Nottingham
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Nottingham City Cycling Design Guide

January 2018 Edition 2 Version 1.1

D2N2 Derby Derbyshire Nottingham Nottinghamshire

MIDLANDS ENGINE | HM Government

Nottingham City Council

Foreword

Since its publication in January 2016, the Nottingham City Cycling Design Guide has been used extensively in the delivery of new cycling facilities in Nottingham. This is working towards the improvement of the City's cycle network to match our world-class public transport network. I am pleased to hear that the our design guide is being used in other urban areas within the East Midlands

So far, the guide has been used and developed further in the design of schemes such as the Western Cycle Corridor, part of which is the Midland's first two way segregated cycle track. It has been used in the design of new facilities for cycling on Daleside Road, as part of our Eastern Cycle Corridor and a North/South quiet route linking the Western Cycle Corridor to Canning Circus via an orbital route on the edge of the City Centre. The recommendations within the guide are there to see on some of Nottingham's Streets through the delivery of these schemes and others.

We have always maintained that the Design Guide would be a document we want to be 'live' - to respond to changes in good design practice and innovation, in addition to new things that we have learnt during the delivery of schemes. Some of these changes have been included in this new edition of the design guide as well as new proposals in the Department for Transport's Traffic Signs Regulations and General Directions 2016 and Sustrans' Handbook for cycle-friendly design. Our officers continue to learn from good practice in other major cycling cities in the UK and abroad. We will seek to consider and apply this knowledge to future schemes in Nottingham as appropriate.

Going forward we are working with the Department for Transport and its consultants, the D2N2 Local Enterprise Partnership and our neighbouring authorities on developing a Local Cycling and Walking Infrastructure Plan (LCWIP) for Derbyshire and Nottinghamshire,. We are also delivering improvements to parts of the River Leen path and publishing our signing strategy to compliment this guide. Our experience in recent years has shown delivering high quality infrastructure requires a long term funding commitment, innovation and bold decisions. We will continue to lobby and seek funding for cycling so we can invest in Nottingham, delivering the best practice that this guide highlights.

Forward thinking Cities around the World have embraced cycling as an integral mode of transport and that is exactly what we are continuing to do in Nottingham.



Councillor Dave Liversidge
St Anns Ward
Portfolio Holder for Transport and Human Resources

Photography: Sustrans or CTC Benchmarking,
or Nottingham City Council unless noted otherwise

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Introduction



Castle Boulevard



Abbey Bridge



Station Street



Cambridge

This guidance is a Nottingham specific technical design note for cycle infrastructure based on the following documents:

- Sustrans Handbook for cycle friendly design (Sustrans 2018 update pending)
- London Cycle Design Standards (Transport for London 2014)
- International Cycling Infrastructure Best Practice Study (Transport for London 2014)

The Nottingham Design Guide covers in more detail the more relevant local issues such as cycle interaction with trams, route maintenance and monitoring.

This guidance aims to provide detailed technical advice on key issues around on and off highway cycle infrastructure whilst signposting users to this developing library of further resources.

This guide contains a concise illustrated compendium of technical guidance relating to cycling: it can stand alone as a ‘tool box’ of ideas but also links to a library of relevant on line resources. It is very visual but contains the essential technical details. The guide is for anyone planning or designing highway or dedicated cycle infrastructure in the city of Nottingham.

This guidance is available in electronic format and can be downloaded from the Council’s Website. It is intended for widespread use as a readily available digest of the key elements of design guidance, which can be used on-site by planners and engineers.

The document has been reviewed following publication of the revised Traffic Signs, Regulations and General Directions in 2016 and continue to be reviewed and updated regularly thereafter.

The structure of this guidance is illustrated in the contents page, and broadly follows the following sequence:

- A summary of the key principles and processes for a user-focused design
- Wider considerations of urban design and other measures to improve the general highway design for cyclists and pedestrians
- On-carriageway provision for cyclists on links and junctions
- Cycle provision off the carriageway, whether cycle tracks alongside the road or traffc free routes away from the road, including crossings
- Associated design issues including cycle parking, signing, integration with public transport and the design of new developments
- The maintenance and management of routes



Photo : LB Camden

London

Understanding user needs 1

Top 10 tips for user-focused design for cycling

1. **Cyclists are important:** designs should send the message that cyclists are at least as important users of the highway network as motor traffic, with cyclists being given an advantage in terms of directness and priority where possible.

2. **User experience:** cycle the route yourself, at various times of the day/week, and make sure you consult with potential cycle users and existing users throughout the design process.

3. **Target user:** designs should be attractive and comfortable for cyclists of all abilities including disabled cyclists, who are trained to at least National Standards/Bikeability level 2.

4. **Design in line with cycle training:** on-highway design should reinforce how people are taught to cycle in National Standards/ Bikeability Level 2, in particular primary and secondary road positioning and enabling cyclists to see and be seen.

5. **Cycles are vehicles:** take account of their space requirements, manoeuvrability and speed in all infrastructure, not just specific cycle facilities and recognising the varying needs of different types of cycle.

6. **Cycles are muscle powered:** aim to minimise energy loss through stopping, hills and sharp corners; cyclists should never be required to dismount on cycle routes. Some people are unable to walk and push their cycle at the same time.

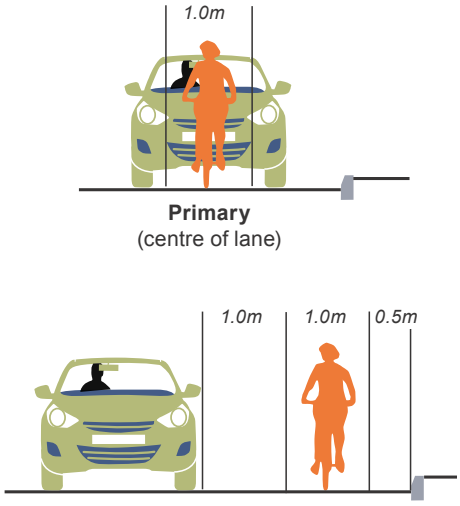
7. **Make space for cyclists:** where segregation of traffic is appropriate this should be achieved through reallocation of road space – taking space from the footway should be the last resort. Space provided should take account of predicted level of use

8. **Tame traffic:** the speed and volume of motor traffic, the proportion of large vehicles, and opportunities to reduce these, will influence the type of provision appropriate and whether specific cycle facilities may be necessary.

9. **Continuity and quality of standards:** consistent high quality provision (including signage) along a route, through junctions and at both ends of the trip is essential, with route design following the 5 Core Principles of Coherence, Directness, Safety, Comfort and Attractiveness. Difficult engineering solutions should be addressed early on to avoid gaps being left. The design should aim to minimise maintenance requirements and costs, and take account of who is responsible for that. Ensure the design of the route enables it to be used effectively in the dark and in poor weather.

10. **Behaviour of other users:** take account of the real world behaviour of all users – including how pedestrians and drivers may interact with cyclists and vice versa.

Fig 1 **Primary and secondary riding positions**



The primary road position is that of the general flow of traffic (i.e. in the centre of the lane). **The secondary road position** is roughly 1 metre to the left of the traffic flow and not less than 0.5 metres to the edge of the road (also see Figure 4)



Cyclist riding in primary road position



Cyclist riding in secondary road position

Understanding user needs 2

Provision on links

Figure 2 illustrates how traffic volume and speed may influence the decision on the need to segregate cyclists from other traffic, and demonstrates how restraint of traffic speeds and volumes may be used to create satisfactory conditions to encourage new and novice cyclists to use the carriageway. The threshold values are intended to reflect the needs of the key target user as described above.

Main cycle routes (see Network Planning) will generally justify a higher level of provision than other cycle routes and so may have lower thresholds at which segregation is provided and greater widths.

Table 1 Core principles for routes used by cyclists

Coherence
- Link all potential origins and destinations
- Be continuous and recognisable
- Offer consistent standard of protection from motor traffic throughout
- Be properly signed
- Include well located cycle parking

Directness
- Be based on desire lines
- Result in minimal detours or delays
- Provide a positive advantage in terms of directness and priority over motor traffic

Safety
- Be safe and perceived as safe
- Provide personal security
- Limit conflict between cyclists and pedestrians and other vehicles

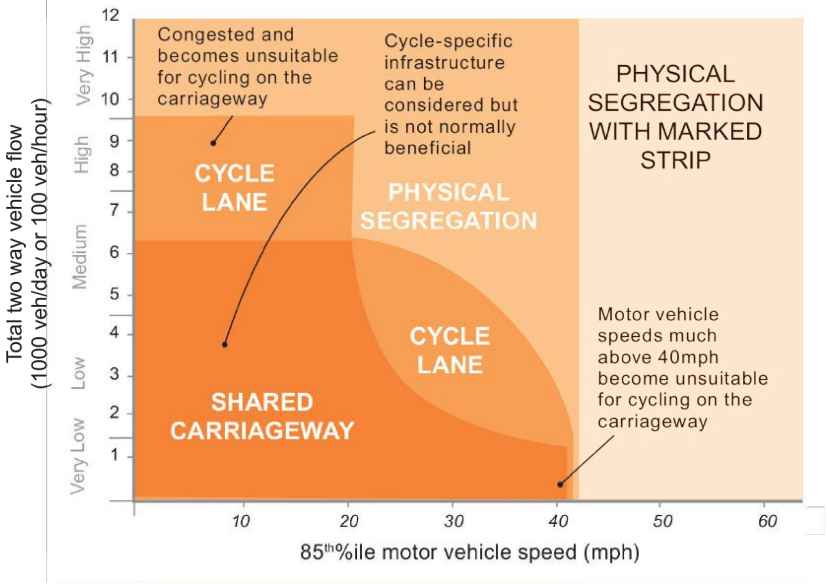
Comfort
- Be smooth, non-slip, well maintained, drained and free of debris
- Have sufficient width for the level of use
- Have easy gradients
- Be designed to avoid complicated manoeuvres
- Enable cyclists to maintain momentum
- Minimise impacts of noise, spray and headlight dazzle from other traffic

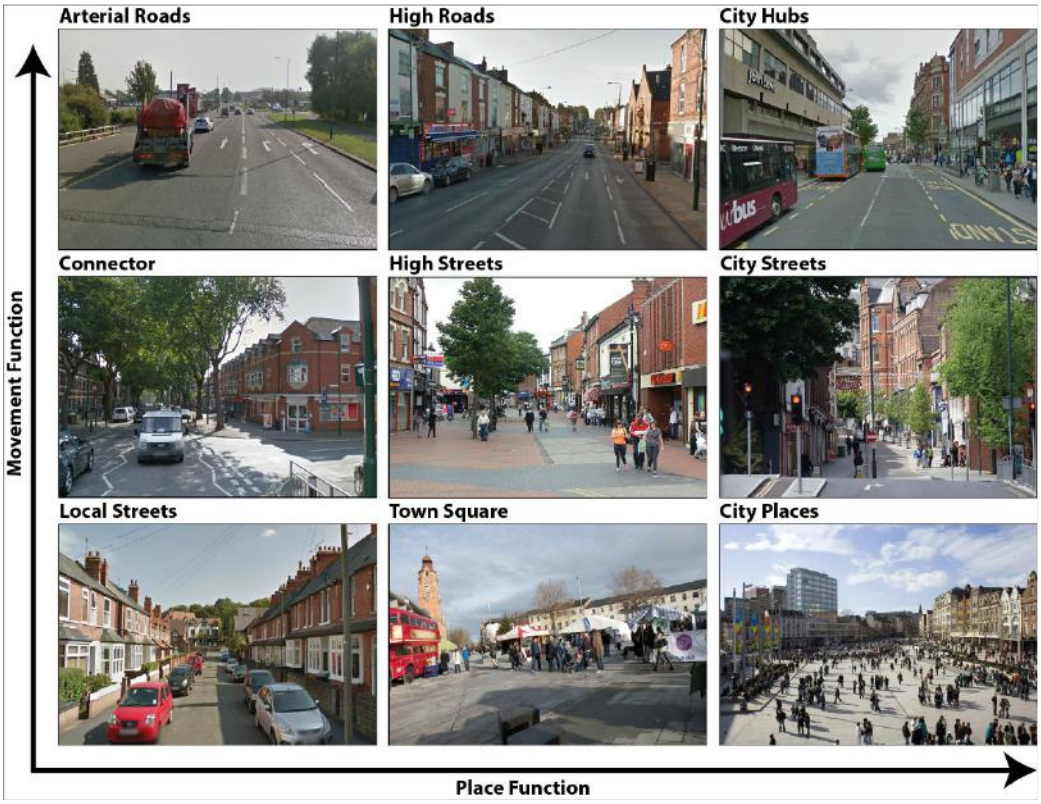
Attractiveness
- Be attractive and interesting
- Integrate with and complement their surroundings
- Contribute to good urban design
- Enhance personal security
- Be well maintained

Adaptability

Where substantial increases in cycling are expected, consideration should also be given to the adaptability of infrastructure to accommodate large increases in use

Fig 2 **Degrees of segregation for cyclists**





Understanding user needs 3

Design speeds

Key design parameters for cycle tracks will normally reflect the expected design speed of the route. A design speed of 12mph is appropriate for a local access route, or for a main route where there is likely to be significant interaction with pedestrians. For other main routes, designers should aim to provide a higher design speed of 20mph.

Widths required by cyclists

The space required by cyclists in motion needs to take account of :

- 'Dynamic width' of the cyclist
- Clearance when passing fixed objects
- Distance from other traffic (both cyclists and passing motor vehicles)
- Non-standard cycles, such as recumbents and hand cycles, may be wider and less visible and so need more space to accommodate them and allow drivers to see them.

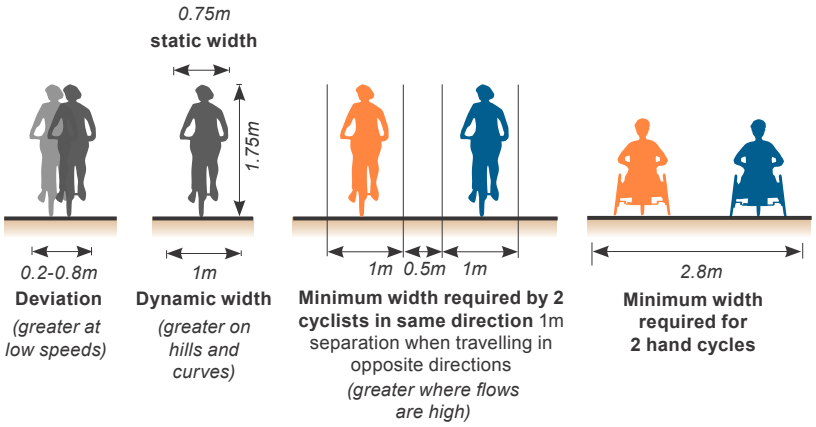


Table 2 **Overtaking by motor vehicles**	
Minimum passing distance	
20mph	1m
30mph	1.5 m
Total width required for overtaking cyclist in secondary riding position (see figure below)	
Car passing at 20 mph	4.3m
Car passing at 30 mph	4.8m
Bus/HGV passing at 20 mph	5.1m
Bus/HGV passing at 30 mph	5.6m

Source : LTN 2/08 & LTN 1/12

Table 3 **Additional clearances to maintain effective widths for cyclists** (see figure below)	
Type of edge constraint	**Additional width required (mm)**
Flush or near-flush surface (including shallow angled battered kerbs - see photo below)	Nil
Kerb up to 150 mm high	Add 200
Vertical feature from 150 to 600 mm high	Add 250
Vertical feature above 600 mm high	Add 500

Table 4 **Calculation of minimum width required:** minimum width = a+b+c+d	
a	dynamic width
b	minimum passing distance from other users (Table 2)
c	clearance for edge constraints (Table 3)
d	additional width for high cycle/pedestrian volumes, steep gradients, curves

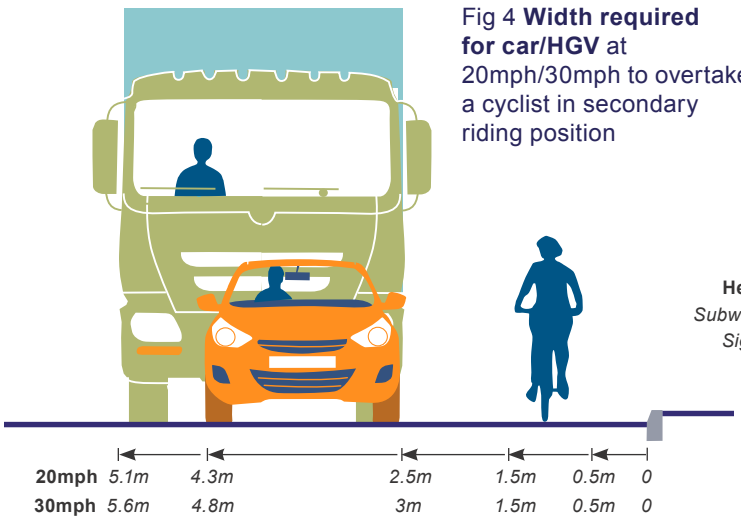
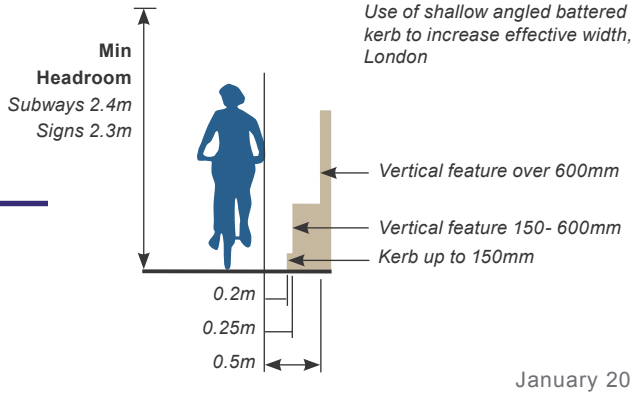


Fig 4 **Width required for car/HGV** at 20mph/30mph to overtake a cyclist in secondary riding position

Fig 5 **Additional clearance** to maintain effective width and headroom for cyclists



Use of shallow angled battered kerb to increase effective width, London



Not to scale

Understanding user needs 4

Table H.4 **Cycle parking and manoeuvring at low speeds**: minimum dimensions				
	Overall width (mm)	**Overall length (mm)**	**Minimum turning circle (mm)**	
			Outer radius (a)	**Inner radius (b)**
Cycle design vehicle	**1200**	**2800**	**3400**	**100**
Conventional bicycle	700	1800	1650	850
Tandem	700	2400	3150	2250
Bicycle and trailer	800	2800	2650	1500
Cargo trike	1200	2600	2300	100

Note: a wide range of adapted bikes are used for disability cycling: their design requirements will generally fall within the ranges in this table

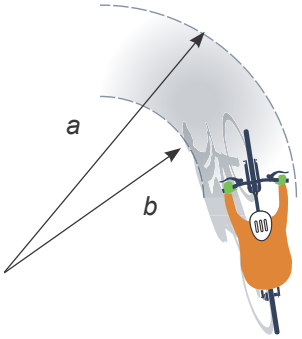
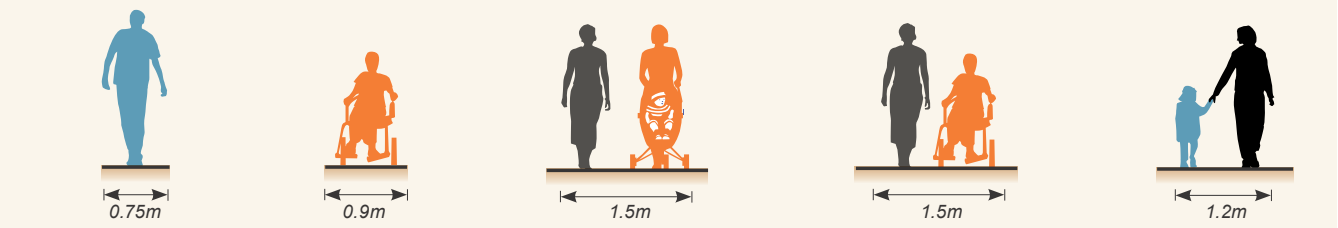


Fig 6 **Typical minimum widths required** by pedestrians and wheelchair users



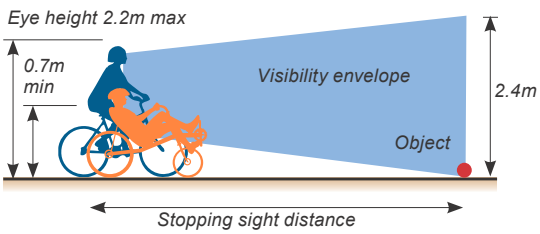
Note: a useful reference is the UK Government document - "Inclusive Mobility" which can be found at - *https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/3695/inclusive-mobility.pdf)*

Visibility

Table 6 **Link design parameters** - traffic free				
Type of cycle route	**Design speed**	**Min. stopping sight distance** (1)	**Sight distance in motion** (2)	**Min. radius of curve** (3)
Commuter route	20 mph	25 m	80 m	25 m
Local access route	12 mph	15 m	50 m	15 m

1. *Add 50% for unsealed surfaces*
2. *Sight distance in motion is the distance a cyclist needs to see ahead when riding in order to feel safe and comfortable*
3. *Minimum internal radius at intersections: 4.0m desirable, 2.0m absolute*

Forward visibility envelope



Visibility at junctions

Recommended X distances for cyclists are:

- 4m desirable minimum
- 2m absolute minimum
- 1m where geometry is tight and usage is very low

If these visibility requirements cannot be achieved the alternative is to use the full range of markings and signs available to make clear the need for cyclists to slow down and give way. An x distance of less than 2.0m may prevent a recumbent cyclist from having adequate visibility even when stationary.

