Chapter 3

Cycle lanes and tracks

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3.1 Types of cycling facility

3.1.1
This chapter considers specific infrastructure for cyclists on links, including what may be necessary for consistency and coherence across the network. Cycle lanes and tracks are an important part of the overall traffic management toolkit. They can help:

- give safety and comfort benefits based on the degree of separation from motor traffic provided and the quality of the cycling surface
- allocate space to cycling
- confirm a recommended route for cyclists
- raise awareness of cycling as a serious mode of transport and thereby encourage more people to cycle

3.1.2
Quality of provision for cyclists on links is covered by the Cycling Level of Service Assessment, as shown in figure 3.1.

Figure 3.1 Key cycle lane and track considerations in CLoS

<table>
<thead>
<tr>
<th>Factor</th>
<th>Indicator</th>
<th>Relates in this chapter to</th>
</tr>
</thead>
<tbody>
<tr>
<td>Safety: Collision risk</td>
<td>Kerbside activity or risk of collision with door</td>
<td>Appropriate provision by street type, width of cycle lanes next to parking/loading and floating parking/loading outside cycle tracks.</td>
</tr>
<tr>
<td></td>
<td>Collision alongside or from behind</td>
<td>Nearside lane widths and avoiding widths in the range 3.2 to 3.9m.</td>
</tr>
<tr>
<td>Safety: Feeling of safety</td>
<td>Separation from heavy traffic; Speed/volume of traffic; HGV interaction</td>
<td>Appropriate provision by street type and according to traffic conditions and composition</td>
</tr>
<tr>
<td>Directness: Journey time</td>
<td>Ability to maintain own speed on links</td>
<td>Type, width and geometry of cycle facility (including ability to overtake)</td>
</tr>
<tr>
<td>Comfort: Effective width without conflict</td>
<td>Allocated riding zone range. Lane allocation in each direction</td>
<td>Accommodating different types of cyclist, understanding effective width, setting lane and track widths.</td>
</tr>
<tr>
<td>Attractiveness: Impact on walking</td>
<td>Highway layout, function and road markings adjusted to minimise impact on pedestrians</td>
<td>Appropriate provision by street type</td>
</tr>
<tr>
<td>Attractiveness: Greening</td>
<td>Green infrastructure or sustainable materials incorporated into design</td>
<td>Appropriate provision by street type, street profiles and function of segregating strips</td>
</tr>
<tr>
<td>Adaptability: Flexibility</td>
<td>Facility can be expanded or layouts adopted within area constraints</td>
<td>Considerations of degree of separation and width in order to accommodate growth over time</td>
</tr>
</tbody>
</table>
3.1.3
Cycle infrastructure must be fit-for-purpose for its users – so, lanes and tracks must be safe, direct, comfortable and attractive, and planned and delivered in a way that is coherent and adaptable. At a more detailed level, good design also depends on a proper understanding of cyclists themselves – how much room they need, how they behave and how diverse they are.

Understanding cyclists

3.1.4
Consideration of cyclists must be properly integrated with other aspects of highway design and transport planning. It should never be an add-on, left until the detailed design stage. It is a specialist area of practice and it is easy to get it wrong, even if it is planned in at the right time. It is important that there should be an emphasis on the experience of cycling: what will it feel like to ride on this street? There is no better way to get a feel for this than riding the route and all those involved in design should do this. The CLoS assessment focuses on this ‘rideability’ aspect of infrastructure.

3.1.5
The intention in London is to provide for all types of cyclist. Assumptions may be made about how much space cyclists need, what can be provided to make them feel safer and how they behave under certain circumstances, but it is important to consider those who do not fit the stereotypes.

3.1.6
Cycle infrastructure should be designed in a way that is inclusive both of larger types of bicycle such as the tandem, tricycle (trike), trailer bicycle and cargo bicycle, and various models used by disabled people such as the handbike. Consideration also needs to be given to the possible use of cycle infrastructure by users of wheelchairs and mobility scooters. It is recommended that the concept of ‘the inclusive bicycle’ is embraced – meaning a recognition that, because of the size of many non-standard types of bicycle and the possible limitations of riders, a more forgiving environment is required. There is no need to design a network capable of carrying thousands of inclusive bicycles at once but it is important that infrastructure is tolerant of non-standard users and does not exclude or disadvantage them.

3.1.7
One of the main things that sets cyclists apart from other road users is that they work on human-generated power. This is significant because characteristics of a street that increase the effort required to cycle might deter people from going that way as part of a route, or may put them off cycling at all. Good design for cycling must
therefore be sensitive to physical conditions that matter less for other users, such as surface quality, surface material, ability to maintain constant speed, gradients, deflections and undulations.

3.1.8

Network and route planning and the detailed design of cycling infrastructure should take account of these factors. Routes that are direct and allow cyclists to maintain their speed are the most appealing as they avoid making cyclists stop or deflect unnecessarily. Local environmental conditions, including built form, are also important factors. Trees, for example, can help diffuse the effects of strong winds.

3.1.9

The typical dimensions of a conventional bicycle are 1800mm long and 650mm wide. For a solo adult cyclist, 750mm is the typical static width but extra width is needed for moving cyclists (see 'Design speed and stability' below). A reasonable assumption is that this amounts to a total width of 1000mm (as stated in LTN 2/08: Cycle Infrastructure Design), although this varies according to speed and type of bicycle. That dimension is often referred to as the 'dynamic envelope' of a cyclist.

3.1.10

People using non-standard types of bicycles should be included through design in all cycle infrastructure. Non-standard bicycles, with indicative dimensions, include:

- Cycles with trailers for children or deliveries (2200-2500mm x 750-850mm)
- Tricycles, including those used by some disabled people (1400-2100mm x 750-850mm)
- Tandems with two or more seats (2100-2500mm x 750mm)
- Recumbent bicycles (1700-2240mm x 750mm)
- Purpose-built cycles for disabled people, such as handbikes (1650-2050mm x 800-860mm)

3.1.11

Key considerations for inclusive design include the following:

- Minimum turning circles for non-standard bicycles are much greater than the dimensions for a standard bicycle shown in LTN2/08 (850mm inner radius, to turn around a fixed object, and 1650mm outer radius, to complete a full turn).
- A tandem needs 2250mm inner radius and 3150mm outer radius.
- Barriers to deter anti-social motorcycling on off-carriageway routes are not encouraged as they can have a major impact on access for wide, non-standard cycles.
- Pedicabs and other similar vehicles can be assumed to use routes designed for motor traffic.
- Lifts to tunnels and bridges, or to allow access to cycle parking areas, should have minimum dimensions of 1.2m by 2.3m, with a door opening of 900mm.
- Vertical deflections such as speed humps should be minimised as cycles with long wheelbases, such as tandems and some recumbent models, are particularly sensitive to the effects of sudden changes in surface level.
- Dropped kerbs should be provided to aid manageable transitions between levels.

Effective width

3.1.12
Effective width refers to the usable width of a cycling facility and depends on how the space is bounded. It is important to make this distinction because the experience of cycling depends more on effective width than actual width. A number of factors reduce effective width, including physical objects, the width of adjacent traffic lane(s), the speed and type of vehicles moving in the adjacent lane, the volume of pedestrians on adjacent footways and the geometry of the cycle lane or track (effective width is reduced on curves and bends).

3.1.13
The minimum clearance between a moving motor vehicle and the outside of the dynamic envelope of a cyclist should ideally be 1.0m where the motor vehicle is travelling at 20mph or less, and 1.4m at 30mph or less. Where traffic is more likely to include buses and other large vehicles, more clearance may be needed, and any measurement should be taken to the furthest side extremity of the vehicle.

3.1.14
When cyclists moving in the same direction and need to overtake each other, or wish to cycle side-by-side, at least 0.5m clearance between dynamic envelopes is required for them to do so comfortably and safely. Based on the dynamic envelope of 1.0m, this would mean that an effective width of 2.5m is required to permit safe overtaking or social cycling. A width of 2m allows these activities with care, preferably at slower speeds. It should be noted that, with a lane or track width of 2.5m, many non-standard cycles cannot overtake or cannot be overtaken without difficulty.

3.1.15
When cyclists are moving in opposing directions, there is an added risk of head-on collisions, and at least 1.0m clearance is recommended. This gives rise to a desirable minimum width requirement of 3.0m for two-way tracks. This would allow

At least 3m width needed for comfortable two-way cycling
Cable Street, Tower Hamlets
overtaking or social cycling only where there is a heavy tidal flow in one direction. Again, this may be inadequate for many non-standard cycles.

3.1.16
Designers should account for ‘wobble room’ when considering effective width, so that cyclists of all abilities feel they have the space to move comfortably. From a standing start, or at speeds of 3mph or less, an extra 800mm should be allowed for and, at speeds above 7mph, an extra 200mm needs to be added (LTN2/08). Where cyclists are climbing steep gradients, they will also need additional width to maintain balance.

3.1.17
Continuous or intermittent physical barriers around pedal or handlebar height reduce effective width. Allowance should be made for this when designing kerbs. Objects with a vertical profile need a wider clearance than rounded or sloping objects, so sign posts and lamp columns reduce effective width by 750mm and walls, railings and bridge parapets by 1000mm. Much depends on the characteristics of the object in question and designers need to assess site specific conditions to take an informed view on the width required. These dimensions are minima and should not be regarded as design targets.

3.1.18
Typical ways of achieving more effective widths for cycling include:

- using low or battered / splayed kerbs rather than kerbs with a vertical or near-vertical profile
- restricting the height of any bounding physical object such as kerb or light segregation – usually this is a balance between making it high enough to deter encroachment by other road users but low enough for it not to be a hazard to cyclists
- wider adjacent general traffic lanes, so that motorised vehicles are less likely to travel close to, or encroach on, a cycle lane
- removal of the centre line on a single carriageway thereby introducing a two-way street with cycle lanes. This encourages motorists to focus on keeping a constant distance from the cycle lane rather than the centre line
- removing or designing out street furniture, including mounting or hanging street lighting, signals and signs from buildings or masts or combining these on fewer poles.
Primary and secondary riding positions

3.1.19
There are two main riding positions that cyclists adopt and are encouraged to adopt by cycle trainers: primary and secondary. The primary position, in the centre of the traffic lane, makes cyclists more visible to other traffic. The secondary position, off-centre and towards the nearside, is used when it is safe and reasonable to allow faster traffic to pass. The recommended secondary position is at least 1m from the kerb or other fixed object on the nearside. Either a dedicated cycle lane on the nearside of the road or a wide nearside lane of at least 4m wide, is required for the secondary position to be appropriate.

