



ENFYS

CARDIFF CYCLE NETWORK
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CARDIFF CYCLE DESIGN GUIDE



SUMMARY / KEY POINTS

PUBLIC AND STAKEHOLDER ENGAGEMENT

Cardiff council is committed to engaging and consulting widely on all schemes. Proper engagement with stakeholders can help develop designs that are more practical and usable than those based simply on standard details (section 8.1.5)

HIGHWAY SCHEMES

Needs of cyclists must be considered in the designing of ANY scheme on the highway, not just cycling schemes.

DESIGN PRINCIPLES

The principles contained in Manual for Streets 2 should be applied to the design of ALL highway schemes which potentially have an impact upon infrastructure that is used, or could be used, by cyclists - not just those schemes involving the comprehensive redesign of the street (section 1.4.3).

HIERARCHY OF PROVISION

Consideration should always be given first to measures to reduce the speed and volume of traffic in preference to providing segregated facilities (section 5.3).

Use the Hierarchy of Provision when considering multiple options for on-road provision.

Hierarchy of provision:

- Reduce traffic speeds and/or flows
- Mandatory cycle lanes
- Advisory cycle lanes
- Providing parallel off road route

ROAD BUILD OUTS & NARROWINGS

Build outs and narrowings can pose hazards to cyclists, whilst bringing little benefit to road users (section 3.9.9). Build outs should not be installed until all other options have been considered.

Depending on the initial rationale for the build-out, alternative options include:

- gateway road markings
- pedestrian crossings
- traffic calming
- waiting restrictions
- doing nothing

CYCLE LANES

Cycle routes must be continuous and coherent.

Short or intermittent lengths of cycle lane that stop abruptly and abandon cyclists are unacceptable (section 5.11.11).

Mandatory cycle lanes should ideally be 1.8m wide (section 5.8.3).

Cycle lanes narrower than 1.5 metres should not be provided (except possibly for feeder lanes).

No cycling facility is better than poor quality cycle provision (section 5.6.7)

Advisory lanes should only be used where a degree of segregation is considered desirable, and where an on-carriageway solution is deemed to be the best approach but there is insufficient carriageway width to accommodate mandatory cycle lanes (section 5.7.1)

Cycle lanes should be demarcated by white lines only (no coloured surfacing)

Mandatory cycle lanes must be augmented with parking restrictions to prevent and enable enforcement against illegal parking in them (section 8.6.5)

N.B. The table below are guidelines only, the context of each individual scheme needs to be properly assessed.

	Mandatory Cycle Lane	Advisory Cycle Lane
Width of cycle lane	1.8m maximum 1.5 minimum	1.8 maximum 1.5 minimum 1.3 for feeder lanes to Advanced Stop Lines
Minimum width of remaining carriageway	2m for 1 lane of traffic (see Figure 8)	3m for two directional shared lane (with centre line removed)
Traffic speeds	>35mph	<35mph (in some cases mandatory may be more suitable even with lower speeds)
Parking restrictions	Double yellow lines	Not necessary (but advisory lanes inappropriate if high parking demand)
Demarcation	Solid white line	Broken white line to Diag. 1040
Surfacing	Coloured surfacing not required	Coloured surfacing not required
TRO	Required	Not necessarily required but may be in some cases.

SIGNING

Only minimal road marking and signing should be required on off-carriageway routes. The only essential signing is to indicate that the route is open to cycles, with direction signing desirable 6.8.1

‘Cyclist dismount’ signs not to be installed at zebra crossings (section 7.8.3)

No ‘End of route’ signs but rather sign to next section of route

JUNCTIONS

Cycle facilities should not ‘abandon’ cyclists at junctions 5.6.9

Requiring cyclists to give way should be avoided 5.9.11

OFF-ROAD ROUTES

As with a number of other cities and towns promoting cycling (Cycling City and Town) Cardiff Council will implement unsegregated shared use cycle and pedestrian routes. 6.2.?

Access barriers on off-road routes should not be installed unless there is proven need. Prior to installation consultation should be undertaken with cyclists and access groups. 6.6

CROSSINGS

Toucan crossings should generally cross the carriageway in a single stage (section 7.7.5)

Staggered crossings including ‘sheep pen’ guard railing are to be avoided, as these can be claustrophobic and difficult for cyclists to negotiate (Section 7.7.5).

Where off road cycle paths cross side roads, designers should seek to give cyclists priority.

FLUSH KERBS

Cycle facilities implemented without flush kerbs at the interface between cycle track and road result in an uncomfortable and possibly dangerous transition between cycle track and carriageway. ‘*Dropped kerbs*’ (with a maximum upstand of 25mm) should not be specified. Instead, ‘*Flush kerbs*’ (maximum upstand 6mm) should be specified. 3.6.10

ROAD REALLOCATION

In general, designers should seek to minimise lane widths for general traffic appropriate to the road type and traffic conditions. Available road space should be reallocated to provide/improve the provision of cycling facilities. 5.6.6

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I.0 INTRODUCTION

I.1 Scope

- 1.1.1 This document is intended to define an approach to design and provision of both on and off road cycling infrastructure that is appropriate to Cardiff and the needs of existing and potential new network users in the city.
- 1.1.2 **This document is intended as a reference for all schemes within Cardiff that may have an impact upon infrastructure that is used, or could be used, by cyclists.**
- 1.1.3 The document should also be considered as part of all transport schemes and studies throughout Cardiff, with the eventual aim that Cardiff will become as cycle-friendly as possible.
- 1.1.4 It is also considered that, over time, existing cycle infrastructure within the city should be reviewed to ensure facilities are provided in line with this guidance, and improvements made where appropriate.

I.2 Context

- 1.2.1 Cardiff Council, as a Highway Authority, has a number of statutory duties which require it to properly provide for cycling:-
 - s.130 of the Highways Act 1980 (HMSO, 1980) requires that Highway Authorities *'assert and protect the rights of the public to the use and enjoyment of any highway for which they are the highway authority'*, those rights including the right to pass along a highway by pedal cycle; and,
 - s.16 of the Traffic Management Act 2004 (HMSO, 2004) requires that Local Traffic Authorities manage their highway networks with regard to *'securing the expeditious movement of traffic on the authority's road network'*, traffic including pedal cycles.
- 1.2.2 These duties also apply with regard to other users of the highway.
- 1.2.3 Cardiff Council identifies increasing motor traffic growth as causing problems in terms of traffic congestion and air pollution, and notes the benefits cycling can bring to help minimise these problems.
- 1.2.4 There is a wide variety of existing guidance on planning and implementing facilities for cyclists, from the Design Manual for Roads and Bridges (primarily aimed at Trunk Roads and Motorways), Local Transport Note 2/08 'Cycle Infrastructure Design', Manual for Streets and various Traffic Advisory Leaflets. Other guidance also exists, including various local authority guides, and guidance produced by third parties such as Sustrans.
- 1.2.5 It is not the intention of the Cardiff Cycle Design Guide to duplicate the existing guidance which is available, but instead to suggest a range of treatments and approaches to design that are considered appropriate for typical situations in Cardiff. The design guide also aims to form a point of first reference, to assist the researching of existing guidance elsewhere and to address gaps in that guidance.

Throughout this document, further reading providing advice and guidance is given in blue boxes such as this. This will refer to specific guidance on particular matters which are beyond the scope of this guidance.

- 1.2.6 This guide includes references where some ideas may have been superseded by good practice and experience since publication. Where this occurs, this document will highlight the current best practice – this should be considered to take precedence over the referred guidance, although that guidance should not be considered as being invalid.

1.3 The Design Guide and the Council's Other Responsibilities

- 1.3.1 There may be occasions where solutions contained in this guide may conflict with other Council policies or actions (e.g. accessibility, streetscape, etc). Where such conflicts arise, engagement between relevant parties will be the best way of resolving the conflict. Section 1.3 of *Manual for Streets* (Department for Transport, 2007b), Section 4 of *Manual for Streets 2* (Chartered Institution of Highways & Transportation, 2010) and Section 2 of *LTN 1/08 Traffic Management and Streetscape* (Department for Transport, 2008a) all provide guidance on joint working between stakeholders to achieve streets which provide a better balance between competing demands.

Cardiff Council will utilise joint working practices for all schemes involving physical or regulatory changes to any part of the highway, to ensure that street design is appropriately balanced, and that no particular group of road users is adversely disadvantaged by the value judgement and/or custom and practice of any one group or individual

- 1.3.2 *Manual for Streets* paragraph 1.3.1 notes-

'In the past street design has been dominated by some stakeholders at the expense of others, often resulting in unimaginatively designed streets which tend to favour motorists over other road users' (Department for Transport, 2007b)

Therefore, it stands to reason that in order to achieve better balanced streets (including accommodating cycling better) there will need to be a departure from previous working practices.

- 1.3.3 Designers should not be afraid of developing bespoke solutions to reconcile policy conflicts where this is appropriate, even if this would mean acting outside of this or other guidance, provided that there is broad consensus amongst the affected stakeholders and the principles of this design guide and other guidance are considered when arriving at that solution.
- 1.3.4 The methodology provided by *Link and Place* (Jones, Boujenko, & Marshall, 2007) is a useful tool to measure the relative importance of the street in terms of its uses; this can be useful when attempting to reconcile the competing demands of a street.
- 1.3.5 One particular concern which often arises when infrastructure for cyclists is proposed is loss of capacity for motor traffic, and the implications of this in terms of the Council's duties under the Traffic Management Act 2004. Where this is a concern, the

following should be considered –

- The duty of the Council under the Traffic Management Act to secure the expeditious movement of traffic and that this applies to the movement of cyclists as much as it does with regard to any other road user, and;
- In a typical street, improvements will have been made over time to improve the flow of motor traffic (sometimes to the detriment of non-motorised users), whilst little, if anything, may have been provided to improve conditions for cycling.

1.3.6 It may be possible to offset any negative impact on capacity associated with providing cycle facilities through considered design, for example: increased signing associated with cycle infrastructure can be offset by the removal of any existing redundant signs; and loss-of-capacity at a signal-controlled junction, where it is proposed to introduce a cycle phase (for instance) could be offset by also improving the junction to increase capacity for motor vehicles. Such design options should always be explored.

1.4 Design Principles

1.4.1 This guidance has been developed taking into account guidance and research from a number of publications, particularly:

- *Manual for Streets* (Department for Transport, 2007b);
- *Manual for Streets 2 – Wider Application of Principles* (Chartered Institution of Highways & Transportation, 2010); and
- *LTN 2/08 Cycle Infrastructure Design* (Department for Transport, 2008b).

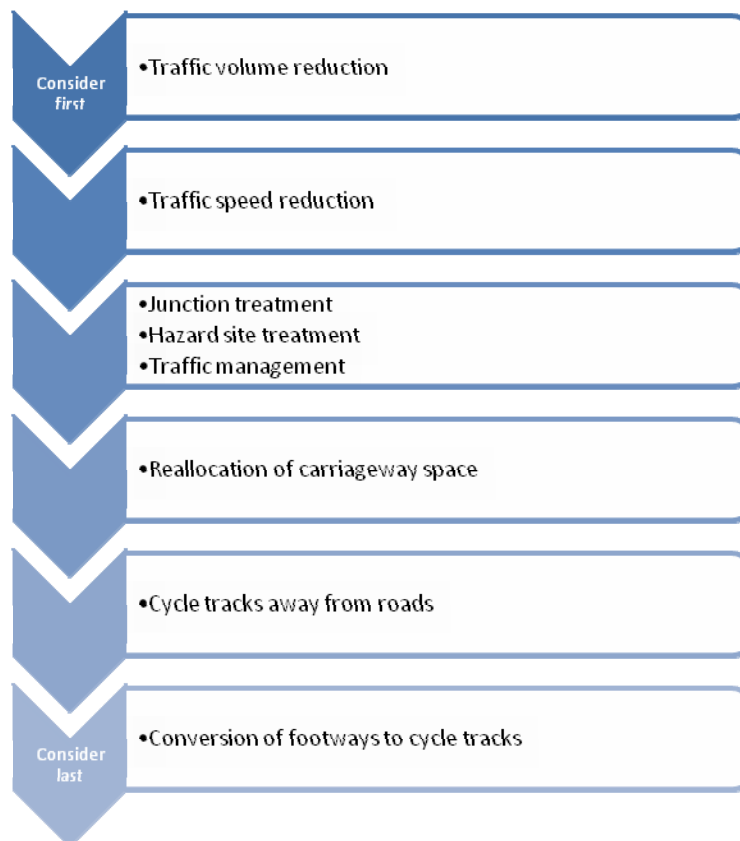
1.4.2 Whilst *Manual for Streets* was intended to be predominantly used as part of the development of new residential streets, it is also applicable to existing streets (see paragraph 1.1.3 of *MfS*). *Manual for Streets 2* emphasises this, and states '**It is recommended that as a starting point for any scheme affecting non-trunk roads, designers should start with MfS**' (paragraph 1.3.2). The Design Manual for Roads and Bridges provides a similar view stating '**When considering the design of roads, other than the strategic trunk network, you should use the Manual for Streets Section C - Detailed design issues**' (Department for Transport, 2010a).

1.4.3 Therefore, the principles contained in *Manual for Streets 2* should be applied to the design of **ALL** highway schemes which potentially have an impact upon infrastructure that is used, or could be used, by cyclists, not just those schemes involving the comprehensive redesign of the street. Section 4.3 of *Manual for Streets 2* addresses how *MfS* principles can be applied for various stages of improvements, from minor reviews of signing, road markings and street furniture to comprehensive building-to-building treatments. It should also be noted that of the six stages identified by *MfS2* (from step 0 'status quo' to step 5 're-create the street'), improvements for cyclists will typically lie in stage 4 're-think traffic management options' or stage 5 'Re-create the street'.

1.4.4 The above documents all advocate approaches to street design which seek to better accommodate cyclists by improving conditions to facilitate the sharing of street, rather than by providing additional segregation. The documents include the Hierarchy of Provision shown in Figure 1. This hierarchy forms the basis for this design guide.

- 1.4.5 Schemes to improve on-carriageway conditions for cycling without resorting to segregation (i.e. those towards the top of the hierarchy) often have many advantages over specific cycle facilities. For cyclists, they enable the full use of the carriageway and as such improve conditions for all potential cycling movements (segregated facilities can usually only accommodate a limited number of expected manoeuvres). More generally, they can also provide greater advantages in terms of safety for other users, have fewer negative impacts on the streetscape and other activities (including parking and loading, and on social activities), and easier usually to accommodate within the physically constrained urban environment.