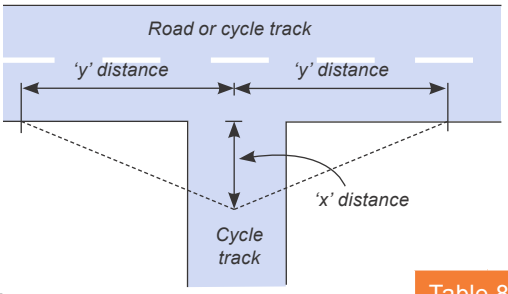


Fig 8 **Junction distances** 'x' distances for cyclists will be maximised with a target of achieving a 2m minimum

Table 7 **Visibility at junctions**											
85%ile speed (kph)	20	25	30	40	45	50	60	70	85	100	120
'y' distance (m) on road	14	18	23	33	39	45	59	120	160	215	295

Source: Manual for Streets TD 42/95

Table 8 **Gradients**	
3%	Preferred maximum
5%	Normal maximum – up to 100m
7%	Limiting gradient – up to 30m
>7%	For short lengths

In hilly areas, many roads have steeper gradients but can still make acceptable cycle routes

Network planning

Characteristics of Nottingham's network

Nottingham's cycle network will comprise the highway network (modified where necessary), together with traffic free routes which offer more direct journeys and attractive areas in which to cycle. Within this network more strategic main routes will be identified for prioritisation of investment and promotion. The network should be:

- Safe, convenient, continuous and attractive to encourage new cyclists of all abilities
- Useful for all manner of routine journeys for local people and existing cyclists
- Memorable such that occasional users are persuaded to cycle more



Citycard cycle hire

Developing a network

The Nottingham network will be further developed using the following stages and with the assistance of the Department for Transport's Propensity to Cycle Tool:

- Identify main trip attractors (residential, employment, retail, education, transport, health, visitor attractions, proposed developments etc)
- Assess demand (existing and potential cyclists)
- Identify desire lines
- Review existing routes, cycle parking, constraints and options for improvements and other proposed transport schemes
- Engage with stakeholders (throughout process)
- Develop a prioritised costed network development plan
- Marketing/public engagement strategy
- Monitor and review

Work will continue in partnership with DfT, D2N2 and partner Authorities to develop a D2N2 wide network and programme of improvements as part of the Local Cycling Walking Investment Plan.

Nottingham's network begins from the urban centre working outwards. The network is organised around a hierarchy of routes: main routes, secondary routes and access routes which will link to trip generators.

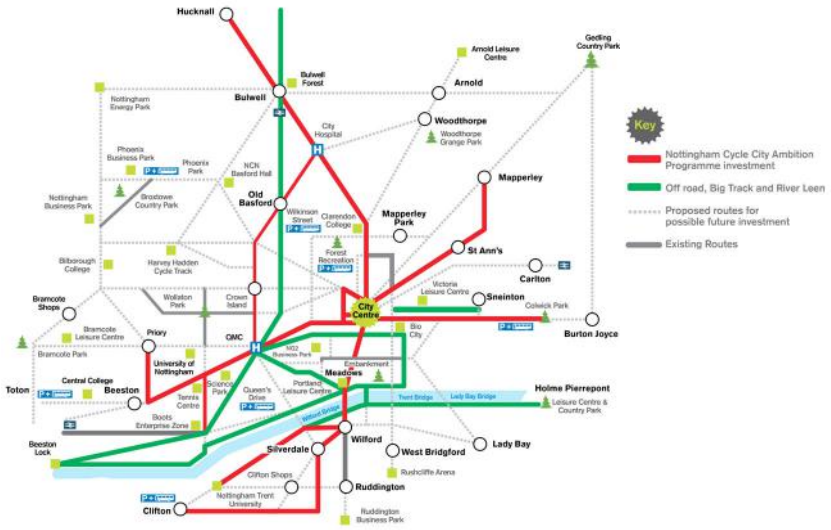


Fig 9 **Nottingham Cycle Network map**

The Council's aspirational network is set out as a London Underground style map. The links beyond the City Boundary have been agreed with Nottinghamshire County Council

Elements of a network

- Providing **good access** to and through town centres and other local centres - this commonly requires mixed priority streets
- **Direct connections** to public transport hubs and other trip generators
- **'Filtered permeability'** - unrestricted access for cyclists through road closures and vehicle restricted areas provided via features such as; contraflow facilities, exemption from restricted turns, cycle bridges across rivers and railways, short-cuts through parks
- **Area-wide 20mph limits** and zones and other means to reduce traffic speed and volume
- Giving a high priority to **cycle friendly junctions** at the design stage
- **Cycle lanes and advanced stop lines** to enable cyclists to avoid queuing traffic
- Cycle tracks alongside **rivers** and **canals** and on **disused railways**
- **Maximising route opportunities** to and through new developments
- **Secure and convenient cycle parking** at both trip ends

Streets and roads 1

Street design

Many of Nottingham's streets are not wide enough to provide separate cycle facilities or have frontage activity that makes such provision impractical. Designers of such environments need to think beyond standard highway design, defining a slow speed highway environment where cycles, pedestrians and motorised traffic can safely integrate. A good street design can help create a bespoke solution that suits the local surrounding buildings and activities. This page illustrates a set of ideas from which the designer may choose to suit the context. Involving the community in local street design is strongly recommended as it enables the scheme to reflect the needs and aspirations of people living or working in the area.

Fig 10 **City centre street design**



Cycle parking next to trip attractor - Market Square



Carlton Street/Broad Street

6m wide carriageway with narrowing using drainage strips that reduce the visual width, slowing vehicles down

Filtered permeability delivered by key traffic free route highlighted by distinctive vertical elements



Informal roundabout helps control speeds at junction, London

Attractive planting to combat localised street flooding, the urban heat island effect, airborne pollutants and to benefit wildlife

Not to scale



Flush central reserve helps reduce carriageway width (allowing occasional over-run by larger vehicles) and allows comfortable pedestrian crossings at more locations, Oxford

Note:

Where existing cobbles form part of a cycle route inset blocks including a cycle symbol should be used (not painted white symbols)



Widened crossing in front of library creates a distinctive gateway feature into the scheme and addresses pedestrian desire lines, Poynton

Streets and roads 2

Speed reduction: street design

Designers should aim to create streets that control vehicle speeds by their physical geometry, visual appearance and provision for pedestrians, cyclists and frontage activity rather than relying on signs and vertical or horizontal traffic calming measures. Such an approach can facilitate the introduction of 20mph speed limits.

The range of traffic calming measures available includes:

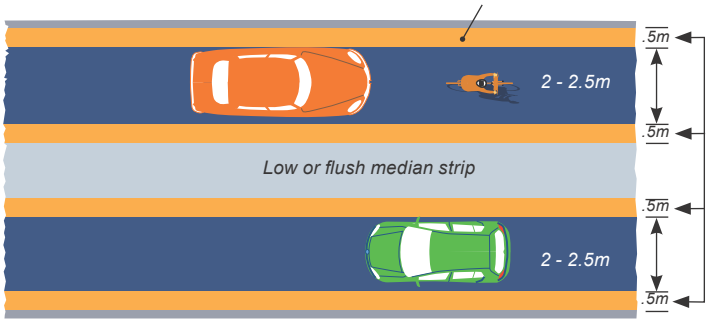
- Physical features
- Changes in priority
- Street dimensions
- Reduced visibility
- Psychology and perception

This page illustrates examples of how street design can reduce speeds. Guidance on achieving appropriate traffic speeds is contained in Manual for Streets. Examples of particular approaches include:

- Shared space
- Home zones and community led street design
- Mixed priority streets and cycle streets

We will implement 20mph limits in residential areas where residents want them. We will also consider 20mph speed limits in the city centre and lowering speed limits elsewhere if it helps to provide high quality cycling facilities.

Fig 11 **Visual narrowing**





Visual narrowing, Ropewalk



Raised table, Old Church Street '(See Guidance on the use of Tactile Paving Surfaces published by the DFT IN 1998)

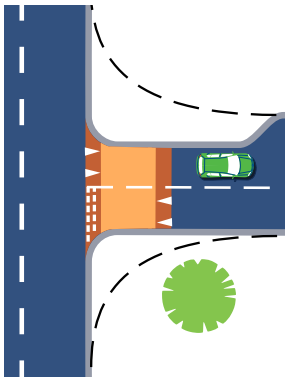


Fig 12 **Side road entry treatment**

Measures to consider:

- Reduced width
- Tight radii
- Raised crossing
- Contrasting surface

These measures serve to reduce motor vehicle speeds through features such as: narrowing traffic lanes, defecting the path of vehicles, tighter radii, creating uncertainty, changes in surfacing

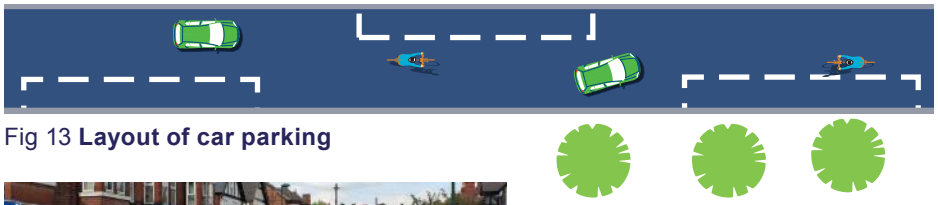


Fig 13 **Layout of car parking**



Staggered parking, City Road



Changed priority, City Road

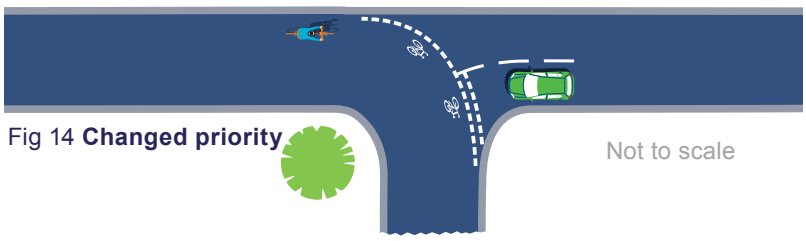


Fig 14 **Changed priority**

Streets and roads 3

Speed reduction: physical traffic calming

This page illustrates the most common forms of conventional vertical and horizontal traffic calming measures, and how they can be designed to take account of cyclists.



Raised junction, Shelton Street



Sinusoidal road hump, Bramcote Lane



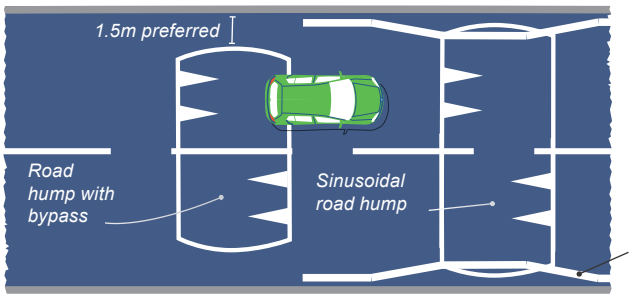
Speed cushion, Ranson Road

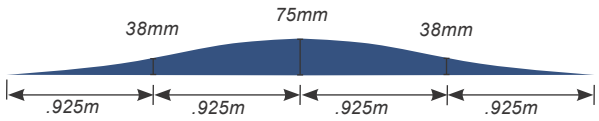


Pinch Point, Bramhall Road

Vertical features

Fig 15 **Road humps**

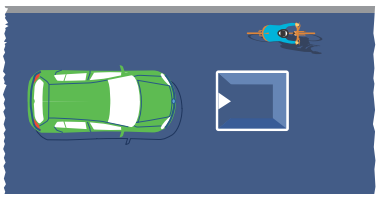




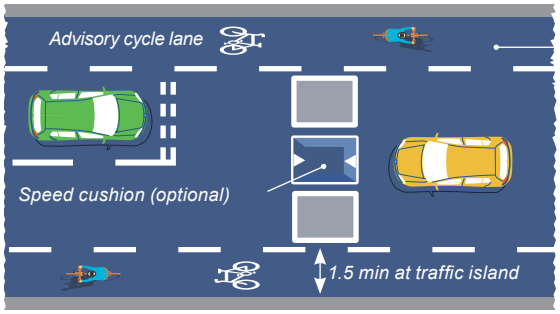
Sinusoidal road hump cross section
(preferred geometry for vertical dimension)

Humps that are excessively high or feature straight ramps can cause some non standard cycles to bottom out

Fig 16 **Speed cushion**



Horizontal features



Entry and exit to be kept clear of parking. Design should discourage encroachment on cycle lane by motor vehicles

Fig 17 **Priority system - pinch point**

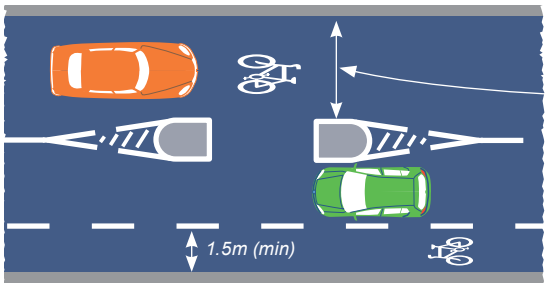


Fig 18 **Central island**

Recommended width depends on speed, but avoid gaps of 3.1 - 3.9m. Option of speed table with refuge or bypasses for cyclists. Where a cycle lane is provided it should be continued through the pinch point with a width of at least 1.5m

Not to scale

Streets and roads 4

Reallocation of road space

A fundamental aspect of the provision of cycling facilities is the reallocation of carriageway from motor vehicles to cycling. This can be seen in the majority of figures within this document. The provision of cycle tracks in urban areas at the expense of the footway is not encouraged (it tends to be unpopular with pedestrians and cyclists), particularly where there are high pedestrian flows, although there are some limited situations where this may be necessary. Reallocation of road space makes an important statement about the relative priority of different transport users, as it not only promotes cycling but can act as a restraint on motor traffic, which is an important aspect of transport and planning policy in congested urban areas. Typically this will involve one or more of the following:

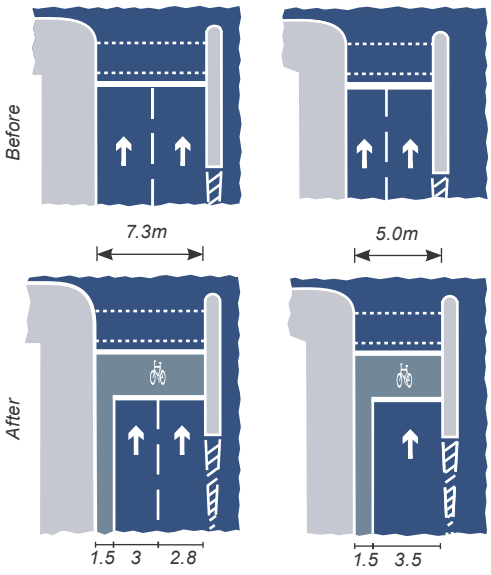
- Filtered permeability (no entry except cycles)
- Removal of a traffic lane
- Conversion of traffic lanes to bus lanes
- Reduced width of traffic lanes
- Removal of centre line
- Reduction in traffic speeds
- Introduction of weight limits
- Removal of car parking
- Reallocation of time at signals
- Less managed streets and junctions

The drawings on this page illustrate a number of options where traffic lanes have been removed or narrowed to accommodate provision for cyclists. When reallocating space in this way the full highway width should be considered, including carriageway, verge, parking bays as well as the footways.

In re-allocating road space the design/solution should remain consistent along the length of the corridor. High quality facilities may impact upon existing on street parking but this shouldn't be avoided if it gives the best solution. Re-allocated road space should continue up to, and through, junctions. The effects of re-allocating road space on the wider network should be considered as part of any corridor design. Be mindfull of significant impact on motor traffic and the Council's duty under the Traffic Management Act 2014 and our air quality targets.

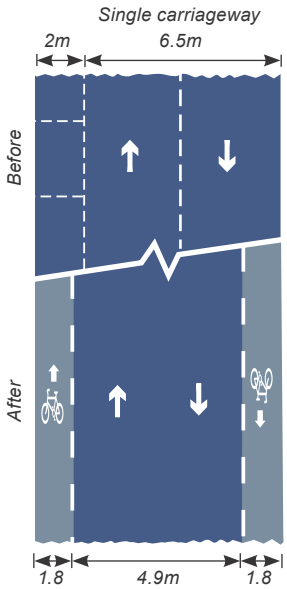
Fig 19 **Advanced stop lines with feeder lanes**

Not to scale



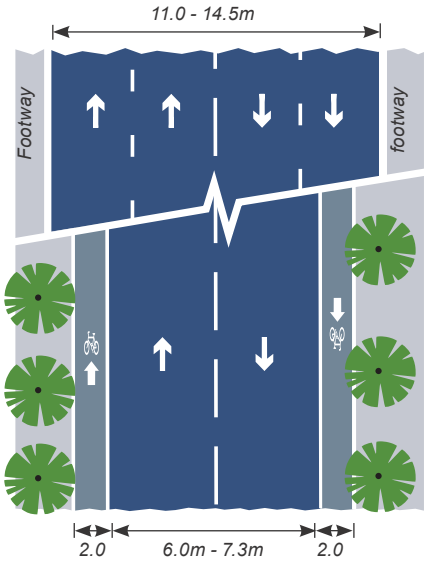
Present guidance indicates that ASL feeder lane should be as long as the average peak hour traffic queues.

Fig 20 **Narrowing of traffic lanes**



Advisory cycle lane. Remove centre line for widths below 5.5m

Fig 21 **Removal of traffic lanes** to provide cycle lanes



Mandatory cycle lane



Removal of centre lines, Haydn Road



Removal of traffic lanes to provide cycle lanes, Hull

Streets and roads 5

Quiet streets and cycle streets

Where a designated cycle route uses a low speed quiet street (e.g. residential road, town centre back street or road through a park) it should typically:

- Provide a convenient and direct route between key destinations
- Give cyclists priority on the road itself and also right of way at junctions
- Carry no more than 3,000 motor vehicles per day

Design elements may include:

- 20mph speed limits
- Changed priorities
- One-way with contraf ow cycling
- Psychological and physical traffic calming
- Point closures with cycle gaps
- Banned turns with exemption for cyclists
- Cycle priority at road crossings
- Surface markings

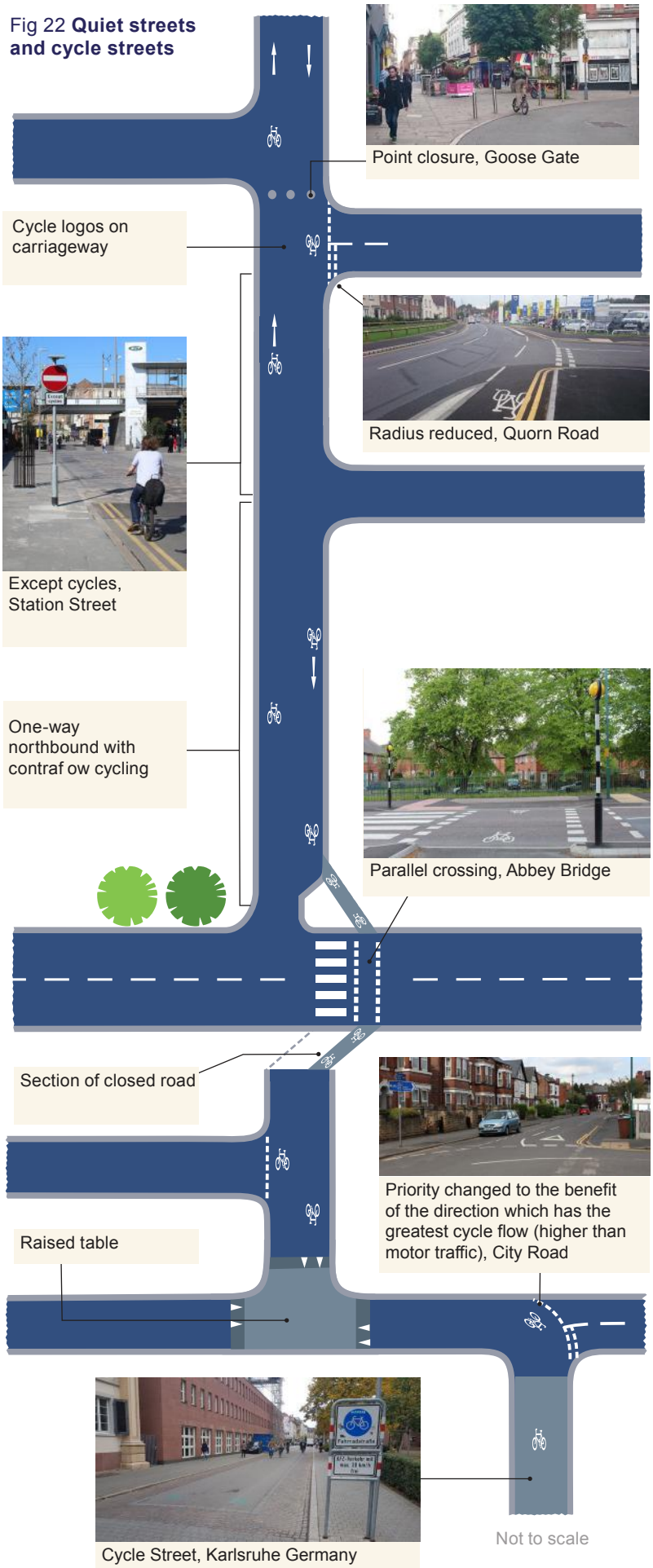
In certain situations, sections of the route may be designated a cycle street (see Sustrans Technical Information Note 32). This is a street designed to be a main cycle route which is open to motor traff c, in which case:

- The street design should encourage cyclists to assume priority with drivers of motor vehicles behaving as ‘guests’
- It should carry at least 1,000 cyclists per day, including forecast cycle growth
- Cyclists should potentially outnumber motor vehicles
- The design should provide cyclists with a level of service comparable to that provided by a high quality traffic free route
- The length over which a car has to follow a cyclist should be limited to 400m



Fig 23 **Cars are ‘guests’ on cycle street**

Fig 22 **Quiet streets and cycle streets**

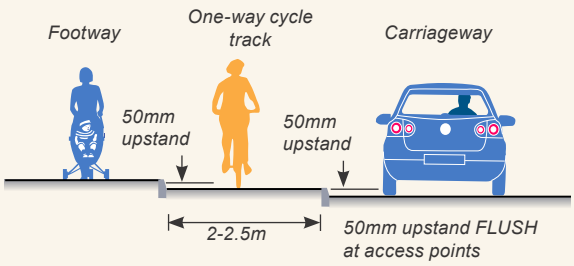


Streets and roads 6

Innovative cycle facilities: details

This page provides some basic details of a number of innovative measures to assist cyclists on links and at junctions that have recently been implemented in the UK, most of which are featured elsewhere in this handbook. The City Council aims to trial innovative measures such as light segregation when suitable locations are identified.