Figure 3.2 Primary and secondary riding positions

3.1.20
Designing for the primary position may be appropriate in locations where:

- there are parked vehicles that frequently mean cyclists have to move out into a traffic flow
- there are high left-turning flows from the nearside lane
- there is slow traffic such as in a 20mph speed limit
- cyclists need to change lanes, particularly in slow traffic
- in a nearside turning lane to facilitate cyclists access to the adjacent straight across lane
- the nearside or only lane is less than 3.5m
- approaches to a small or mini-roundabout

3.1.21
Designers need to be aware of these riding positions and design to them, which may enable some good cycling and driving practice to be encouraged and bad practice discouraged. For any cycle lane, it is assumed that cyclists will adopt the secondary position but, in this case, effective width and cycle flows need to be taken into
account, particularly where lanes are advisory or part-time. It is important to consider what position cyclists will need to adopt, particularly as the use of a street environment changes through the day, and to avoid situations where parked cars or other obstructions effectively render cycle lanes useless.

Definitions of cycle infrastructure types

3.1.22
It is important to appreciate the distinction between cycle lanes, tracks and paths. This has implications for signing and, in many cases, enforcement. In this guidance, and in line with the Highways Act (1980), a cycle lane is defined as a part of a carriageway marked with a formal lane marking and allocated for use by cyclists. Mandatory cycle lanes may be reinforced by additional physical protection to deter other vehicles from entering the lane (see section on light segregation below), but they are still lanes.

3.1.23
Formally, a cycle track is a right of way for pedal cycles which can either be part of a public highway adjacent to a carriageway or a separate highway in its own right, with or without a right of way on foot. So, it may be either away from the highway completely, substantially separated from it – by, for example, a verge or planted strip – or simply at a different level from the carriageway. Pedestrians and cyclists may be separated by physical barriers, by level, or by markings only. Section 65(1) of the Highways Act (1980) allows a highway authority to convert a footway into a cycle track by council resolution, and by use of a Section 65 Notice.

3.1.24
Where necessary, to alert different road users to the presence of a cycle track, signing should be to TSRGD diagram 955 with associated diagram 1057 cycle symbol markings. In the interests of more legible, attractive street environments, the preference should be to show that a facility is for cyclists through design and through choice of materials rather than relying on signage.

3.1.25
Kerb-segregated facilities at carriageway level usually alternate between the status of a lane and track, being tracks on links (physically separated and without lane markings) and breaking to become lanes through junctions. For the purposes of classifying cycling facilities in this guidance, it is helpful to regard them functionally as cycle lanes throughout.
3.1.26
Lane markings are not always required to identify space for cycling. Examples include segregated and light segregated types, the status of which as a ‘lane’ or ‘track’ is sometimes unclear.

Variation among facilities: a (mandatory) cycle lane and cycle track away from the carriageway

(Left) cycle tracks that break to become lanes across accesses and side roads and (right) space for cycling delineated by objects – technically, neither a lane nor a track

3.1.27
For clarity, the term ‘path’ is only used in this guidance when referring to shared use paths, covered in section 3.3, and by the Local Transport Note LTN1/12, Shared use routes for pedestrians and cyclists. Nevertheless, there are also complications of definition here. A footpath converted into a shared use path by an order made under section 3 of the Cycle Tracks Act 1984, and the procedures in Cycle Tracks Regulation 1984 (SI 1984/1431), is technically a cycle track with right of way on foot. On conversion, the footpath becomes a highway, maintainable at public expense.

3.1.28
Various categories of Public Rights of Way exist, some of which can be used by cyclists. Public Rights of Way are minor public highways and are described in more detail in the Sustrans Connect 2 and Greenways Design Guide, chapter 15. Cycling
is not permitted on footpaths but is allowed on the other three types of Public Rights of Way:

- bridleways, where cyclists must give way to walkers and horse riders
- restricted byways, which permit horse riders and horse-drawn carriages as well as walkers and pedal cyclists
- byways open to all traffic (BOAT), or simply ‘byways’, where motor vehicles are also allowed

3.1.29

Permissive rights of way also exist in some areas, where landowners (including organisations such as the Canal and Rivers Trust, the Forestry Commission and the National Trust) have agreed with the local authority for certain categories of access to be permitted, usually for a fixed period. This can include access for pedal cyclists.

Categories of cycling provision

3.1.30

Drawing from these definitions, the different categories of cycling provision used in this guidance are set out in figure 3.3 below. This uses the idea of degrees of separation to demonstrate that there is a range of options, not just a choice of whether or not to segregate cyclists. Using street types, a key distinction is made here between providing for cyclists on-carriageway (separated from motorised vehicles) and off-carriageway (separated from pedestrians). Certain street types, generally those with a lower place function, are likely to require a greater degree of separation from motorised vehicles, so that cycling is provided for off-carriageway. For low movement / high place function street types, more integration of users is likely to be appropriate. These ideas are developed further in figure 3.6.

3.1.31

Each type of lanes and track is dealt with separately in this chapter. Off-carriageway and shared options are covered in chapter 5. The distinctions between all types are summarised in figure 3.3. Note that the ‘maximum separation’ option would be to separate users at the network level. This means that, in the process of planning cycling routes, an option that offers the best level of service to cyclists may be to dedicate different routes to them across a wider area and avoid streets where provision may be inadequate. Network planning is covered in section 2.1.
### Figure 3.3 Degrees of separation

<table>
<thead>
<tr>
<th>Category</th>
<th>Cycle facility</th>
<th>Street type</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A. Full separation</strong></td>
<td>Cycle track (off-carriageway)</td>
<td>Off-carriageway cycling next to:</td>
</tr>
<tr>
<td></td>
<td>Separated path</td>
<td>Arterial roads</td>
</tr>
<tr>
<td></td>
<td>Shared use area with ‘suggested route’ for cyclists</td>
<td>Connectors</td>
</tr>
<tr>
<td></td>
<td>Shared use path</td>
<td>High roads</td>
</tr>
<tr>
<td></td>
<td>Shared use area</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fully segregated lane/track</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Stepped track</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Light segregated lane</td>
<td></td>
</tr>
<tr>
<td><strong>B. ‘Dedicated’ cycle lanes</strong></td>
<td>Mandatory cycle lane</td>
<td>On-carriageway cycling:</td>
</tr>
<tr>
<td></td>
<td>Shared bus/cycle lane</td>
<td>Connectors</td>
</tr>
<tr>
<td></td>
<td>Advisory cycle lane</td>
<td>High roads</td>
</tr>
<tr>
<td></td>
<td>Cycle street</td>
<td>City streets</td>
</tr>
<tr>
<td><strong>C. ‘Shared’ lanes</strong></td>
<td>Mixed traffic (optional markings to indicate presence of cyclists)</td>
<td>On-carriageway cycling:</td>
</tr>
<tr>
<td></td>
<td>Shared space</td>
<td>Local streets</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Town squares</td>
</tr>
<tr>
<td></td>
<td></td>
<td>City streets</td>
</tr>
<tr>
<td><strong>D. Integration of users</strong></td>
<td></td>
<td>City places</td>
</tr>
</tbody>
</table>
### Figure 3.4 Degrees of separation from motorised traffic

<table>
<thead>
<tr>
<th>A. Full separation (on links)</th>
<th>Fully segregated lane/track</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Lane segregated by a continuous or near-continuous physical upstand (kerbs and/or segregating islands) along links.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>B. 'Dedicated' cycle lanes</th>
<th>Stepped tracks: Vertically separated cycle tracks at an intermediate level between the footway and main carriageway.</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>C. 'Shared' lanes</th>
<th>Light segregated lane</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A facility separated and protected by intermittently placed objects. These generally includes formal, mandatory lane markings.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>D. Integration</th>
<th>Mandatory cycle lane</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A marked lane for exclusive use of cyclists (with some exceptions) during the advertised hours of operation. It is an offence for other vehicles to enter, unless they are exempted.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Shared bus lane</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Cyclists may use the full width of the bus lane during and beyond its hours of operation. Applies to nearside, with-flow bus lanes, and should extend to contraflow and offside types.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Advisory cycle lane</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>An area intended for, but not legally restricted to, cyclists' use. Other vehicles are permitted to enter or cross it.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Cycle street</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A street where cyclists have assumed priority in a speed restricted area, variously marked with or without formal cycle lanes or indicative areas for cycling. The concept is promoted by DfT in its draft revisions to TSRGD (2014).</td>
</tr>
</tbody>
</table>

|                  |               |
### Figure 3.5 Degrees of separation from pedestrians off-carriageway

<table>
<thead>
<tr>
<th><strong>Cycle track</strong></th>
<th>![Cycle track Image]</th>
</tr>
</thead>
<tbody>
<tr>
<td>An off-carriageway route dedicated to cyclists, which may or may not be next to a pedestrian-only path. Some physical separation (which can include vertical separation) must be present if cyclist and pedestrian routes are next to one another.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Separated path</strong></th>
<th>![Separated path Image]</th>
</tr>
</thead>
<tbody>
<tr>
<td>A path where separate areas for cyclists and pedestrians are clearly indicated.</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Suggested route through shared use area</strong></th>
<th>![Suggested route Image]</th>
</tr>
</thead>
<tbody>
<tr>
<td>A route for cyclists through an area closed to motor traffic but shared with pedestrians. Subtle changes in surface materials and wayfinding allow some indication to pedestrians of where cyclists are likely to move through. These may be in locations with a high place function, but where it is important to assert clearly the right of cyclists to be there.</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Shared use path</strong></th>
<th>![Shared use path Image]</th>
</tr>
</thead>
<tbody>
<tr>
<td>A path either alongside or removed from the carriageway that is shared between cyclists and pedestrians without any form of separation. Examples include canal towpaths, paths through parks and cut-throughs away from the highway.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Shared use area</strong></th>
<th>![Shared use area Image]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area shared between cyclists and pedestrians, usually to allow cyclists to make a turn, cross from one side of the street to another, or make a transition between other types of cycling facility.</td>
<td></td>
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</tbody>
</table>
Chapter 3 – Cycle lanes and tracks

Selecting the right provision for cycling

3.1.32

Whether cyclists should mix with general traffic, have their own dedicated space on-carriageway or be taken off carriageway depends primarily on the functional and aesthetic characteristics of streets as places, on the movements of other modes of traffic and on the role of a given street or route within the network. In all cases the chosen facility should be capable of delivering all the good design outcomes:

- **Safety** – an appropriate degree of separation based largely on the movement function of the street
- **Comfort** – facilities that are fit-for-purpose and appeal to existing and new cyclists
- **Coherence** – consistent, predictable provision, not constantly changing between types
- **Directness** – a choice that promotes direct cycle movement, without unnecessary delay
- **Attractiveness** – facilities that contribute positively to the urban realm and wider neighbourhood
- **Adaptability** – provision for cycling that can be altered to meet changing needs over time

3.1.33

It is recommended that three tests are applied sequentially:
1. What **street type** has been agreed for this location?
2. What range of interventions will provide appropriate levels of service for the place (see figure 3.6) in view of the identified street type?
3. What degree of separation from motor traffic is desirable, based on the movement characteristics of the street/route.