Figure 1 – Hierarchy of provision



Source: Manual for Streets

- 1.4.6 In some instances, it may be possible to provide an off-road route, either as a parallel route or along an alignment entirely away from the highway network (such as with the Taff Trail). Such facilities can provide pleasant, useful infrastructure (particularly for novice or leisure cyclists), but should generally be considered as an addition to infrastructure provided in line with the hierarchy, rather than as an alternative.
- 1.4.7 In practice, it is considered that streets within Cardiff fall very broadly into two categories –
- those which serve little or modest function in terms of motor traffic (where cyclists can be accommodated on carriageway satisfactorily using measures towards the top of the Hierarchy of Provision); and,

- those where segregated cycle facilities offer the most appropriate solution, owing to them having a traffic function of a nature which in practice precludes cycling on unsegregated carriageway for all but experienced cyclists.

1.4.8 This 'Hierarchy' approach seeks to reduce danger to cyclists and other road users by removing heavy traffic from cycle routes if at all possible, or reducing traffic speeds to help reduce the likelihood and severity of an injury collision. This approach, as long as it is rigorously applied, aims to integrate cycling into the general traffic management and casualty reduction strategies of the Council rather than seeing it as a separate 'add on' item. The hierarchy is not to be used as a 'dogma' however, and there are clearly circumstances where off-carriageway provision is going to be the most attractive and appropriate option for all users such as alongside trunk roads, at major multi-lane junctions and where primary schools are situated close to main roads.

1.4.9 It is important to recognise that the infrastructure itself is an opportunity to positively encourage cycling. This means that 'perceived safety' concerns are almost as important as responding to actual recorded casualties and personal security issues. If people perceive that a site is not safe, due to either road safety, or personal safety issues, they will not use it. Sometimes it may be necessary to offer 'dual provision' to cater for different levels of confidence, for example, to include both a cycle track and a cycle lane or junction treatment along the same piece of road.

2.0 PROCEDURE

2.1 Introduction

- 2.1.1 This Section deals with the process to be followed when progressing cycling schemes.

2.2 The Highway Authority's Powers and Responsibilities

- 2.2.1 The following primary legislation is relevant with regard to cycle infrastructure - broadly:

For **on-street** infrastructure (including cycle tracks adjacent to carriageways) –

- The **Highways Act 1980** (HMSO, 1980), which grants various powers regarding the physical construction of highways; and
- The **Road Traffic Regulation Act 1984** (HMSO, 1984a), which grants various powers to regulate the use of highways by road traffic.

For **off-street** infrastructure –

- The **Cycle Tracks Act 1984** (HMSO, 1984b), which grants various powers regarding the conversion of existing footpaths to cycle tracks (also allows for access control arrangement in any cycle track); and
- The **Town and County Planning Act 1990** (HMSO, 1990), which details requirements regarding the construction of entirely new cycle infrastructure (can also be used to create pedestrianised streets).

- 2.2.2 Legislation also imposes responsibilities on Highway Authorities to protect the rights of road users on highways – these apply to cyclists, but also to all other road users.

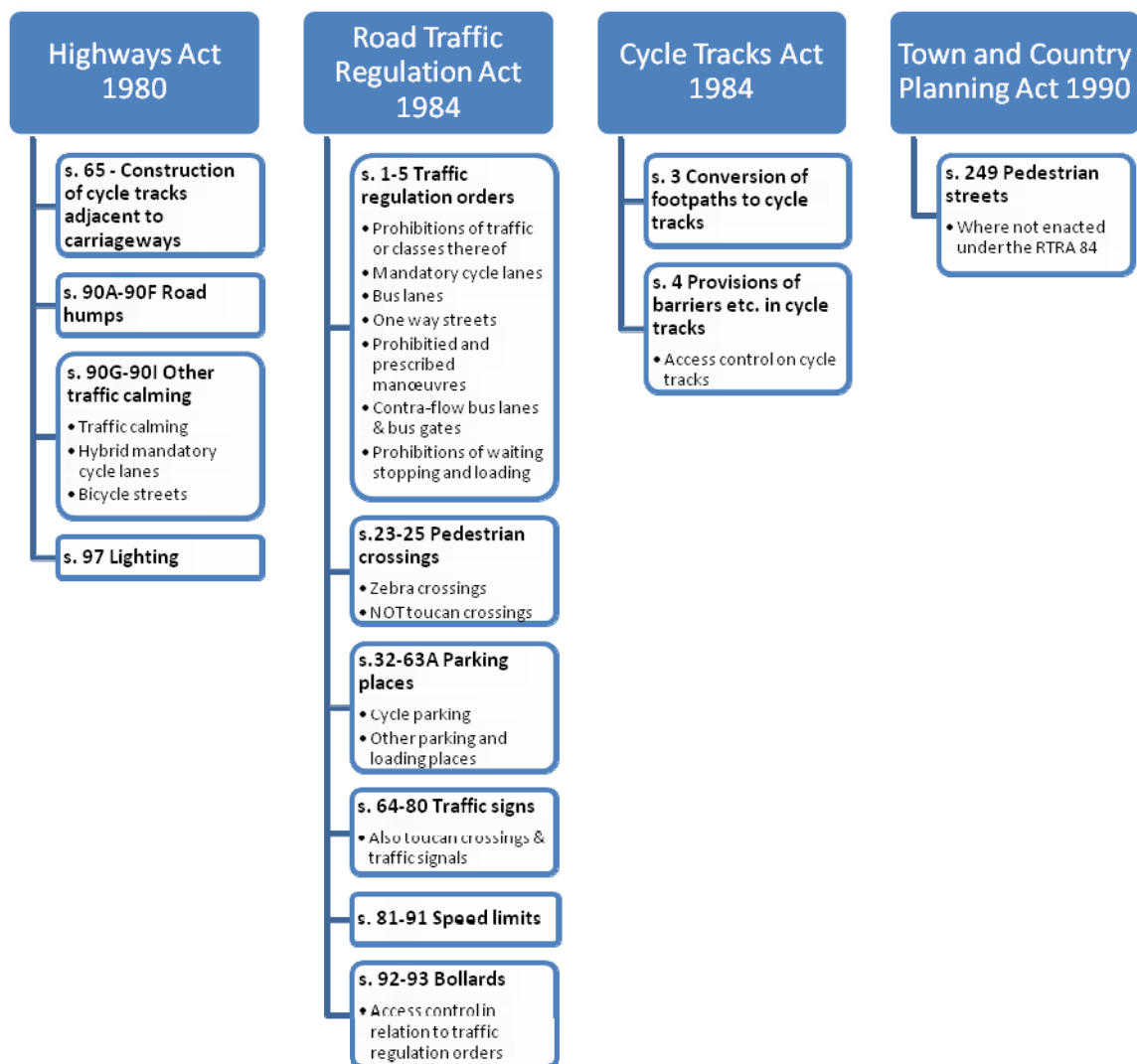
- 2.2.3 There are also additional responsibilities with regard to the visually and mobility impaired imposed by Section 1 of the Disabled Persons Act 1981 (HMSO, 1981) – these apply to all works and schemes within the highway.

- 2.2.4 In addition the duties under Section 149 Equalities Act 2010 to promote and advance equality also apply to its highway functions. Most pertinent to cycle infrastructure is the requirement for the Council to take steps to meets the needs of people with disabilities (HMSO, 2010).

- 2.2.5 Figure 2 below illustrates this key legislation regarding the provision of cycle facilities.

- 2.2.6 See section 8 for further information on the procedure required to exercise each power.

Figure 2 – Legal framework for cycle infrastructure



2.3 Engagement and Consultation

- 2.3.1 There is a minimum statutory level of consultation required before the Council can exercise some of its powers. However, Cardiff Council is committed to engaging and consulting more widely than the statutory minimum.
- 2.3.2 Proper engagement with interested parties can allow any concerns to be addressed as far as possible, designs to be fully optimised to meet the needs of the public (including existing and potential cyclists) and can help minimise the risk of objections. This can be the difference between a successful, accepted and effective scheme and an unpopular scheme. The former situation may be much more likely to encourage cycling than the latter.
- 2.3.3 Proper engagement can often help identify design solutions which cannot be foreseen by this or other guidance. Such designs can work towards improving the conditions for cycling, whilst avoiding some of the problems which may be associated with a more conventional design.
- 2.3.4 The following provides a list of groups who may have an interest in cycling schemes.

Ensuring local groups are engaged can be particularly helpful. The list is not exhaustive and designers should use their judgement and ensure any other affected parties are properly involved:

- Public transport operators
- Crime and Disorder Reduction partnerships
- Cycling groups
- Disabled person groups
- Environmental NGOs
- Emergency services
- Freight transport groups
- Environment Agency
- CCW
- Local Access Forums
- Walking Groups
- Local businesses and business groups
- Chambers of Commerce
- Economic partnerships
- Emergency partnerships
- Trade Associations
- Local Education Authority and universities
- Neighbouring authorities
- Motoring groups
- Pedestrian groups
- Primary Care Trusts, as well as including NHS and private hospitals
- Public transport users group
- Residents' associations
- Other sections of Cardiff Council e.g.
- Equalities
- Planning
- Traffic Management

2.3.5 A community street audit can prove a useful means of engaging with the public, as well as enabling different sections of the community to engage with each other, which can ease the processes of balancing various parties' needs. Further details are provided in paragraph 2.5.9.

2.3.6 Cycling England's *Consultation Good Practice Guide* (Cycling England, 2010a) provides a useful framework for consultation which, if followed, should ensure all interested parties have an opportunity to air their concerns and for these to be addressed as far as is practical.

2.3.7 See also paragraph 8.12.2 with regard to the consultation with enforcement agencies.

2.4 Risk and Liability

2.4.1 In order to achieve conditions suitable for cycling within the constrained urban environment, designers will need to recognise the flexibility within the various regulations, rather than preparing overly-cautious 'belt and braces' designs. An effective scheme can often be achieved within the flexibility offered by the legal framework, and there is almost always scope for special authorisations to be sought where appropriate. Good scheme design must satisfy regulatory requirements, meet functional objectives, provide clarity and safe movement for all road users and also consider the visual quality of the streetscape .

2.4.2 LTN 1/08 (Department for Transport, 2008a) notes that some designers may be unaware of the status and intended role of guidance documents and regulations, treating all as mandatory instructions. It highlights the considerable discretion which local authorities have in developing local policies and standards.

2.4.3 Risk of collisions, and concerns regarding liability in the event of collisions, are often cited as an obstacle where unusual or innovative treatments are proposed. In practice, these concerns may not be borne out to the degree feared by some

professionals. Section 3 of *Manual for Streets 2* (Chartered Institution of Highways & Transportation, 2010) addresses the issues of Highway Design, Risk and Liability and is considered essential reading for anyone involved in the design or project management of infrastructure schemes.

Further guidance on highway design, risk, and liability can be found in:

- *Sections 3 & 4.5 of Manual for Streets 2 (Chartered Institution of Highways & Transportation, 2010); and,*
- *Highway Risk and Liability Claims (UK Roads Board, 2009).*

2.5 Audits

- 2.5.1 There are a number of different types of audits which can be undertaken when designing and implementing infrastructure schemes: Road Safety Audits, Non-motorised user audit, Cycling Audit, Access Audit, Equality Impact Assessment, Community Street Audit.
- 2.5.2 A **non-motorised user audit** should be carried out for all traffic schemes where cycling, or other schemes affecting cyclists, are proposed, in line with HD 42/05 *Non-motorised User Audit* (Highways Agency, 2005a). This can help identify issues with design which may hinder cycling and can lead to design improvements which better accommodate cyclists in Cardiff.
- 2.5.3 TAL 07/98 *Cycle Audit and Review* (Department for the Environment, Transport and the Regions, 1998c) and *Guidelines for Cycle Audit and Cycle Review* (Institute of Highways and Transportation, 1996) both offer guidance on how to audit schemes to ensure they are cycle-friendly.
- 2.5.4 The Council's **Road Safety Audit** Manual (Cardiff Council, 2010) should be referred to for guidance. In instances where the road safety audit identifies issues in relation to proposed cycle infrastructure, all options to mitigate for the issue raised should be explored.
- 2.5.5 The actual level of risk posed by the issue(s) highlighted should also be considered. A risk assessment of the issues raised by the safety audit may be useful in considering an appropriate proportionate response, whilst still designing for the objectives of the scheme. Section 6.5 of the IHT's Road Safety Audit Guidelines (Institution of Highways & Transportation, 2008) provides guidance on such risk assessments.
- 2.5.6 It is important to remember that designs do not 'pass' or 'fail' a road safety audit. It may be appropriate for the Council to accept an identified risk where mitigation of that risk undermines the objectives of the scheme, particularly where the risk is small.
- 2.5.7 In some instances, an **access audit** may be appropriate to identify possible issues with the proposed design with regard to accessibility, so that these can be addressed before implementation. Such audits should be conducted by a registered access auditor – a list of suitable auditors can be found on the website of the National Register of Access Consultations (www.nrac.org.uk) (National Register of Access Consultants, 2010).
- 2.5.8 All infrastructure schemes must be subject to an **Equality Impact Screening** at the

concept stage. This will allow identification of any aspects of proposals where there may be concerns regarding the possible impact on the different equality strands as defined in current legislation. Where a screening identifies potential impacts the Council's Equalities Team should be contacted and a more detailed Equality Impact Assessment (EqIA) may be required to establish the level of any impacts and identify possible measures to mitigate them. These considerations should then be fed into subsequent stages of design and decision making on a scheme.

- 2.5.9 **Community street audits** can be a useful tool to assess the quality of existing street layouts, in terms of streetscape and walkability. The findings of the audit can then be used to inform design decisions where changes are proposed. Community street audits can be particularly helpful in identifying issues faced by the users of a street, and can also help reconcile conflicts between user groups. Guidance can be found in *Living Streets DIY Community Street Audit Pack* (Living Streets, 2003).

Further guidance on relevant audits can be found in the following documents:

- Road Safety Audit Manual (Cardiff Council, 2010);
- HD 19/03 Road Safety Audit (Highways Agency, 2003);
- HD 42/05 Non-motorised User Audit (Highways Agency, 2005a);
- Road Safety Audit (Institution of Highways & Transportation, 2008);
- Living Streets DIY Community Street Audit Pack (Living Streets, 2003);
- TAL 07/98 Cycle Audit and Review (Department for the Environment, Transport and the Regions, 1998c); and,
- Guidelines for Cycle Audit and Cycle Review (Institute of Highways and Transportation, 1996).

2.6 Design Standards and Road Hierarchies

- 2.6.1 Historically, design decisions have been made using national design standards, with reference to road hierarchies. This section explores some of the issues this approach has raised.
- 2.6.2 The *Design Manual for Roads and Bridges* (DMRB) is written as a set of design standards for trunk roads, where the sole or principal function of the road is the movement of motor traffic.
- 2.6.3 Some authorities have adopted DMRB as the standard for their local highway networks. Whilst DMRB includes guidance which can be useful when considering local authority roads, its rigid application is unlikely to be appropriate, as DMRB does not (and is not intended to) consider functions of streets beyond the movement of motor traffic, other than in the case of all-purpose trunk roads where non-motorised users and access are provided for only as far as is necessary to meet legal obligations.
- 2.6.4 *Manual for Streets* (Department for Transport, 2007b) was written to provide guidance to local authorities to assist them in designing their streets for the full range of functions they provide for – not just the movement of motor traffic, but also

movement of non-motorised road users, place, parking, statutory undertakings and access. *Manual for Streets 2* expands upon this guidance, particularly for more heavily trafficked local authority roads. Cardiff Council will ensure that MfS is appropriately used and in the main replaces the use of DMRB for all infrastructure schemes on the highway.