Fig 24 **Hybrid cycle track detail** *(e.g. Brighton)*

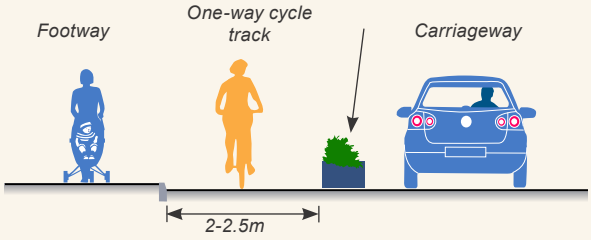




Hybrid cycle track, Brighton

Fig 25 **Light segregation detail** *(e.g. London)*

Intermittent segregation 2.5m to 10m spacing
- *Planters*
- *Armadillos*
- *Wands*



Benefits : low cost; easily widened



Planters and armadillos, London

Photo: LB Camden



Armadillo

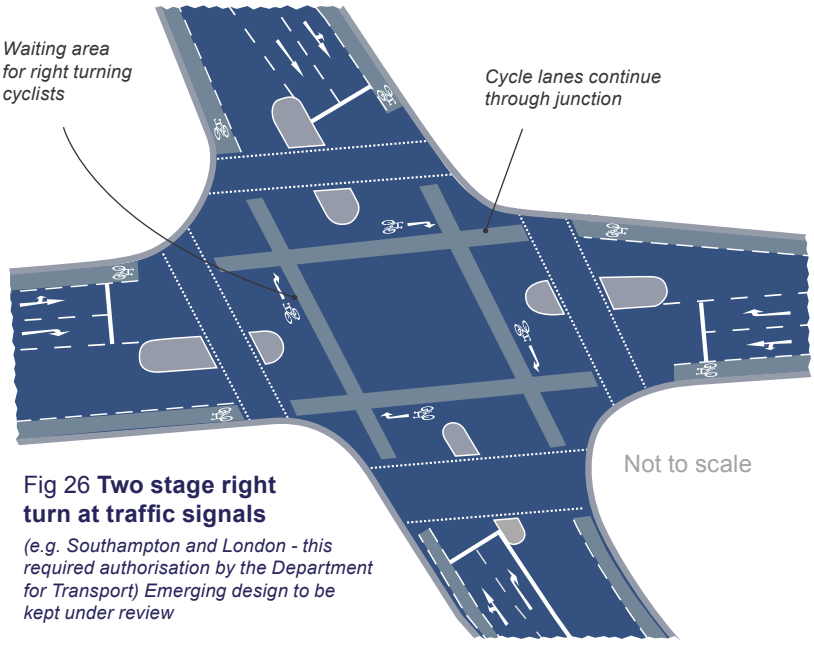


Fig 26 **Two stage right turn at traffic signals**

(e.g. Southampton and London - this required authorisation by the Department for Transport) Emerging design to be kept under review



Wands

Photo: TRL Ltd



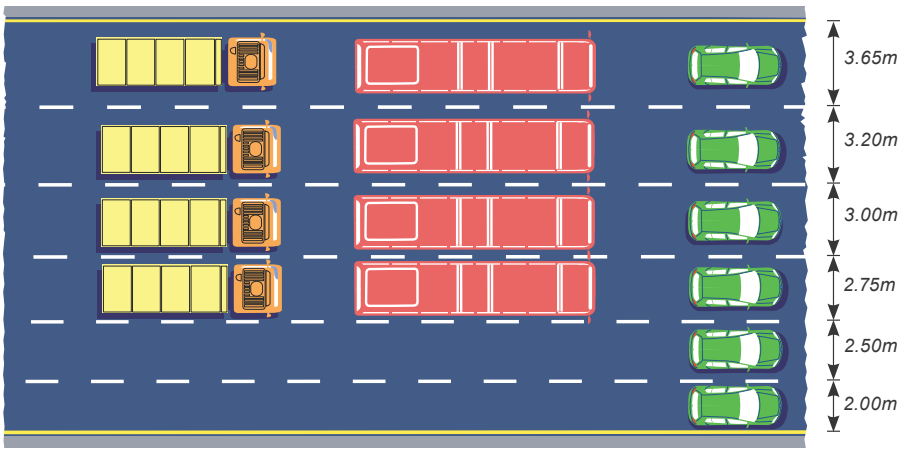
Two stage right turn, Southampton

Streets and roads 7

Carriageway and lane widths

Fig 27 **Sizes of vehicle that can be accommodated by various lane widths at low speeds, where cyclists are segregated from traffic**

In some instances, multiple lanes are provided to accommodate queuing vehicles and it may be acceptable for vehicles to straddle lanes in free flowing periods (as at the approach to traffic signals, or at a right turn lane). In this instance it may be possible to reduce lane widths to 2.5m, or 2.0m where HGV flows are light



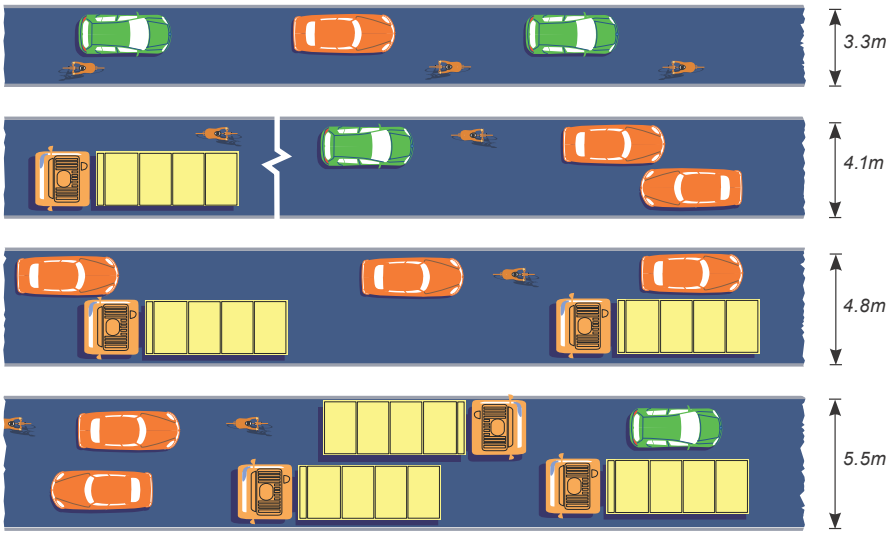
(Cardiff Cycle Design Guide)

Fig 28 **Illustration of what various effective carriageway widths can accommodate at low speeds and low flow**

Note: emergency vehicle access generally requires width of 3.5m

parking bays and buses may influence final carriageway / lane widths along a corridor

Careful consideration of lane widths is required where the road also accommodates on street parking as this may further narrow the carriageway when larger vehicles are parked



(adapted from Manual for Streets)

Minimum widths for one-way cycle lanes (Changing carriageway speeds to maximise provision can be considered

1.5m on nearside approach to Advanced Stop Line (ASL) (1.2m absolute minimum)

1.5m where speed limit is 30mph

2.0m where speed limit is 30mph and cycle flow high

2.0m (or 1.5m + 0.5m margin) on busy roads or speed limit 40mph

2.0m ASL approach lane between traffic lanes

2.0-2.5m for hybrid cycle tracks and light segregation, dependent on level of use



Cycle lane and 20 logo, Haydn Road

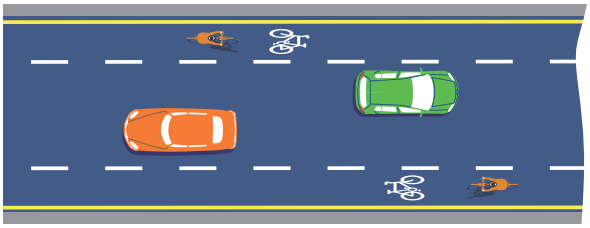


Fig 29 **Example of advisory cycle lane layout with centre line removed**

Waiting restrictions may be appropriate

Not to scale

Streets and roads 8

Fig 30 **Traffic calming and contra-flow cycling**

Note: for traffic calming details see **streets and roads 3**



Use of cycle symbols and arrows at intervals, Brighton

Contraflow cycling in one-way street with no cycle lane

Car parking

‘Speed cushions should normally be avoided on cycle routes. However, where provided (e.g. on bus routes) they need careful design



Point narrowing: avoid widths between 3.1 and 3.9m, (note inclusion of speed table), London



Entry treatment for contra flow cycle lane, Nottingham



Removal of centre line to provide cycle lanes, Haydn Road

Protected entry for cyclists, min 1.5m

Side road entry treatment, Nottingham Ring Road



Transition must be flush

Humps to be of sinusoidal profile (hump designs must be bus friendly)



Provision of cycle bypass ramped up to footway level reduces maintenance but requires additional drainage, London

Provide cycle bypass at narrowing to single lane, min 1.5m width



Contra flow cycle lane, Castle Gate

Not to scale

Streets and roads 9

Contraflow cycling

Benefits:

- It can improve accessibility, permeability and directness of a cycle network within an urban area
- Shorter, more direct journeys, can lead to reduced times between start and end points relative to other transport options and encourage a greater uptake of cycling
- It can avoid displacement of cyclists onto other, less suitable, routes
- It is regarded as a safe design option, even on narrower city or town centre streets that have a high number of pedestrian movements or frequent kerbside parking
- It can be relatively cheap to implement and the improved permeability is often popular with cyclists
- It can have a positive impact on pedestrian movements by removing illegal pavement cycling



Park Row



Shrewsbury



Bath

Low flow, low speed roads, which are suitable for contraflow cycling, can be found anywhere in an urban area.

Residential one way “gyratory system” streets result in lengthy detours for cyclists wishing to start or end journeys.

Urban centres can provide greater permeability between destinations within the main shopping and business areas, or provide connectivity for trips across town.

Available Guidance:

UK design guidance is fairly limited in its scope, which is perhaps reflected in the low levels of understanding of the benefits that the solution can bring. The DfT’s Traffic Advisory Leafet, TAL 6/98 “Contraflow Cycling” is now nearly 20 years old and sections of it have been superseded with amendments to legislation since 2011.

Both TfL, with the London Cycle Design Standards, Chapter 4 “ Cycle Lanes and Tracks”, and Sustrans, Design Manual Chapter 4 “Streets and Roads”, and Technical Information Notes (TIN’s) 34 “Processes” and 35 “Design Options” give more current information and design ideas.

The DfT design guidance, LTN 2/08 “Cycle Infrastructure Design” has limited details on design speeds and flows.

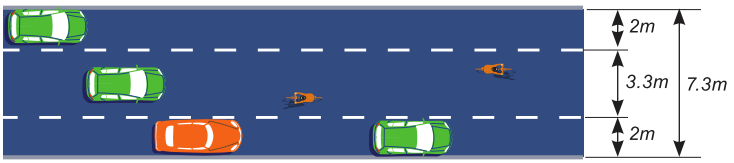
Cycle Lane Requirements:

- UK guidance together with legislative changes in 2011 allows the implementation of contraflow cycling on streets without the need for cycle lanes to be marked when:
  - 85th percentile speeds are less than 25mph; and
  - Vehicle flows are less than 1000 vehicles per day (vpd); or
  - The street forms part of a 20mph zone
- Advisory lanes may be used on streets where there is potential for occasional loading and unloading, or vehicle encroachment across the carriageway is necessary (ie to avoid obstructions)
- Each street should be considered on its own merits, using the above as a starting point for determining overall suitability

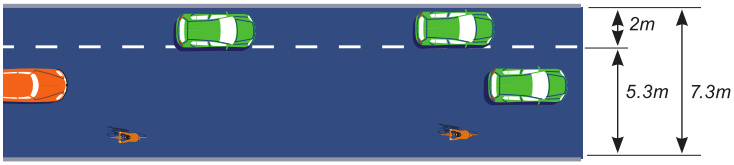
- Contraflow lanes should aim to provide a high quality space for cyclists, 2.0m is quoted in most guidance, with an absolute minimum of 1.50m
- Avoid leaving “with flow” traffic lanes of between 3.1-3.9m on wider streets as this will compromise the “with traffic” cyclist
- Wider (2.0m) advisory contraflow lanes, are better than narrow mandatory ones – especially on streets where large vehicles are known to operate (although frequency may be low)
- Assess each street on its merits, but consider the alternative alignment carefully when unsure

We will review our one-way streets with the aim of allowing two-way cycling. We will aim to achieve this with minimal infrastructure such as ‘No Entry Except Cycles’ and low vehicle speeds where safe to do so.

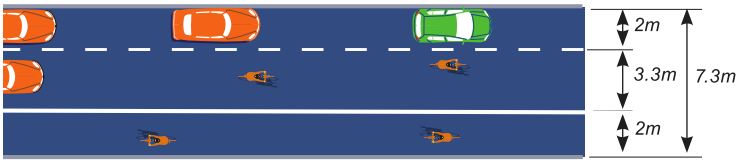
Figure 31 **Typical layouts with contraflow cycling**



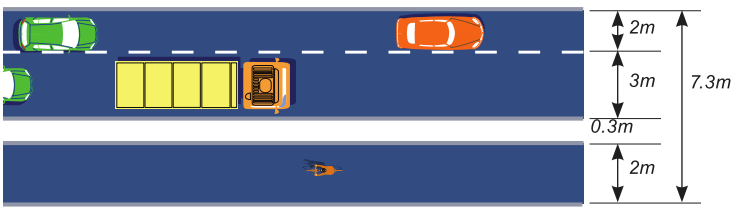
Typical one way residential street where users give way to oncoming traffic



Typical one way street with sufficient space for contraflow cycling



Typical one way street with mandatory contraflow cycling



Typical busy street with segregated contraflow cycling
(2m in this figure refers to parking bays)



Ropewalk



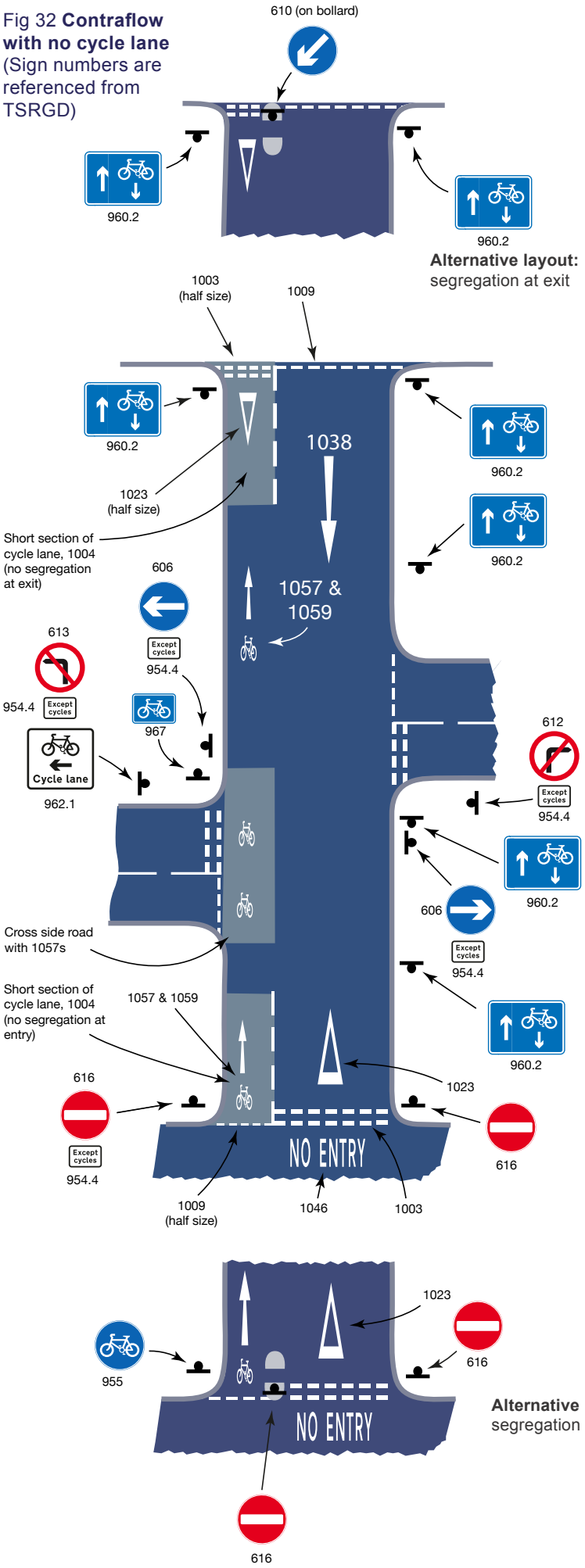
Manchester city centre



Sheffield city centre

Contraflow cycling in UK city centres needs to consider other factors as part of the process – all of which can be overcome with considerate design.

Fig 32 **Contraflow with no cycle lane** (Sign numbers are referenced from TSRGD)





Cycle contraflow at lights, London



Grade separated contraflow cycle lane, Norwich



Right turn for cyclists, Carrington Street

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Signalised junctions

General considerations

- Reduce the number of conflicts to a minimum, even if it means taking capacity from other vehicles
- Cycle safety benefits from focussing movements rather than separating into complex or incomprehensible ones
- Ensure that space allocated for pedestrians and cyclists is big enough to allow for growth in numbers, especially at peak times

We will look at improving existing, or implement new, facilities that aid cycle journeys and reduce the stop / start impact of traffic signals. We will look to implement new ideas as and when updated legislation permits. We will look at retaining permeability for cyclists when motor traffic movements are prohibited. We will ensure that facilities continue up to, and through, junctions

Safety

Signal-controlled junctions can provide safety benefits for pedestrians and cyclists by separating opposing traffic movements and reducing the need for weaving manoeuvres. Evidence indicates that signalised junctions are safer for cyclists than traditionally designed UK roundabouts with the same capacity.

Collisions involving cyclists which occur at signalised junctions are often related to drivers and cyclists running red lights, or due to conflict between left turning vehicles and straight ahead cycle movements.



Castle Bridge Road/Castle Boulevard Signals

Delays

Signalised junctions can reduce delays for cyclists and pedestrians during peak traffic periods and can manage and facilitate specific turning/ crossing movements which may be difficult under priority control. This can give dominant cycle movements time advantage over other traffic.

However, signal controlled junctions commonly result in increased delays during off-peak conditions, compared to a priority junction.
Advanced stop lines or alternative suitable provision offering a higher level of service for cyclists should be provided at all signalised junctions to enable cyclists to bypass queues and to help cyclists position themselves correctly for their turning movement.



Cycle lane across junction, Manchester

Cyclists do not like stopping because they lose momentum. Uninterrupted left turns for cycle users can be created by including cycle bypasses where space exists. In other situations, priority control may be preferable on cycle routes to minimise the need to stop and start.



Cycle bypass, Stoke

Designing for cyclists

The design of signalised junctions should consider all movements and how each user group interacts with each other. Many issues can be avoided if sufficient thought is given to pedestrian and cycle movements early enough in the design process.

More detailed design guidance and ideas are contained within the London Cycle Design Standards, Chapter 5 “Signalised Junctions” and Sustrans Design Manual Chapter 7 “Junctions and Crossings”. Guidance on how to provide Tactile Paving at signalised junctions can be found in the DFT document ‘Guidance on the use of Tactile Paving Surfaces (1998).

Designers now have a greater array of solutions to consider in order to provide high qualitiy infrastructure, all of which are dealt with in greater detail in the above documents. Traditional and ‘new’ thinking solutions include:

- Advanced stop lines and feeder lanes
- Cycle signal phases
- Early start signals
- Low level signal heads
- Cycle bypasses
- ‘Rest on’ on bus/cycle gates
- Exemption from banned turns
- Two stage right turns
- Cycle lane markings through junctions
- Diagonal crossings

Key design considerations

Waiting areas for pedestrians and cyclists should be suitable for holding peak hour demands and may require road space from other traffic.