Figure 3.6 Recommended on-carriageway cycle facility provision
3.1.34

These tests replace the speed/volume matrix and graph from 2005 edition of LCDS. Motorised traffic speed and volume remain important, but are considered as part of the movement function of a street. In general, recommended options for cycle facility type within a given street type are more flexible where speed and volume can be calmed but decisions about degrees of separation should not be based on traffic characteristics alone (as these are a product of other attributes of a street). Refer to chapter 5 for methods of civilising streets.

3.1.35

Beyond these key considerations of place and movement are various other, more site-specific issues and constraints that are likely to influence choice of type of provision (summarised in figure 3.7).

**Figure 3.7 Further considerations for choice of cycling facility**

<table>
<thead>
<tr>
<th>Issues/constraints</th>
<th>Implications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Space available: quantity, shape,</td>
<td>A choice about appropriate cycling facility needs to be informed by the possibilities for changing the physical conditions. Consider the potential for:</td>
</tr>
<tr>
<td>how it is bounded</td>
<td>- reconfiguring the space (including opportunities and constraints arising from land ownership or future development)</td>
</tr>
<tr>
<td></td>
<td>- reallocating space between users (see ‘street profiles’ below)</td>
</tr>
<tr>
<td></td>
<td>- overcoming specific physical constraints such pinch points within the scope of the project</td>
</tr>
<tr>
<td>Streetscape character: built and</td>
<td>The sensitivity of street environments to physical interventions needs to be taken into account at a more detailed level than street type. Where there are street trees, the default should be to retain them and find a type of cycling provision that allows for this. Where there are particular requirements about materials and use of signs, road markings and colour (for example in conservation areas), more subtle choices may need to be made (cycle lanes and tracks may not be appropriate) and certain more intrusive elements such as large areas of tactile paving will need to be avoided (therefore generally precluding options involving shared use paths).</td>
</tr>
<tr>
<td>natural environment</td>
<td></td>
</tr>
<tr>
<td>Issues/constraints</td>
<td>Implications</td>
</tr>
<tr>
<td>--------------------------------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Cycle and pedestrian flows and desire lines</td>
<td>Existing and future patterns of use by cyclists and pedestrians should be informed by an understanding of where attractors are and by the function of a street within a wider route or network. Certain facilities (segregated tracks, shared space, cycle streets) are unlikely to be appropriate where pedestrian and cycle desire lines cross, and where there are high flows of both, but could work well where those movements are more likely to be in parallel. Adaptability should also be a key consideration: providing for future growth in cycling.</td>
</tr>
<tr>
<td>Types of land use and frequency of active frontages</td>
<td>Frequent kerbside activity that needs to be retained in its current location, such as loading bays for certain types of delivery, needs to remain accessible and so requires cycling infrastructure to be designed with some flexibility – i.e. not preventing access to the kerbside. In environments with a mix of uses, where pedestrians and vehicles are coming and going from street entrances often during the day, the possibilities for cycling infrastructure are more limited. Reducing traffic speed and volume is likely to be the most appropriate intervention.</td>
</tr>
<tr>
<td>Changes in conditions over time</td>
<td>A choice needs to be made that allows for safe and comfortable cycling at all times of the day and week. Particular care needs to be taken when choosing lanes that operate part-time, such as shared bus lanes, or paths away from the carriageway that may feel unsafe to use after dark.</td>
</tr>
</tbody>
</table>
3.2 Segregated lanes and tracks

3.2.1

Segregated cycle lanes and tracks can provide a high level of service for cyclists on links, offering comfort and subjective safety in particular. Complications arise with the integration of segregated facilities with kerbside activity and at junctions and, for that reason, these types are likely to be most readily applicable to streets with a low place and high movement function, such as arterial roads, connectors and high roads.

3.2.2

Shorter stretches of segregation on these and other street types can help give protection from specific risks, but their use needs to be balanced with the benefits that arise from the coherence and legibility of cycling infrastructure. Bicycles are vehicles and have the same rights to use the highway network as other vehicles (except where specifically prohibited) so any decision to remove them from the carriageway should be based on a clear rationale: there should be identifiable advantage for the cyclist in taking that step.

3.2.3

Where cycle tracks or separated paths are provided away from the highway, personal security issues need to be considered. If the route is intended for use during the hours of darkness, an appropriate level of lighting will be required. In secluded areas, opportunities for increased visibility to and from the cycle facility should be considered.

Fully segregated cycle lanes/tracks

Southwark Bridge  Skinner Street, Islington  Bunhill Row, Islington (contraflow)
3.2.4

Fully segregated lanes and tracks involve the use of features such as kerbs, separating strips, islands, grass verges or lines of planting to create a continuous physical barrier between moving motor vehicles and cyclists on links. The space provides a high degree of separation and, if sufficiently wide, can be designed to provide additional amenity space in the street – for cycle racks and planting, for example.

![Indicative layout 3/01: Segregated cycle tracks with verges and parking bays](image)

3.2.5

Fully segregated lanes are one-way, in the same direction as adjacent general traffic lanes, unless signed otherwise. Contraflow cycle lanes may be of the segregated type, particularly if there is fast-moving one-way traffic and/or a high proportion of larger vehicles on the main carriageway. If a facility is created as a cycle track (under Section 65(1) of the Highways Act (1980) or under section 3 of the Cycle Tracks Act 1984 – see section 3.1 above for explanation), then it is two-way unless made one-way by a Traffic Order.

3.2.6

Provided they are well constructed, with a smooth, preferably asphalt riding surface, and are well maintained, fully segregated lanes/tracks can offer a high degree of comfort. They should be provided with regular breaks, both for drainage purposes and to allow cyclists to exit and enter as required. Even with those breaks, however, they tend to reduce effective width and constrain capacity because they do not allow cyclists to move out and overtake unless they are very wide, preferably at least 2.2m one-way or 4.0m two-way. (See section 3.4 on widths, below, for more detail.)
3.2.7

To maximise the effective width of kerb-separated facilities, the level of the lane/track can be raised above that of the carriageway, reducing the height of the kerb upstand on the cyclists’ side to around 50mm. Use of battered or splayed kerbs, sloping on the cyclists’ side, can also help reduce loss of effective width and lower the risk of cyclists catching a pedal on a high kerb.

3.2.8

The strip or island can contribute positively to the quality of the streetscape. It is important to have clarity about the function and future use of such areas, and to ensure they are distinguished visually from the cycle lane or track and from the carriageway. Making use of them for greening and, potentially, sustainable drainage
could have both aesthetic and air quality benefits. If they are intended for pedestrian use, and they resemble the footway, then this needs to be clear from the outset. This may also indicate the need for crossing points on desire lines over the cycling facility. If, on the other hand, they are not intended for pedestrians, they may need to be designed to look deliberately different from the footway.

Segregating strip used for cycle parking, Utrecht

Planted segregating strip, Utrecht

Planted segregating strip in New York

Planted segregating strip in Southwark

3.2.9

The appropriate width for the segregating strip depends on: the relationship between subjective safety of cyclists and speed and volume of adjacent motorised vehicles; space available; integration with pedestrian facilities; signage requirements; and other uses that might be accommodated in the space. There are no absolute requirements, and it is recommended that a risk assessment on a site-by-site basis should inform those decisions related to safety but, indicatively, widths should be:

- 0.5m or above
- 1.0m or above where speed limit is 40mph or above
- 1.8m or above where a pedestrian refuge is needed
- 2.0-3.0m where the strip accommodates parking or loading bays

3.2.10

Where signal poles or bollards are provided on islands and segregating strips, more than 0.3m is needed, in order to accommodate the object itself and provide safe clearance to moving vehicles. Guidance in Design Manual for Roads and Bridge suggests that 450mm clearance is required on the motor traffic side, and this is good
advice for crossings and junctions. However, there is no such requirement on the cyclists’ side, and so this clearance could be much lower. In some circumstances, the signal could also be cranked to make the best use of space.

3.2.11
Where it is considered necessary to use a bollard at the start of a segregating island or edge strip, a blank-faced bollard should be used rather than ‘keep right’ arrow for general traffic otherwise cyclists legally would be required to pass the lane or track on the outside.

3.2.12
Any decision to use kerb segregation should be based on a realistic assessment of future demand for cycling. Given that it generally involves redesign of street drainage and excavation to build the segregation, this type of facility is expensive and difficult to expand to suit future needs.

Stepped cycle tracks

Stepped cycle track in Copenhagen – small, clear level difference between footway and cycleway

Contraflow cycle track at footway level in London – distinction with cycleway is less clear

3.2.13
Stepped cycle tracks are tracks vertically separated from the footway and main carriageway in order to provide protection, safety and comfort. Although they have many similarities to kerb-segregated lanes, stepped tracks may be regarded as a more subtle intervention. The level change between footway and cycleway can help pedestrians and cyclists understand the function of different spaces.

3.2.14
Given that they present less of a barrier to cross-movement by pedestrians or to loading than kerb-segregated lanes/tracks, stepped tracks are likely to be useful where motor traffic conditions dictate that a high degree of separation for cyclists would be desirable but where streets have higher pedestrian flows, more active
frontages and/or more kerbside activity – for example, the high road street type. They could be applied to Superhighways or, where a shorter stretch of segregation is required on a main road on a longer route, to Quietways.

3.2.15
The model of stepped cycle track described here is the one that has formed the basis for Copenhagen's cycling provision, and has been successfully employed in Brighton and Hove. Although they are very often built up from carriageway space and usually one-way, they are described here as tracks because they are at a different level from the carriageway and are kerb-separated from motorised traffic, so that they are more associated with the footway than the carriageway.

3.2.16
Kerb heights are not fixed but typical provision has level differences of around 50mm between both nearside general traffic lane and the cycle track, and between the cycle track and footway.

Indicative layout 3/02: Stepped tracks at priority junction

3.2.17
Stepped tracks are unlikely to require any lane marking on links. They can be a good solution in sensitive streetscapes where other types of provision may not be acceptable. By using raised entry treatments or even a blended footway/cycle lane
(see section 5.2), they can continue seamlessly across side roads, providing a greater sense of priority for cyclists. However, they need to become on-carriageway lanes through junctions. See section 3.5 on priority of cycling facilities for details.

3.2.18

Stepped tracks can work well when applied consistently and over a long distance, so that they are a recognised part of cycling infrastructure. Isolated stretches of any cycle track tend not to fare so well: cyclists may not choose to use them if they are required to return to carriageway a short way ahead.