- 2.6.5 *Manual for Streets* also advocates a move away from approaches to street design based on road hierarchies based purely on importance in terms of movement of motor traffic and the use of the hierarchy as set out in Figure 1.
- 2.6.6 Advice on more context-sensitive classification of streets is given in Section 2.4 of *Manual for Streets* (Department for Transport, 2007b) and Section 2.1 of *Manual for Streets 2* (Chartered Institution of Highways & Transportation, 2010). A more formal approach is developed in *Link & Place* (Jones, Boujenko, & Marshall, 2007) – this approach can also provide a useful mechanism for balancing Cardiff’s objectives.
- 2.6.7 Designers who fear use of *Manual for Streets* may be inappropriate on (e.g. principal roads) can be reassured by the examples of schemes consistent with *Manual for Streets* introduced on principal roads elsewhere in the United Kingdom shown in Table 1.

Table 1 – Examples of principal roads treated in line with *Manual for Streets* principals

Location	Highway authority
MfS2 case studies (Chartered Institution of Highways & Transportation, 2010)	
A215 Walworth Road, Southwark, London	London Borough of Southwark Council
A61 Sheaf Square, Sheffield	Sheffield City Council
A6008 Maid Marian Way, Nottingham	Nottingham City Council
DfT Mixed Priority Route Demonstration Projects (Department for Transport, 2008d)	
A534 Nantwich Road, Crewe	Cheshire County Council
A3036 Wandsworth Road, Lambeth, London	London Borough of Lambeth Council
A5038 Renshaw Street & Berry Street, Liverpool	Liverpool City Council
A6100 Wilmslow Road, Renshaw, Manchester	Manchester City Council
A1081 St Peter’s Street & Chequer Street, St Albans	Hertfordshire County Council
Other examples	
A315 Kensington High Street	Royal Borough of Kensington and Chelsea Council
A502 Camden High Street (North)	London Borough of Camden Council

2.7 Cycling and the Planning Process

- 2.7.1 The Advice Note *Cycling and Development (Residential and Commercial)* (Cycling England, 2009b) gives guidance on how local authorities can encourage higher levels

of cycling by integrating cycling into the planning and development of towns and cities.

2.7.2 Key measures highlighted by that note, which can be implemented as part of the planning process, include:

- Ensuring proper policies and standards are in place to encourage the integration of cycling into developments;
- Use of Section 106 and Community Infrastructure Levy mechanisms to accrue funds for cycle infrastructure, including links between core cycle routes and proposed developments;
- Ensuring that designs allow for permeability by bicycle, and that this is protected by robust mechanisms (particularly where it is proposed that some links should be retained by the developer and a permissive route for cyclists is proposed); and,
- Requiring that cycling be considered from the earliest stages of design and that facilities not be 'bolted-on' at the last minute.

2.7.3 Any infrastructure proposed as part of the planning process should be considered in light of the Cardiff Strategic Cycle Network Plan (Cardiff Council, 2011) and this design guide.

Further guidance on cycling as part of new developments can be found in the advice note Cycling and Development (Residential and Commercial) (Cycling England, 2009b).

3.0 GENERAL PARAMETERS

3.1 Introduction

- 3.1.1 The following section provides a summary of the general principles for designing facilities for cyclists. Further guidance can be found in Section 2 of the Department for Transport's Cycle Infrastructure Design Guide (Local Transport Note 2/08).
- 3.1.2 In order to provide cycle facilities that are attractive, comfortable and convenient, it is important to ensure they are designed with reference to the needs of all end users.

3.2 Clear Space Required by Cyclists

- 3.2.1 A bicycle is an inherently unstable vehicle and cyclists require clear space in which to ride. This space includes the physical width of the bicycle, room for 'wobbling' (especially at low speed) and for avoiding minor defects in the surface.
- 3.2.2 A typical bicycle with rider can be taken to have the dimensions shown below (Department for Transport, 2008b):

Table 2 – Dimensions of a typical bicycle (including rider)

Dimension	Size
Length	1,800mm
Width (without rider)	650mm
Width (with rider)	800mm

- 3.2.3 Bicycles with trailers, or more specialised designs such as tandems, rickshaws or bicycles towing trailers can have significantly larger dimensions. Cycle length can increase up to 2.75m for some designs.
- 3.2.4 When moving, cyclists require additional space to cater for deviations in their path. At speeds in excess of 7mph, cyclists can typically ride in a reasonably straight line, with a deviation of 200mm being typical. Below this speed, deviation increases – at 3mph a deviation of 800mm can be expected. This should be borne in mind when designing infrastructure at locations where lower cycling speeds are expected (e.g. islands for two-stage crossings, or feeder lanes for advance stop lines), as greater widths may be required to accommodate cyclists in these instances.
- 3.2.5 For simplicity, the width required by a moving cyclist (the dynamic envelope) can be taken to be 1.0 metre. Where cyclists pass each other, ideally 500mm should be allowed for between the two cyclists' dynamic envelopes.
- 3.2.6 Additional clearance is required where cyclists are passing adjacent to vertical features, to accommodate cyclists' 'kerb shyness', to reduce the risk of collision with adjacent objects and to improve cyclists' comfort. These clearances are detailed in the table below:

Table 3 – Clearances required between cyclists and adjacent objects

Object	Clearance required
--------	--------------------

	Clearance required	
	From wheel	From dynamic envelope
Kerb (<50mm upstand)	250mm	
Kerb (>50mm upstand)	500mm	
Sign posts, lighting columns etc.		250mm
Walls, railings, parapets etc.		500mm
Parked cars (in short term parking area with high turnover)		1000mm

3.2.7 Where cycle lanes or tracks run adjacent to parked vehicles, there is a risk that vehicle occupants can open doors into the path of oncoming cyclists. A clearance of 1.0m between the cyclist's dynamic envelope and the adjacent parked vehicle will allow for doors to be opened without conflicting with cyclists (Department for Transport, 2003).

3.2.8 Where it is not possible to provide additional clearance for carelessly opened doors, this should not necessarily rule out the provision of any given layout; instead the level of risk likely should be considered. For example, on a residential street with low parking turnover and long stays, there are likely to be fewer instances of doors being opened. In a shopping area with short stay parking and a high turnover, there may be more instances of door openings, and thus a relatively higher risk.

3.2.9 Cyclists require a minimum of 2.7 metres headroom. This may be reduced to 2.4m where the obstruction is for less than 23 metres (such as where a traffic sign spans the carriageway) (Highways Agency, 2005b). Every effort should be made to provide this headroom; where this cannot be achieved (i.e. at a low railway bridge), 'limited headroom' signing should be provided in a similar fashion as for a low bridge over a carriageway (see *Traffic Signs Manual*, Chapter 4, Section 7 (Department for Transport, 2004). 'Cyclists dismount' signs may also be appropriate in these circumstances, but these should only be used in addition to warning signs, and only where it is deemed essential that cyclists should dismount following an independent risk assessment.



Photo 1 – Low headroom signing at low railway bridge

3.3 Clearance from Moving Motor Vehicles

3.3.1 Motor vehicles pose the greatest source of discomfort for cyclists. This is borne out by the results of the consultation conducted when developing the Strategic Cycle Network Plan (Cardiff Council, 2011) which highlighted motor traffic as a major concern of respondents. Consequently, it is important to recognise the need for sufficient clearance between cyclists and motor vehicles.

3.3.2 LTN 2/08 recommends a minimum clearance of 1.0 metre between the cyclist's

dynamic envelope and a motor vehicle passing at 20mph, and 1.5 metres when passing at 30mph.

- 3.3.3 This clearance, as shown in Table 4, added to the cyclist's dynamic envelope and the width of the motor vehicle, can be used to give ideal minimum widths for motor vehicles to pass cycles. These figures simply indicate ideal minimum physical width for motor vehicles to pass cyclists and do not necessarily form lane widths.

Table 4 – Ideal minimum widths for motor vehicles to pass cyclists

Motor Vehicle Speed	Car	Bus / HGV
at 20mph	3.8m	4.6m
at 30 mph	4.3m	5.1m

3.4 Motor Vehicle Design Speed

- 3.4.1 It is important to recognise the difference between the design speed for motor vehicles using/passing by cycle infrastructure and the design speeds for cyclists using the infrastructure. Some aspects of the design of cycle infrastructure relate to the speed of motor traffic, such as tapers where the carriageway is narrowed. These should be designed with reference to the 85th percentile measured speed of motor traffic. This should be measured in accordance with TA 22/81 *Vehicle Speed Measurement on All Purpose Roads* (Highways Agency, 1981). Design speeds of less than this should only be considered where physical speed reducing features are proposed to bring actual speeds down to the design speed. On shared streets where physical traffic calming is provided, an assumed design speed of 20mph is appropriate.

- 3.4.2 Designing for lower-than-measured speeds is not generally recommended. This can result in layouts which encourage motor vehicles to encroach into cycle facilities and can result in pinch points or other conflict points which may be hazardous for cyclists. This practice can also result in less comfortable and less direct layouts for cycling, undermining the quality of cycle facilities required to encourage their use.



Photo 2 – Substandard taper affecting motor vehicles inviting encroachment and providing less direct route for cyclists

- 3.4.3 For design considerations affecting cycles but not motor vehicles, such as where a cycle lane tapers back to the kerb resulting in a widening of a traffic lane, it is recommended that a cycle design speed of 20mph is adopted for general use. Routes with a lower design speed may not be attractive for regular commuter use (Department for Transport, 2008b).
- 3.4.4 At difficult locations on off-carriageway routes, a design speed as low as 6mph can be acceptable over short lengths. (Highways Agency, 2005b). This might apply at constrained subway entrances, for example. This relaxation should not be used on on-carriageway routes, as speed differential between motor vehicles and cyclists may introduce additional conflicts, and is likely to make cycling feel dangerous and

uncomfortable.

- 3.4.5 It may be necessary to introduce traffic calming to reduce the speeds of cycles at difficult locations, such as where a lower design speed is required or where there is particular risk (e.g. of conflict with pedestrians). Section 8.15 of *LTN 2/08 Cycle Infrastructure Design* offers some guidance on possible measures (Department for Transport, 2008b).

3.5 Visibility

- 3.5.1 As for motor vehicles, cyclists' safety is largely dependent on them being able to see and be seen sufficiently for their speed of travel. The principles for the visibility requirements of cycles are similar to those for motor vehicles.
- 3.5.2 The envelope of forward visibility required by cyclists is slightly wider than that required by motor vehicle drivers -
- The cyclist's eye height is to be taken as being in the range 1.0m – 2.2m, to accommodate the wide variety of riding positions the cyclist may choose to adopt;
 - Cyclists should be able to see to ground level, so as to observe any surface defects in good time;
 - Cyclists should be able to see objects at a height of 2.2m, so any low-hanging branches, for example, can be seen in good time.

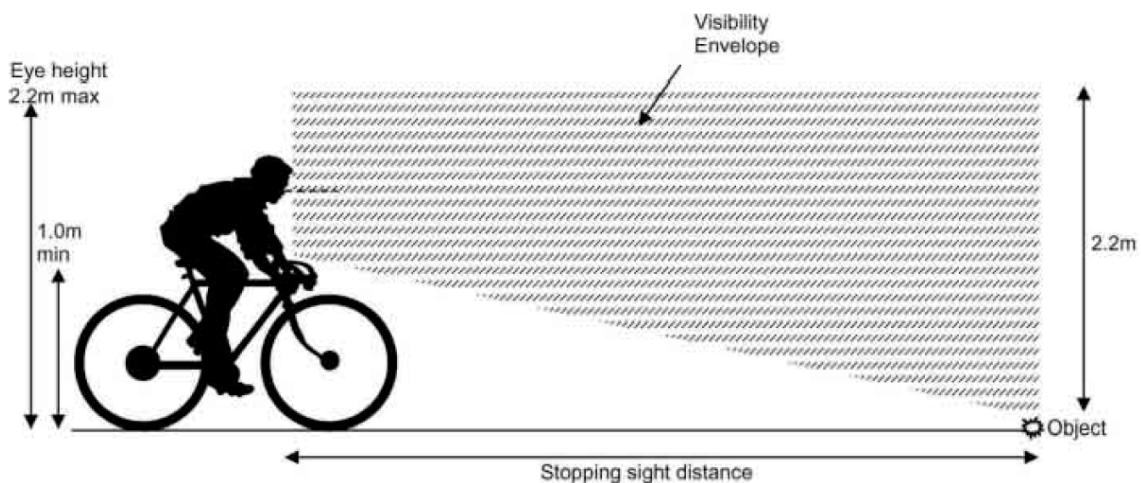


Figure 3 – Cyclists' visibility envelope (reproduced from TA 90/05 (Highways Agency, 2005b))

- 3.5.3 The stopping sight distance required depends on the design speed. The table below details recommended stopping sight distances for cyclists.

Table 5 – Preferred and recommended stopping sight distances

Parameter		Design speed		
		30 km/h 18mph	20 km/h 12mph	10 km/h 6mph
Stopping sight distance	Preferred	30m		
	Recommended	25m	15m	10m

- 3.5.4 Cyclists also need to see and be seen at junctions in the same manner as motor vehicles. Where cyclists are on the carriageway, visibility splays in line with the guidance provided in Section 7.7 of *Manual for Streets* (Department for Transport, 2007b) will generally suffice.