Cyclists should not have to wait for more than one signal phase to clear a junction, and where ever possible the cycle movement should be made the ‘next call’ on the sequencing rather than waiting for a whole junction to operate before triggering the cyclist lights. We aim to get cyclists to the head of the queue so that they will be through the junction at the next available green.

Physically segregated areas should be of sufficient width to allow for a mini sweeper to maintain the facility.

Developing technology should be investigated and considered to adjust the green phase for cyclists to suit slow moving, or large numbers of cycists and ensure that they are clear of the junction before allowing other vehicles to progress.

Early starts for cyclists of 5-6 seconds can be sufficient to allow them to clear most junctions, but consider distance, other road traffic types, gradient and numbers in any design.

Bypasses should be built within the carriageway rather than by taking space from pedestrians, with a minimum width of 2.0m.

Allow for growth in user numbers.



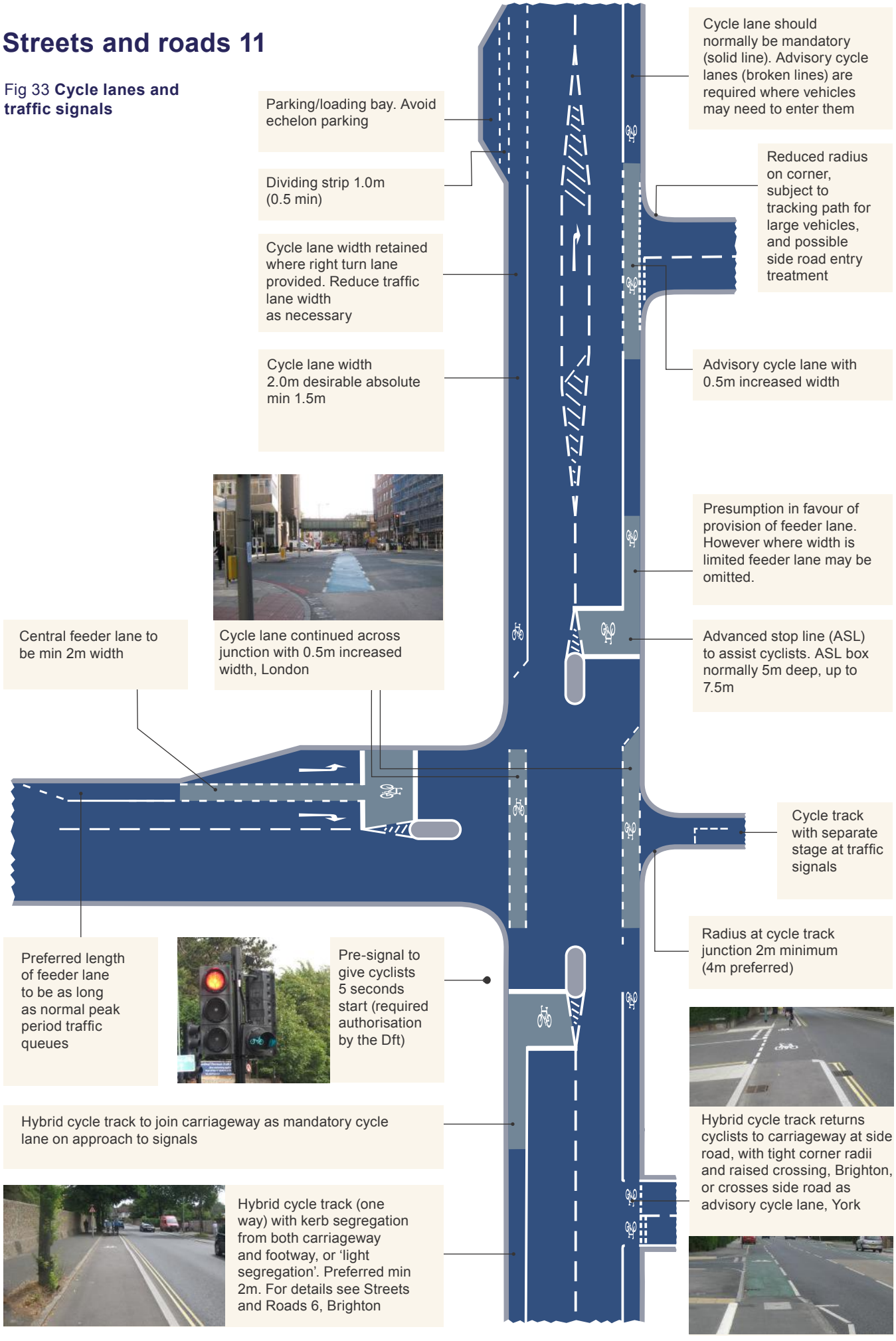
Table 9 **Summary of options for cycle-friendly interventions at signal-controlled junctions**	
Signalisation to remove conflict	Complete separation at junctions involves signalling cyclists separately to remove all conflicting movements with others
Managing conflict with turning vehicles	This may be done by giving cyclists an advantage in time or space, or by seeking to move the point of crossing conflict away from the junction itself (managing conflict)
Support for cycle right turn	As part of a segregated cycling system or a wider strategy on a route or a series of junctions to keep cyclists in a predictable position on the nearside, cyclists could be assisted with right turns by staying on the nearside and making the turn in two stages
Cycle bypass of signals	In some instances, particularly through signalised T-junctions, cyclists making certain movements may be permitted a bypass of signal control
Using ASLs and feeder lanes	Advanced stop lines (ASLs) can help cyclists position themselves in a safer, more advantageous position at a signal-controlled junction for the start of a phase and so, selectively can assist cycle movements through a junction
Banning selected motorised vehicle movements	Generally in conjunction with other measures listed here, certain vehicle movements could be banned to improve cycle safety and directness. This should be done as part of a wider traffic management approach rather than on a case-by-case basis
Convert to a priority junction	Signal removal can have some beneficial effects where the volume and mix of traffic and nature of conflicting movements does not necessarily justify the existence of a signal-controlled junction
Remove all priority and de-clutter	As part of an integrated, area-wide approach, designers may explore the potential benefits of removing signal control and priority altogether in order to promote more consensual road user behaviour generally



Part width ASL, London

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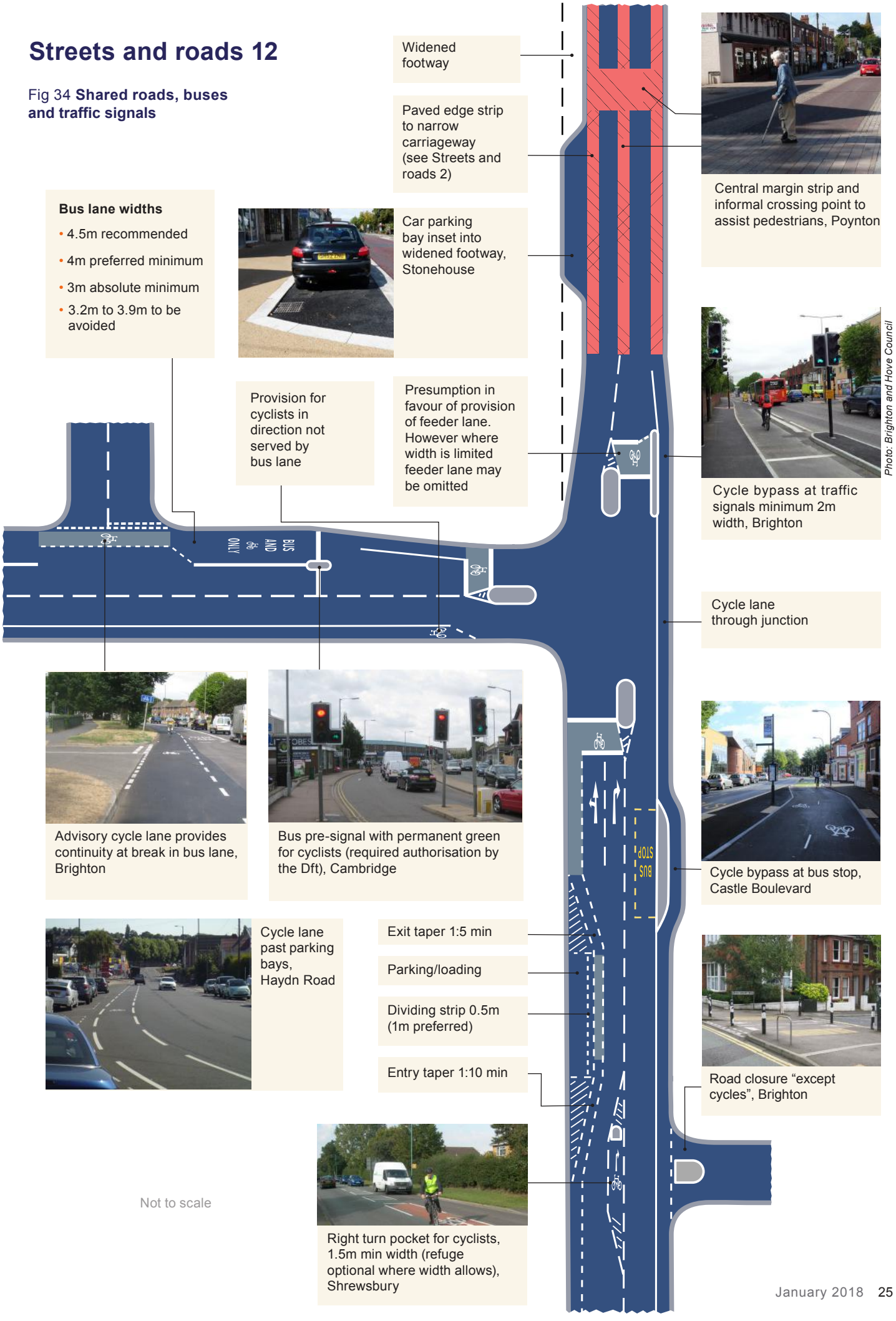
Fig 33 **Cycle lanes and traffic signals**



Not to scale

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Fig 34 **Shared roads, buses and traffic signals**



Bus lane widths

- 4.5m recommended
- 4m preferred minimum
- 3m absolute minimum
- 3.2m to 3.9m to be avoided

Central margin strip and informal crossing point to assist pedestrians, Poynton

Photo: Brighton and Hove Council

Cycle bypass at traffic signals minimum 2m width, Brighton

Cycle lane through junction

Advisory cycle lane provides continuity at break in bus lane, Brighton

Bus pre-signal with permanent green for cyclists (required authorisation by the Dft), Cambridge

Cycle bypass at bus stop, Castle Boulevard

Cycle lane past parking bays, Haydn Road

Exit taper 1:5 min

Parking/loading

Dividing strip 0.5m (1m preferred)

Entry taper 1:10 min

Road closure “except cycles”, Brighton

Right turn pocket for cyclists, 1.5m min width (refuge optional where width allows), Shrewsbury

Not to scale

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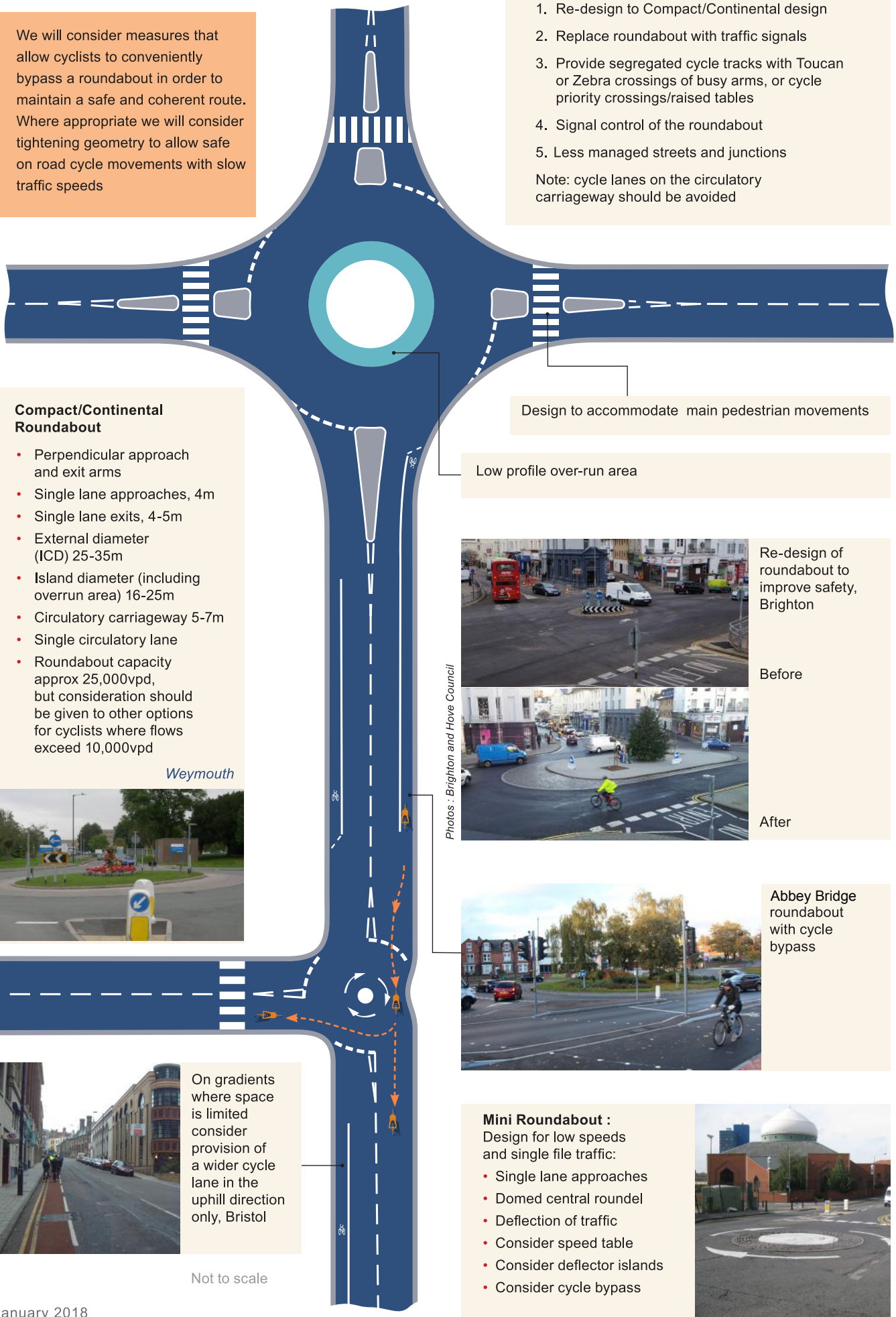
Fig 35 **Roundabouts**

We will consider measures that allow cyclists to conveniently bypass a roundabout in order to maintain a safe and coherent route. Where appropriate we will consider tightening geometry to allow safe on road cycle movements with slow traffic speeds

Large conventional roundabouts pose problems for cyclists. Options to consider are:

1. Re-design to Compact/Continental design
2. Replace roundabout with traffic signals
3. Provide segregated cycle tracks with Toucan or Zebra crossings of busy arms, or cycle priority crossings/raised tables
4. Signal control of the roundabout
5. Less managed streets and junctions

Note: cycle lanes on the circulatory carriageway should be avoided



Design to accommodate main pedestrian movements

Low profile over-run area

Compact/Continental Roundabout

- Perpendicular approach and exit arms
- Single lane approaches, 4m
- Single lane exits, 4-5m
- External diameter (ICD) 25-35m
- Island diameter (including overrun area) 16-25m
- Circulatory carriageway 5-7m
- Single circulatory lane
- Roundabout capacity approx 25,000vpd, but consideration should be given to other options for cyclists where flows exceed 10,000vpd

Weymouth

Photos : Brighton and Hove Council

Re-design of roundabout to improve safety, Brighton

Before

After

Abbey Bridge roundabout with cycle bypass

On gradients where space is limited consider provision of a wider cycle lane in the uphill direction only, Bristol

Not to scale

Mini Roundabout :
Design for low speeds and single file traffic:

- Single lane approaches
- Domed central roundel
- Deflection of traffic
- Consider speed table
- Consider deflector islands
- Consider cycle bypass

Leicester

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Cycle track (one way) with priority over motor traffic, Netherlands



Cycle track (two-way) with prority over motor traffic, Netherlands



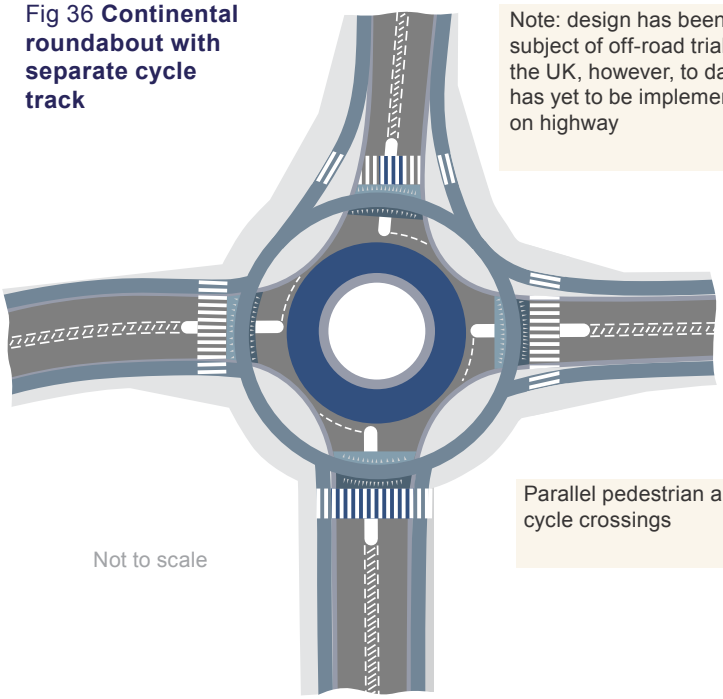
Separate signals for circulating and exiting cyclists



Graphic illustrating overall scheme

Image: TfL

Fig 36 **Continental roundabout with separate cycle track**



Note: design has been the subject of off-road trials in the UK, however, to date it has yet to be implemented on highway

Parallel pedestrian and cycle crossings

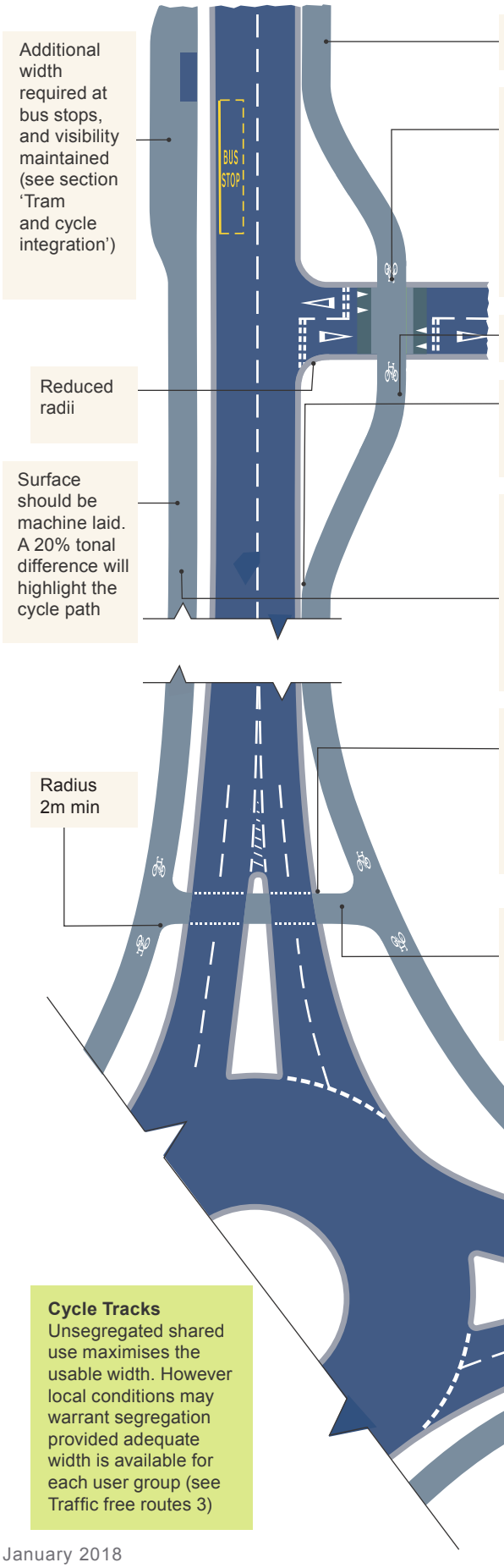
Fig 37 **Separately signalled cycle track around large roundabout,** Queen's Circus, Battersea

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Fig 38 **Cycle tracks alongside carriageway**

Key design requirements:

- Minimise number of side road crossings
- Provide for all movements at all junctions
- Cycle track continuity to avoid crossing and recrossing road
- Aim to provide cycle tracks on both sides of the road



Additional width required at bus stops, and visibility maintained (see section 'Tram and cycle integration')

Lamp columns and other street furniture to be removed from cycle track

Crossing of side roads or busy private access set back 4m to 8m, cycle track has priority, on raised table. In Nottingham a 20% tonal difference has been agreed with disability Groups for inclusion at this type of feature'

Bristol



Cycle track should not deflect through more than 45°

Reduced radii

Min 0.5m margin separation from carriageway'at 30mph speed limit. 1.5m at 40mph, 4.5m over 40mph

Surface should be machine laid. A 20% tonal difference will highlight the cycle path

Additional width for cycle track to be provided by reallocating carriageway space where practicable

Glasgow



Radius 2m min

Single stage Toucan 20m from give-way line at roundabout normally recommended subject to the road being a suitable width (5m for a zebra)

London



Final approach of cycle track to crossing at right angles to carriageway to maximise visibility for cyclists

Side road or busy private access crossing not set back. On raised table, reduced entry radii. Priority to be determined from site conditions, visibility, speeds, flow. Note that TSRGD now permits use of a parallel crossing. Green surfacing can be used to highlight to cyclists and drivers their need to be aware of potential interaction with each other

Parallel crossings

Cycle tracks on both sides of road improve connectivity

Not to scale

Less busy private access, cycle track continued across (access to be re-engineered where necessary)

Cycle Tracks
Unsegregated shared use maximises the usable width. However local conditions may warrant segregation provided adequate width is available for each user group (see Traffic free routes 3)

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On-carriageway cycle-only tracks

Measures and brief description

One way or two-way cycle-only tracks can be created at carriageway level by reallocating part of the carriageway width. Separation from traffic is achieved using sections of raised kerb or a planted strip or pedestrian median. Occasionally parking/loading bays provide additional separation. Equivalent two-way on-carriageway facilities without kerb separation are not recommended.