3.2.19

The main drawbacks of stepped cycle tracks are the cost and complexity of construction. Material generally needs to be imported into the carriageway space to install them and gullies will often need relocating. If they are created from footways, excavation is involved, and location of lighting columns can be a problem. Stepped tracks can also require more substantial carriageway reconstruction as the crossfall of the road can be affected.

Segregation using car parking

3.2.20

Continuous separation between cycles and motorised vehicles can be achieved through positioning the cycle lane/track between parking or loading bays and the kerb. When compared to marking lanes on the offside of parking, this method requires little additional space, is unlikely to lead to any overall loss of parking and represent a higher level of service for cyclists in terms of safety and comfort. It could be used for any suitably wide street with parking, but is most appropriate for street types that justify higher levels of separation, such as connectors and high roads.

3.2.21

Facilities such as these should be at least 2m wide wherever possible: wide enough to allow one cyclist to overtake another comfortably, bearing in mind the impact of parked cars on effective width. A 1.5m-wide facility may be appropriate on a Quietway or a route with a moderate cycle flow. If possible, cyclists should run opposite to the direction in which the car doors open, thereby reducing the severity
of any collisions with car doors as they are opened. This is likely to be more difficult to achieve with two-way tracks.

Separation using car parking in Seville (left) and Copenhagen (right)

Separation using car parking in Newham (left) and Amsterdam (right)

3.2.22

Particular consideration needs to be given to the transition in and out of a facility such as this. The visibility of cyclists to other road users on the carriageway may well be greatly reduced as they emerge from behind parked cars.

Two-way cycle tracks

3.2.23

Where cycle tracks are part of the highway – parallel to the carriageway – there is a strong case from a consistency and coherence perspective to make cycle tracks on either side of the street that match the direction of travel of motorised vehicles.

3.2.24

However, two-way tracks on one side have practical advantages for some street types – for example, where there are many more side roads and greater levels of kerbside activity on one side than the other. Where cycle flows are tidal (large flows in one direction during the peak periods), they represent a more flexible use of space than constrained one-way tracks because cyclists can move out into the ‘opposing
lane' within the cycle track to overtake. They are likely to require less space than one-way tracks where cycle movements are separated in time and space from those of other vehicles at signal controlled junctions. They can be applicable to street types where a high degree of separation from motorised vehicles is required.

3.2.25

Use of a centre line on two-way tracks and/or cycle symbols to TSRGD diagram 1057 in the direction of travel can remind users that the track is two-way, and will help distinguish it from an adjacent footway. A half-width (50mm) marking has been authorised by the DfT for Cycle Superhighway use and is recommended for general use, with site specific authorisation. See sections 6.4 and 6.7 for more details.

3.2.26

UK and international practice shows that there are circumstances in which two-way tracks on one side can be a choice that offers a high level of service. This suggests that the model of using segregated two-way tracks on one side of a street ought to be applied very selectively. These conditions include:

- streets with buildings and active uses on only one side (a waterside location, for example)
- streets with few side roads on one side
- streets with a particularly high level of kerbside activity on one side, or where kerbside activity may be reconfigured so as to take place entirely on one side
- one-way systems and gyratories – where motor traffic can only turn one way, there may be advantages in providing for cyclists entirely on the opposite side
- major arterial roads such wide dual carriageways with infrequent crossings, where there may be a case to allow two-way movement for cyclists on both sides of the carriageway

3.2.27

Two-way tracks may also be a good, pragmatic choice away from the highway, or in instances where streets are blocked to motorised vehicles. Effectively, they constitute the carriageway where there are no other vehicles moving through and so it makes sense for them to be two-way.

Track through street closed to motor vehicles, Steatham Street, Camden

3.2.28

The main disadvantages of two-way tracks on one side of the street are:

- they can be an unintuitive arrangement, particularly for pedestrians who do not expect to have to look both ways for cyclists when crossing the first part of the road
- for similar reasons, there is a higher risk of collision with motor vehicles at priority junctions, especially for cyclists travelling the ‘wrong’ way (generally they can lead to confusion about priorities where tracks cross side roads)
- transitional arrangements with one-way provision at the beginning and end of a two-way track can be difficult to design without using some form of signal control, which may add to delay and journey time for cyclists
- connectivity for cyclists to and from the track is more difficult to manage than for one-way provision – one solution is to design in waiting spaces for cyclists seeking to enter or leave the track.

3.2.29

In each case, an appropriate balance needs to be struck between safety and cycle priority, with additional signage or vehicle slowing measures provided as necessary. On one hand, a cyclist riding in the opposing direction from all other traffic will normally have good intervisibility with the driver of a motorised vehicle about to turn left into a side road. However, a driver about to turn left from a side road into the main dual carriageway will not be expecting a cyclist approaching from the left unless there is clear signing that this may happen.
Two-way facilities can lead to awkward transitions when joining with one-way provision (left). Consideration needs to be avoided pinch-points at bends where effective width is squeezed (right).

### 3.2.30

Since two-way tracks can be unintuitive for pedestrians, there may be advantages in having the track at carriageway level to differentiate it from the footway. This is often the case where tracks are created from the carriageway. However, this can make tracks more visually intrusive in the street environment and it makes them more difficult for pedestrians to cross.

Difficulties in highlighting to all road users that a two-way cycle track is crossing a side road – Tavistock Place, Camden (left) and CS3, Cable Street (right). There is no standardised combination of road marking for this, so efforts are made on a site-by-site basis to demonstrate the intended priority.

### 3.2.31

Tracks at footway level may integrate better with the street, but they are also likely to invite more pedestrian/cyclist interaction with some users unsure of where they are supposed to be or unaware of the distinction between areas. Two-way tracks at intermediate level (similar to stepped tracks, but with a full-height kerb upstand between track and carriageway) can be a good compromise.
3.2.32

International practice also shows occasional use of two-way cycle lanes/tracks in the centre of the carriageway, often using light segregation to separate from adjacent general traffic lanes and heavier forms of segregation at points of potential conflict. Cyclists in both directions have space to overtake yet remain in an expected position in the carriageway, and there is no interaction with kerbside activity to manage so it may be a treatment suitable for bus and cycle priority routes. However, central tracks are likely to need certain vehicle movements to be banned and more complex signalisation than would otherwise be required.

Central two-way cycle track, Cours des 50 Otages, Nantes (with bus-only lanes on either side)
Geometry of cycle tracks

3.2.33

Basic parameters for cycle track or path design are as follows:

- apply a cyclist design speed of at least 15mph on tracks and a maximum of 10mph on shared footways
- avoid instantaneous changes of direction
- use a minimum radius of 14m on links
- use a minimum external radius of 4m at intersections where the cyclist may not need to stop
- consider local widening and super-elevation (banking) on bends, particularly where cycle speeds are likely to be high
- ensure that, where a track or path is two-way, the centre line takes a natural line that cyclists can comfortably follow.

3.2.34

Visibility splays at junctions should generally be provided in accordance with Manual for Streets are summarised in figure 3.9. The 15mph speed has been included in as an appropriate speed for cycle tracks.

Figure 3.9 Visibility splay and sight lines at junction

<table>
<thead>
<tr>
<th>Speed</th>
<th>30mph</th>
<th>20mph</th>
<th>15mph</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y</td>
<td>40m</td>
<td>22m</td>
<td>15m</td>
</tr>
</tbody>
</table>

Notes:
1. Motorist’s eye level 1.05m minimum
2. Cyclist’s eye level age/height dependent but assume 1.00m minimum

3.2.35

The Y-distance (measured along the main route) depends on vehicle (85th percentile) speeds on the road. For urban situations, the Manual for Streets distances, shown in figure 3.9, should be used rather figures than DMRB. These are based on a Stopping Sight Distance (SSD) for which a formula has been developed.
3.2.36

The normal set-backs for general (motor) traffic on roads are 9m preferred, 4.5m normal minimum, 2.4m minimum, and lesser distances in exceptional circumstances. If sight distances are too long then vehicles may approach junctions at inappropriate speeds as they can effectively see a clear exit. Drivers may not notice the presence of cyclists if they are driving at inappropriate speeds and so care is required when considering sight lines. It is therefore recommended not to exceed the preferred distance in urban environments.

3.2.37

Note that different guidance applies where cyclists are separated from motor traffic – see section 3.5 below, which gives details about set-back of segregation from the mouth of a priority junction.

Transition between cycle lanes and cycle tracks

3.2.38

Occasionally it will be necessary to provide a transition from on-carriageway cycle lanes to off-carriageway cycle tracks and vice versa. This transition should be clear, smooth, safe and comfortable for cyclists. Minimum speed change and vertical and/or horizontal deviation for cyclists should be the objective.

3.2.39

It is particularly important not to have a vertical step change in level along a line running along the general direction of travel. This can happen if cyclists are directed to cross at a shallow angle over a dropped kerb that has not been laid properly. Such situations can de-stabilise cyclists’ steering.

Transitions between on- and off-carriageway cycling: Rye Lane, Peckham (left) and Stockholm (right)
3.2.40

Road markings from TSRGD used at transitions may include the diagram 1003 ‘double-dashed’ or diagram 1023 triangular give way markings. These are only appropriate where the cycle track is required to give way to the route it is joining. Preferably a cycle track should make a transition into a lane without having to cede priority.

Cyclist slowing measures

3.2.41

Where, for safety reasons, it is desirable for cyclists to slow down in lanes or tracks, it is better to give the required messages through design such as visual narrowing or changes in surface texture, rather than additional standard signing or physical calming features. Locations where some intervention may be required include:

- Blind bends
- Steep gradients
- Subways and pedestrian/cycle bridges
- Areas of high or specific pedestrian activity including shop entrances
- Approaches to road junctions
- Direct approach to rivers or canals

3.2.42

Over a very short distance, rougher surface texture, with aggregate size of about 20mm can be used for a slowing effect. Rows of granite setts are another option. Care needs to be taken to ensure that the surfaces are safe for cycling, so setts should be reasonably flush and not polished. Rough surfaces should only be used at conflict points as otherwise they can require too much physical effort on the part of cyclists and so reduce the attractiveness of the route.

Use of granite setts to slow cyclists through parks and, right, at a courtesy pedestrian crossing
3.2.43
Where some deflection is desirable, horizontal is preferable to vertical, which can be uncomfortable for both pedestrians and cyclists. Bends and curves, or the breaking-up of straight sections into sweeping curves, can be introduced as horizontal deflections, possibly with the addition of planting or street furniture. Staggered barriers should only be used selectively – in situations where there is a clear safety reason for requiring slowing such as bridges and subway ramps. The speed of cyclists can be tuned by the stagger between barriers with a 2-3m stagger for walking speeds and 5m in a less restrictive situation. Barriers are unlikely to be suitable where there are high levels of cycling.