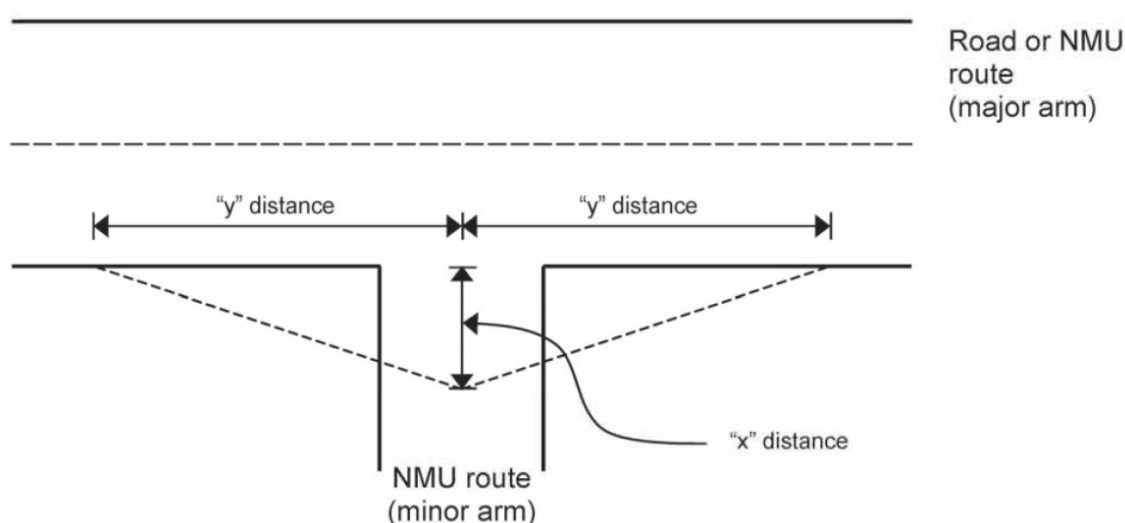


Figure 4 – Visibility at junctions (reproduced from TA 90/05 (Highways Agency, 2005b))

- 3.5.5 Where cyclists are off-carriageway, visibility splays at junctions also need to be considered. Where two off-road cycle tracks meet at a junction, the preferred 'x' distance for cyclists is 4.0m. Longer 'x' distances can offer benefits to cyclists, as they enable cyclists to make an earlier decision as to whether they need to stop, and can therefore maintain momentum when no conflicting traffic is present. However, longer 'x' distances can encourage higher approach speeds; this should be weighed up against the benefits for cyclists.
- 3.5.6 A minimum 'x' distance of 2.0 metres is suggested. This may be reduced to 1.0 metre in exceptional circumstances, where approach speeds are controlled (such as at a 'jug-handle' right turn facility).
- 3.5.7 The 'y' distance will be the stopping sight distance for the main route – Table 7.1 of *Manual for Streets* (Department for Transport, 2007b) provides guidance that will be applicable in most instances. Where the major arm of the junction is not used by motor traffic (i.e. is another cycle track), the design speed of the major route can be assumed to be 20mph – lesser 'y' distances may be acceptable where measured speeds are lower.

Further advice on the visibility requirements of cyclists can be found in the following documents:

- Sections 8.3 and 9.1 of LTN 2/08 Cycle Infrastructure Design (Department for Transport, 2008b); and,
- TA 90/05 The Geometric Design of Pedestrian, Cycle and Equestrian Routes (Highways Agency, 2005b).

3.6 Surfaces

3.6.1 Cyclists (and pedestrians) require smooth, trip free surfaces that should be well drained. Surface defects can be particularly hazardous for cyclists, as cycles have only small contact patches between the tyres and the surface, and therefore any surface defect can seriously destabilise and/or damage the cycle.



Photo 3 – Poor surfaces can render cycle facilities unusable

3.6.2 Surfaces should be well drained, not able to be washed away by rainfall and run-off, and not susceptible to standing water. Cyclists require good quality surfaces with an even profile and a smooth texture (though with adequate skidding resistance).

3.6.3 Most surface materials generally employed on carriageways, (bituminous and concrete materials) create an acceptable running surface for cyclists, apart from granite setts, which are often uncomfortable to ride on.

3.6.4 Where setts or similar uneven surfaces are proposed e.g. as part of public realm works, consideration should be given to providing smoother 'tracks' for cycles to run in as part of the paving detail. Such details have been used historically to ease the passage of horse-drawn vehicles, and so need not detract from the aesthetic aspects of such paving schemes. Alternatively, parts of the route to be used by cyclists can be sensitively paved using concrete pavers to create a smoother surface.



Photo 4 – Use of pavers to create a smoother path for cyclists on a cobbled street

courtesy Tony Russell, Sustrans

3.6.5 Where flexible surfacing is proposed, this should ideally be machine laid, as this provides a smoother running surface for cyclists. It is recognised this may be difficult

to achieve in some circumstances, for example on an off-road cycle track at a constrained site.

- 3.6.6 Where it is proposed to convert an existing footway for shared cycle use, the surface should be reviewed to ensure its suitability for cycling. Where flagstones are provided, it will not necessarily be essential to replace these with bituminous surfacing, but the stones should be checked for defects and any remedial works conducted before conversion. Where such cycle tracks are maintained in future, consideration should be given to providing a more cycle-friendly surface at that time.
- 3.6.7 Care should be taken to ensure that surfaces are maintained to a high standard, and defects are rectified quickly. This is especially important on busier roads and / or where cycle lanes are provided, as cyclists may not be able to, or be expected to, swerve to avoid potholes etc. Defects within cycle lanes, or within the 2m adjacent to the kerb, should be treated as a priority.
- 3.6.8 The Council's experience of using coloured surfacing for cycle lanes in Cardiff shows that some surfaces tend to be of variable quality, carry a higher implementation and maintenance cost, more visually intrusive and are prone to wear. Therefore, the Council will generally seek to avoid the use of colour surfacing, except in specific circumstances where it is advisable to highlight the presence of a particular infrastructure design feature. The use of coloured surfacing to highlight cycle infrastructure is addressed in Section 8.7.

- 3.6.9 Inspection covers and gullies should ideally not be placed within cycle facilities, particularly cycle lanes. Where they are existing, covers and gratings should be of designs which can be safely overrun by cyclists. Where the opportunity arises, these features should be removed or relocated out of the cycle facility - for example, drainage could be converted to an in-kerb system as part of a major highway maintenance scheme.



Photo 5 – Example of a gully design which may be hazardous to cyclists

- 3.6.10 Cycle facilities implemented without flush kerbs at the interface between cycle track and road result in an uncomfortable and possibly dangerous transition between cycle track and carriageway. '*Dropped kerbs*' (with a maximum upstand of 25mm) should not be specified. Instead, '*Flush kerbs*' (maximum upstand 6mm) should be specified.
- 3.6.11 Highway designers often cite drainage problems as a reason for not specifying flush kerbs where cycle tracks meet roads. It is important to ensure that the surface at the interface point between cycle tracks and highways does not become puddled or waterlogged as this will deter use and can be dangerous in winter when the water freezes.
- 3.6.12 A level survey and localised reconstruction can ensure that water drains adequately. The extra cost of this work is usually minimal in relation to the overall scheme cost, and the resulting smooth transition more than justifies the extra effort. Depending

upon the specific type of drainage system employed, it may be necessary to maintain a small upstand (maximum 6mm), to ensure water continues to flow past the crossing, rather than into it. Again, careful design and adequate supervision of works at the construction stage is required to ensure a specified 6mm maximum is achieved. An additional gully on the upstream side of the crossing may be appropriate in some locations.

- 3.6.13 Future maintenance is also a consideration. Surface dressing is often applied to road surfaces, particularly in rural areas, to protect the road structure and improve skidding resistance. If it is laid right up to a flush dropped kerb, this can again lead to ponding of water. A gap of 100mm should therefore be left between the edge of the kerblin and the start of the surface dressing treatment to facilitate drainage.
- 3.6.14 Tactile paving should be provided at flush kerbs to assist the blind and partially sighted (see Section 8.1). *Guidance on the Use of Tactile Paving Surfaces* (Department for Transport, 2005a) provides guidance for standard layouts – however, where a flush kerb is provided for cyclists, there might not be a flush kerb opposite to provide a crossing point for pedestrians. In this instance, engagement with local disability access groups will be necessary to develop a bespoke solution.

3.7 Continuity and Legibility

- 3.7.1 For cycling to be attractive, cycle routes and infrastructure need to be continuous and legible. Cyclists must be able to easily and comfortably follow the route, and should not be, or feel to have been, abandoned by infrastructure at difficult locations, with signage provided at the end of a cycle route to other parts of the network.
- 3.7.2 Infrastructure which is not continuous or well designed is unlikely to encourage a take up of cycling, and may in fact foster a negative image of cycle facilities that is entirely counter-productive particularly as many potential cyclists may consider the provision of high-quality facilities as an essential for them to consider cycling.



Photo 6 – Discontinuous cycle facilities do not encourage cycling and may undermine efforts to encourage cycling

3.7.3 Care should be taken to ensure that cycle routes are also accessible from streets not identified as cycle routes, particularly quiet residential streets. Only a small proportion of Cardiff's residents will live immediately on a cycle route; most will have to cycle a short distance, usually on quiet streets, before joining dedicated infrastructure – the design of infrastructure should ensure cyclists can actually join it once they have reached the cycle network, just as motorways need to have junctions so motorists can join them from the routes they have taken from their origin.

3.7.4 In all instances, it is vital the cycle route is clear and concise, particularly where the layout is not obvious (e.g. where the road layout is complex, and an off-road cycle route is not readily apparent). How cyclists and road users will actually see and interpret the layout should be considered at all stages, and it should never be assumed that the provision of more signing or lining will improve clarity or usability. Engagement with local cycling groups can help designers understand how cyclists will interact with proposed infrastructure, as can designers riding the route for themselves.

3.7.5 **Designers of cycle infrastructure in Cardiff should avoid providing short or intermittent sections of cycle route and should instead seek to provide continuous links which form part of the overall cycle network. Cyclists should not feel 'abandoned' at the end of a new cycle feature but able to continue their journeys and be directed to the nearest section of cycle route.**



Photo 7 – Cluttered road markings and coloured surfacing guiding cyclists through a poor layout.

A wholly on-carriageway solution would provide a better service for cyclists, and would likely be less intrusive.

3.8 Personal Security

3.8.1 Cyclists need to feel safe when using cycle routes if they are to be attractive and be effective at encouraging cycling. Feeling safe is not simply a matter of physical safety, but also of perceived safety. This consideration is emphasised by paragraph 6.4.10 of *Manual for Streets* (Department for Transport, 2007b).

3.8.2 Paragraph 6.3.18 of *Manual for Streets* considers factors which make pedestrians feel safe from crime – it is also considered that the same factors can be applied to cycle routes:

'Pedestrians generally feel safe from crime where:



Photo 8 – Routes where people do not feel safe are unlikely to encourage cycling.

- *their routes are overlooked by buildings with habitable rooms;*
- *other people are using the street;*
- *there is no evidence of anti-social activity (e.g. litter, graffiti, vandalised street furniture);*
- *they cannot be surprised (e.g. at blind corners);*
- *they cannot be trapped (e.g. people can feel nervous in places with few entry and exit points, such as subway networks); and,*
- *there is good lighting.'* (Department for Transport, 2007b).

3.8.3 Local authorities have a legal responsibility under Section 17 of the Crime and Disorder Act 1998 (HMSO, 1998) to have regard to crime implications when exercising their functions. This duty is in force when developing cycle infrastructure.

3.8.4 Although primarily related to planning, the publication *Safer Places: The Planning System and Crime Prevention* (Home Office, 2004) offers guidance on 'designing out' crime which may be of use when considering cycle infrastructure.

3.9 Features which may pose problems for cyclists/features to avoid

3.9.1 The following guidance is not intended to be exhaustive, however it does provide guidance with regard to particular issues that can cause problems for cyclists.

Street furniture

3.9.2 Street furniture close to the carriageway can be intimidating, especially for continuous features such as pedestrian guardrailing. This can be particularly problematic where motor vehicles may pass within close proximity of the cyclist. Street furniture should be located a minimum of 450mm clear of the adjacent carriageway, to avoid being struck by passing vehicles (Gravelle, 2010; Transport for London, 2009). This minimum clearance is also important from a cyclist's point of view

High kerbs

3.9.3 **High kerbs** can also pose a similar concern to cyclists. Kerb upstands should generally be no higher than 150mm. The practice of using 450mm high 'Trief' kerbs for pedestrian refuges and build-outs introduces threatening obstacles for cyclists with little practical safety benefit in most instances (in fact the Trief kerbs may be more hazardous in the event of being struck by a vehicle head-on). It is recommended that the use of Trief kerbs is generally avoided for new installations.



Photo 9 – High kerbs can be intimidating for cyclists

3.9.4 Where cost effective as part of maintenance programmes and other schemes, existing installations should be remodelled with lower kerbs - no higher than 150mm, or 75mm for traffic islands (*Traffic Signs Manual Chapter 5*, paragraph 4.23 (Department for Transport, 2003)).

Large corner radii

3.9.5 At road junctions, **large corner radii** can encourage vehicles to turn at higher speeds, and this may encourage motorists to 'cut up' cyclists proceeding ahead. It is therefore recommended that radii should generally not be greater than 4m. Section 9.4 of *Manual for Streets 2* (Chartered Institution of Highways & Transportation, 2010) provides guidance on junction radii, and explicitly states '**advice contained in TD 42/95, that minimum corner radii should be 6m in urban areas, should therefore not be taken as representing best practice when the needs of vulnerable road users are to be prioritised**'.

3.9.6 In some instances it may be necessary to provide larger radii –

- to accommodate larger vehicles; or,
- at junctions on roads with relatively high speeds where slow-turning vehicles may result in shunts on the main road.

3.9.7 In the first of these cases, vehicle tracking software, rather than rigid application of standards, should be used to determine the required radius.

3.9.8 In the latter case, measures to reduce traffic speeds should be considered before providing generous radii, in line with the hierarchy of provision.

Road Narrowings and build outs

3.9.9 Road narrowings should be avoided, as research has indicated that cyclists perceive these as a serious threat to their safety (Gibbard, Reid, Mitchell, Lawton, Brown, & Harper, 2005). Such features are sometimes used where vehicles are often parked, to address perceived safety concerns – however the following should be borne in mind-



Photo 10 – Build-outs can pose a hazard to cyclists and add to street clutter, whilst bringing little benefit to road users.

- Parking in visibility splays in built-up areas is quite common, yet does not generally appear to create significant problems (paragraph 7.8.5, *Manual for Streets* (Department for Transport, 2007b)); and,
- Cars are provided with reflectors and reflective registration plates, which in addition to the physical presence of the vehicle, means parked cars should be clearly visible by both day and night. Build-outs often are not, and hence often require additional marker posts (themselves posing a risk to cycles) incorporating reflectors similar to those already on parked vehicles – it may therefore be a false economy to provide build-outs to ‘protect’ parked vehicles.
- Generally, junction build outs are a response to speeding vehicles on the main carriageway and the heightened risk of collisions this causes. However, in themselves they are not effective in tackling the source of the safety problem they seek to address, namely, excessive vehicle speeds.

3.9.10 **It is considered that junction build outs should only be considered in exceptional circumstances and then only following full consultation with relevant council officers. Full consideration of alternatives should be undertaken with justified reasoning as to why these alternatives are unacceptable.**

3.9.11 Where build outs are existing or proposed to provide a gateway and/or to locate signs, it may be possible to achieve the desired effect utilising different treatments:

- Road markings can provide a more conspicuous treatment in the driver’s line of sight;
- Textured surfacing can also provide a gateway treatment which emphasises a change in environment;
- Pedestrian crossings;
- Traffic calming; and
- Waiting restrictions.