Two way cycle tracks are a good way to provide facilities where there is limited road space and side road flows are low. An example is Castle Boulevard.

Examples of this type of cycle track in the UK have increased in recent years. Short lengths of this treatment can provide a solution to route continuity; for example where a two-way connection is needed between two cycle routes which intersect a major road on the same side. In the absence of wide footways or verges, the alternative would be for cycle users travelling in one direction to cross and re-cross the main road.

Successful examples of significant lengths of on-carriageway two-way cycle tracks exist in Glasgow, Belfast, Bristol and London. TfL identifies the following situations where two-way cycle tracks on one side of the road are beneficial:

- Streets with buildings and active uses on only one side (e.g. a waterside location)
- 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

The design of provision at side roads and at start and termination points is key to cyclists' safety and priority. Designs must ensure that motorists and pedestrians are aware of all potential cycle movements, through signing supported by speed reducing entry treatment. This is particularly important where the road parallel with the two way cycle track is one-way. Side road treatment is generally more straightforward where the side road is one-way.



Use of diagram 1057 cycle symbols and diagram 1059 direction arrows at side road junction
Castle Boulevard / Alderney Street



Yellow box marking reinforces cycle track priority at side road junction, Glasgow



Two way cycle tracks increase complexity at signalised junctions and may require separate staging for cycle movements
Castle Boulevard



Castle Boulevard

Benefits

- Created by reallocation of carriageway space and does not take space from pedestrians
- Segregation from traffic on links
- Kerb separation prevents parking encroachment
- Kerb separation from pedestrians reduces the likelihood of pedestrians inadvertently walking in the cycle track. However, locations where pedestrians will want to cross require careful design (See Sustrans Design Manual: Chapter one - Principles and Processes for Cycle Friendly Design)
- Retention of existing carriageway levels will ensure minimal impact upon existing underground utilities
- Two-way cycle tracks within the carriageway can link destinations and routes on the same side of major roads, without the need to cross and re-cross the adjacent main road alongside. Can provide essential links between Quiet Streets

Key design features

Widths of cycle-only tracks should be as follows:

- Cycle-only two-way tracks should be a minimum of 3.0m wide in most situations (2.0m wide for one way cycle only tracks) These minimum widths accommodate low levels of cycle use
- Preferred widths where flows are high are 4.0m or more for two-way use or 2.5m+ for one way use, which will allow cyclists to overtake each other
- For short distances (up to 6m in length), minimum widths are 2.0m for two-way cycle use and 1.5m for one-way use. However, this may create a significant capacity constraint where flows are high
- Additional width should be added to the above dimensions to provide clearance from vertical bounding features
- Use of battered kerbs is recommended to increase the effective width of the cycle track

The width of the segregating kerbed strip should be as follows:

- 0.5m minimum where the speed limit is 40mph or less (We will consider a 0.3m kerb where road widths are constrained. Following a successful trial on the Western Cycle Corridor)
- 1.5m minimum where speed limit is over 40mph
- 1.8m or above where a pedestrian refuge is needed in the margin strip
- 2.0-3.0m where the strip accommodates parking or loading bays
- The kerb separator between the cycle track and traffic lanes will affect carriageway drainage, Leaving gaps in the kerbing at existing gully points can overcome this, without needing to introduce new gullies

Cycle-only tracks are signed using signs to diagram 955 (route for use by pedal cycles only) and cycle symbol diagram 1057. Two-way cycle tracks may have lane markings to diagram 1008 along the centreline of the track to help separate opposing cycling streams.

Priority at side roads and accesses: vehicles which nudge out into traffic will obstruct the cycle track and may obscure intervisibility between cyclists and other turning vehicles. The following treatment is recommended:

- The cycle track should be marked as an advisory cycle lane, with coloured surfacing across the side road. The cycle lane should be as wide as the cycle track (at least 2.0m). Use of cycle symbol diagram 1057 and direction arrows (diagram 1059) should be used at junctions to emphasise the direction(s) cyclists may be travelling across the path of motorists
- Alternatively, yellow box markings can be an effective solution to prevent encroachment into the cycle track by motorists
- Junction entry treatment with tight radii, narrowed side road carriageway width and a raised footway crossing can help to reduce traffic speeds and reinforce cycle priority

Design of two-way provision at other junctions may require separate signal stages, with impacts on capacity and/or cycling journey times compared to with-flow provision. Where pedestrians need to cross, the following options should be used:

- Where pedestrian and traffic movements are low, the kerb separating the cycle track and traffic lane should be removed at the crossing point and pedestrians wait to cross cycle and traffic streams in one movement
- Where pedestrian and/or cycle flows are high, additional space should be provided where possible for pedestrians to wait between the cycle track and the traffic lanes. This will enable pedestrians to cross cycle and traffic streams separately
- It may be beneficial to raise the cycle track to footway level at crossing locations top moderate cycling speeds

At bus stops, additional width will be needed between the cycle track and the carriageway for passengers to alight and wait to board without obstructing the cycle track. If this additional width is not available, the cycle track may be raised to footway levels and a short section of unsegregated cycle track introduced.

On carriageway cycle tracks may impact upon existing frontage activities, particularly waiting and loading.

Other considerations

- Construction costs are higher than for light segregation due to kerbs and drainage requirements
- Potential impact on underground services
- Cycle tracks with a kerb separator are less adaptable than light segregated cycle lanes to enable widening if cycle use increases



Cycle track with kerb segregation. The margin strip is splayed to minimise the risk of cyclists colliding with the outer edge of the narrow track, London



With-flow cycle track on the carriageway with wide kerb segregation adjacent to car parking, Brighton



Cycle track raised to footway level and locally narrowed to create a bus boarding area and to moderate cycling speeds, Glasgow

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Two way segregated cycle tracks

On key routes we will aim to provide segregated cycle facilities.

Table 10 **Two way segregated cycle tracks**

Detail	Size / description	Material
Cycleway surface	Minimum 3m wide	Machine laid small aggregate flexible surfacing
Separation from the carriageway	Kerbed separation strip 500mm wide. May vary to max 1000mm / min 300mm for short lengths. Road kerb face 125mm, cycleway kerb face 100mm	Concrete kerbs, concrete infill
Kerb Detail	Splay kerbs on all cycle facing kerblines where motorised traffic does not share cycleway	Standard pressed concrete kerbs
Drainage	Conventional gullies in road, kerb drains in cycleway	Concrete drainage kerbs or ductile iron kerb drains in cycleway depending on capacity requirements
Gaps in Segregation	Consideration to be given to introduction of breaks in segregation strip where frequency of side roads is low, to assist access for service vehicles	-
Lighting	Existing street lighting to be used Lighting columns not to be placed in cycle way. We will consider the use of lighting mounted at a low level	-
Side road entry treatments	Principles referred to in Side Roads section to be adapted to suit wherever possible	Green pigmented surface treatment incorporating anti-slip aggregate
Lining	As required by TSRGD, to provide priority for cyclists, to show a clear route through junctions	specified MMA lining where high wear of lining is anticipated and maintenance access difficult
Bus stops	Relocation of stops away from cycleway where possible. Where this cannot be achieved, 'floating' bus stop arrangement to be used	
Signals	Low level signals to be used where appropriate (Nottingham City Council has approval from the DfT to use citywide)	-

When looking at what type of cycle facility to install, a variety of factors will be considered including space, traffic levels, on street parking and the number of side roads and driveways present. A two way segregated cycle facility will not fit all locations and would be one of the options considered in addition to one on the following types of provision with a view to achieving the best possible provision for cyclists:

1. One way cycle lanes on both sides of the road (varying levels of segregation)
2. Partial segregation
3. Mandatory cycle lanes
4. Segregated facility in the verge/footway

A two way segregated cycle track provides a two way cycle route which is at road level and is segregated from both traffic and the footway by kerbs. Cyclists travelling in either direction will have priority over vehicles turning into and out of side roads

Signalised Junctions

Two way segregated tracks will cross signal controlled junctions via a cycle only phase triggered by loop detectors and push buttons that will call the cycle phase at the end of the next traffic phase.

Side Roads

Priority for cycles across side roads is to be maintained with double 'Give ways' installed to control side road traffic. The cycle route across the side road is to be constructed in a green paint to highlight the junction to cyclists and drivers and therefore to each other. Improvements at side roads also present opportunities to increase connectivity with the wider network (please refer to 'Side road entry treatment' section on next page). Tactile paving at side roads should be provided as indicated in the DFT document 'Guidance on the Use of Tactile Paving Surfaces (1998)

Enforcement

Although it is envisaged that the kerbed segregation will make two way segregated tracks self enforcing, they will be dedicated as cycle tracks enforced by the Police to exclude unauthorised vehicles travelling upon them. Parking and loading on two way segregated tracks is to be controlled by Clearway orders. At side roads where vehicles may be able to enter the cycle lane, the green surfacing shall extend into the cycle lane a short distance, and 1057 cycle symbols shall be used in each direction to each side of the side road to reinforce the restriction. If encroachment issues are found to occur at side roads measures such as a bollard can be installed.



Castle Boulevard



Castle Boulevard

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Side road entry treatments

Where a cycle track crosses a relatively lightly trafficked street, the cycle track can be given priority over the side road. The crossing should generally be sited on a flat-topped road hump to ensure low vehicle speeds. This treatment can be used at crossings of side roads where they join a larger road, or mid link.

The design in both situations should ensure that it is clear to motorists that they must give way, and that there is sufficient intervisibility between drivers and users approaching the road along the cycle track.

Cycle priority at side roads (raised) crossings is appropriate where vehicle turning flows to and from the side road are low (two-way flows of less than 2000vpd) and 85th percentile speeds are less than 30mph.

This treatment will help to maintain continuity and priority for cycle routes alongside main roads which are commonly key cycle desire lines. The following sketches do not show all of the detail required at side road crossings. Tactile paving services should be provided is indicated in the DFT document – Guidance on the Use of Tactile Paving Surfaces (1998).

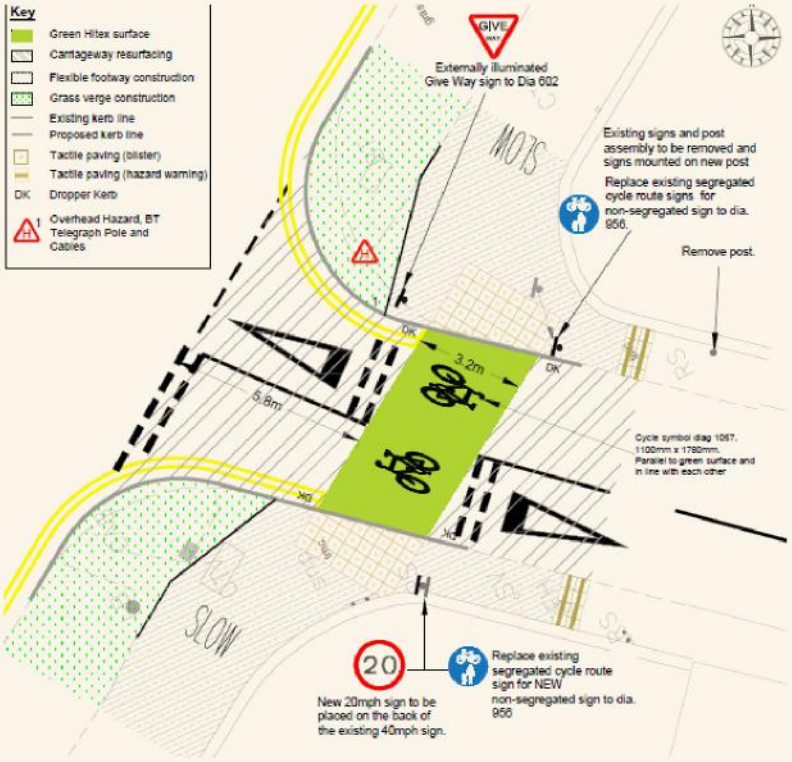
Fig 39 **Option 1: Ramp and 'Give way' to provide priority**

This option is for use on one-way or two-way cycle tracks where space is available to accommodate a cycle track set back from the main road. The option might be used on a residential access road serving a large housing estate located on busy main road.

The design allows clear continuation of the cycle track across a side road but without 'Give way' markings. The cycle / pedestrian crossing point should be a contrasting colour (Nottingham green) from the approach paths.

The cycle track is set back from the main road and crosses the side road on a ramp. The 'Give-way' markings and ramp slow traffic to give cyclists priority over vehicles. The option is very useful when two way cycle crossings are desired.

Examples of this layout can be found across the country and standard details have been produced by TfL and Sustrans. Appropriate visibility is very important to the success of this junction design.





Southwold Drive



Barnby Walk

Fig 40 **Option 2**

This option is for use on one-way or two-way cycle tracks where low traffic volumes use the access road and vehicle speeds are also low on the private forecourt/access road/Cul-de-sac.



The Overarching Design Principles are:

- Priority for cyclists and pedestrians at all side roads (They should not need to give way) (designs need a strong visual priority including a 20% tonal surface difference)
- Low vehicle entry and exit speeds needed.
- A risk assessment/safety audit should be undertaken on a site by site basis (local conditions may indicate that a surface treatment, such as a continuous footway and cycle lane/track, is sufficient to give clear visual priority that turning vehicles must give way).
- Maximum visibility with minimum street clutter.
- Smooth, attractive and ‘at level’ surfacing.
- Where a bell mouth layout is proposed use materials, in potential conflict areas, that have a visual contrast with the carriageway to raise awareness (Nottingham green surfacing)
- At some locations – especially streets with a low property number, materials simply continue, unbroken across the mouth of the junction – similar to a private driveway

Tram, bus and cycle integration

Integration with on highway public transport

Buses

In many locations it may be necessary, or appropriate, to use the same street for bus and cycle movements. These roads may be connectors, high streets and key arterial routes. In all cases the level of provision should match the nature of the road travelled, so that routes which see greater numbers of bus movements should receive a greater level of cycling provision. Shared bus/cycle lanes are most likely to be appropriate on street types with a medium to high movement function.

Refer to London Cycle Design Standards 2015, Chapter 4 for further information.

Consider:

- Cycle flows and variations in flows during the day
- Volume and frequency of buses, including several buses using a stop simultaneously
- Ability and number of passengers to access/leave the bus
- Pedestrian and wheel chair access to and from the stops
- Design and layout of any bus hoardings and shelter
- Hours of operation for bus lanes



Consider changing existing bus stop layouts to accommodate cycle movements.

Transition to and from any on road facility to a bus stop bypass should be smooth, with flush kerbs, suitable drainage provision and clear sight lines.



Bus stop bypass, Castle Boulevard

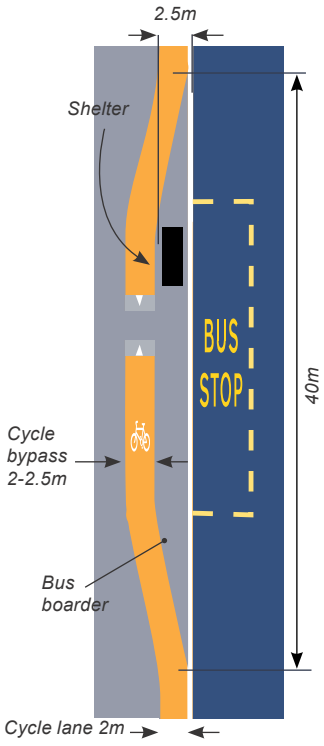


Fig 41 **Bus stop bypass, typical detail (floating)**

Design requirements

- Shared bus/cycle lanes should be a minimum of 4.0m wide, with a preferred width of 4.50m on roads with gradients steeper than 1 in 20, and on contraflow bus lanes
- Segregated corridors that result in fixed kerb lines should be designed to accommodate overtaking cyclists and / or two directional cycle flows. Minimum widths of 2.0m (one way) or 3.0m (two way) tracks are appropriate
- Bus routes at signalised junctions should provide suitable facilities, such as loop detection or ‘developing detection technologies’, to ensure that cyclists are not missed from “bus only” detection on gates and bypasses
- Consider centreline removal on bus routes with low general traffic flows, to encourage lower speeds and more flexible use of the carriageway around a bus stop
- Bus stops within bus lanes should be 4.5m wide to ensure that cyclists may pass a standing bus without encroaching into adjacent traffic lanes

Trams

In the UK cities where tram networks have been reintroduced (Manchester / Sheffield / Edinburgh and Croydon) design guidance in relation to cycling is limited. It appears that (with the exception of Edinburgh) the common approach has been to provide alternative or parallel routes to minimise the need for cyclists to travel along the same road as trams. A similar approach has been taken within Nottingham.

Consider:

- Routes that are designed to specifically avoid tram infrastructure should ensure that high quality provision remains at key junctions and crossing points
- Routes crossing tram tracks should be designed to ensure that cyclists cross at, or as close to, 90 degrees as possible
- Avoid designing cycle routes that limit the crossing options available to cyclists. Road closures to accommodate tram routes should still provide facilities to allow cyclists to continue on quieter streets
- Encourage cyclists to slow down on the approaches to tram crossings, using tighter geometry and gentle horizontal deviations in alignment
- The types of bikes cyclists use for various journeys. Try to avoid developing “fast commuter” routes, where cyclists may prefer “narrow tyre” road bikes that need to cross, or run alongside tram tracks



Waverley Street

The design of Nottingham’s tram routes are set down in an unpublished document ‘Highway Alignments and Geometrical Layout’ produced by Mott McDonald for the Concessionaire. The specifications for cycle routes along tram links are included in this document and key points are included in this guide. The Design Guide does not seek to change significantly how cyclists are provided for on existing tram routes but to influence the design of future links. It is further noted that any works proposed on the public highway within the envelope of tram operation must be consulted on with the tram operator.





Bus stops on new developments should provide facilities which encourage greater connectivity between cycling and public transport use

Design guidance provided to the Concessionaire for use when designing the first Nottingham tram route included a requirement to give consideration to the following when making assessments of cycle infrastructure requirements:

- The views of local cycle interest groups
- The impact on cycle routes and facilities in the wider area (existing routes)
- Alternative routes
- Cyclists remaining on the alignment (for local access)
- Mitigation measures to ensure cycling as a transport mode is benefited by the presence of the tramway

This design guidance also states that:

Cycle routes shall as far as is reasonably practicable be designed with consideration of the following:

- Reducing the number of conflicts of the route with other traffic, including the tram
- Where possible, cycle routes should be provided with a facility to keep cyclists away from the rails
- Where a cycle route crosses the tram track, this shall be as close to perpendicular as possible; shallow angles shall be avoided
- Clarity of the cycle route at remodelled junctions
- The continuity and coherence of the cycle route to users and adjacent traffic
- The use of appropriate signs to promote the use of cycle routes

The above should be considered for any future tram route development.

The following three basic scenarios where a tramway presents a hazard to cyclists should also be considered;

- **Junctions** – turning movements across the tram tracks at traffic junctions
- **Divergence/convergence** – where a tram lane and traffic lane diverge or converge forcing a crossing at a shallow angle
- **Tram stop platforms** – where cyclists are squeezed out from the space between the platform and the nearest rail

Details of cycle provision along tram routes requiring further consideration for future tram route development are noted below.

Shared use adjacent to tram routes

Shared use pedestrian and cycle facilities adjacent to tram routes should be of the same standards noted in Table 10. A 3m minimum width is specified with a preferred width of 4m where demand is high or where there is a steep gradient. The width should also be increased where edge constraints are present.

Tram stops

The width of carriageway between tram rail and kerb narrows on the approach to stops. For future routes segregated cycle provision should bypass tram stops by providing 'floating' stops. Only where the space available does not allow for this type of facility should shared use around the back of stops be considered.

Warning signing

Crossing tram tracks can be hazardous and, cycles should be guided to cross at 90 degrees. The tram operator has obtained temporary Department for Transport permission to use a variation of the 'slippery Road' sign to warn cyclists of this danger. The tram operator and City Council should ensure that future routes will still be able to use these signs.

Direction signing

Direction signing is also very important to inform cyclists how they should negotiate the tram tracks ahead and also to indicate suitable alternative routes avoiding tram tracks. Again, the tram operator has Department for Transport temporary permission to use non standard signs for this purpose. Again the tram operator and City Council should ensure that future routes will still be able to use these signs.

Cycle parking

The first route of the Nottingham Tram included a minimum of 5 Sheffield stands at tram stops covered by CCTV. For the second route, consultation led to parking only being provided where demand was likely to occur. For future routes cycle parking should be provided at all tram stops. 'Citycard' cycle hire should also be provided at key transport interchanges.

