roundabouts

a. Cycle lanes should not be provided within the circulatory carriageways of roundabouts. If designers wish to draw the attention of motorists to the presence of cyclists then introduction of cycle symbol road markings may be considered (though see note).

NOTE: The needs of cyclists at roundabouts will often best be served by replacing these with another form of junction.



3.6 Feeder lanes to advanced stop lines (ASLs)

a. See standard DS.303 about the introduction and arrangement of ASLs and associated feeder lanes.

3.7 Vertical traffic calming features within cycle lanes

NOTE: See standard DS.111 for general requirements about the design of vertical traffic calming features.

- Raised tables in carriageways should extend across any cycle lane or contraflow advisory route that may be present.
- Where other types of vertical traffic b. calming measure than raised tables are permitted that do not run kerb to kerb (e.g. speed humps or speed cushions) then care must be taken when positioning them to ensure they do not encourage other vehicle users to divert into any cycle lane (see note 1). It is difficult to be specific about recommended arrangements. These will therefore be agreed with approving officers on a case specific basis. However, the appropriateness of the positioning of the cushions or humps in relation to any cycle lanes should be raised as a Point Of Enquiry within the Audit Brief for a Road Safety Audit.

NOTE 1: In general, the introduction of speed cushions and speed humps is to be avoided with use of full width raised tables preferred.

- 3.8 Negotiation of lanes around traffic islands, footway build outs and motor vehicles parked at kerb side within the carriageway
- a. See standard DS.113 about consideration of the needs of cyclists when introducing traffic islands in the centre of the carriageway and standard DS.118 when introducing footway build outs.

NOTE: See also section 3.1 about lane widths when cycle lanes pass traffic islands.

- b. See standard DS.304 about the distance that should be maintained after the start of contra-flow cycle lanes or advisory routes before the users of those facilities are required to negotiate around protrusions at the edge of the carriageway (such as footway build outs or parking bays that are not fully inset into the footway).
- 3.9 Segregation of cycle lanes from other vehicle lanes using raised kerbs or extended splitter islands
- a. See standard DS.113 about the potential use of splitter islands along cycle lanes to provide occasional physical separation from opposing general traffic lanes for very brief distances at points of potential conflict (e.g. junctions).
- b. In instances other than 'a' cycle lanes should not be separated from other vehicle lanes by lengthy kerbs or extended reservations /traffic islands (see note 1).

NOTE 1: Creation of kerb separated cycle lanes is generally discouraged by national guidance owing to the considerable road safety issues that they pose - both for cyclists themselves and other road users. In addition, feasibility is likely to be limited within busy London streets owing to various factors. These include: spatial and engineering constraints; the considerable additional costs of adapting roads to accommodate such facilities (compared to other interventions to assist cyclists); and likely opposition from other street users to proposals (for instance in relation to loss of parking). Given the substantial delivery and live usage risks that follow from this, restricting use to Design Pilots is considered appropriate. This will help ensure that any project permitted to explore the use of such approaches is properly planned and resourced from the outset so as to stand a realistic chance of addressing



the many issues likely to be encountered along the way without significant unforeseen escalation in programme length or costs. It will also help avoid attempted application in circumstances that are clearly unsuited and the loss of resources that follows from this.

NOTE 2: Broadly, proposals for such Design Pilots are most likely to be acceptable on busy Principal Roads where the overall street is very wide streets and where lengthy distances exist all it between junctions and vehicle crossings. In order to justify the significant enhanced expenditure these roads will need to represent a considerable barrier to cycling growth whilst the project will need to be resourced to reflect this. In addition, given the major constraint that kerb separated lanes will pose to future adaptation of the street environment, projects will generally need to be part of (or comprehensive offer) а improvement package that will deliver other objectives at the same time (or at least makes provision for these to be easily added in future). Examples include the addition of street trees, improved footway widths and other improvements that will be dependent on the availability of sufficient cross-sectional width within the street.



Appendix A - Background

1.1 General

- a. Cycle lanes are lanes for cyclists in the carriageway. Normally they are marked out with both upright traffic signs and linear road markings. However, in some circumstances one or both of these may be omitted (a common example being unmarked contra-flow advisory routes along one-way streets). Lanes may be either 'mandatory' (meaning that other road users cannot enter them for the periods stated on associated upright signs) or 'advisory' (meaning other road users shouldn't enter unless it is safe to do so). Sometimes they will be signed in such a way as to be mandatory for certain times of the day (e.g. busy periods) but advisory for others (e.g. quieter times of the day when shops might need loading space).
- b. Members of the public often confuse cycle <u>lanes</u> with cycle <u>tracks</u> which are different from each other. Cycle <u>tracks</u> are ways for cyclists provided off of the carriageway on what would normally be thought of as a footway or footpath. They include cycle tracks that adopt an 'adjacent use' design so that that a clear path is designated on the footway for cyclists (rather than the entire width of the footway being shared between pedestrians and cyclists). You can find further information about cycle tracks in standard DS.203.
- c. National guidance on the design of infrastructure for pedal cyclists¹ encourages designers to take а hierarchical approach when considering how to meet needs. Designers are encouraged to consider first reducing traffic speeds and volumes so that cyclists can share the carriageway with other vehicles without the need for any form of special facility. Designers are advised to consider reallocation carriageway of space to create cycle lanes or the creation of segregated off-road routes

only where reducing traffic speeds and volumes would not be possible or in certain other limited circumstances (like where a large numbers of lorries use a road).

- d. Notwithstanding this. quidance also emphasises that - even where providing cycle lanes or cycle tracks would appear justified - they may not always be appropriate for design and safety reasons. This is especially so in urban streets where road environment can be verv the complicated because of the frequency of side roads, vehicle crossings, parked vehicles and other turning movements. This is supported by research². In relation to cycle lanes, this suggests that lanes encourage riskier overtaking of cyclists by other road users in some circumstances even when cyclists are not using them.
- e. The council as Highway Authority considers that current national guidance on providing for cyclists is well reasoned. For 20mph streets it concludes that other approaches to improve conditions in the carriageway for cyclists should be favoured over the introduction of cycle lanes. This is likely to have much wider benefits than for cyclists alone as it will also help reduce street clutter and so enhance sense of place on streets. As such, the council intends to limit the availability of cycle lanes as a first choice option for designers to contra-flows lanes only. Contra-flow lanes are considered to be important due to their benefit to permeability and ease of journeys. On 30mph streets, the council considers that cycle lanes could be an appropriate response. However, because of the many issues that can be associated with lanes in urban areas it is not considered appropriate to make their introduction across an the board requirement. Rather, 30mph streets should be reviewed for cycle friendliness and the introduction of lanes should be considered amongst a tool box of potential design responses to address issues.

¹ See Department for Transport, (2010a) Local Transport Note 1/10 Cycle infrastructure design;

Department for Transport, (2007) Manual for Streets;

and Department for Transport (2010b) Manual for Streets 2.

² See TRL (2011) TRL report PPR 580 -

Infrastructure and Cyclists Safety. This is a literature review of previous research on the topic.