In some circumstances it may be preferable for no action to be taken rather than build outs to be installed.



Photo 11 – Road markings can form a prominent gateway treatment¹



Photo 12 – Textured surfacing as a gateway



Photo 13 – Example 'courtesy crossing'

*The above photos are reproduced from TAL 10/97
(Department of the Environment, Transport and the Regions, 1997)*

- 3.9.12 Where build-outs are intended to assist pedestrians crossing the road, a zebra crossing or a 'courtesy crossing' comprising a flat-top road hump may offer an improvement to pedestrians that is more accommodating of cyclists.
- 3.9.13 In many streets busy with pedestrians (such as shopping streets), pedestrians will often wish to cross the carriageway along its full length, rather than along specific desire lines – in such instances, facilities such as build-outs and crossings may be of only limited benefit, and traffic calming and/or a mixed priority route treatment may be more appropriate.
- 3.9.14 Where visibility for emerging drivers is proposed to be improved, it is recommended this is only progressed at sites where there is a recorded collision history suggesting that visibility is an issue. In those instances, build outs should be considered only after the following options have been explored:
- Measures to reduce main road traffic speeds to reduce visibility requirements; and,
 - The introduction of waiting restrictions.
- 3.9.15 Where build-outs are proposed at several junctions along a length of street to improve visibility where parking demand is high, it is recommended the first build-out is introduced with a nearside approach taper commensurate with Table 4-3 of TD 27/05 *Cross-Sections And Headrooms* (Highways Agency, 2005c), and that build-outs are provided at each end of every length where parking is permitted. This will have the effect of creating a series of 'lay-bys' for parking, and should minimise potential conflict between cyclists and moving motor vehicles. It will also minimise the need to provide street furniture on the build-outs to make them conspicuous, reducing the risk of injury where cyclists are squeezed towards the narrowing.
- 3.9.16 Traffic calming should always be provided to reduce vehicle speeds to around 20mph where a build out is proposed that has the effect of –
- introducing a narrowing with a nearside approach taper of less than those

¹ 'SCHOOL' road markings are not prescribed and require special authorisation

specified in Table 4-3 of TD 27/05 *Cross-Sections And Headrooms* (Highways Agency, 2005c); or,

- reducing the nearside traffic lane width² to 4.0 metres or less, to facilitate cyclists taking the primary riding position in the centre of the nearside lane as recommended by the national 'Bikeability' cycle training scheme (Cycling England, 2008b) at hazardous locations.

3.9.17 Where, owing to parking demand on the approach side, the build out is less than 1.8m wide and therefore does not result in a pinch point in itself in practice, traffic calming might not be necessary specifically in response to provision of a build-out. However, provision for cyclists along the street as a whole should still be considered in line with the hierarchy of provision.

² Where 'give way to oncoming vehicles' signs are provided, this can be taken to be the entire width of the carriageway

4.0 SHARED STREETS

Note: For the purposes of this design guide, 'shared streets' are those streets where it is expected that cyclists will share the carriageway with motor traffic without specific cycling infrastructure. This should not be confused with 'shared space' or 'shared surfaces'.

4.1 Introduction

- 4.1.1 The majority of Cardiff's streets are considered as 'shared streets' ie those where cyclists share the carriageway with vehicles. It is important to note these streets act as feeders onto the main cycle network, even when not identified specifically as a cycle route – just as the same streets act as feeder routes for motor vehicles onto the main traffic routes. Consequently, all such streets should over time be considered for treatment in line with this section.
- 4.1.2 Shared streets in this context do not necessarily involve the removal or absence of segregated footways or conventional traffic calming measures, although issues surrounding schemes which may involve such treatments are considered in section 4.7.

4.2 Objectives

- 4.2.1 The objective of shared streets should be to calm traffic to provide conditions in which cyclists can use and enjoy the full width of the carriageway, in line with Manual for Streets (Department for Transport, 2007b) –
'6.4.1 Cyclists should generally be accommodated on the carriageway. In areas with low traffic volumes and speeds, there should not be any need for dedicated cycle lanes on the street.'
- 4.2.2 In order to achieve conditions which facilitate cycling on the carriageway, it will be appropriate to ensure 85th percentile traffic speeds are ideally kept below 20mph, and certainly below 25mph.

4.3 Identifying Level of Provision Required

- 4.3.1 Provision on shared streets will consist almost entirely of measures to reduce traffic speeds and flows to acceptable levels. The actual measures required should be considered in light of the reduction required from existing recorded speeds and flows to those considered to be acceptable. LTN 1/07 *Traffic Calming* provides guidance on the effectiveness of the various traffic calming features and on the spacing of measures that will be required to achieve various speed reductions.
- 4.3.2 The table below provides suggested preferred, recommended and absolute traffic flows and speeds on shared streets.

Table 6 – Suggested limits on vehicle flows and speeds for facilities on shared streets

	85 th %ile traffic speed	Maximum daily traffic flow
<i>Preferred maximum</i>	20mph	1,000
Recommended maximum	20mph	3,000
<i>Absolute maximum</i>	25mph	5,000* (but can be up to 10,000)

* see paragraph 4.3.3

- 4.3.3 LTN 3/08 *Mixed Priority Routes: Practitioners' Guide* (Department for Transport, 2008d) gives guidance on schemes on busy roads which aim to enable better sharing of the highway space, in circumstances where segregation is neither feasible nor desirable. Of particular note is Newland Avenue, Hull which saw a 50% (282 cycles per day) increase in cycle flows after treatment on a route carrying around 10,000 vehicles per day (vpd).

4.4 Reducing Traffic Volumes

- 4.4.1 Where a significant proportion of vehicles could be diverted to more suitable alternative routes without unacceptable consequences, consideration could be given to introducing a road closure at a point along the street to reduce through traffic.
- 4.4.2 All such closures should include an exemption for cyclists. A gap or flush kerb of 3.0 metres width should be provided for cycles in any kerbing enforcing the closure – a bollard may need to be provided to prevent misuse by other vehicles. Widths down to 1.5m may be acceptable for one-way working, or where site constraints do not allow for a larger gap. Locating the cycle gap in the middle of the carriageway will reduce the risk of obstruction and the lengths of waiting restrictions required, and will also be more convenient and legible for cyclists.
- 4.4.3 Alternatively, a lower maintenance approach might be simply to provide bollards across the carriageway without introducing kerbing. This would reduce sweeping requirements, and minimise any alterations to drainage arrangements, but may not be effective at deterring powered two wheelers and will need careful consideration in terms of visibility and conspicuity, approach speeds (of cycles as well as motor vehicles), and technical concerns.
- 4.4.4 Where a closure only exempts cyclists, 'Cycles only' signs to diagram 955 are to be used in preference to 'No motor vehicles' signs to diagram 619, to emphasise the closure as forming part of the cycling infrastructure.
- 4.4.5 Where traffic volumes are high but a road closure is not practical or acceptable, traffic calming could be introduced to deter through-traffic by making the route relatively unattractive compared to more suitable alternative route(s).



4.5 Traffic Calming and Reducing Traffic Speeds

- 4.5.1 Even where existing speeds are high, research has indicated the traffic calming can be highly effective in reducing traffic speeds, provided measures are robust and are not spaced excessively. For example, Table 7 (reproduced from LTN 1/07) highlights speed reductions that can be expected as a result of road hump schemes. Where other measures are proposed, LTN 1/07 also provides guidance on the effectiveness of these.

Table 7 – Estimated hump⁴ spacing required to achieve a mean ‘after’ speed between humps reproduced from LTN 1/07 Traffic Calming (Department for Transport, 2007a)

Mean ‘before’ speed (mph)	Spacing between humps (metres)						
	20	40	60	80	100	120	140
	‘After’ speed between humps (mph)³						
20	13	14	15	16	18	19	20
35	15	16	17	18	20	21	22
30	17	18	19	20	22	23	24
35	19	20	21	22	24	25	26

4.5.2 Traffic calming can greatly improve conditions for cycling, but it can also cause cyclists discomfort. Vertical traffic calming can pose a nuisance and horizontal features can introduce conflict with motor vehicles. Although cycle bypasses can alleviate these, they can often become obstructed by parked vehicles, and collect detritus. Therefore, traffic calming should be avoided where motor traffic flows are low, speeds are naturally low (as per paragraph 4.2.2), or where traffic flows can be reduced as an alternative (section 4.4).

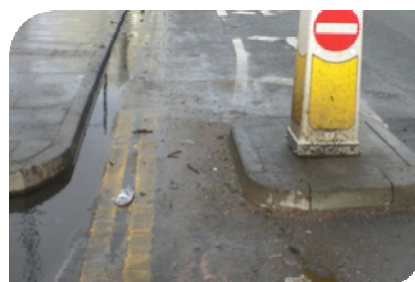


Photo 14 – Cycle gaps at pinch points can often become filled with detritus

4.5.3 Notwithstanding the above, existing traffic speeds will often be higher than the 20mph ideal maximum; in these cases it is considered that the advantages of traffic calming for cyclists outweigh the disadvantages.

4.5.4 Advice on traffic calming is provided in LTN 1/07 *Traffic Calming* (Department for Transport, 2007a). The following paragraphs give specific guidance with regards to cycling.

4.5.5 On identified cycle routes, full-width road humps will ideally be of the sinusoidal type, so as to minimise discomfort for passing cyclists. However, it is recognised that sinusoidal humps can be difficult to construct. Round top humps are preferred, but flat-top humps can be considered i.e. as an informal pedestrian crossing. Humps should ideally not be higher than 75mm, and the gradient of ramps should be as shallow as practical to minimise discomfort for cyclists whilst achieving sufficient speed reduction for motor vehicles. Ramps rising 75mm over 1800mm have been found to work well elsewhere. 100mm high humps and/or ramp gradients as steep as 1 in 15 may be necessary where ‘before’ motor vehicle speeds are high – whilst not ideal for cyclists, the inconvenience caused by the road hump will generally be more

³ The corresponding 85th percentile speeds would be 4-5mph greater than the mean speeds

⁴ For round top humps 75mm or 100mm high, flat top humps 75mm high (ramp gradient 1:10-1:15) and flat top humps 100mm high (ramp gradient 1:8-1:10)

than offset by the benefit of reduced motor vehicle speeds in these circumstances.

- 4.5.6 Gaps can be provided adjacent to road humps to allow cyclists to by-pass the hump altogether, although this is not essential. Gaps should be a minimum of 1.5m wide where provided as a cycle by-pass (assuming one-way use); narrower gaps can be acceptable where the function is purely drainage. Gaps of 1.8m or greater may allow car drivers to bypass the road hump, and should generally be avoided. Where gaps are provided, humps should be designed so that the presence of the gap is readily apparent to cyclists (see paragraph 4.8.3)
- 4.5.7 Road narrowings should be avoided, as research has indicated that cyclists perceive these as a serious threat to their safety (Gibbard, Reid, Mitchell, Lawton, Brown, & Harper, 2005). Cycle gaps can be considered as a mitigation, provided that these can be protected from obstruction by parked vehicles and that a regular sweeping program is in place to prevent the cycle gaps becoming filled with detritus. These should be a minimum of 1.5m wide for one-way use.
- 4.5.8 Centre lines should be avoided on shared streets as there is some evidence that centre lining can encourage higher speeds (Department for Transport, 2007b) and may encourage motorists to pass cyclists closer than they should be.

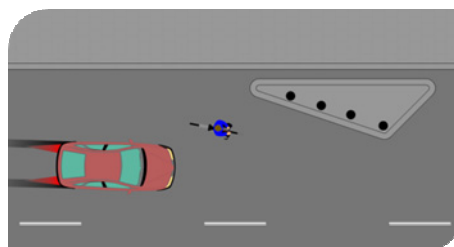


Figure 5 – Build-outs can create hazardous and uncomfortable situations for cyclists

Further advice on traffic calming is provided in LTN 1/07 Traffic Calming. (Department for Transport, 2007a).

Appendix A of that document provides a comprehensive bibliography of publications pertinent to the design of traffic calming.

TAL 1/97 Cyclists at Road Narrowings (Department of Transport, 1997) may also be of use when considering such features.

4.6 20mph Speed Limits

- 4.6.1 20mph speed limits are typically introduced (normally using zonal signing) alongside traffic calming, primarily as a means of indicating a traffic calmed area but also introducing an enforceable speed limit. The impact of the signing and speed limit order over and above the impact of the physical traffic calming is typically small, but this approach does give an indication to motorists of what is expected of them, and the limit may give cyclists an additional degree of confidence. 20mph zones can in some (but not all) instances indicate the presence of traffic calming in a simpler manner than using warning signs.
- 4.6.2 20mph speed limits can be installed without traffic calming, either using repeater signing, or zonal signing provided authorisation is granted. TRL report 363 (Mackie, 1998) found 20mph limits relying solely on signing only achieved speed reductions of around 1 or 2mph. This compares to typical reductions of around 5-10mph for

physical traffic calming (Department for Transport, 2007a).

- 4.6.3 20mph speed limits without traffic calming are at an early stage of development in the UK at the time of writing and are in practice unenforceable as no equipment is type approved for their enforcement. Early monitoring of a recent much-publicised scheme in Portsmouth, involving the mass implementation of 20mph speed limits with repeater signs, came to the following conclusions based on 24 months of ‘after’ data:

- *‘The average speed reduction achieved by installing speed limit signs alone is less than that achieved by the introduction of 20 mph zones partly because 20 mph Speed Limits are implemented where existing speeds are already low;*
 - *Within an area-wide application of 20mph sign only limits, those roads with average speeds higher than 24 mph may benefit from significant speed reductions, but not to the extent that the 20mph speed limit is self enforcing;*
 - *Casualty benefits greater than the national trend have not been demonstrated’.*
- (Atkins, 2010)

- 4.6.4 The study also found that when asked about the scheme, over 40% of local residents stated that since the introduction of the 20mph limits, there has been a safer environment for walking and cycling. As a result, around a third of respondents felt that there had been an increase in pedestrian and cyclist activities in the local areas, suggesting there is potential to increase cycling through improved perception of safety.

- 4.6.5 Based upon these findings, 20mph limits without traffic calming may be appropriate on shared streets without significant casualty histories where speeds are modest, so as to provide an improved perception of safety for cyclists. However, these are not considered suitable for core cycle routes in Cardiff, unless existing speeds are low.

Further advice on 20mph and other speed limits is provided in the following documents:

- *Setting Local Speed Limits in Wales (Welsh Assembly Government, 2009)*
- *Section 3.2, LTN 1/07 Traffic Calming (Department for Transport, 2007a)*

4.7 ‘Shared Space’ Schemes

- 4.7.1 Shared Space is an approach to highway design which seeks to provide better quality built environments by encouraging road users to ‘negotiate’ passage along a street with each other, rather than having their behaviour regulated through conventional traffic engineering features. Such schemes typically enable pedestrians to use the full width of the highway and cross vehicle areas freely.