Use of rubber infills

The tram operator has clarified the position with regard to the use of "rubber infills" for tram rails. This states that their use cannot be endorsed. Whilst the intention of these 'infills' is to address the hazard of cyclist in grooves, in doing so they introduce a wide range of other issues and hazards to other users. This point is supported by trials carried out on tram systems worldwide.



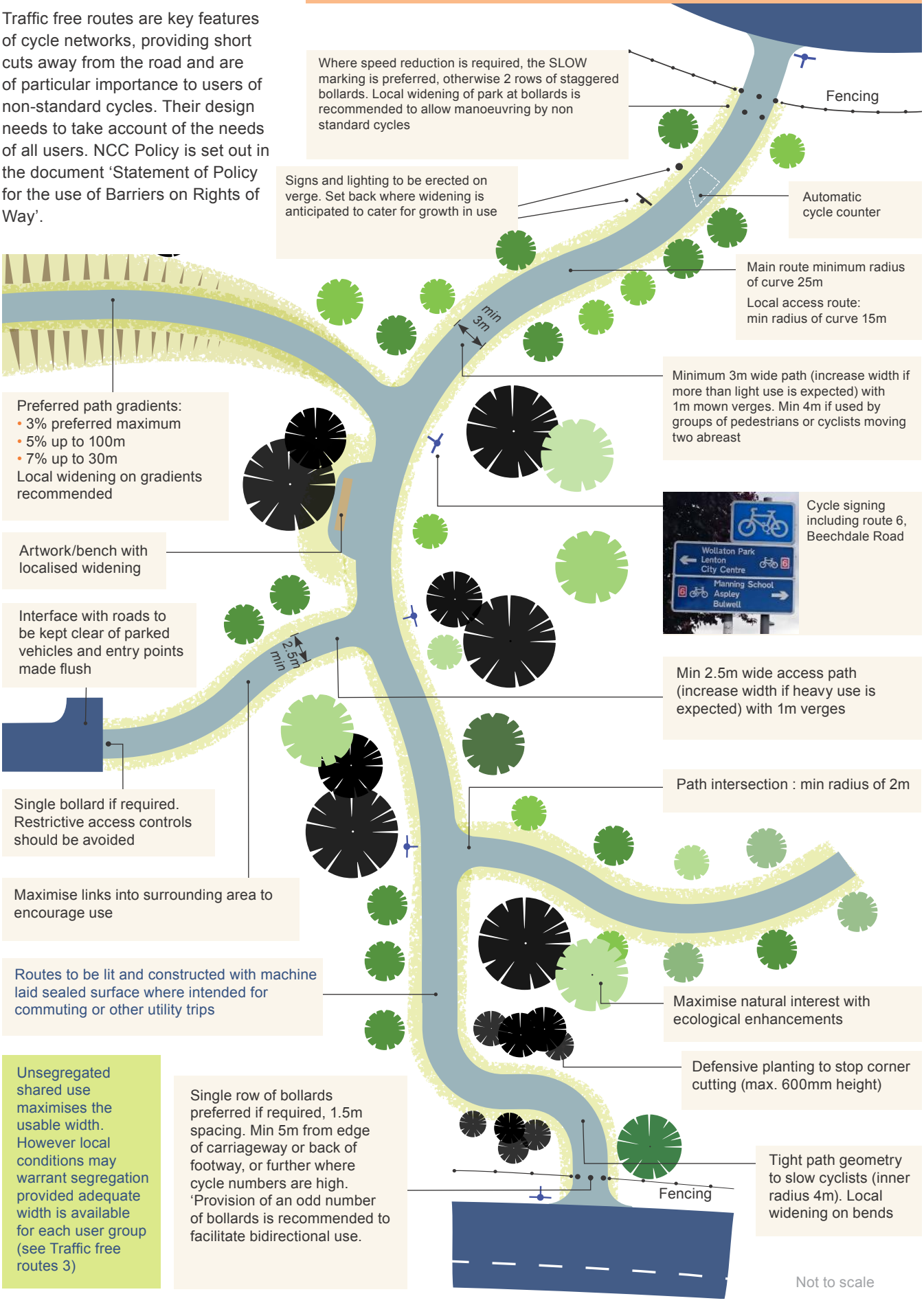
Theatre Royal Square

Traffic free routes 1

Fig 42 **Route design**

Traffic free routes are key features of cycle networks, providing short cuts away from the road and are of particular importance to users of non-standard cycles. Their design needs to take account of the needs of all users. NCC Policy is set out in the document 'Statement of Policy for the use of Barriers on Rights of Way'.

We will look to maximise improvements for all potential users where routes cross parks and urban open spaces. We will consider whether it is appropriate to segregate path users and when required to do so will implement solutions that are easy to maintain Segregation should not be considered in central areas. More restrictive access controls are likely to cause problems for non standard cycles, particularly hand cycles where it is not an option for the rider to get off.



Traffic free routes 2

Fig 43 **Path construction**

Traffic free routes 2

Path construction

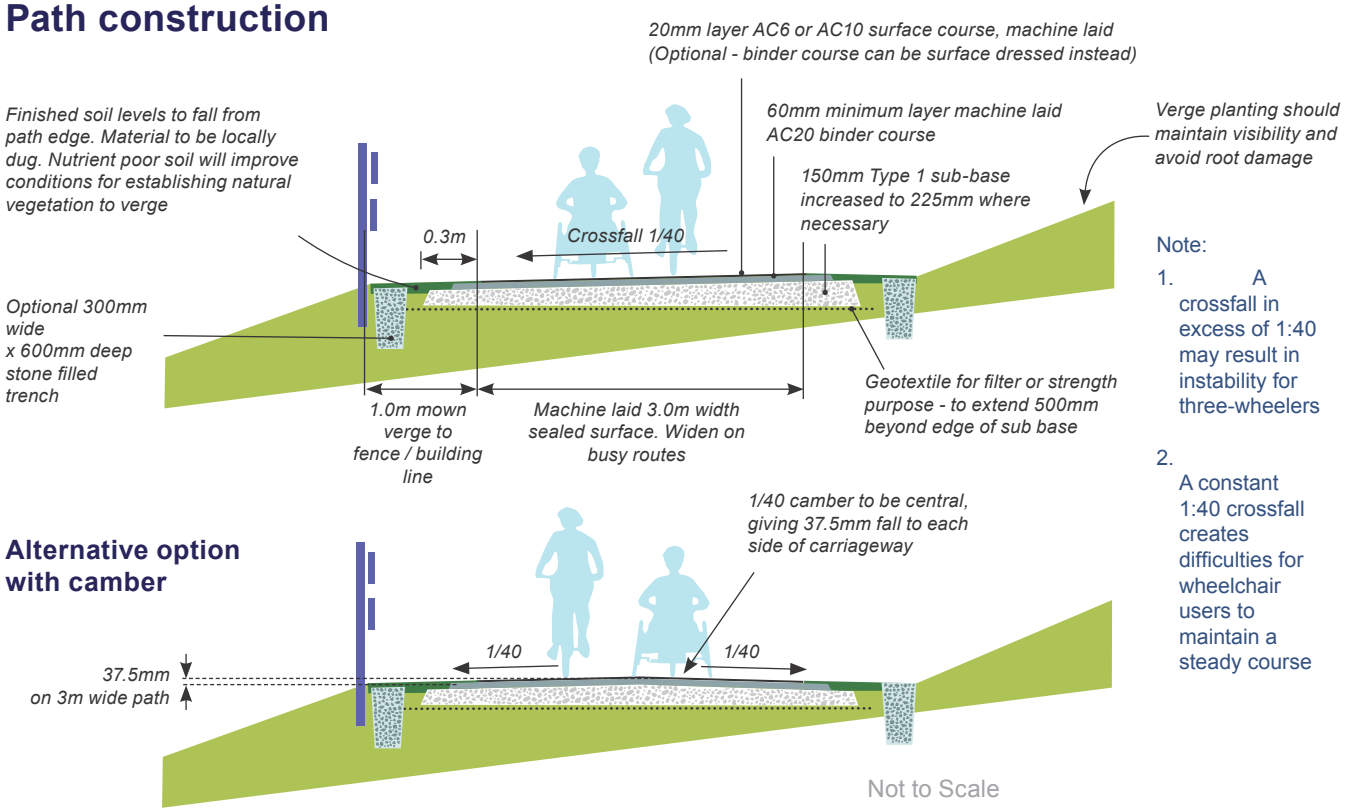


Table 11 **Path construction requirements,** unsegregated shared use

Nature of route	**Min. effective path width** (see Note 1)	**Type of surface**
Urban traffic free	3.0m on all main cycle routes, secondary cycle routes, major access paths and school links; wider on curves and steep gradients. Where high usage is expected, or significant demand to ride two abreast, a width of 4m is preferred and segregation between cyclists and pedestrians considered. 2.5m possible on access routes and links with low use	Sealed surface imperative Surface dressed top to bitumen base course may be appropriate
Urban fringe / semi rural traffic free	3.0m on all main cycle routes, major access paths and school links 2.5m possible on lesser secondary cycle routes and access links	Sealed surface imperative Surface dressed top to bitumen base course may be appropriate

1. *Refer to Table 3 for additional width required for various edge constraints*
2. *Minimum acceptable verge width is 0.5m, 1.0m preferred*
3. *Greater width required where route is used by horses*
4. *For widths on segregated routes see Table 12*

Traffic free routes 3

We will maximise access to the city centre for cyclists and continue to allow cyclists through pedestrianised areas with minimal conflicts. We will seek to improve permeability though areas where cycling is currently restricted.

Segregation of cyclists and pedestrians

There are significant advantages with unsegregated paths where the width is shared by all users, particularly on traffic free routes away from the road. Unsegregated routes maximise usable width and minimise maintenance requirements and sign/line clutter. Effective segregation will benefit all users but requires significant additional width to provide the same level of service. DfT advice in LTN 1/12 encourages designers to think through their decisions rather than start from a default position of implementing any particular feature. Each situation must be considered on a case by case basis, and careful consideration must be given to the factors listed below.



Unsegregated shared use, Strelley Road

Whether to segregate

Segregation can take the form of a tactile delineator, or physical separation such as a kerb (standard or tampered), barrier or verge. Effective segregation requires sufficient width to be provided for each user group; segregation where insufficient width is provided is largely ineffective.

Developing the design of a shared use path, including decisions on segregation, should include early consultation with relevant interested parties such as those representing people with disabilities, walkers and cyclists.

Factors to consider when deciding whether to segregate include:



- Width available
- Level of use
- Type of use (e.g. journey purpose)
- Variability of use
- Use by groups
- Use by vulnerable pedestrians
- Gradients
- Land take, drainage, maintenance

Shared use routes alongside the carriageway are more likely to justify segregation between cyclists and pedestrians, in which case there are particular advantages in providing one-way cycle tracks on each side of the road.

Segregated shared use routes require use of tactile paving. For guidance on the use of tactile paving on segregated and unsegregated shared use paths see DFT document ‘Guidance on the Use of Tactile Paving Surfaces (1998).

Widths

Width requirements for unsegregated paths are given in *Table 12.*

Where segregation is provided, the requirements for users indicate the following two-way widths:

Table 12 **Widths**	**Cyclists**	**Pedestrians**	**Total**
Desirable minimum	4m	3m	7m
Acceptable minimum	2.5m	2m	4.5m
Absolute minimum for short lengths	2m	1.5m	3.5m

The effect of edge constraints is given in *Table 3*. Segregated cycle tracks of 2.5m or more in width should normally include centre lines.



Segregation, Bilborough Road



Segregation by grass verge, Loughborough



One way hybrid cycle tracks on both sides of carriageway, Brighton

Management

Following the introduction of a shared use path it is advisable to monitor its performance; this will enable any concerns to be identified early on and suitable mitigating measures implemented if required.

On unsegregated paths consideration should be given to the erection of courtesy signs such as “cyclists give way to pedestrians” or “share with care”.

Crossings

We will seek to maximise space at crossings by considering the extent and position of street furniture and will include “de-cluttering” in any design brief / works. We will continue to implement at least a 20% tonal colour contrast that we have already agreed with the disability forum. Wherever possible we will aim for single stage toucan crossings and include the new “cycle zebra” once legislation permits

Fig 44 **Types of crossing**

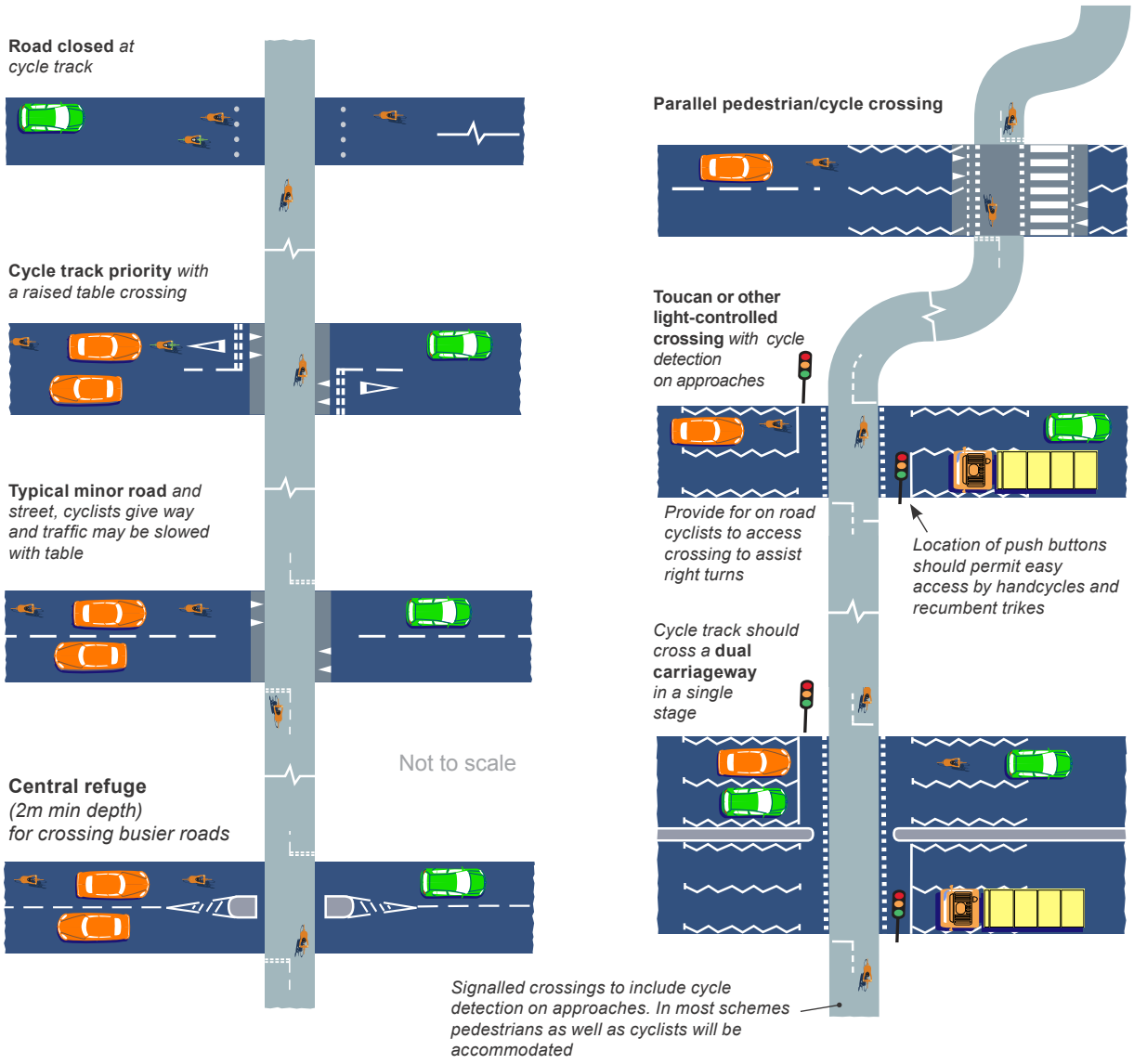


Table 13 **Choice of crossing type**

85th percentile speed	Traffic flow (two way daily)	Type of crossing
< 30 mph	< 2,000	Cyclists have priority at side road - raised crossing
< 30 mph	< 4,000	Cyclists have priority mid-link - raised crossing
< 50 mph	< 6,000	Cyclists give way to road traffic (no refuge)
<35mph	< 8,000	Parallel pedestrian / cyclist crossing’
< 50 mph	< 8,000	Cyclists give way to road traffic plus central refuge - urban
< 60mph	< 10,000	Cyclists give way to road traffic plus central stage refuge - rural
< 50 mph	> 8,000	Signal controlled including Toucans
> 50 mph	> 8,000	Grade separated crossing - urban
> 60 mph	> 10,000	Grade separated crossing - rural

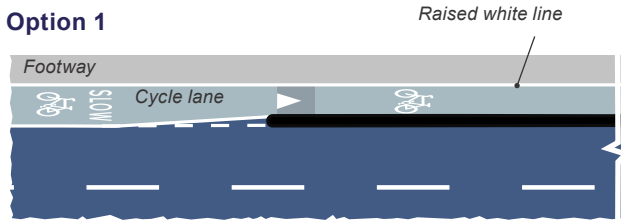
Notes : 1. Table provides guidance on appropriate crossing type, but individual locations should be assessed on a case-by-case basis.

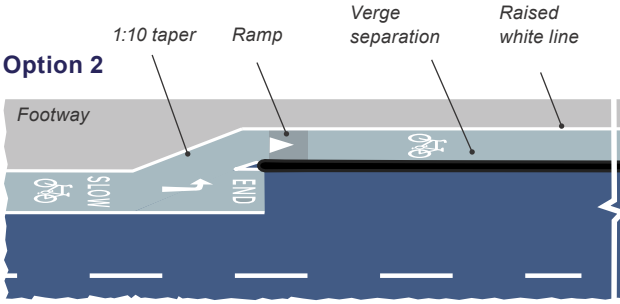
2. Main cycle routes justify a higher level of service than other routes and so are likely to have greater priority at crossings and junctions.

Interface with carriageway

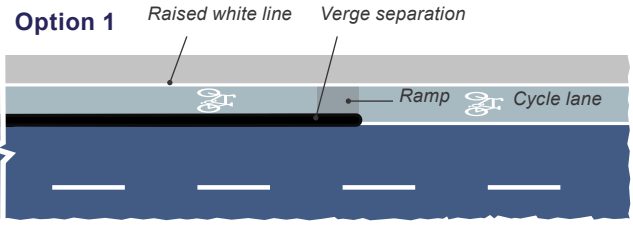
Fig 45 **Joining and leaving carriageway**

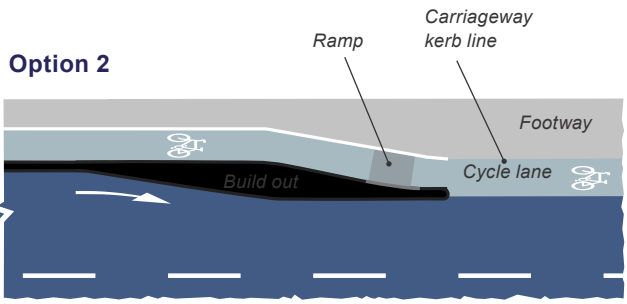
Leaving carriageway





Joining carriageway





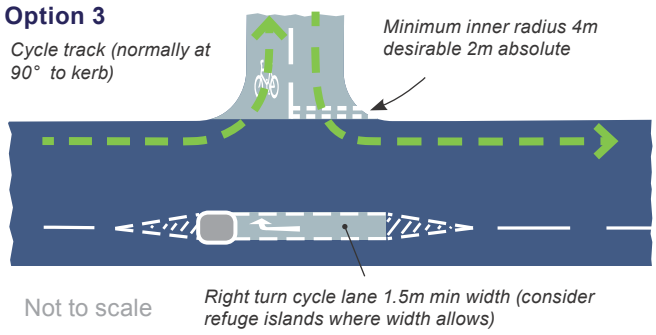
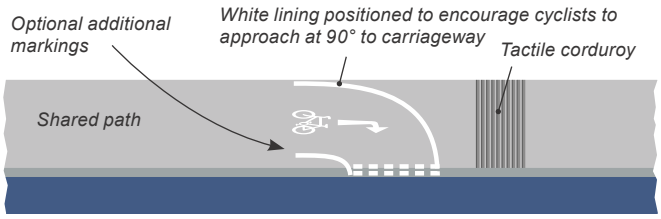


Fig 46 **Crossing carriageway**

Option 1 (shared use with pedestrians)



Note. Non standard cycles may have difficulty making a right angled turn on path widths below 3.5. Approach to junction should be perpendicular to traffic flow for adequate visibility

Option 2 (segregation from pedestrians)

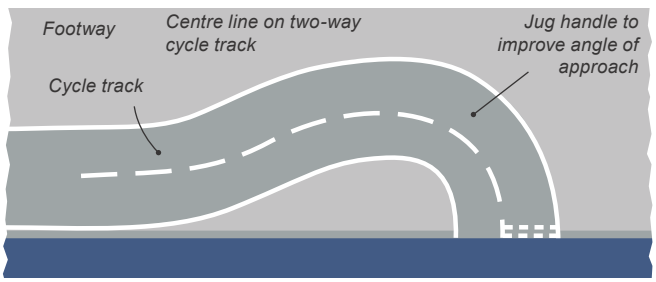
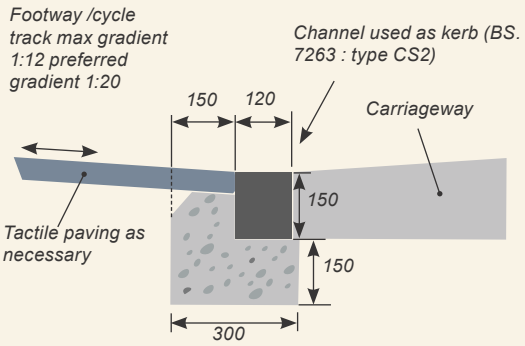