3.2.44
Vertical methods of slowing cyclists include raised rib markings or road humps or ramps 50-75mm high, preferably with sinusoidal profiles, and with lengths of about 2m.
3.3 Cycle lanes

3.3.1 Provision of cycle lanes helps to:
- facilitate cycling in the carriageway and simplify movements through junctions
- visibly allocate space for cycling and demonstrate investment in cycling as a serious transport mode
- legitimise undertaking slow moving or stationary traffic
- support motor traffic speed reduction by visually narrowing the street

3.3.2 This guidance makes a distinction between dedicated and shared cycle lanes. Dedicated lanes, which include mandatory cycle lanes and light segregated lanes, are kept clear of other vehicles and are available for cycling 24 hours a day. Shared lanes, including bus/cycle lanes and advisory cycle lanes, are more flexible, allowing for general use or occasional entry by other vehicles, and often not operating all of the time.

There can be good, site-specific reasons for using shared lanes, covered in detail below, but in general new cycle lanes should be mandatory lanes, properly enforced and well maintained in order to provide a high level of service for cyclists.

3.3.3 As figure 3.6 shows, dedicated cycle lanes are usually appropriate for street types that have a reasonably high movement function, but where speeds are not excessive, such as high roads, connectors and city hubs.

3.3.4 Shared lanes may be more applicable to locations with lower traffic flows and/or high levels of kerbside activity – appropriate street types include local streets and high streets. They should not generally be used for streets with volumes above 500 motor vehicles per peak hour without a 20mph limit. Bus/cycle lanes can give an acceptable level of service on busier streets such as high roads and city hubs, and may be used on Superhighway routes but are not generally appropriate for Quietways.
Mandatory cycle lanes

3.3.5

Mandatory cycle lanes, with a solid lane marking, are spaces on carriageway dedicated to cyclists within the signed hours of operation (if this is limited). International best practice shows that dedicated, wide, properly enforced on-carriageway lanes such as these are a valuable option for cycling networks.

![Mandatory cycle lane – CS8, Millbank](image1) ![Contraflow mandatory cycle lane – Long Acre](image2)

3.3.6

Creating enforceable space for cycling on-carriageway can also be a step towards securing more separated space, particularly if funds and/or political support are not immediately available for more radical change in one phase. There are several examples in New York of this staged approach to delivering cycling infrastructure.

![New York: lanes can be a precursor to different forms of separation, such as stepped tracks](image3)

3.3.7

Traffic Regulation Orders are currently needed to create mandatory cycle lanes, although it is proposed in the draft revised TSRGD that this requirement will be removed from 2015, making mandatory lanes easier to implement. If the formal TRO process is not undertaken, there should still be consultation with stakeholders. These lanes are thereby enforceable by the police for violation of moving offences and by civil enforcement officers for waiting regulations. It is usually illegal for any motor traffic to enter them, except taxis, which are normally allowed to stop within cycle lanes to drop-off and pick-up passengers.
3.3.8
Mandatory lanes have 150mm-wide TSRGD diagram 1049 lane markings, and the associated ‘with-flow cycle lane’ sign (diagram 959.1), which can be omitted in 20mph areas. The use of the ‘with-flow cycle lane ahead’ sign (diagram 958.1) is not necessary. Lanes must start with a diagonal broken line to diagram 1009, with a recommended 1:10 taper, although this is not required at intermediate breaks such as bus stops. It may be appropriate to place these diagonal markings after side-road junctions, where cycle lanes are wider than 1.5m, to ensure that the lanes are clearly visible and enforceable.

3.3.9
Where cycle lanes are at least 2m wide, site-specific or authority-wide authorisation can be sought for 250mm-wide mandatory cycle lane markings in order to reinforce the separation from general traffic lanes. This width of marking does not yet appear in the consultation draft of TSRGD (2015).

3.3.10
Mandatory cycle lanes can be given extra protection to discourage motorised vehicles from entering. One method is light segregation – see below. Another is to create a buffer between the general traffic lane and the cycle lane by using two parallel sets of lane markings, separated by TSRGD diagram 1041.1 ‘chevron’ markings. Intermittent islands can be used to add extra protection and assist pedestrian crossing. In this arrangement, one lane marking should be to diagram 1004 (dashed, advisory) and one to diagram 1049 (solid, mandatory). Whether the solid lane is on the cyclists’ or the motorists’ side depends on the extent to which either road user might be invited to enter the buffer zone.

3.3.11
Mandatory cycle lanes may be continued through priority and signal-controlled junctions using a dashed diagram 1010 (or ‘variant 1010’) marking – see section 3.5 for details. As set out in the Traffic Signs Manual (chapter 5, para 16.5), they can be continuous across certain accesses where a TRO defines the exemption. This is typically done where crossing is unlikely to be frequent, such as access to private

Cycle lane with buffer and intermittent island protection – Baylis Road, Lambeth
residential properties. For other accesses, such as the entry to petrol stations, it is usually recommended to break mandatory cycle lanes to raise awareness of motorised vehicles entering.

3.3.12

On a site-by-site basis, a judgement by the designer is required based on a risk assessment and recognising that breaking a mandatory lane provides a visual message to both cyclists and motorists as to the presence of a hazard. In indicative layout 3/03, the narrowing of the general traffic lane caused by the pedestrian refuge island means there is a case for making the cycle lane advisory at this point to alert all users to the likelihood of other vehicles partly entering the cycle lane. In each case, the benefits of the continuous lane (for example, clear demonstration of priority for cyclists and discouraging encroachment by vehicles in the adjacent traffic lane) need to be weighted up against the disadvantages of allowing more regular crossing by motorised vehicles.
Light segregation

3.3.13

Light segregation is a term given to the use of physical objects intermittently placed along the inside of a cycle lane marking to give a higher degree of separation and protection to cyclists over motorised traffic. In effect, light segregated lanes are a variant of mandatory cycle lanes. Consideration could be given to their use where a mandatory cycle lane may be appropriate but greater subjective safety for cyclists is desired – for example, on a connector or high road. There is little established practice in on light segregation but current on-street trials around the UK will help in ascertaining the benefits and risks of different products and types.

Light segregation with wands in Minneapolis

Use of concrete ‘lacasitas’ in Seville

3.3.14

Light segregation has many benefits over full segregation in that it is easier to install, usually costs less, is more adaptable and does not create barriers to pedestrian crossing movements. Generally, it will not require excavation, physical adjustments to the structure of the carriageway or repositioning of drainage or utility covers. It should not constrain cyclists in the same way as full segregation, although this depends on the objects used and how they are spaced. In order to maintain an acceptable level of protection, spaces between objects should be no less than 2.5m and no greater than 10m on links. Tighter spacing can be considered on bends and junction approaches.

Trialling layouts using light segregation in New York: ‘light’ reallocation of space can help to make the case for more substantial re-engineering of the carriageway in time
3.3.15
Given the low costs of installing most types of light segregation and the relative with which it can be adjusted or removed, it can be suitable for trialling temporary measures to reallocate carriageway space. Just as mandatory lanes may be a step towards other, more substantial forms of separation, so light segregation could be an interim stage to a more permanent form of segregation.

3.3.16
Light segregation should not be used where general traffic is expected to straddle it. This will diminish the desired effect of providing a clear delineation between general traffic and cyclists. In streets with a 20mph limit, many different objects are used for traffic calming, streetscape improvement and local amenity, so there is more flexibility in the type and purpose of light segregation than on streets with a 30mph or more limit. Any objects used in the carriageway may be struck at higher speed and the potential implications of the destabilising effects of such objects on cycle and motorcycles moving at speed must be taken into account.
3.3.17
Types of light segregation that may be considered include:

- Pre-formed objects made out of rubber, recycled plastic or concrete, including small humped separators variously known as 'armadillos', 'zebras' and 'hedgehogs'. These are placed inside (not on top of) mandatory cycle lane markings, and are easy to install and cheap to replace.
- Knock-down poles or wands, which provide a strong visual indicator of separation of space, and even come with illuminated tops. However, they can look temporary and diminish the attractiveness of a street.
- Planters, narrow versions of which are available and can help to delineate cycle routes. They do present a risk of causing an obstruction at a turning point. Installing them also has maintenance implications.

Whatever object is used for light segregation, it should not resemble an existing road marking or obstruct a road marking in a way that might make it unidentifiable.

3.3.18
Interim results from off-street trials show that, in comparison to lane markings only, users felt safer when light segregation was placed next to the marking. Cyclists stay further from lower objects, such as armadillos and zebras, but are more comfortable riding nearer to moving motor vehicles where they are separated by high objects such as wands. This is an important consideration for the effective width of the cycle lane, and the potential for overtaking within the lane.

3.3.19
Where lower types of light segregation are used, consideration may be given to providing a more visible object – such as a wand, planter or island – at the beginning of a run. This should keep vehicles out of the cycle lane until the point where they need to turn and send a clearer message that a transition is taking place at that point. For streets with a speed limit of 30mph or more, this treatment is recommended.
3.3.20

Although this has yet to be tested fully, it is reasonable to assume that advice in section 3.5 below on how to begin and end kerb segregation (including how far ahead of a priority junction should it be ended) might also apply to light segregation.

![Diag 1062 (optional)](image)

Indicative layout 3/05: Light segregation at priority junction on 30mph street

3.3.21

Access to the kerbside will often need to be maintained to allow for drainage, road sweeping and general maintenance. Where wider lanes are provided, emergency vehicles should also gain kerbside access if required.

3.3.22

Light segregation can be provided without road markings where there is no ambiguity for road users about the route for cyclists. This can work very well in 20mph areas, since there is less emphasis on communicating important messages to fast moving motorised traffic that have to be processed quickly. However, the areas set aside for cyclists cannot legally be enforced for cyclists' use. Good will between road users is required to ensure they are used as intended. For this reason, parking and loading restrictions are very often important to keep the 'lanes' clear of motorised vehicles.
Advisory cycle lanes

3.3.22

Advisory cycle lanes indicate an area of the carriageway that is intended for the use of cyclists and should indicate a recommended (but never required) line of travel for cyclists. They instruct other vehicles not to enter unless it is safe to do so. They are indicated by broken white line (diagram 1004) and associated sign (diagram 967). To minimise street clutter, the sign should only be used in locations where interpretation of the road markings is not otherwise clear; it is unlikely to be necessary in areas with a 20mph limit.