Photo 15 – Example shared space scheme in the Netherlands

- 4.7.2 Well designed shared space schemes may be of great benefit to cyclists, as traffic speeds should be reduced and cyclists should be able to enjoy equal precedence with

motor traffic.

- 4.7.3 Concerns have been raised about shared space schemes and as with all cycle schemes they will be subject to an initial Equality Impact Screening and the Council's Equalities Team should be involved at an early stage.
- 4.7.4 Some issues that need considering with regard to cycling are discussed below; this is not an exhaustive list and proper engagement and officer's professional judgement will be required to ensure satisfactory design (see Section 2.3).
- 4.7.5 As shared space schemes tend to allow and encourage pedestrians to use the full width of the highway, there is likely to be potential for increased conflict between pedestrians and cyclists. Whilst this may not result in an unacceptable risk of injury, it may reduce the convenience of the route for cyclists slightly. This should be borne in mind where shared space schemes are considered on core cycle routes.
- 4.7.6 Shared space schemes typically involve the reduction or elimination of traffic signs, and some may involve level surfaces without marked routes or areas for vehicles. This can make navigation through these areas more difficult, particularly where cyclists are trying to follow a signed route. Care should be taken to ensure that any cycle routes through shared spaces are clear and legible for cyclists.



Photo 16 – Delineation of cycle routes in shared spaces can be achieved sensitively using cycle symbol pavers

4.8 Cycle-specific Infrastructure on Shared Streets

- 4.8.1 Whilst shared streets should predominately be treated for cycling by reducing traffic flows and speeds, it may in some instances be desirable to provide dedicated cycle facilities.
- 4.8.2 Where a street is prone to traffic congestion for some or all of the day, cycle lane(s) may be beneficial to enable cyclists to by-pass traffic queues. In this instance advisory cycle lane(s) would ordinarily be most appropriate, to provide an indication of the area to be kept free of queuing vehicles, without suggesting full segregation as a mandatory lane might. An alternative could be to provide a differently paved / coloured strip with cycle symbols to indicate the area to be kept free of vehicles. In these instances, the desirable minimum width for the cycle lane is 1.5m, although 1.2m may be acceptable where there is insufficient width. Waiting restrictions may be appropriate to protect the lane from parked vehicles.
- 4.8.3 In some instances, a short length of shared street may link segregated facilities on two adjacent busier streets. To ensure legibility and continuity of the route, it may be best to continue facilities similar to those on the busier streets on the quiet link; this may also reduce unnecessary movements on and off the carriageway. Care should be taken to ensure the facilities are fully accessible from the quiet street route and other adjacent quiet streets, even (and especially) if these are not on a core cycle route.

4.9 'Bicycle Streets' / Mixed Priority Treatment

4.9.1 'Bicycle streets' are a technique used in some towns and cities in the Netherlands and Germany to give priority to cyclists on certain streets whilst still admitting motor traffic (Ligtermoet, 2006).

4.9.2 It is envisaged that bicycle streets may be used initially to afford cyclists greater priority in situations where a cycle route runs along one street, parallel to another which is deemed better able to cater for motorised traffic (through policy decision and/or engineering measures). Consideration will need to be given to the implications of diverting traffic away from the proposed bicycle street onto the alternative route, both by any supporting traffic restrictions and by the installation of the bicycle street itself.



Photo 17 – Fietsstraat sign in the Netherlands

Text translates as 'Bicycle street – cars are guests'⁵

4.9.3 The treatment will consist of physical measures which give the street the appearance of being for mixed use – these will typically be installed under existing powers to alter the highway (see paragraph 4.9.8 onwards).

4.9.4 No legislative mechanism which would require anything of other road users is required – the aim should be that the physical design encourages appropriate behaviour without resorting to enforcement, as with 'shared space' schemes. This is a common approach even with conventional traffic management features (such as lane markings and 'keep clear' markings) and given limited enforcement resources is how many legislative traffic management techniques also work much of the time in practice.

4.9.5 Although not considered essential, there may be mechanisms to provide formal priority for cyclists on bicycle streets. In a similar vein, the Royal Borough of Kensington and Chelsea are in discussions with the Department for Transport regarding mechanisms to formalise priority for pedestrians as part of the proposed Exhibition Road shared space scheme (Forster).

4.9.6 Schemes in the Netherlands have typically been introduced in the following circumstances:

- Minimum flows of 2,000 cycles per day;
- Maximum motor vehicle flows between 500 and 2,000 vpd (perhaps as high as 2,500 vpd);
- Cycle flows will be between double and quadruple motor vehicle flows;

⁵ Reproduced from www.fietsberaad.nl

⁶ Streets with motor vehicle flows less than 500 vpd are considered not to require special treatment

- Bicycle streets will typically have 30km/h (20mph) speed limits (Fietsberaad, 2005).

4.9.7 However, in Cardiff, where cycle use is much lower (= [approximately 5.9% of commuter journeys (Cardiff Council, 2009b) – compared to between 15% and 40% in the Netherlands (Fietsberaad, 2009)] it is envisaged that such treatments would be intended to encourage a modal shift to generate high cycle flows by greatly improving conditions for cycling.



Photo 18 – Example bicycle street in the Netherlands

4.9.8 The treatment itself is expected to consist of physical alterations to the carriageway, to give an impression to motorists that while they are admitted, they are below bicycles in the road hierarchy.



Photo 19 – Example bicycle street in the Netherlands⁷

- 4.9.9 The physical construction of the bicycle street will typically be achievable within the Highway Authority's existing powers, provided that all over-run areas meet the requirements of Section 5 of the Highways (Traffic Calming) Regulations 1999 (HMSO, 1999a).
- 4.9.10 It will probably be appropriate to provide signs, and possibly road markings, to emphasise that cyclists are intended to be given priority over motor vehicles. These will require special authorisation.
- 4.9.11 The management of parking and loading will also need careful consideration, to ensure these activities do not compromise the operation of the bicycle street.



Figure 6 – *Fahrradstraße* sign in Germany

Literally 'street for cycles – motor vehicles admitted'

4.10 Vehicle Restricted/'Pedestrianised' Areas

- 4.10.1 Some streets in Cardiff are 'pedestrianised', in the sense that access to vehicles is restricted, with vehicles only admitted at certain times and/or for certain essential purposes. Such streets are technically known as Vehicle Restricted Areas (VRAs)
- 4.10.2 Access restrictions in VRAs may include exemptions for cycles at some times of the day.
- 4.10.3 Issues relating to admitting cyclists in to VRAs usually pertain to existing restrictions. Notwithstanding this, the possibility of admitting cyclists should always be explored whenever new pedestrian areas are proposed. It will usually be easier to not prohibit cycling in the first instance (when the scheme will still be seen as of great benefit to pedestrians and people with disabilities), than it will be to attempt to re-admit cyclists at a later date (when admitting cyclists may be seen as conflicting with pedestrians and people with disabilities).
- 4.10.4 VRAs are normally treated as shared surfaces, which are typically dominated by pedestrians as a result of high pedestrian flows and low vehicular flows. Therefore, the guidance contained in Section 4.7 may also be pertinent.
- 4.10.5 Where cycling is prohibited the restrictions can pose a major barrier to cycling – the alternative routes to avoid restricted streets are often circuitous and heavily trafficked and can avoid key destinations altogether. This reduces the attractiveness of cycling, and may increase the risks associated as alternative routes may be more hazardous than allowing cyclists into the restricted streets.
- 4.10.6 The issue of cycling in VRAs was considered by the report *Cycling in Vehicle Restricted Areas* (Davies, Chinn, Buckle, & Reid, 2003). This found that cyclists tended to modify their behaviour in VRAs (by slowing down or dismounting) as pedestrian numbers increased. Pedestrian attitude surveys suggested that cycling through the studied streets was not a major concern.
- 4.10.7 Notwithstanding the above, some users express concern at the admission of cyclists into VRAs/pedestrianised streets, citing concerns regarding the potential for conflict

between pedestrians and cyclists. Groups representing the blind and partially sighted have expressed particular concerns (Royal National Institute for the Blind, 2010).

- 4.10.8 In practice, few recorded collisions occur between pedestrians and cyclists in pedestrianised streets (Davies, Chinn, Buckle, & Reid, 2003) *'a small, but not inconsiderable, number of pedestrians reported having seen, or been involved in, an accident within a VRA [vehicle restricted area],'* Discussions with the Cardiff's Access Focus Group suggest that It may be that such collisions are under-reported
- 4.10.9 All proposals for lifting restrictions on cycling in existing VRAs or to allow cyclists into new VRAs should be carried out (as with all cycle schemes) with an initial Equality Impact Screening in consultation with the Council's Equalities Team. This will allow identification of any concerns regarding impacts on the different equality strands as defined in current legislation. Where such a screening identifies potential impacts, a more detailed Equality Impact Assessment (EqIA) may be required to establish the level of any impacts and identify possible measures to mitigate them.
- 4.10.10 The admission of cyclists into VRAs should not be seen simply as a matter of changing traffic regulation orders and signing, but instead may need to comprise comprehensive schemes including any physical changes that may be required to accommodate an acceptable compromise between the needs of pedestrians, cyclists, traders, the visually impaired and other users. Such schemes will need to be tailored to each restricted street in full consultation with all user groups.
- 4.10.11 Alternatively, a segregated 'carriageway' could be provided through the affected streets, either using conventional kerbs, or paving with contrasting colour and/or texture. This may reduce the interactions between pedestrians and cyclists by providing clear cycle-free areas for pedestrians and by guiding cyclists away from particularly hazardous locations, such as doorways. In considering proposals for segregated routes through VRAs, the impact of possible increases in cycling speeds need to be considered. The effectiveness of VRAs should also be considered with the issues highlighted in Section 6.2.
- 4.10.12 An alternative could be to introduce 'soft' segregation by arranging street furniture and trees to guide cyclists. In any event, street furniture will need to be located so there is clear space for cycling, to ensure good intervisibility between pedestrians and cyclists, and to prevent cyclists from having to weave unpredictably. Care should also be taken to ensure there are no pinch points where pedestrians may concentrate, increasing the interactions, and also to ensure that street furniture does not form an obstruction or trip hazard for the visually impaired. It is also important to ensure that street furniture is suitably located with regard to its function and to the public realm, as well as with regard to other users of the street (including servicing vehicles and pedestrians).
- 4.10.13 Other Traffic Regulation Orders may be in place to regulate the flow of permitted vehicles through pedestrianised areas, including one-way streets and prescribed movements. Where these exist, the orders and signing associated with those restrictions need to be reviewed where it is proposed to admit cyclists into a VRA street to ensure appropriate exemptions are provided for cyclists.
- 4.10.14 Where cyclists are admitted into vehicle restricted streets, care should be taken to

ensure cyclists are adequately catered for at either end of the restricted section, particularly at junctions. Potential conflict with motor vehicles and pedestrians will need to be considered, and it may be necessary to adjust traffic signal control arrangements, for instance.

- 4.10.15 **Where there is a demonstrable demand for cycling access to and through VRAs, the Council will consider ways of permitting cycle movements, subject to careful consideration of the above issues.**

Further guidance on pedestrianised streets more generally can be found in the following documents:

- *TAL 9/93 Cycling in Pedestrian Areas (Department of Transport, 1993c);*
- *Paragraphs 4.3.4-4.3.10, LTN 2/08 Cycle Infrastructure Design (Department for Transport, 2008b);*
- *Paragraphs 2.3.11-2.3.13, Manual for Streets 2 (Chartered Institution of Highways & Transportation, 2010);*
- *LTN 1/87 Getting the Right Balance: Guidance on Vehicle Restriction in Pedestrian Zones (Department of Transport, 1987)*

4.11 Home Zones

- 4.11.1 'Home Zones' are streets which are engineered to facilitate the use of the street for various civic, social and recreational activities, in particular children's play, in addition to more conventional highway functions. This is supported by legal orders, made under Section 268 of the Transport Act 2000 (HMSO, 2000), which can permit these activities to take place in the highway.
- 4.11.2 A Home Zone will be subject to a designation order (which designates the road as a Home Zone), and this might be supported by a Use Order and/or a Speed Order. The Use Order can permit various activities in the street, provided that these do not prevent the passage of traffic along the street or deny access to premises on or near the street. The Speed Order authorises the Highway Authority to take measures to reduce traffic speeds to below the speed stated in the Order.
- 4.11.3 It is important to note Home Zone orders do not impose any prohibitions, restrictions, speed limits, or requirements on users of the street – where such restrictions are required, Traffic Regulation Orders will be necessary in addition to the Home Zone order(s).
- 4.11.4 Home Zones should result in reduced traffic speeds and an improved environment and may reduce traffic flows. Consequently they are likely to improve conditions for cycling. Home Zones are to be preferred over the now-obsolete street playgrounds mechanism (Road Traffic Regulation Act s.29), as Home Zones permit cycling whereas street playgrounds usually prohibit most cyclists.
- 4.11.5 Home Zones will often involve designs incorporating 'shared space' ideas – the guidance provided in Section 4.7 may also be pertinent to the design of Home Zones.

Further guidance on Home Zones more generally can be found in the following documents:

- *TAL 10/01 Home Zones - Planning and design (Department for Transport, 2001);*
- *TAL 8/02 Home Zones – Public participation (Department for Transport, 2002);*
- *IHE Home Zones website (www.homezones.org.uk) (Institute of Highway Engineers, 2010).*

5.0 SEGREGATED STREETS

5.1 Introduction

- 5.1.1 On some streets, the nature of the street is such that –
- In terms of motor traffic, the street has a significant traffic function;
 - Motor vehicle flows are typically high;
 - Motor vehicle speeds may be high, but may be constrained, e.g. by traffic congestion.
- 5.1.2 On some of these streets (particularly the lesser trafficked ones) it may be possible to reduce traffic flows and speeds to a level which would enable the sharing of the street, without adverse impact on other road users. However, this will not always be possible, in which case a segregation approach is likely to be more appropriate. Many of Cardiff's classified road network could broadly be considered as such.

5.2 Objective

- 5.2.1 The objective of segregated streets should be to provide cyclists with a safe, comfortable space in which to cycle with a degree of separation from motorised traffic. Such provision may be in the form of on-carriageway cycle lanes, facilities adjacent to the carriageway, or in some cases alternative routes near to, but away from, the street.

5.3 Identifying Level of Provision Required

- 5.3.1 The exact facilities provided on any particular segregated street will typically depend upon what can physically be accommodated within the existing highway. Where multiple options are considered feasible, the hierarchy shown in Figure 7 should be applied. Note that in some circumstances, dual provision may be desirable (i.e. an off road cycle track for school pupils and on-road cycle lanes for commuters). Provision may differ in opposing directions – site constraints may allow for a cycle lane in one direction, but necessitate an off-carriageway facility in the other. Reducing traffic speeds and flows where this can be achieved will always be of benefit to cyclists, no matter what cycle-specific provision is in place.
- 5.3.2 In some instances, it may be possible to provide a parallel off-road route – this should generally be considered in addition to providing on-highway infrastructure.