Fig 47 **Flush kerb detail**



Notes

1. All kerb transitions must be flush (±6mm)
2. Where cycle access may be obstructed by parking, consider use of a build-out, waiting restrictions, white line or 'keep clear' markings
3. Where a cycle route leaves a shared path to join/cross the carriageway, signing should initially be kept to a minimum. If necessary, direction signing can subsequently be reinforced by:
   - White lining
   - Arrow (1059) and cycle symbol (1057)
   - Cyclists Rejoin Carriageway (966)
4. End of Route (965) and Cyclists Dismount (966 variant) NOT recommended
5. Additional drainage likely to be required at transitions

Bridges and other structures

Wheeling Ramps
The provision of wheeling ramps on a cycle route is only acceptable as an alternative to a signed route suitable for all types of cycle

Bridges



Sub-standard parapets on cycle route, Bristol

Fig 48 **Bridge approaches**

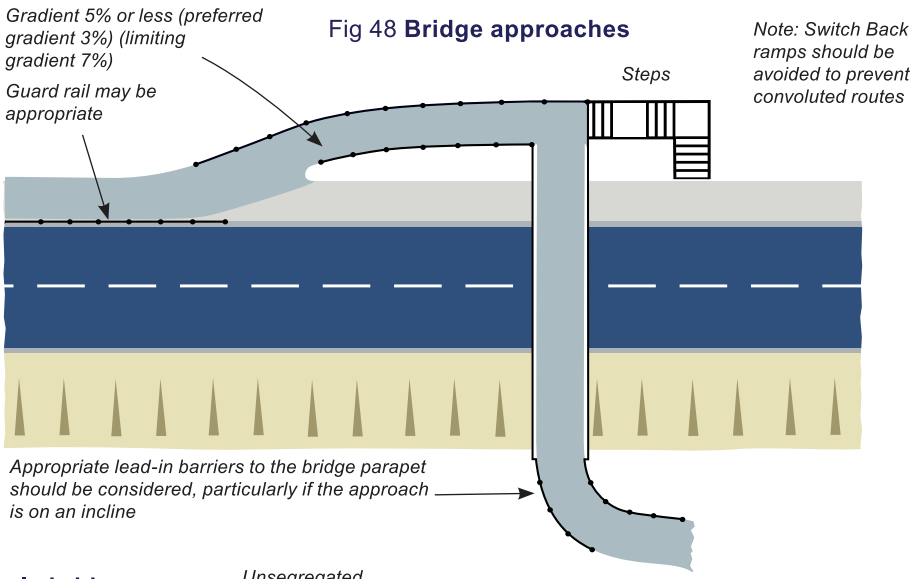
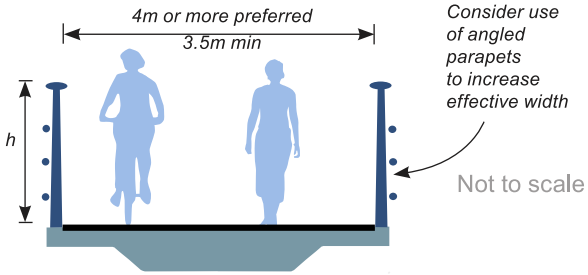


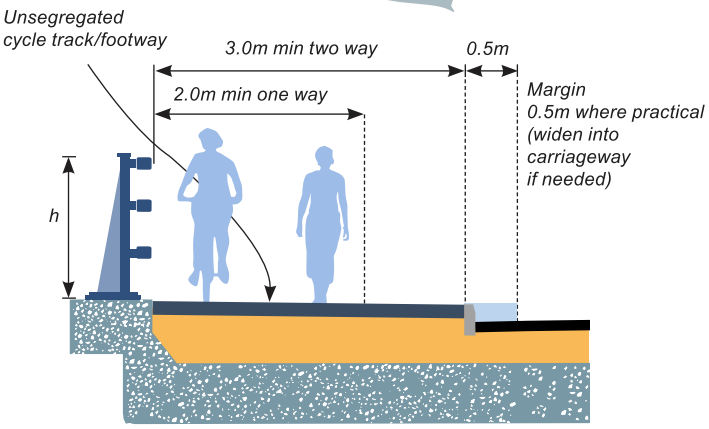
Fig 49 **Dimensions for foot/cycle bridge**



Parapet height *(h)*

- *1.4m preferred for cyclists, but many existing bridges operate well with lower heights*
- *1.8m for equestrian use (mounted)*
- *Effective width of bridge reduced by 500mm at each parapet*
- *For advice on substandard parapet heights, refer to Sustrans Technical Information Note 30*

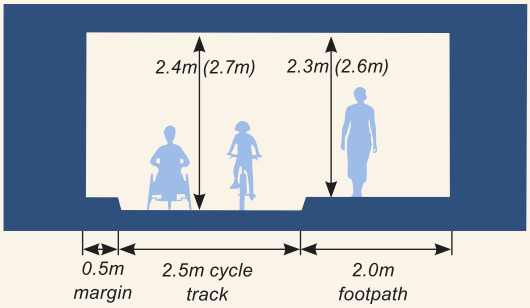
Fig 50 **Dimensions for road bridges**



Subways

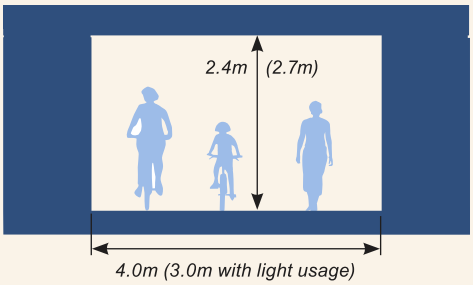
Vertical segregation (including subways) should be avoided when crossing a road, unless level differences mean such a route is more practical

Fig 51 **Typical Section** (Segregated)



- *Dimensions shown are minimum recommended for new subways*
- *Dimensions in brackets apply to subway lengths> 23m*
- *Many existing subways operate well with lower headrooms and appropriate warning signs*
- *Headroom of 3.7m required for equestrians (mounted)*
- *A greater width or walls receding towards the top increases natural light*

Fig 52 **Typical Section** (Unsegregated)





A bridge with sub-standard headroom on cycle route, Grove Road

Signing and branding

More detailed guidance on destination signage and guidance on regulatory and warning signage is provided in Sustrans' Technical information Note 5. A separate piece of work has been undertaken for the City Council to produce a signing and branding strategy which will also be published. This will also consider on road and on the ground markings to indicate routes, in addition to route branding and numbering.

Comprehensive destination signing plays a key role in the development of safe and attractive places to cycle.

Signs are an essential part of any cycle route and great care must be taken when considering their design and placement. They must provide clear, reliable information and at the same time must be appropriate and sensitive to their environment. A balance must be struck between sufficient signage and the visual clutter and maintenance liability that signing can cause. Surface markings may provide a useful alternative to post mounted signs.

Cycle specific route signing serves several purposes:

- Routes for cyclists may differ from those for motor traffic
- Gives cyclists good directions
- Improves cyclist safety and comfort
- Raises awareness of cyclists amongst other road users
- Promotes cycle routes to other road users (particularly where times are used)

Direction signing should make the route legible and reflect cyclists' behaviour, and include:

- Direction
- Destination(s)
- Distance and time

Non-standard signs may be appropriate in certain situations:

- To fit in with a sensitive environment
- Use of map type signs to assist legibility
- Signing alternative routes, e.g. where main route is unlit or may flood
- Use of temporary signs to maintain continuity is a good short-term measure until permanent signs are put up, particularly at roadworks

All signing should be:

- High quality
- Coherent
- Consistent
- Frequent
- Well maintained
- Appropriate

Tip: maximise use of lamp columns and other existing surfaces for mounting signs to avoid clutter

When looking to install new signs, a review of existing signs will take place to remove anything which is unnecessary and/or out of date.



Carrington Street



University Boulevard



Castle Boulevard



Mansfield Road



Totem



Sign with 'N' route number



Cycle signing including route 6, Beechdale Road

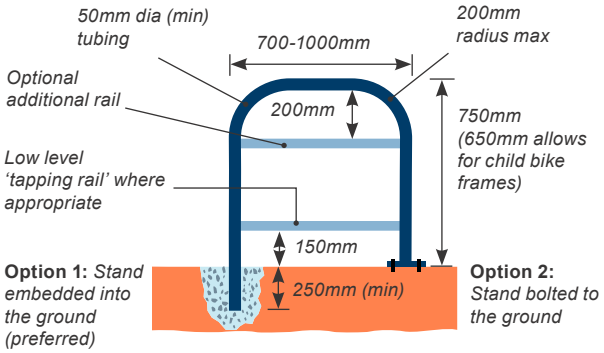
Avoid: Cyclists Dismount or End of Route signs

We will raise the profile of cycle parking facilities so that they are visible to the public, users and building occupiers. We will also increase the provision of cycle parking in the City Centre.

Cycle parking

Cycle parking is an essential element of a cycle network. General cycle parking should include adequate provision of parking suitable for all types of cycle, including tricycles. It should cater for all destinations and be sited close to building entrances where it can be observed by passers by and the building occupier. Wider and longer than standard cycle parking spaces should be provided at the end of racks, designated for disabled cyclists. When significant numbers of tricycles are expected, the provision of designated parking areas is recommended.' The preferred type of public cycle parking is the Sheffield stand, in conjunction with shelters where bikes are left for long periods. Care should be taken when siting cycle parking to avoid obstructions to pedestrians including those with visual impairments. Standards for cycle parking can be found in section DG16 provided from a link in the 6C's New Development Design Guide. Single point (Earlu) stands should not be considered as a suitable cycle parking type (prone to bike thefts). The City Council has nineteen Citycard Cycle hubs, each providing covered cycle parking for any bike, CCTV, lighting, Citycard access controlled doors and at some sites, offering Citycard activated lockers and 24 hour access.

Fig 53 **Sheffield stands**



Note: Where sign plates are to be attached to an additional rail the plates should not impede the use of the stand (it should still be easy to secure a bike to both the stand and additional rail)

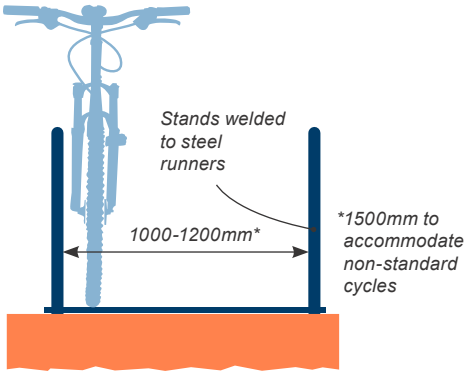
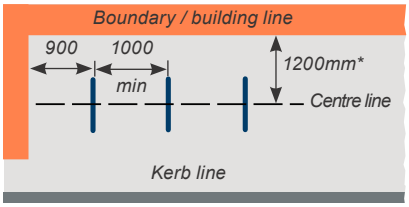


Fig 54 **'Toast rack' of Sheffield stands**

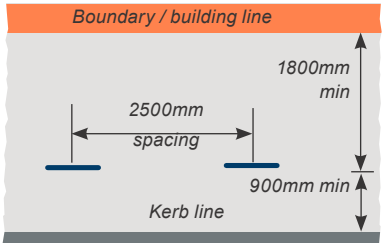
Fig 55 **Layouts**

Perpendicular



**1400 to accommodate non-standard cycles. 2500mm if pedestrian access required*

Along kerb





Stands to be oriented at right angles to any slope

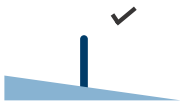
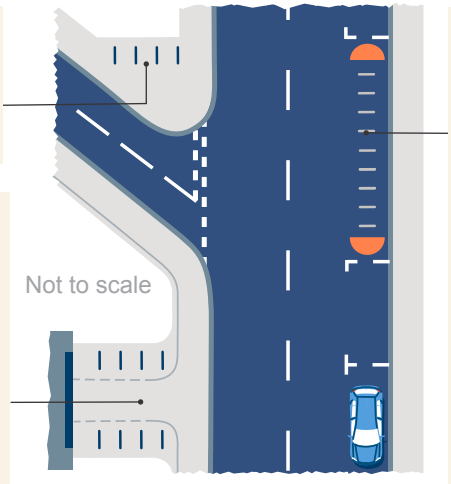


Fig 56 **Siting details**

Footway: cycle parking on the footway should be located where it is unlikely to cause obstruction to pedestrians

Off-street: cycle parking should be in prominent locations near entrances to major attractions. Appropriate standards for cycle parking should be imposed on new developments



On carriageway: road space can be given over to cycle parking, for example by removal of car parking bays. The cycle stands should be protected from encroachment by motor vehicles. Care should be taken when siting on-carriageway cycle parking opposite (nose to kerb) echelon parking bays



Brighton

Development planning

New developments present opportunities to improve the permeability of the development plot and to adjust building lines that previously constrained the cycle network around the pre-existing frontages.

The Nottingham City Council Cycle Team should be consulted on all significant developments.

Nottingham City Council intends to introduce a 'Cycle proofing' process which over time ensures that the built environment generally, and roads specifically, are seen to be safe, convenient and pleasant for cycle use by people of all ages and abilities.

The cycle proofing process will involve in priority order:

a. Progressively creating comprehensive and coherent transport networks for cycle use
b. Identifying measures to improve cycling conditions in the context of all transport and other infrastructure schemes and programmes, including planned road maintenance works, new developments and the creation or management of rights of way and other off-highway routes
c. Considering the extent and quality of existing cycling conditions on the roads network including - streets, junctions, crossings, off-highway cycle-routes and public transport networks; and to improve these where they fall below the required standard

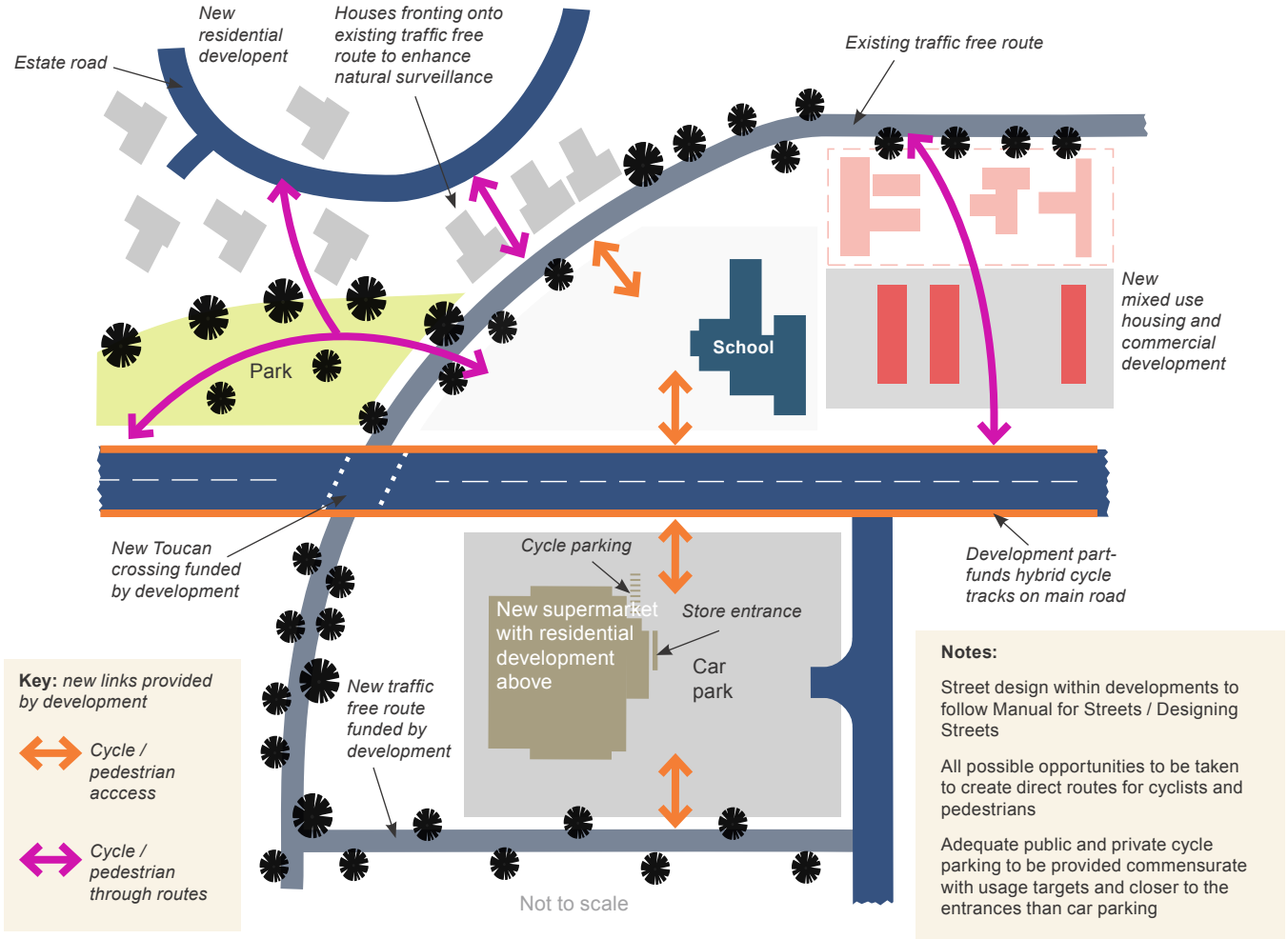
Cycle proofed infrastructure

Through the introduction of a Cycle proofing process it is intended that all roads, streets, paths and public spaces in Nottingham are attractive and comfortable for people of all ages and abilities to cycle on and feel they belong and are safe.

Cycle proofed transport infrastructure (rail, bus and, tram) enables people to use cycles with ease and convenience. This includes the provision of secure cycle parking and information for planning onward journeys by cycle. Planning for new infrastructure in Nottingham will explore opportunities for integrating cycling, including created cycle paths alongside new public transport infrastructure.

Cycle use should be a considered from the beginning of an inclusive design process aiming to maximise benefits to all road users.

Fig 57 **Intergrating cycleways with new developments**



Maintenance and management

Well maintained cycle routes and facilities are essential if we are to grow the number of people who regularly cycle, as most highway defects have a greater negative impact on cyclists and have the potential to cause severe hazards for them. Maintenance standards for cycle routes should be higher than general motor traffic as described in the Department for Transport Roads Liaison Group's "Well-maintained Highways" document (2005) and there is a need to ensure a good understanding of cyclists' needs on dedicated cycle tracks, on road facilities and shared use footways by highway maintenance services.

Currently the Council is formulating new highway maintenance standards to adhere to the risk based approach which the Council will be adopting following the publication of the national Code of Practice 'Well Managed Highway Infrastructure'.

In light of the Council's continued commitment and investment in new cycle this review will ensure the needs of cyclists are fully represented whilst remaining realistic in terms of budget and the Council's defence under Section 58 of the Highways Act.

When road works are being undertaken, proper consideration should be given to the requirements of cyclists as well as pedestrians, with appropriate provision made and signed diversion routes offered where necessary, all of which is covered in the Safety at Street Works and Road Works Code of Practice.



Provide for cyclists at roadworks



Repair damaged surface

Signing the way

Cyclists unfamiliar with a route will quickly become lost without good signing and effort is needed to ensure signs remain in place and in good condition. The Council operates a robust inspection regime and will respond to issues raised by the public in order to maintain a well signed cycle network.

In order to reduce street clutter – and obstructions within the footway or on shared routes - street lighting columns will be used to mount signs where appropriate. We will also look to put branding and lining on the cycle path where we feel it will aid way finding such as through a junction or along a major cycle corridor.



Tactile surfacing should be simple and clear for users

On road routes:

- Pre-plan cycle network enhancements as part of the wider infrastructure and maintenance programme
- Repair loose drain covers and potholes
- Clear drainage channels and gullies. The City Council has 36,000 gullies on the network all of which are cleaned on a 12 month basis. The Council ensures that any reports of blocked gullies are visited and cleaned on a 3 working day priority.
- Sweep debris. New segregated will be routes will be incorporated into the road sweeping programme - such as the Western Cycle Corridor.
- We will ensure cyclists' needs at road works are sufficiently covered by the Safety at Street Works Code of Practice



Mowing of grass verge required



Design complexity causes maintenance liability



Facility ineffective due to poor maintenance



Inadequate drainage



Regular sign inspection and maintenance required

- The Council is currently looking at options to ensure key cycle routes remain usable all year round. The Council intends to trial a non-corrosive spray to prevent ice on certain trial cycle routes during the 2017/18 Winter. This will be applied using quad bikes.
- Replace lining when worn
- Repair/replace damaged/lost signs

Traffic free routes (along the Leen, Trent and in other open spaces)

- Repair surface damage
- Clear drainage channels and culverts
- Sweep debris on a regular basis
- Mow verges/remove edge creep
- Ensure entry points are clear, obvious, attractive and welcoming
- Cut encroaching trees and other vegetation
- Maintain lighting, furniture and structures
- Winter maintenance, including snow clearing on strategic routes
- Repair/replace damaged/lost signs
- Develop signing and management plan to encourage considerate behaviour on shared paths

Maintenance policies to include:

- Prioritise key strategic cycle routes
- Conduct frequent inspections as outlined in the Council's planned inspection regime
- We welcome reports of faults from users of our cycle network, in particular via our on-line reporting system
- Publicise fault reporting hotline
- Quick response (all reports are inspected within 3 working days)
- We will use measures which will accommodate the safe movement of cyclists as provided for in the Safety at Street Works Code of Practice
- Use temporary direction signing as short term measure where new signs are needed

Materials and Products

The City Council has two existing documents that inform on the use of materials for Highway and public realm schemes. The first applies to schemes in the City Centre (Streetscape Design Guide City Centre) and the second to the rest of the City (Neighbourhood Streetscape Design Guide. Both were adopted in 2006.