Indicative layout 3/06: Advisory cycle lanes at priority junction

3.3.23

Advisory lanes are a practical option where flexibility is required, often where motor vehicles frequently need to enter or cross the lane in places where there is a high degree of kerbside activity such as high streets or city hubs. Unless that requirement for exists, mandatory cycle lanes should be the default provision. Advisory lanes used in this way, on street types with a medium-to-high movement function are unlikely to be suitable for Quietways. However, advisory lanes may be useful on some quieter local streets where some sharing of limited space at low speed may be acceptable and preferably some parking controls are in place or parking provided in marked bays. This treatment could work for Quietways, offering good continuity for a route, provided the level of motor vehicle activity is very low. In these instances, a cycle streets approach may be preferable (see below).
Advisory lanes used for a visible cycling facility where carriageway width is limited

Advisory lanes used where kerbside activity is high; lanes are marked outside parking bays

Indicative layout 3/07: Advisory lane markings past splitter island at side road

3.3.24

Advisory cycle lanes can be used next to narrow general traffic lanes where it is inevitable that some encroachment will occur – for example, 2.5 to 3m lanes that some larger vehicles may need to straddle, particularly on bends. As this suggests, there is a significant risk that they may offer a compromised level of service for cyclists, relative to other types of cycle lane.
3.3.25
A major drawback of advisory cycle lanes between junctions is that at times of day when parking and loading are permitted, the lane becomes unusable as cyclists have to pull out round parked vehicles. Time-limited mandatory lanes are often preferable to advisory lanes, for this reason.

Indicative layout 3/08: Advisory cycle lanes and diagram 1057 markings around parking bays
Top shows cycle lane continued past parking; bottom shows continuity through cycle symbols only

3.3.26
To deal with kerbside activity, the preference for a cycle route would be to relocate parking and loading wherever possible, or to ‘float’ parking and loading on the offside of the cycling facility. The next-best alternative is inset parking and loading bays (see section 5.5). A further option is to mark an advisory cycle lane around the parking, with a buffer zone of at least 0.5m, or use TSRGD diagram 1057 cycle symbols.

3.3.27
Advisory cycle lanes may be continued through priority and signal-controlled junctions using a dashed diagram 1010 (or ‘variant 1010’) marking – see section 3.5 for details.

Cycle streets
3.3.28
Using advisory cycle lanes and removing the centre line in narrow carriageways on quiet local streets can be a good way of flexibly providing a cycling facility and a high level of service for cyclists. This is a treatment that could be suitable for Quietways.
3.3.29

A cycle street treatment may be appropriate for a street:

- that cyclists already use in large numbers
- where motor traffic volumes and speeds are already very low
- where it is possible to use traffic management across the wider area to bring down speed and volume of motor vehicles, or
- where the street is access-only for motor vehicles.

As a rule of thumb, according to Dutch guidance, cycle streets should have (or have the potential for) flows of at least 1,000 cyclists a day. Cyclists should generally outnumber other vehicles by 2 to 1 during peak hours.

3.3.30

Using UK road markings in this way, together with other features to reduce motor traffic speed and volume (see chapter 5), is a method of approximating the ‘cycle streets’ approach used in several countries, including the Netherlands and Germany. In a cycle street, motor vehicles have access and there is a conventional footway, but the carriageway is dominated by cyclists in a manner indicated by the design of the street.

Example cycle street types in Utrecht, with standard ‘cars are guests’ signage
Dutch guidance (CROW, *Design manual for bicycle traffic in The Netherlands*, 2006) shows three types of cycle street, which have in common narrow carriageways, low speeds and low motorised traffic volumes, but which differ in several key characteristics:

- Cycle street with mixed traffic (above, top left and bottom left). These tend to have few road markings and, throughout the whole carriageway, have the same coloured surfacing as cycle tracks or a distinctive surfacing that marks them out from a conventional carriageway.

- Cycle street with cyclists in the middle (above, top right). Cyclists ride on the central, often coloured lane. Border strips, often in black or grey, allow for cars to move through. The central strip should be no more than 3m wide, with around 0.75m for the border strips.

- Cycle street with cyclists at the side. Cyclists ride on wide advisory cycle lanes (recommended 2m wide) either side of a single, narrow general traffic lane, without centre line (no more than 3.5m on a two-way street). Motorists can only pass a cyclist if there are no oncoming cyclists by straddling into the opposing cycle lane.

The last of these is likely to be the most achievable in the UK as an extension of existing practice, created by removing the centre line and introducing wide advisory cycle lanes, either side of a narrow general traffic lane. However, the consultation draft of the revised traffic signs regulations, TSRGD (2014) proposes a formal cycle street designation for the UK in which a speed limit of 15mph would apply and where motorised vehicles would not be permitted to overtake.

Cycle streets in the UK? Benwell Street, Islington (left) and Loughborough Road, Lambeth (right)
Indicative layout 3/09: Street with advisory cycle lanes and centre line removed

Indicative layout 3/10: Cycle street concept

3.3.33 Consideration of cycle streets in 20mph zones may be a practical first step to introducing and refining the concept. In this case, the base plate below the 20mph sign may be adapted to convey a message about the special status of the street, such as a safety campaign logo.

3.3.34 For coherence, cyclists should have priority at any junction with the cycle street itself, and the difference in street environment should be visible and obvious from any side street. Parking and loading should be incorporated in bays rather than freely allowed. Kerbside activity needs to be carefully considered as the design is developed, taking account of use throughout the day.
Shared bus/cycle lanes

3.3.35

Bus lanes provide a high level of continuity and priority – benefits that can easily be transferred to cycling – and they represent an existing means of controlling kerbside activity. Combined bus and cycle lanes are therefore a useful tool in the provision of facilities for cyclists, particularly on street types with a medium to high movement function, such as high roads and connectors.

3.3.36

Designers of bus schemes should consider the needs of cyclists, and include provision for them unless there are exceptional reasons not to do so. Provision for cyclists can add to the justification and business case for the scheme. Bus lanes should be available for cycle use for their full hours of operation (as well as outside those hours). Where there is clear demand for cycling on a bus route, operation hours should be considered for extended times.

3.3.37

The TSRGD diagram 1057 cycle symbol is not permitted within bus lanes, although can be used as part of a ‘Bus and Cycle Lane’ marking in contraflow lanes.

3.3.38

To highlight a Superhighway route, the default treatment option in bus lanes is the use of the project symbol as a route continuity indicator within the lane. This has been authorised by DfT for the Cycle Superhighways only, but needs agreement with the relevant highway authority. The only caveat is that it does not interfere with or form any part of the usual bus lane-specific markings.
3.3.39

Parking and loading is often permitted outside of the operational hours of a bus lane. In such instances, it is preferable if the lane is at least 4.0m wide and if marked bays are provided, to encourage parking closer to the kerb – that way the lane remains usable for cycling. Alternatively, parking and loading could be provided in inset bays, in adjacent side roads or permitted in the bus lane in one direction only during peak times (i.e. the direction opposite the main tidal flow).

Mandatory cycle lane inside bus lane – Blackfriars Bridge (left), Waterloo Bridge (right)

Indicative layout 3/11: Mandatory cycle lane within bus lane
3.3.40

For bus lanes of 4.5m or above, a mandatory cycle lane of at least 1.5m width may be included on the nearside. Since such a lane will be interrupted by bus stops and side roads, there is only likely to be benefit in providing one over a substantial distance or where it would provide a fit-for-purpose cycle facility outside the operational hours. The advantage it will confer, and the level of subjective safety it may offer, will also tend to diminish with higher flows of cyclists.

3.3.41

Bicycles should be allowed in contraflow bus lanes wherever possible, and sufficient room provided to enable cyclists to overtake comfortably at bus stops. Lane widths less than 4.0m should therefore be avoided. When bicycles are not permitted in contraflow bus lanes, the managing highway authority must take on responsibility for the safety and other issues relating to alternative routes that cyclists must use.

3.3.42

Bus gates and other bus priority signals should be carefully designed to ensure that appropriate priority benefits are also given to cyclists. A push-button for cyclists or reliable cycle detection at signals should be provided where a long wait time for cyclists would result if signals were only linked to bus detection. Joint bus and cycle gates can provide bus priority and advanced release for cyclists and so should be considered for these multiple benefits. In some cases, where space allows, a cycle by-pass to bus priority signals may be desirable and, where feasible, this should be provided.

Two-way cycling in one-way streets

3.3.43

Cycle lanes to enable two-way cycling in one-way streets are an established measure, described in TAL 6/98, Contraflow Cycling. Mandatory cycle lanes are the most common way of providing for this where there are moderate and high traffic flows or speeds. They should be at least 1.5m (preferably 2.0m) wide, delineated by the solid line diagram 1049 marking and with diagram 960.1 contraflow cycle lane sign. Particular attention should be given to the design of entry and exit points, side roads, accesses and parking bays to ensure that all road users have adequate warning of priority and each others’ movements. Physical separation by traffic islands can be provided as necessary – there is generally a greater need for segregation at the exit point.
3.3.44

The arrangement and placement of cycle symbols, arrows and protection should effectively 'speak for itself' in slow moving environments without the need for additional vertical signage. A flexible, minimal approach to signage should, in particular, be applied to areas with 20mph limits.

Advisory contraflow cycle lane – Paul Street, Hackney

Contraflow with island separators, and showing the diagram 960.1 sign

3.3.44

Where motor traffic speeds and flows are low then an advisory lane marking may be used. The effective carriageway width may be as little as 4m for an advisory lane to work.

Indicative layout 3/12: a) Mandatory (left) and b) advisory (right) contraflow cycle lanes
3.3.45

A further option for contraflow is to omit lane markings altogether, or provide two TSRGD diagram 1004 advisory lane markings on entrance and exit. This was made possible by amendments to TSRGD in 2011 and the creation of a new sign, diagram 960.2, to signify this arrangement. Diagram 1057 cycle symbols with optional arrows may be used to add clarity to the layout.

3.3.46

The standard signing arrangement at the entrance should be a ‘no entry’ sign (TSRGD diagram 616) with ‘except cyclists’ plate underneath. Where additional protection is required due to tracking movements of larger vehicles then a protective island can be introduced with a sign to diagram 955 (route for use by pedal cycles only) on a bollard.
Chapter 3 – Cycle lanes and tracks

3.4 Recommended widths

3.4.1

Advice on widths in the section should not be read as fixed dimensions, but as a guide to help in ensuring that a cycling facility is fit for purpose. Site-specific factors, traffic conditions and anticipated levels of cycling will tend to dictate what is necessary. The 'minimum' width in each case should be seen as the lower limit for a single cyclist to ride in safety and comfort. The 'recommended' width is designed to be more flexible and allow for substantial growth in cycling.

Widths of cycling facilities

3.4.2

Figure 3.10 summarises the minimum and recommended absolute widths, which are described in more detail below. In all cases, consideration should be given to the impact of site-specific conditions on effective width, as described above, and the need to accommodate higher cycle flows over time.