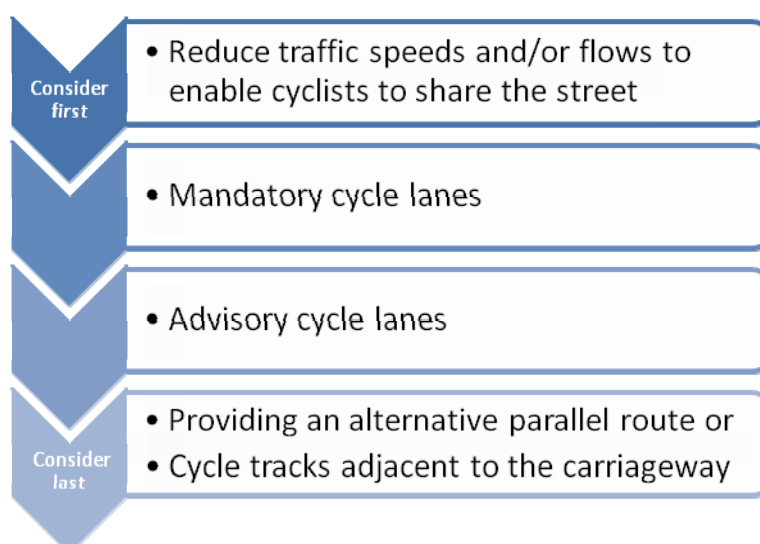


Figure 7 – Hierarchy of provision for segregated streets

5.3.3 Once the options have been considered in line with this hierarchy, with reference to local considerations beyond cycling, a check should be made to ensure the measures proposed are suitable given the *expected* volume and speed of traffic *following installation*. It should be noted that some measures may be expected to reduce traffic flows and speed in some circumstances. Suggested limits are given in Table 8. A scheme lower down the hierarchy within the preferred maximum limits will usually be preferable to a scheme higher up the hierarchy but outside of the preferred maximum limit.

Table 8 – Suggested limits on vehicle flows and speeds for facilities on segregated streets

Measure	85 th %ile traffic speed		Traffic flow (vpd)	
	<i>Preferred maximum</i>	Recommended maximum	<i>Preferred maximum</i>	Recommended maximum
Reduce speeds / flows	20mph	25mph	3,000	5,000⁸
Mandatory cycle lanes	35mph	40mph	20,000	30,000
Advisory cycle lanes	30mph	35mph	7,000	10,000
Adjacent cycle tracks	-	-	-	-
Alternative parallel route	-	-	-	-

5.4 Reducing Traffic Volumes and Speeds

5.4.1 As noted previously consideration should always be given to measures to reduce the speed and volume of traffic in preference to providing segregated facilities. If traffic speeds and flows can be brought down sufficiently without unacceptable impacts on other stakeholders, this would allow the street to be treated as a ‘shared street’ as per Section 4. This is likely to bring greater benefit to cyclists than any segregated facility, as this allows cyclists the flexibility to use the full width of the carriageway and allow much greater flexibility in manoeuvres than segregated facilities are in practice able to accommodate.

5.4.2 Even where speeds and flows cannot be brought down sufficiently to enable cyclists

to share the carriageway, measures should still be considered to reduce traffic flows and speeds as far as reasonably possible. There are two key reasons for this:

- Lower traffic flows and speeds may allow for a lower degree of segregation for cyclists, which may minimise adverse affects on other road users (for example, if speeds and flows are reduced this may permit a reduction in the widths or number of traffic lanes, which may in turn enable on-carriageway cycle lanes to be provided where a footway might otherwise need to be converted to a cycle track, to the detriment of pedestrians); and,
- Lower traffic flows and speeds are likely to improve the comfort and safety of cycling, even on a segregated facility.

5.5 Widths Required for Moving Motor Vehicles

- 5.5.1 It is important to achieve an appropriate balance when determining the width of highway primarily intended for use by motor vehicles (i.e. those parts of the carriageway outside of any cycle facilities). Providing excessive width encourages higher vehicle speeds and limits space that can be utilised for other purposes (including the provision of cycle facilities), while providing insufficient width may result in excessive levels of encroachment by motor vehicles, which would undermine the effectiveness of any cycle facility.
- 5.5.2 Section 8.6 of *Manual for Streets 2* (Chartered Institution of Highways & Transportation, 2010) provides guidance on lane and carriageway widths. Figure 7.1 of *Manual for Streets* (Department for Transport, 2007b) provides an indication of what various carriageway widths can accommodate. The following considers the documents to identify what widths may be appropriate when exploring ways to accommodate cycle facilities – altering lane widths in the spirit of the guidance below is not considered in itself to provide for a satisfactory cycling environment.
- 5.5.3 Historically, traffic lane widths of 12 feet (3.65m) have been provided as standard in the United Kingdom. However lane widths of 3.0 metres have been used in many parts of the country on urban roads for some time, and can successfully accommodate most typical vehicles (including HGVs) at speeds up to 40mph (Institution of Highways & Transportation, 1997).
- 5.5.4 But where flows of large vehicles are low, and speeds are modest (less than 35mph), lane widths as narrow as 2.75m can accommodate car traffic comfortably. Larger vehicles can pass each other at this width at low speed with care, although some drivers may choose to encroach slightly outside of lanes to pass (i.e. into a cycle lane). Where flows of bus and/or HGV are unusually high widths between 3.2m and 3.5m may be required.
- 5.5.5 However where two or more lanes proceed in the same direction, lane widths of 2.75m may be sufficient *even* where bus and HGV flows are relatively high, as these vehicles can straddle the lanes, provided speeds are modest.

- 5.5.6 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 even to 2.0m where HGV flows are light.

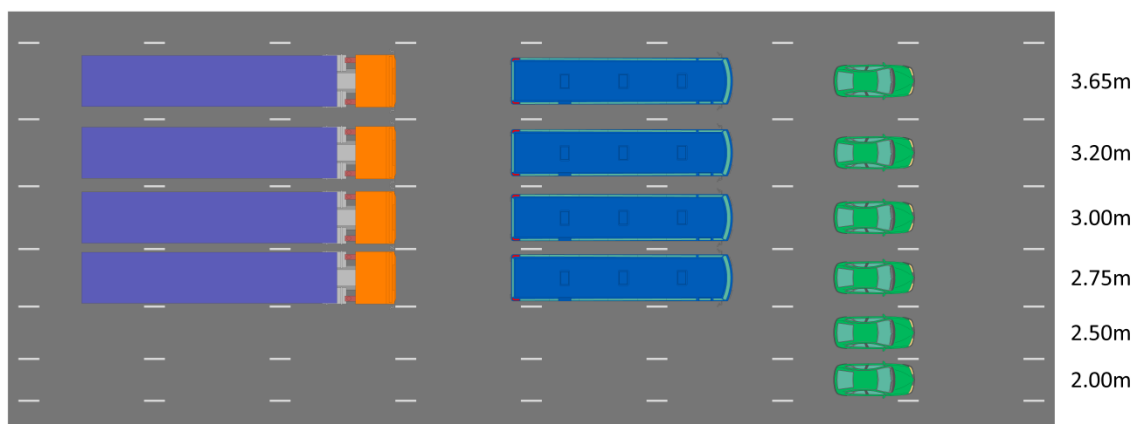


Figure 8 – Illustration of the sizes of vehicle various lane widths can accommodate

- 5.5.7 Wider lane widths may be required on curves, particularly where flows of large vehicles are significant. Vehicle tracking software can be used to identify the required widths. It is important for reasons of safety that sufficient widths are provided for motor vehicles in these circumstances as substandard widths may result, for example, in cyclists being ‘squeezed’ on the inside of bends.
- 5.5.8 Where concerns exist about the use of lane widths less than 3.0 metres, designers can be reassured by the following guidance for trunk roads, where speeds are typically higher and traffic flows (particularly of heavy goods vehicles) greater than will commonly be found on Cardiff’s streets:
- TD 50/04 (Highways Agency, 2004) permits lane widths as narrow as 2.25 metres in certain circumstances on the approaches to traffic signal stop lines.

5.6 Widths Required for Parked Motor Vehicles

- 5.6.1 Parked vehicles also require physical width. Whilst the standard width of 2.4m for a car parking space is considered to be ideal, in practice it is recognised that this will often be difficult to accommodate within many existing streets. A width of 2.0m is considered the preferred minimum – this provides a margin of error to allow for poorly parked vehicles. Widths between 1.8m and 2.0m are only recommended if providing parking is essential and space constraints require such narrow widths. Widths of less than 1.8m should never be used, as this would not provide sufficient space to park a car and may be unlawful where a designated parking place is provided.



Photo 20 – Example of cycle lane compromised by inadequate width for motor vehicles



Photo 21 – Example of better cycle lane where appropriate widths are provided for motor vehicles and for cycles

- 5.6.2 Parking bays intended to be used by vans should be at least 2.4m wide, and for buses and HGVs should be at least 2.8m wide (preferably 3.2m wide).
- 5.6.3 Loading bays should ideally be of similar dimensions as for parking bays. However, as loading is an activity which is essential to local businesses, and as it generally only occurs for relatively short periods, it will often be an acceptable compromise to allow for loading in on-road cycle lanes, either informally or in loading bays which overlap cycle lanes. Loading can be restricted to off-peak periods or be time limited, where this is appropriate to minimise obstruction to cyclists.
- 5.6.4 In order to release carriageway space, it is possible to provide parking and loading places partially or entirely on footways (see Section 8, Chapter 3, *Traffic Signs Manual* (Department for Transport, 2008c)). This also means the space can be used as footway when vehicles are not present, whereas the space occupied by a lay-by will be wasted when empty. The needs of pedestrians and the structural strength of the footway, and the protection statutory undertakers' equipment should be fully considered when proposing such layouts. A minimum clear width of 2.0 metres should be retained for pedestrians where parking is proposed wholly or partially on the footway, and engagement with the Council's Equalities Team and other stakeholders.
- 5.6.5 It might be possible to make a street one way in order to provide width for cycle facilities. Any one way order should include some means of exempting cyclists (see section 8.8).
- 5.6.6 **In general, designers should seek to minimise lane widths for general traffic appropriate to the road type and traffic conditions. Available road space should be reallocated to provide/improve the provision of cycling facilities.**



Photo 22 – Designated parking on footways can free up carriageway space⁹

5.7 Cycle Lanes

5.7.1 The table below sets out the basic requirements for mandatory and advisory cycle lanes.

5.7.2 More detail can be found in the proceeding sections.

	Mandatory Cycle Lane	Advisory Cycle Lane
Width of cycle lane	1.8m maximum 1.5 minimum	1.8 maximum 1.5 minimum 1.3 for feeder lanes to Advanced Stop Lines
Minimum width of remaining carriageway	2m for 1 lane of traffic (see Figure 8)	3m for two directional shared lane (with centre line removed)
Traffic speeds	>35mph	<35mph (in some cases mandatory may be more suitable even with lower speeds)
Parking restrictions	Double yellow lines	Not necessary (but advisory lanes inappropriate if high parking demand)
Demarcation	Solid white line	Broken white line to Diag. 1040
Surfacing	Coloured surfacing not required	Coloured surfacing not required
TRO	Required	Not necessarily required but may be in some cases.

5.8 Mandatory Cycle Lanes

5.8.1 Mandatory cycle lanes (with an unbroken white line) provide a demarked space on the carriageway for the mostly-exclusive use of cyclists. The lane must be backed up by a Traffic Regulation Order, which will prohibit vehicles from entering, proceeding or waiting in the cycle lane. Exemptions are provided for various purposes, including access to premises and loading.



Photo 23 – Example mandatory cycle lane¹⁰

- 5.8.2 Where cycle lanes are proposed it is important to ensure that the 2m strip of carriageway covering the intended implementation area is surveyed, and any remedial works to repair potholes, raise sunken gullies etc. is carried out. The repaired width should always be at least 2 metres, even if the cycle lane proposed is narrower than this.
- 5.8.3 Mandatory cycle lanes of 1.8m are considered appropriate –
- Where speeds are high (>35mph);
 - Where cycle flows, traffic flows or HGV flows are high;
 - Where parking is provided immediately adjacent to the cycle lane (to allow space for opening doors).
- 5.8.4 Mandatory cycle lanes should ideally be at least 1.8 metres wide. The aim should be to provide a cycle lane that is as wide as possible (but see paragraph 5.8.6), and space for motor vehicles that is no greater than absolutely necessary. Consideration should be given to removing traffic lanes where necessary – this should only be discounted on the grounds of loss of capacity once a modelling exercise has confirmed that the consequences of this would be unacceptable. Provision of narrow traffic lanes should also be explored (see Section 5.5).
- 5.8.5 However, it is recognised that mandatory cycle lanes of this width may not be feasible, even after reduced space for motor traffic has been considered. In such instances, an absolute minimum width of 1.5 metres is acceptable. This, when combined with the advice regarding space for motor vehicles given in section 5.5, is broadly commensurate with the ideal widths for a car to pass a cyclist at 30mph and for a bus or HGV to pass a cyclist at 20mph (see Table 4). This is also the minimum width able to accommodate cyclists riding in the secondary position (0.5 – 1.0 metres from the kerb) advocated by the national ‘Bikeability’ cycle training scheme (Cycling England, 2008b).
- 5.8.6 Mandatory cycle lanes narrower than 1.5 metres should not be provided. Cycle lanes narrower than 1.5 metres may result in motorists ‘squeezing’ cyclists into the kerb, and may encourage cyclists to ride ‘in the gutter’, where they risk losing control by striking the kerb, gullies or detritus in the channel. Paragraph 5.8.10 provides guidance where the constraint is only localised – where a considerable length of street cannot accommodate cycle lanes of the required width, alternative solutions should be considered in line with the hierarchy of provision.
- 5.8.7 Cycle lanes in excess of 2.0m may be at risk of misuse, as their width may make them appear to be bus lanes or general traffic lanes. Cycle lane widths greater than 2.0m should therefore be avoided, with hatching or carriageway narrowing provided to remove any excessive remaining space.
- 5.8.8 The remaining space for motor vehicles may or may not be marked into lanes, depending on the capacity and safety concerns associated with the movement of motor vehicles. It may not be necessary to provide any centre or lane lining (other than the lining associated with the mandatory cycle lane).

5.8.9 Where mandatory cycle lanes terminate at junctions (as they might at the approach to a give way line or at a traffic signal stop line), care should be taken to ensure that the facility does not ‘abandon’ cyclists at a point of difficulty, and allows for any movement cyclists may wish to make at the junction (see section 7.0 for more on the treatment of junctions).