Charcon segregation kerb and machine laid asphalt



Stirling Lloyd Sidetrack surfacing

The City Centre

Three key principles are applied to schemes in the City Centre:

- **Reusing materials** - Materials should be salvaged and reused on a scheme to reduce expenditure on new materials and the environmental impact of disposal and sourcing new materials. The reuse of materials such as granite kerbs can also help to protect the distinctiveness and historic character of a street
- **Bespoke products** - Standardisation of materials and equipment in the street helps to achieve a calmer and more consistent look to the street. Replacing damaged items is also easier and cheaper
- **Maintenance is vital** - Standards of maintenance probably have a greater effect on the perception of street quality than the original design. Good design reduces the future maintenance burden by selecting materials on the basis of whole life costing and positioning street furniture to make cleansing

City Centre streets are divided into four types, Vehicle Dominant, Pedestrian/Vehicle, Pedestrian Dominant and Historic. The Streetscape Design Guide notes the key features for each street type. Cycle facilities are mentioned twice, under 'Vehicle Dominant' where it is suggested that central reserves can be used for cycle parking (this would no longer be recommended on busy streets) and under 'Pedestrian Dominant' where it is noted that vehicles should give way to pedestrians and cycles.

Table 14 (below) sets out the materials to be used in 'neighbourhood' areas outside the City Centre.

Table 15 (on page 50) notes key features of streetscape components.

Table 14 **Materials for 'neighbourhood' areas**

Street type	Footway surface	Tactile Blister Paving	Kerb	Block paving
Pedestrian areas of local importance such as large district centres	Charcon Ultrapave (former City)	Grey Granite or Standard concrete modular units depending on conservation area status	Grey Granite	Charcon Woburn
Low and medium Pedestrian flows, smaller district centres	Blacktop	Standard modular units (set out in accordance with National guidelines)	Grey concrete	
Areas with existing high quality consistent materials	Maintain or repair existing*	Concrete modular or grey granite	Maintain or repair existing	Tegula

Table 15 **Key features of streetscape components**	
Kerbs	We will use grey granite kerbs with Charcon City paving to complement their grey colour
Utility inspection covers	We will continue to work with utility companies to ensure that they useand maintain covers inset with paving material
Coloured surfacing	We will not use coloured surfaces to mark bus stops or bus lanes. Cycle lanes will not be coloured except for short distances across side roads
Anti skid surfacing	We will use black spray applied anti-skid surface, such as Prismo Suregrip
Lining and lettering	We will use 50mm yellow lines in Conservation Areas and 75mm throughout the rest of the city centre when roads are re-surfaced
Traffic signals and control boxes	We will consider mounting signal heads on lighting columns where moving the lighting column to the signal position does not result in lighting levels falling below the required standards. It is vital that the column is designed to take the extra loading and that safe electrical separation is achieved within the column
Footway and cycleway lighting	Supplementary lighting on footways in areas of heavy pedestrian use will be considered
Footway and cycleway lighting	Wherever possible, a white light source should be utilised
Cycle parking	We will use a Sheffield style brushed finish stainless steel hoop such as the one produced by Townscape. All stands in a row need tapping rails
Cycle lanes	Minimum 1.5m width for a one way lane in a 30mph area. Where cycle flows are high this should be increased to 2m. Imprinted Asphalt
Bollards	We will use a simple brushed finish stainless steel shaft bollard with a dome top, such as that available from Townscape and reinforce it using concrete. Bollards will have a diameter of 114mm, wall thickness of 3.05mm and overall length of 1300mm
Side road crossings	Green coloured Thermoplastic anti skid surfacing or a resin based system presently being trialed
Off road paths/two way segregated tracks	We will consider the use of lighting mounted at a low level
Segregated cycle paths	Please see section on ‘two way segregated tracks ’
Light segregation	We will trial techniques used to provide light segregation such as wands and planters in-order to broaden the streetscape
Segregation strips	Where cycle links pass parked cars (for example on the proposed city centre north south routes) a contrasting material will be used to provide a segregated strip between vehicles and cyclists
Tactile paving	To be installed as required in DFT document - Guidance on the Use of Tactile Paving Surfaces (1998)

Monitoring and evaluation

A programme of data monitoring and evaluation is important to the City Council so that a baseline for measuring future improvement and progress towards targets and policy goals is established. This is very important not only for the Council's Plan but is also required by funders such as the D2N2 Local Enterprise Partnership. Monitoring will always be considered from the outset and will be built into all projects. The type of monitoring that is undertaken will depend upon a number of factors relevant to the specific scheme. The Council also subscribes to the academic mandate 'No innovation without evaluation' for its experimental cycle infrastructure development.



Cycle counter, Glasgow

Gathering data about the usage and impact of cycle/pedestrian routes provides the justification for existing schemes and makes the case for new/future options. Typically, monitoring will be used to:

- Compare and prioritise scheme design options
- Demonstrate that schemes represent value for money
- Review operation of an experimental scheme that may disadvantage some stakeholders, prior to deciding on whether to make it permanent
- Assess the operation of innovative schemes to learn lessons on how the design might be developed / improved in future
- Assess progress towards scheme targets and outputs/outcomes

Monitoring also needs to be expanded to cover new routes as usage increases.

When planning a new cycle/pedestrian route or improvements to existing infrastructure, data from other similar routes and networks will be used for scheme justification purposes and as the basis for forecasting what the usage and scheme impacts might look like following the intervention.

Scheme funders will expect to see evidence of the impact of schemes post implementation. It is not just about increasing the number of users but getting the views of cyclists about the new infrastructure. The case for future funding or providing support at public consultation will be enhanced by a quantitative and qualitative examination of scheme impacts and usage.

At the outset a Monitoring and Evaluation Plan will be developed for a cycle scheme and the costs of this will be factored in to the overall scheme cost. This requires the identification of:

- Objectives
- Inputs
- Outputs
- Outcomes
- Impacts
- Multi modal model outputs (if applicable)

A number of data collection methods are available. These will be selected according to the data outputs required for the Monitoring and Evaluation Plan. It is also important to consider what is already available from existing national or local datasets that might meet the project's needs before embarking on any additional data collection.

The most common data collection methods are listed below:

- Automatic cycle/pedestrian counts
- Manual cycle/pedestrian counts
- Video counts
- Cycle parking counts
- Cyclist/pedestrian interview surveys

Data analysis

Data analysis will be planned at the stage of designing the data collection approach and will relate directly to the requirements of the Monitoring and Evaluation Plan. The complexity of assembling a report on scheme impacts depends on the reporting needs and the data sources used. It is relatively easy to report on the usage of a short stretch of route if counter and user intercept survey data is available. However, this approach can risk significantly underestimating usage on a more complex network due to the failure to account for sections of the route not covered by data collection activity. This issue will be dealt with by using anonymous data collection methods such as mobile apps or Bluetooth surveys that go beyond traditional approaches and provide a variety of data on the volume and characteristics of journeys at specific points. This data will then be used as a proxy for the usage in the surrounding area. It allows geographically distinct sources of data, collected on a network of routes, to be combined to estimate use across that network. This approach will generate a single annual usage estimate (broken down by user type) for a walking or cycling infrastructure scheme for both pre and post scheme construction. It is important to obtain baseline data early prior to construction starting.



Cycle counter, Cambridge

Any analysis output needs to be expressed clearly and its content and format will be set at the outset in the Monitoring and Evaluation Plan.

Options will include:

- Measures of levels of walking and cycling
- Measures of change in levels of walking and cycling
- Levels of walking and cycling among different user groups
- Levels of walking and cycling by trip type category
- Perceptions of safety
- Perceptions of features of a route and the impact of a route on its surroundings
- Health and economic benefits associated with a route as calculated by the World Health Organisation's Economic Assessment Tool for Cycling
- Benefit to cost ratio of a route
- Route approval ratings (Estimated benefits set against the cost of building the route)

The presentation of results will have regard to the target audiences. Detailed analysis is likely to be more appropriate for an internal City Council audience, the Department of Transport, Local Enterprise Partnership Board (D2N2) or other funding stakeholders. A more visual representation of key results will be more suited to other stakeholders.

Road Safety Audits

All highway schemes in the City are subject to the Safety Audit process and should therefore consider the safety of all highway users including cyclists (see HD19 / 2015). More broadly based audit techniques should however be considered. These can be used to check how well a design meets the objectives that were set for it at the outset.

Where a Road Safety Audit identifies that a scheme departs from safety related design standard, all options to mitigate for the issues raised should be explored. The actual level of risk posed by issues highlighted should also be considered and a risk assessment of these may be useful in considering an appropriate proportionate response.

It is important that the usefulness of a cycle route is not compromised by an overcautious approach to road safety. Designs do not 'pass' or 'fail' a Road Safety Audit. From the outset Road Safety Audits were envisaged as a way for cutting edge knowledge on road safety to be fed ino main stream highway design. Manual for streets 1 noted that:

'There can be a tendency for auditors to encourage designs that achieve safety by segregating vulnerable road users from road traffic. Such designs can perform poorly in terms of streetscape quality, pedestrian amenity and security, and in some circumstances, can actually reduce safety levels.'

It is therefore very important that auditors have a clear understanding of the latest safety research and knowledge of innovation in road and street design (see Manual for Streets 2 for further guidance).

Given that objectives should in future include enhancing active travel, the audit process should normally include assessments of the quality of provision for walking and cycling. This could be by undertaking a Non-Motorised User Audit to HD 42/05 of the Design Manual of Roads and Bridges. Specific audits of walking and cycling facilities would also contribute towards the evolving 'Cycle proofng' process noted on page 46.



The Future

LCWIP

In its Cycling and Walking Investment Strategy (CWIS) the Government has recommended that local authorities look to develop a Local Cycling and Walking Infrastructure Plan (LCWIP). In June 2017 the City Council submitted an Expresion of Interest to the Department for Transport for support to develop an LCWIP in partnership with Derby City, Derbyshire and Nottinghamshire Councils in addition to the D2N2 Local Enterprise Partnership. In October 2017 the DfT announced that our bid had been successful and we will be working with our colleagues in the D2N2 area to develop this LCWIP which will prioritise routes and facilities for future investment.

The joint bid will place us in a stronger position to source additional funding and deliver cycling infrastructure, in particular cross boundary schemes. This will mean that we will have an LCWIP that provides the basis for a D2N2-wide programme of walking and cycling infrastructure improvements. This programme will be an evidence based technical assessment that demonstrates where investment in walking and cycling will have the greatest impact and can be best coordinated across the D2N2 area, when set against other schemes which support economic growth and housing development.

We want to ensure our walking and cycling network helps to deliver a strong economy, thriving and healthy communities where health and accessibility inequalities are reduced in addition to supporting young people and families who want to live and work in the D2N2 area. In doing so, they will benefit from good jobs, high quality public realm and a wealth of walking and cycling leisure opportunities. These benefits, as well as reducing absenteeism and congestion, all carry financial values, which we will work with consultants to highlight and develop as part of the LCWIP process.

Local Transport Plan 4

Whilst there is no set timescale, the City Council will be reviewing the current and third Local Transport Plan in the future and Cycling will continue to be a part of this.

Experimental Schemes

We will look to trial and experiment potential schemes where practical to assess their impact and demonstrate the benefits permanent infrastructure will have by learning from other cities in the UK and abroad. We have started to develop a relationship with our sister city of Karlsruhe in Germany.

HS2

We will be working to ensure that high quality facilities for cycling are included as part of the access strategy for the East Midlands HS2 hub at Toton.

Future funding

We will continue to bid for additional funding for scheme development from:

- D2N2 Local Enterprise Partnership
- Central Government for any future bidding rounds or funding methods
- Work with other parties to access other sources of funding e.g. National Lottery, Highways England
- Working with development sites to ensure cycling is catered for

References

This section includes a range of useful UK reference documents.
Links to all of these are provided from Sustrans' website.

Key references

Cycling Infrastructure Design, LTN 2/08, DfT 2008

Manual for Streets DfT, Communities & Local Government 2007

Manual for Streets 2, CIHT 2010

Guidelines for Providing for Journeys on Foot, CIHT 2000

Shared Use Routes for Pedestrians and Cyclists, LTN 1/12, DfT 2012

Cardiff Cycle Design Guide, Cardiff Council 2011

Inclusive Mobility: A Guide to Best Practice on Access to Pedestrian and Transport Infrastructure, DfT 2002

London Cycling Design Standards, TfL 2014

Design Checklist, Cycling England 2010

Infrastructure Toolkit for Cycling Towns, Cycling England 2009

Cycling by Design, Transport Scotland 2010

Designing Streets, The Scottish Government 2010

Slow Streets Sourcebook, Urban Design London, 2014

Traffic Calming, LTN 1/07, Dft 2007

Other DfT guidance

Shared Space, LTN 1/11, DfT 2011

Traffic Management & Streetscape, LTN 1/08, DfT 2008

Mixed Priority Routes: Practitioners' Guide, LTN 3/08, DfT 2008

Guidance on the Use of Tactile Paving Surfaces, DfT 1998

The Assessment of Pedestrian Crossings, LTN 1/95, DfT 1995

The Design of Pedestrian Crossings, LTN 2/95, DfT 1995

Traffic Signs Regulations and General Directions, HMSO 2002

CPR1035, Traffic Management Techniques for Cyclists, TRL 2011

Traffic Advisory Leaflets (various)

Traffic Signs Regulations and General Directions 2016

Shared Space LTH1/11, DfT 2011

Sustrans

The Merits of Segregated and Non-Segregated Traffic-Free Paths, Phil Jones Associates, Sustrans 2011

A Guide to Controlling Access on Paths, Sustrans 2012

Sustrans' Technical Information Notes (TINs)

TIN05: Cycle Network Signing, 2013

TIN07: Aggregates for Path Construction, 2011

TIN08: Cycle Path Surface Options, 2012

TIN11: Trees, 2012

TIN12: Side Road Crossings, 2011

TIN14: Gaining permission for works that might be affected by coastal or river flooding, 2011

TIN16: Cycle & Pedestrian Routes within Car Parks, 2011

TIN18: Toucan Crossings, 2011

TIN19: Segregation of Shared Use Routes, 2014

TIN23: Road Safety Audits, 2011

TIN24: Manual for Streets 2: Digested Read, 2011

TIN27: National Cycle Network Signing and Route Branding, 2012

TIN28: Horses on the National Cycle Network, 2011

TIN29: Lighting of Cycle Paths, 2012

TIN30: Parapet Heights on Cycle Routes, 2012

TIN31: Obstacles in the Carriageway, 2012

TIN32: Cycle Streets, 2014

TIN 34: Congraflow Cycling - Part 1: Process, 2015

TIN 45: Contraflow Cycling - Design Options and Considerations, 2015

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Design Manual, Chapter 7

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Ecology Note 01: Hedge Management, 2011

Ecology Note 02: Grass Verge Management, 2011

Ecology Note 03: Himalayan Balsam, 2011

Ecology Note 04: Japanese Knotweed, 2011

Ecology Note 05: Ragwort, 2011

Ecology Note 06: Ecology in the Planning System, 2011

Ecology Note 07: Nesting Birds, 2015

Trunk Roads : Design Manual for Roads and Bridges

Provision for Non-Motorised Users, TA91/05, Highways Agency

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Other

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Cycle Parking Guide, Cambridge City Council 2010

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Work Place Cycle Parking Guide, TfL 2008

London Cycling Design Standard, TfL 2014

Design Guidance, Active Travel Wales 2014

Cycling by Design, Chapter 7, Transport Scotland

British Standard BS5489-1, Code of Practise for the Design of Road Lighting

PFI developers specification - Specification For Road Lighting in the City of Nottingham

Neighbourhood Streetscape Design Guide - Nottingham City Council

List of Amendments

Photos have been changed on the following pages –

Front Cover, 4, 9, 10,11,12,13,14,17,18, 21, 25, 28, 29, 33, 34 and, 49.

The date and edition number have been altered on the front cover.

The Foreword has been replaced.

Changes by page number:

5. Target user paragraph changed to: 'designs should be attractive and comfortable for cyclists of all abilities, including disabled cyclists, who are trained to at least National Standards / Bikeability level 2.'

   Following text added - 'and enabling cyclists to see and be seen'. 'and recognising the varying needs of different types of cycle'. 'Some people are unable to walk and push their cycle at the same time'. 'Space provided should take account of predicted level of use'. Consistent high quality provision (including signage along a route, through junctions'.

6. Physical segregation with verge altered to, 'Physical segregation with marked strip'.

7. Hand cycle graphic text has been altered as follows, '2.8m Min width required for 2 hand cycles'.

   Following bullet point has been added - 'Non-standard cycles, such as recumbents and hand cycles, may be wider and less visible and so need more space to accommodate them and allow drivers to see them'.

   After' 2 cyclists' the following has been added - 'in same direction. 1.0m segregation when travelling in opposing direction'.

8. Bicycle and trailer 2700 measure changed to 2800.

   In the Table a row has been added - Cycle design vehicle - 1200 - 2800 - 3400 – 100.

   The envelope has been increased from 2.0 to 2.4.

   A recumbent cyclists profile has been added into the image background.

   Minimum height has been increased to 0.7m Min.

   The following point has been added - 3. 'Min internal radius at intersections 4.0m desirable, 2.0m absolute.

   The following has been added to the end of paragraph – 'An X distance of less than 2.0m may prevent a recumbent cyclist from having adequate visibility even when stationary'

9. Propensity to Cycle Tool added as a bullet point

   Text added 'to encourage new cyclists of all abilities'.

11. Text added - 'These measures serve to reduce motor vehicle speeds through features such as: narrowing traffic lanes, defecting the path of vehicles, tighter radii, creating uncertainty, changes in surfacing'.

    Graphic altered to add cycle logos on outside of bend.

12. Widths altered to '1.5 preferred' and '100 to 75mm and 50 to 38mm'.

    Note added, 'Humps that are excessively high or feature straight ramps can cause some non standard cycles to bottom out.'

    Note added - Entry and exit to be kept clear of parking. Design should discourage encroachment on cycle lane by motor vehicles'.

    Text deleted - 'Where pinch point cannot be removed consider marking large cycle symbol centrally' replaced with 'Option of speed table with refuge or bypasses for cyclists'.

13. Text added - 'When reallocating space in this way the full highway width should be considered, including carriageway, verge, parking bays as well as the footways'.

    Road widths altered to 'width to 6.5m' and '4.9m and cycle lanes to 1.8m'.

14. Graphic changed to a parallel crossing.

    Added after 'raised table'. - 'Note that TSRGD now permits use of a parallel crossing'.

    Fig 38 – Text deleted - 'increasing to a min 1.5m where speed limit exceeds 40mph'. Added in - 'at 30mph speed limit. 1.5m at 40phh, 4.5m over 40mph'.

    Single stage Toucan graphic changed to Toucan graphic.

32. 'Superhighway' replaced with 'Two way segregated cycle tracks'.

    Table 13 - deleted ' zebra crossing shared with cyclists. Replaced with - 'Parallel pedestrian / cyclist crossing'.

44. Option 3 – Refuge island added to graphic. Text deleted - Min effective path radius 4m preferred 2m absolute' Replaced with 'Minimum inner radius 4m desirable 2m absolute'.

    Figure 46 options – note added between the two options - 'Non-standard cycles may have difficulty making a right angled turn on path widths below 3.5. Approach to junction should be perpendicular to traffic flow for adequate visibility'.

45. Wheeling Ramps note added - 'Wheeling Ramps. The provision of wheeling ramps on a cycle route is only acceptable as an alternative to a signed route suitable for all types of cycle'.

    Figure 48 - Added to first note - '(limiting gradient 7%)

    Figure 49 - Note added - 'Consider use of angled parapets to increase effective width.'

    Figure 51 - adult cyclists graphic replaced with trike.

46. Update required to reflect signage and branding strategy

    At final set of bullet points the following added - 'Visible to users of all types of cycle'.

45. Text added - ‘General cycle parking should include adequate provision of parking suitable for all types of cycle, including tricycles.’

    First paragraph, end of second sentence – text added - ‘Wider and longer than standard cycle parking spaces should be provided at the end of racks, designated for disabled cyclists. When significant numbers of tricycles are expected, the provision of designated parking areas is recommended.’

    First paragraph, end of final sentence - ‘and to provide ramped access’ added.

    Figure 54 - width altered from 1000mm to 1200mm. Note added – ‘1500mm to accommodate non-standard cycles’.

    Figure 55 – width altered from 1000mm to 1200mm and a new note under kerbline replaces existing - ‘1400 to accommodate non-standard cycles. 2500mm if pedestrian access required.’

47. Text altered according to new maintenance strategy/protocol.

48. References to ‘Super highway’ altered to ‘two way segregated tracks’.

54. New text added.



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