Figure 3.10 Summary of guidance on widths

<table>
<thead>
<tr>
<th></th>
<th>Absolute minimum</th>
<th>Preferred minimum</th>
</tr>
</thead>
<tbody>
<tr>
<td>cycle lanes (inc contraflow lanes) **</td>
<td>1.5m</td>
<td>2.0m</td>
</tr>
<tr>
<td>lead-in lanes to ASLs (see section 4.3)</td>
<td>1.2m</td>
<td>2.0m</td>
</tr>
<tr>
<td>bus/cycle lanes *</td>
<td>4.0m</td>
<td>4.5m</td>
</tr>
<tr>
<td>1-way cycle track ** (including segregated lanes)</td>
<td>1.5m (low flow)</td>
<td>2.2m (medium flow)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2.5m+ (high flow)</td>
</tr>
<tr>
<td>2-way cycle track **</td>
<td>2.0m (low flow)</td>
<td>3.0m (medium flow)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4.0m+ (high flow)</td>
</tr>
<tr>
<td>shared use – separated (two-way)</td>
<td>1.5m each for cyclists and pedestrians (low flow)</td>
<td>3.0m each for cyclists and pedestrians (high flow)</td>
</tr>
<tr>
<td>shared use – fully shared (two-way)</td>
<td></td>
<td>2.0m (low flow)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3.0m (medium flow)</td>
</tr>
</tbody>
</table>
* A ‘narrow bus lane’ of 3.0m to 3.2m is possible where space does not allow for a lane wider than 4m (except for contraflow and offside bus lanes – see below for more detail). 3.2m to 3.9m should be avoided as it generates situations where unacceptable risks may be taken.

** More width is needed for cycling facilities where separate cycle movements are taking place, particularly at signals. Consideration needs to be given to space for waiting.

Figure 3.11 Flow categories for cyclists

<table>
<thead>
<tr>
<th></th>
<th>Peak hour</th>
<th>6am – 8pm</th>
<th>24-hour</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>&lt;200</td>
<td>&lt;1,000</td>
<td>&lt;1,600</td>
</tr>
<tr>
<td>Medium</td>
<td>200-800</td>
<td>1,000-4,000</td>
<td>1,600-5,500</td>
</tr>
<tr>
<td>High</td>
<td>800+</td>
<td>4,000+</td>
<td>5,500+</td>
</tr>
</tbody>
</table>

3.4.3

Note that the above minimum dimensions are based on the width of standard bicycles. In order to allow comfortable use by those using trailers and cycles/tricycles used by disabled people, lanes and tracks should normally be 2m wide one-way, but wider where space permits.

3.4.4

On streets that are frequently congested, a narrower lane may be useful to allow cyclists to pass slow or stationary motor vehicles on the approach to junctions. A 1.5m-wide lane may be acceptable in these situations. See ‘traffic lane widths’ below for more details.

3.4.5

The value given for shared bus lanes allows cyclists space to pass a stopped bus safely and comfortably within the shared lane or for a bus to pass a cyclist with maximum clearance. Widths between 3.2m and 3.9m are generally to be avoided because they create uncertainty about whether enough space is available to overtake but generally do not allow enough space for overtaking. Given that wider bus types are being developed, the preference from a cycling perspective is for shared bus lanes to be 4.5m wide or more wherever possible.
3.4.6

Narrow bus lanes of 3.0-3.2m, where overtaking is clearly not possible, may also be used where bus frequency and cycle flows are both low (up to 20 buses/hour or 100 buses+taxis/hour). Narrow bus lanes should be avoided where there is a significant uphill gradient or where there are high levels of infringement by unauthorised vehicles.

3.4.7

Where bus lanes are on the offside of other lanes or running in contraflow, they ought not to be of the narrow type if cyclists are also permitted to use them – a risk assessment should take place on a site-by-site basis to inform any decision about narrow shared bus lanes of this kind.

3.4.8

Where a bus lane is at least 4.5m wide, it may have a 1.5- to 2m-wide cycle lane marked within it. This could have benefits for cyclists where there are long gaps between bus stops, where a lane becomes a track as a bus stop bypass and/or where the bus lane is time-limited.

3.4.9

For contra-flow bus lanes, widths of 4.5m are desirable where possible but widths down to 3.0m are often adequate, except possibly on longer uphill sections (greater than around 500m).

Traffic lane widths

3.4.10

The introduction of a cycle lane will not necessarily require removal of an existing general traffic lane or result in a negative effect on the overall capacity of a link. In many situations, reducing the width of general traffic lanes can create the space required for a cycle lane, although some caution should be applied where there are high numbers of buses and HGVs. *Manual for Streets 2* (2010) states that narrower lanes are easier for pedestrians to cross and can encourage lower traffic speeds without causing a significant loss of traffic capacity. (p53, para 8.6.2)
Chapter 3 – Cycle lanes and tracks

3.4.11

The golden rule is to avoid situations where motorised vehicles and cyclists are expected to move together through a width between 3.2m and 3.9m.

Comfortable overtaking is possible above 3.9m. Below 3.2m it is clear to all parties that overtaking cannot be done safely. Between those widths, however, lies an area of uncertainty where road users might estimate they could overtake each other but where the clearance they would be able to give is inadequate, putting the more vulnerable road user at risk. This includes the typical lane width adopted in much UK practice of 3.65m. Use of this lane width should be avoided.

3.4.12

Where there is no cycle lane, the nearside lane width should therefore either be below 3.2m or at least 3.9m. Where there is a lane, the combined width of the cycle lane and adjacent (nearside) traffic lane should not be between 3.2m and 3.9m.

3.4.13

Where mandatory cycle lanes are provided (and parking is not permitted), the adjacent general traffic lane should be at least 3.0m wide, meaning that the half-road width should be at least 4.5m for a 1.5m cycle lane or 5.0m for a 2.0m cycle lane. The minimum carriageway width that could accommodate mandatory cycle lanes on both sides is therefore 9m, based on a half-road width of 4.5m divided between a 3m general traffic lane and a 1.5m cycle lane.

3.4.14

If the proportion of HGV and public service vehicle traffic is less than 10 per cent then, subject to the carriageway geometry and speed and volume of traffic, motor traffic lane widths may be reduced to between 2.5 and 2.9m, including those adjacent to advisory cycle lanes. Note that deflection due to road geometry needs to be taken into account: a narrow lane may not be appropriate on a bend and may be particularly problematic adjacent to a nearside advisory cycle lane. If the proportion of larger vehicles is above 10 per cent, then general traffic lanes next to advisory cycle lanes should be no less than 3m wide.

3.4.15

Where advisory cycle lanes are used, and the lanes can be over-run by motor vehicles, then an 8m wide carriageway could accommodate 1.5m-wide cycle lanes and 2.5m-wide general traffic lanes on each side. If the centre line of the road is removed, the carriageway could be narrower still: a 7m-wide carriageway could be divided into 1.5m advisory lanes either side of a 4m two-way general traffic lane.
3.4.16

Where parking is permitted, at least another 2.3m needs to be added to the width (and more still for loading bays and disabled parking bays). This comprises at least 1.8m for the bay (less if the bay is half on, half off the carriageway) and a 0.5m gap between the bay and the adjacent cycle lane. A street with bays on one side could therefore be as narrow as 10.3m and still accommodate advisory cycle lanes on both sides and a centre line for general traffic. At 12.6m wide, bays could be provided on both sides. At 9.3m, bays could be provided on one side of a street with advisory cycle lanes either side of a 4m two-way general traffic lane.

3.4.17

Mandatory cycle lanes of 2m or above can be mistaken for a general traffic lane, in which case enforcement becomes an issue. Use of the TSRGD diagram 1057 cycle symbol and/or surface colour can help to clarify where dedicated areas for cycling exist.

3.4.18

Additional protection of cycle lanes from motorised traffic on the rest of the carriageway by physical features has the potential for increasing cyclists’ subjective safety and encouraging use. Protection to cycle lanes can be provided by the following methods:

- Hatched road markings outside the cycle lane
- Intermittent traffic islands (which should not reduce the cycle lane width)
- Reflective road-studs (authorised for advisory but not mandatory lanes)

Cycle lane buffered by hatched markings in Beech Street, City of London

3.4.19

Where bus lanes are provided, 3m should be added to the width calculations for a ‘narrow’ type of bus lane (where overtaking is not possible) and 4.5m for a ‘wide’ type. Traffic lanes next to narrow bus lanes should ideally not be less than 3m wide.
3.4.20
Note that, in relation to all of the above, lane widths are measured from kerb face to centreline of markings, and vehicle lane widths below 2.5m are seldom acceptable except on roads with very low speeds and flows.

Width considerations for high cycling flows

3.4.21
The above guidance gives some indicative, mostly minimum, figures for cycle lane and track widths, largely based on the dimensions of a single cyclist. On routes where cycle flows could be high, more detailed consideration is needed as the width implemented should ensure the facility does not quickly become congested and lose its appeal for many types of cyclist.

3.4.22
Factors to take into account when considering the appropriate width of a cycle lane or track include:

**Physical constraints**
This includes the highway width, mature trees, parking and loading facilities and the location of services.

**Pedestrian flows and footway widths**
Unless the footway is very wide for the pedestrian flows it accommodates, space for cycling should not generally be taken at the expense of pedestrians. Minimum footway widths of 1.8m should be retained, and improved upon where possible.

**Predicted cycle flows**
(particularly peak flow anticipated and the tidal nature of flows)
Flows of less than 1,000 per day are low; high may be regarded as any flow above 2,000 per day. Some parts of central London already experience the equivalent of 5,000 per day at peak times. Balanced flow assessments should be conducted to identify realistic cycle flows.

**Land use and activity levels**
The frequency of crossing movements, and the influence that uses on either side of the street may exert on pedestrian movement, may impact on the demand for space and the decision about degree of separation.

**Degree of separation**
In general, the higher the degree of separation, the greater the width required for the cycling facility (which may reduce the effective width of the facility).
Design speed
Designing bends to accommodate higher bicycle speeds along links is vital and will ensure that all cyclists can travel with an extra level of comfort. Speeds of 18mph (30km/hr) may be regarded as high, and anything below 12mph (20km/hr) low.

User type
The kinematic envelope of a cyclist depends on their speed and the degree to which they ‘wobble’ when riding (as described in section 3.1), meaning that there is a difference between the width requirements of commuter cyclists and those of more casual cyclists or groups of cyclists. An assessment of potential users may therefore be needed before determining degree (and therefore width) of separation.

Street profiles
3.4.24
This section demonstrates how the above guidance on cycle facility types, street types and width can be brought together to derive options for a range of circumstances. The profiles show that, for a given carriageway width, different configurations are possible through adjustment of various parameters:

- type of cycling provision (degree of separation from motorised traffic)
- width of cycle lanes/tracks
- one- or two-way working of general traffic in the street
- number and width of general traffic lanes and bus lanes
- parking on one or both sides of the street

Other situations not included in the above are key routes such as the Thames bridges where traffic is often congested during peak hours. Here, cycle lanes or tracks should be provided to enable cyclists to overtake on the inside legally, to minimise exposure to vehicle emissions and to maintain momentum on the uphill side of the bridge. Drivers generally respect these lanes, and in these circumstances the provision of a lane can also help to reduce footway cycling.
3.4.25

9m-wide carriageway
Local street / Connector / City street

Wide, dedicated cycle lanes can be accommodated on both sides. Remaining space for general traffic is 5m, so advisory cycle lanes and/or centre line removal may be advisable to allow passage of all vehicles.

It is difficult to retain parking, unless the street is made one-way to general traffic. If so, the opportunity exists to ‘float’ the parking on one side and give protection to the cycle lane/track.

In the options in this section, a higher degree of separation could be achieved by adding light segregation to cycle lanes.
3.4.26

10m-wide carriageway
Connector / High street / City street

Wide, mandatory cycle lanes can be accommodated without parking and with sufficient space for two-way general traffic in 3m-wide lanes.

Fuller forms of segregation may require one-way working to allow room for a 2m-wide buffer.

The buffer space could also accommodate parking and loading, or be substituted for ‘floating’ parking.
3.4.27

10m-wide carriageway
Local street

An alternative for a local street where parking is needed on both sides could be a ‘cycle streets’ approach with advisory cycle lanes. This would permit two-way access to all vehicles but at slow speeds, with cyclists having effective priority.

3.4.28

12m-wide carriageway
Connector / High street

Wide cycle lanes can be accommodated, together with parking on one side, leaving 6m for two-way general traffic.
The parking could also be ‘floated’ without losing any space.

For a street with a higher movement function, full segregation could be provided on one side instead of a continuous bay – parking/loading could sit within the segregation.

3.4.29

12m-wide carriageway
Connector / High road

Where cycling numbers are very high, parking could be relocated to accommodate cycle lanes as wide as 3m. This still allows two-way working for general traffic. This is only likely to be appropriate where there is very little kerbside activity.
3.4.30

12m-wide carriageway
High road / City hub

A further variant on this approach could be a bus/cycle priority street, where cyclists are segregated either side of a dedicated, one-way bus lane. A similar approach could be applied to a street open to one-way general traffic.

3.4.31

12m+ carriageways
Arterial roads / High roads / City hubs

Wider carriageways offer more possibilities for accommodating cycling on links. Where kerbside activity is concentrated on one side of the road, two-way cycle tracks are an option and could fit within the profile as shown below.
3.5 Priority of cycling facilities

3.5.1
Cycle lanes and tracks should enjoy priority over turning traffic. This is essential not just for directness and continuity, but also safety. A high proportion of collisions involving cyclists arise from motor vehicles turning across cyclists, either through failing to see a cyclist or failing to observe good practice on road user behaviour and priority as set out in the Highway Code (rule 183): ‘When turning, give way to any vehicles using a bus lane, cycle lane or tramway from either direction’.

3.5.2
This section covers design that unambiguously gives priority through road markings and design that can help achieve a stronger ‘visual’ priority. Methods for giving unambiguous priority provided by UK regulations are limited in scope and so ‘suggested’ priority through design is an important tool.

3.5.3
Some different considerations apply to cycle lanes and tracks respectively. Where cyclists are in lanes, they are generally more visible and are understood by other road users to be on carriageway. Where cyclists are using tracks, separated from the carriageway, there is more ambiguity about their status and they may be more difficult for other road users to see.

3.5.4
The UK lacks a completely supportive legal framework for giving vulnerable road users priority, meaning that physical design and road markings that meet regulations can only achieve so much. Some countries with high levels of urban cycling, such as Denmark and the Netherlands, legally require turning traffic to give way to cyclists and pedestrians on their nearside. People who visit cities such as Copenhagen often report feeling more comfortable and less vulnerable than in London – the experience of motor vehicles giving way to cyclists at junctions is a major part of building that sense of reassurance.

Cycle lanes at priority junctions

3.5.4
Nearside mandatory cycle lanes need to be broken at priority junctions to allow turning movements. For advisory cycle lanes, it is also helpful to highlight visibly the change in the lane’s status to prompt a change in behaviour at a location of potential conflict and secure effective priority for cyclists.
3.5.5

Several different strategies are available to highlight to other road users the ahead movement of cyclists, and the need to give way to ahead movement in the nearside lane (as the Highway Code recommends). These are based on typical road user behaviour: experienced cyclists will tend to move out from the nearside as they approach side roads, both to reduce the potential for being overtaken by a turning vehicle and to enhance their visibility to other road users. Options include:

- widening the lane
- providing a buffer space (of 0.5m) between the the give way (TSRGD diagram 1003) markings at the side road and the cycle lane
- continuing the lane marking across the side road using a short, dashed diagram 1010 marking (these are edge-of-carriageway markings and so do not mean ‘give way’ but are recognised as lines that should not be crossed without due care – see chapter 6 for further information)
- using surface colour to highlight the potential conflict (which is common practice in Copenhagen)
- using diagram 1057 markings to highlight the cycling facility
- minimising corner radii and providing side road entry treatments to slow turning vehicles (see section 5.2 for more detail on these methods)

3.5.6

All of the above are visual cues to encourage motorists to slow and/or be more aware of the presence of cyclists before turning. No single measure or combination of measures completely removes the potential conflict but all of them can help improve road user understanding of where cyclists are likely to be. Side road entry treatments and changes to kerblines can have significant benefits for pedestrians – shorter crossings on desire lines, for example – but are more substantial and more expensive interventions that will usually need to be justified as part of a wider traffic management approach rather than a stand-alone measure.
Segregated lanes and stepped tracks at priority junctions

3.5.7
Some different considerations apply when lanes or tracks are physically segregated. In all cases, raising awareness of the presence of cyclists moving past the side road is important.

3.5.8
Segregated and light segregated lanes/tracks must be broken and converted into lanes at priority junctions in order to reintegrate cyclists briefly with general traffic, enhancing their visibility. The distance between the transition point, where the segregation ends, and the mouth of the junction is an important factor in this process of reintegration. Based on interim findings from off-street trials, there are two recommended options:

- 5m or less – where motorised vehicle speeds are low (less than 30mph) and street geometry tight
- 20m or above – in all other cases

Diagrams showing segregation setback distances trialled off-street

3.5.9
The options set out above for treatment of cycle lanes at priority junctions may then be followed. Lanes should be marked as mandatory (with TSRGD diagram 1049 marking) from the point where the segregation ends and then marked across the side road itself with diagram 1010 markings, as described above.

3.5.10
The range of setback distance to be avoided is 5m to 20m as this constrains cyclists but does not have a significant reduction effect on the speed of turning motor vehicles. Greater setback distances may be required where allowance needs to be made for cyclists moving into general traffic lanes to turn right.
3.5.11

This treatment can also be applied to stepped tracks: they can return to carriageway level as lanes through priority junctions. An alternative is to maintain the track at the same level by use of a raised table and apply corner radii that are as tight as possible. The side road should be required to give way to the track at the table, but the provision of markings on the offside of the track should be subject to a site-specific risk assessment. Continuous footway / cycleway treatments could also be applied to reinforce the visual priority in this case (as is observed on major cycle routes in many cities in Sweden and Denmark). See section 5.2 for further details.

Cycle tracks across side roads

3.5.12

Where cycle tracks are more distant from the carriageway – for example, where they are separated by verges or floating parking – then reintegration is, again, a design option. This involves ‘bending in’ the cycle track (diverting it close to the carriageway), returning it to carriageway level some way before the side road and converting it to a lane. This may only be done for one-way tracks, never two-way.

3.5.13

The second option is ‘bending out’, which is the only way of giving unambiguous priority under UK regulations to cyclists as it allows the space for the recommended ‘give way’ markings on either side of the track: both the TSRGD diagram 1003 (double-dash) and diagram 1023 (triangle) markings. With this method, the cycle track continues across the side road on a road hump, raised above carriageway level, but set back of at least 5m from the carriageway. This allows one car to turn into the side road and have enough space to stop to give way to a cyclist on a hump before proceeding. It is an option for one- or two-way tracks.

Bent-out cycle tracks with unambiguous priority over a side road junction at Waterden Road, Hackney. In this instance, the bending is less apparent because the tracks are already set well back from the carriageway.
3.5.14
Cyclists can be given priority over a side road without using a 5m set-back where the side road is one-way leading to the main road (as there is no need to accommodate vehicles turning in). Appropriate set-back, if any, should be determined by visibility considerations for vehicles exiting the side road, bearing in mind the need to give way to the cycle track.

3.5.15
The Traffic Signs Manual (para 3.25) sets specific requirements for road humps used for bent-out cycle tracks on streets with speed limits of 30mph or less:

- the road hump should be of the flat-topped type and marked with diagram 1062 (the solid triangles showing the sloping part of the hump)
- give way triangle markings (diagram 1023) should be provided on each approach, placed on the carriageway of the road, not on any part of the hump
- longitudinal warning lines to diagram 1004 on each approach (1010 markings could also be used)

However, these conditions are likely to be superseded by the revised TSRGD in 2015 as it is proposed in the consultation draft to remove the requirement for a road hump to allow cycle track priority over a side road.

3.5.16
The above options require deviation of the cycle track – unless the track is already set back 5m from the carriageway on the link – and therefore compromise the directness of the cycle facility. Local conditions, such as low motor traffic flow and speed, low proportion of larger vehicles or high cycle flow, may dictate that a surface treatment, such as a continuous footway and cycle lane/track, is sufficient to give clear visual priority that turning motor vehicles must give way when turning in or out of a side road. A risk assessment should be undertaken on a site-by-site basis.

3.5.17
Where a cycle track is being considered but there are a significant number of side roads, it may be feasible for some of them to be closed or converted to one-way operation by point closure thereby enabling a track to be provided with fewer interruptions.
Cycling facilities across minor accesses

3.5.18

Priority should be given to cyclists at access crossovers, which should be narrowed and raised where feasible. For larger accesses, a give way triangle (TSRGD diagram 1023) may be used to provide further warning to drivers leaving the access that they must give way to cyclists. At wide accesses, such as those at petrol filling stations, alternative measures to slow down vehicles should be considered.

3.5.19

At access crossovers, it is important to retain good visibility of the cyclists for drivers of vehicles intending to turn left across the cycle track. This means keeping the kerbside clear of street furniture and parked vehicles. It is also necessary for drivers leaving the access to have adequate visibility of approaching cyclists.