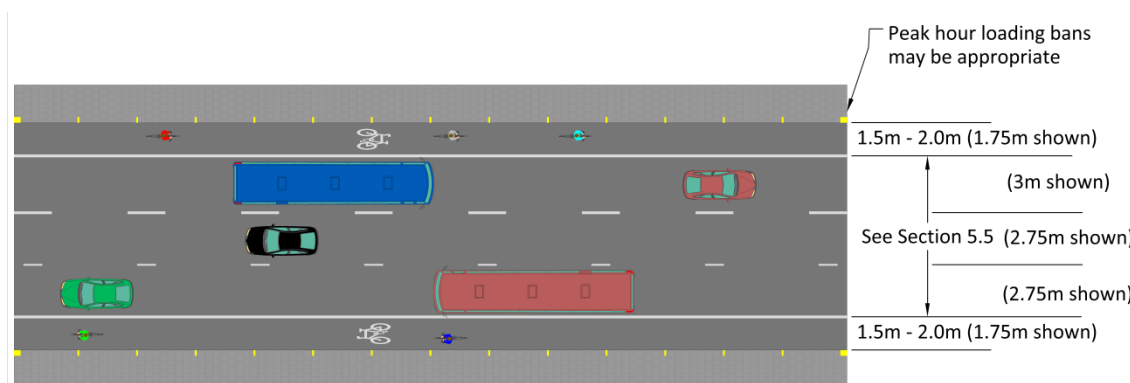
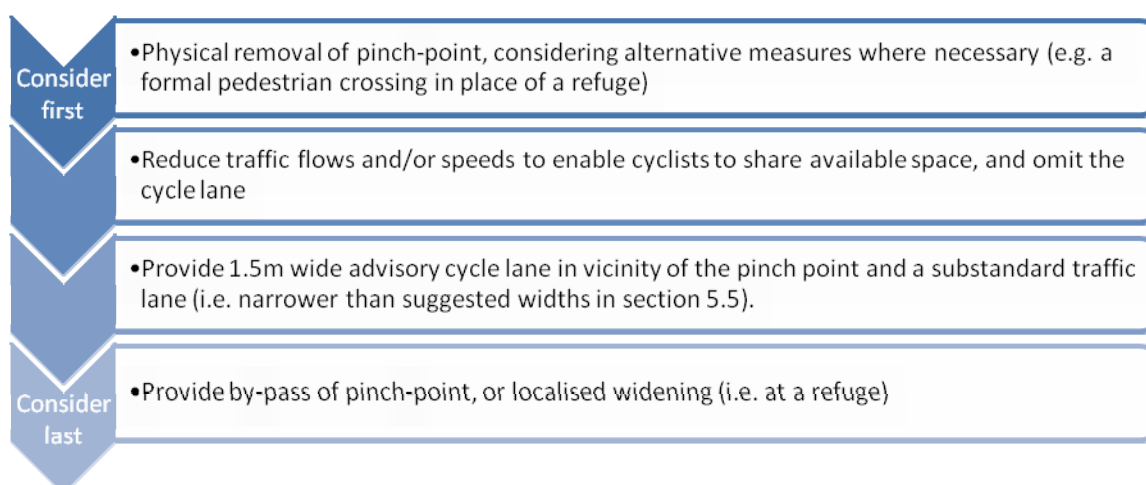


Figure 9 – Example mandatory cycle lane layout

5.8.10 Where the absolute minimum cycle lane width of 1.5m cannot be provided over a short length without unacceptably compromising traffic lane widths (as may occur at a pinch point), the cycle lane should never be reduced in width to address this. The pinch-point should be addressed in line with the following hierarchy –

Figure 10 – Addressing pinch points in cycle lane schemes



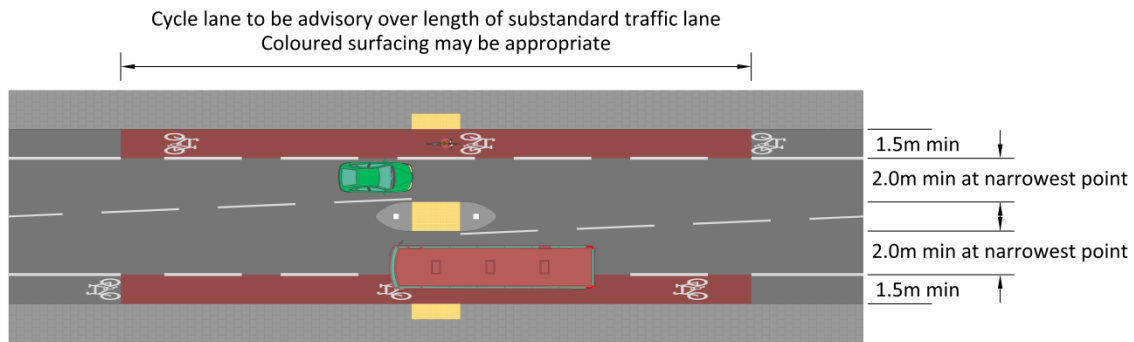


Figure 11 – Example of cycle lane at pinch point caused by an existing refuge

- 5.8.11 Where it is necessary to vary the position of the cycle lane relative to the carriageway (i.e. to bring a kerbside lane around the outside of a parking place), this change in position should be developed over the following taper lengths –
- 5.8.12 Where the taper has the effect of guiding motor vehicles (as where a traffic lane narrows or follows the realignment of the cycle lane), the tapers recommended by Table 14-1 of the *Traffic Signs Manual, Chapter 5* should be used (Department for Transport, 2003);
- 5.8.13 In other circumstances (such as where a traffic lane widens or a new lane starts when the cycle lane returns to the kerb), the preferred minimum taper is 1 in 10, and the absolute minimum taper is 1 in 8.
- 5.8.14 Mandatory cycle lanes have the effect of prohibiting waiting so as to ensure the cycle lane is not obstructed by parked vehicles (see also paragraph 8.6.4). However Cardiff Council will implement double yellow lines in all mandatory cycle lanes to ensure waiting prohibitions are clear and enforceable.
- 5.8.15 However, parking can be accommodated where necessary behind the cycle lane, as the cycle lane order will normally include an exemption allowing for vehicles entering the cycle lane to cross it. For additional clarity, it is possible to designate parking places or construct lay-bys to the rear of the cycle lanes and to provide additional exemptions from the order to allow explicitly for the use of these. A gap for opening doors may be appropriate at locations with high turnover of parking (see paragraph 3.2.7) – this should be in addition to minimum parking and cycle lane widths.
- 5.8.16 Loading is not prohibited by the cycle lane order. In some circumstances an additional loading ban may be appropriate to keep the cycle lane clear of loading vehicles at peak times. It will be necessary to balance the needs of cyclists and local businesses when proposing such restrictions and the provision of loading facilities may help alleviate local concerns – it may be possible to provide these in adjacent side streets.

5.9 Hybrid Cycle Lanes

- 5.9.1 A form of cycle lane which gives greater segregation and comfort is a 'hybrid' cycle lane, where the cycle lane is separated from the carriageway by a physical feature (i.e. a low kerb or over-run area). Cyclists can enter and leave the cycle lane as if it was a standard cycle lane, but the physical presence deters unnecessary encroachment by

motor vehicles. Such lanes may be beneficial where motor vehicle speeds or flows are high, or on important stretches of the core cycle network. Signing, lining and TRO requirements will be similar to those for conventional mandatory cycle lanes.

- 5.9.2 Any design for a hybrid cycle lane should consider the lane to be part of the carriageway, and should conform to all relevant legal requirements. Particular reference should be made to Section 5 of the Highways (Traffic Calming) Regulations 1999 (HMSO, 1999a), as the physical feature is likely to take the form of an overrun area, although physical non-overrunnable islands can be used where space permits.



Photo 24 – Hybrid cycle lane¹¹

- 5.9.3 In general designers should look to provide a mandatory cycle lanes of 1.8m with just the minimum required space for motor vehicles. As an absolute minimum a mandatory cycle lane can be 1.5m wide.

Further guidance on mandatory cycle lanes is provided in the following documents:

- Paragraphs 17.5-17.11, Traffic Signs Manual, Chapter 3 (Regulatory Signs) (Department for Transport, 2008c);
- Paragraphs 16.4-16.8, Traffic Signs Manual, Chapter 5 (Road Markings) (Department for Transport, 2003); and,
- Section 7.2, LTN 2/08 Cycle Infrastructure Design (Department for Transport, 2008b).

5.10 Advisory Cycle Lanes

- 5.10.1 Advisory cycle lanes (with a broken white line) provide a demarked space which can be used where a degree of segregation is considered desirable, and where an on-carriageway solution is deemed to be the best approach but there is insufficient carriageway width to accommodate mandatory cycle lanes within the parameters laid out in section 5.8.



Photo 25 – Advisory cycle lanes

- 5.10.2 As with mandatory cycle lanes, any surface defects in the 2m strip where the cycle lane is proposed should be rectified before cycle lanes are provided (see paragraph 5.8.2).
- 5.10.3 Advisory cycle lanes are considered appropriate where motor vehicle speeds are less than 35mph (ideally 30mph), and bus flows only modest. Heavy goods vehicle flows should be light.
- 5.10.4 The width of advisory cycle lanes should be considered in the same manner as for mandatory lanes (see paragraph 5.8.4 onwards). The 1.5m width should not be reduced at pinch points; the hierarchy described in paragraph 1.4.5 should be considered as for mandatory lanes, although in practice there will usually be space to

narrow the central traffic area (see paragraph 5.11.5). Where it is required to alter the position of the cycle lane relative to the carriageway, the advice given in paragraph 5.8.11 should be followed.

- 5.10.5 Advisory cycle lanes of less than 1.5m width should not be provided simply to avoid confusion with parking bays. In this instance, additional cycle symbols, an education campaign and/or yellow line waiting restrictions will be a more appropriate response. Designs which allow for parking behind the cycle lane can also be considered where there is sufficient carriageway width.
- 5.10.6 Traffic Regulation Orders are not required for advisory cycle lanes.
- 5.10.7 Despite a TRO not being required, Cardiff Council will carry out consultation as if a Traffic Regulation Order is proposed, in addition to any less formal consultation, so that any scheme is and can be seen to have been installed in an open and transparent fashion, and so every opportunity is provided for the concerns of road users (cyclists included) to be considered during the design and implementation of the scheme.
- 5.10.8 It may be necessary to consider the introduction of yellow line waiting restrictions, and possibly loading restrictions, to ensure the cycle lanes are kept free of stationary vehicles, either at all times or at key times of day (i.e. when cycle flows, motor vehicle flows and/or parking demand is at its highest). Parking can be provided behind advisory lanes as for mandatory lanes (note diagram 1049 will be replaced with diagram 1004 where the cycle lane is advisory). It should be noted that the Council will only introduce advisory lanes in conjunction with parking restrictions which are practically enforceable.

5.11 Removal of centre line

- 5.11.1 Unlike mandatory lanes, where traffic runs in an entirely separate part of the carriageway which may be divided into lanes entirely outside of the cycle lanes, a system of advisory cycle lanes can operate with a central space for motor vehicles, shared for both directions. This space will not generally be wide enough for vehicles to pass each other without some incursion into the cycle lanes; consequently no centre line should be provided and any existing centre line should be removed.
- 5.11.2 Vehicle flows should ideally be less than 10,000 vpd, although an existing scheme on the A605 Oundle Road, Peterborough, caters for nearly 14,000 vpd, according to DfT estimates (Department for Transport, 2010b).
- 5.11.3 Situations where this layout may not be appropriate include:
 - where forward visibility is seriously constrained, particularly where this is due to vertical alignment which may not have the same speed reducing effect of bends;
 - where parking demand is significant enough to result in frequent obstruction of the cycle lane and waiting restrictions are not acceptable to protect the cycle lanes.
- 5.11.4 There is no maximum or minimum length for such a layout. Advisory cycle lanes with a single central lane could even be provided over a short length where carriageway

widths do not allow for mandatory lanes in line with Section 5.8. Schemes of up to 2.5km have been installed elsewhere in the United Kingdom, with little evidence emerging that there is a practical upper limit to the length of such schemes.

- 5.11.5 The central traffic area may vary between 3.0m and 5.5m in width. Ideally, the width of the central traffic area should lie between 4.1m and 4.8m – 4.1m being the minimum width to allow two cars to physically pass each other at very low speed (cars will in practice encroach into the cycle lane to pass at this width) and 4.8m being the width at which two cars can pass each other at modest speed without encroaching out of the central lane.

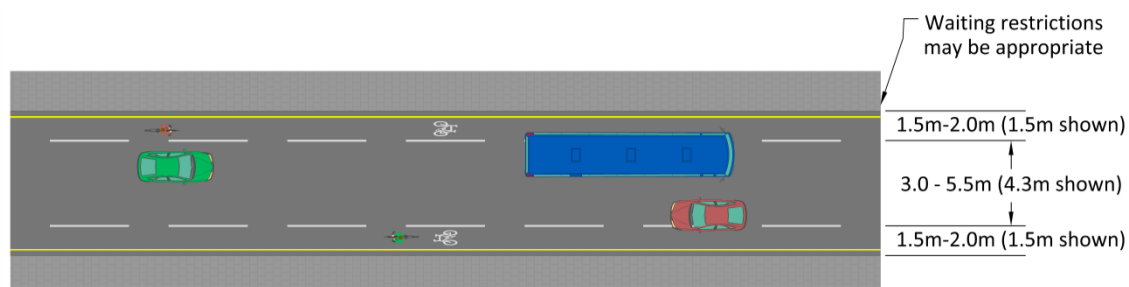


Figure 12 – Example advisory cycle lanes layout

- 5.11.6 The table below details locations where similar layouts have been introduced within the United Kingdom.

Table 9 – Examples of advisory cycle lanes with single central traffic lane

Location	Highway authority
Manor Road & Woodhall Way, Beverley	East Riding of Yorkshire Council
Tower Street, Kingston upon Hull	Kingston upon Hull City Council
Felixstowe Road, Martlesham	Suffolk County Council
A161 Swinefleet Road, Old Goole	East Riding of Yorkshire Council
A605 Oundle Road, Peterborough	Peterborough City Council
Bristol Road, Scunthorpe	North Lincolnshire Council
B7062 Kingsmeadows Road, Peebles	Borders Council
Rownhams Lane, North Baddesley	Hampshire County Council
Priory Road, Cottingham	East Riding of Yorkshire Council

- 5.11.7 Lack of forward visibility can be raised as a concern when proposing this layout. In practice, provided speeds are reasonably low, this does not seem to be a problem. Examples exist in the UK where forward visibility is limited – the photograph to the right shows part of the Felixstowe Road, Martlesham route, which is subject to a 40mph speed limit.



Photo 26 – Advisory cycle lanes at point of poor forward visibility

- 5.11.8 Where forward visibility or other concerns render advisory cycle lanes unsuitable, consideration should be given to introducing traffic calming to reduce vehicle speeds to facilitate the introduction of the cycle lanes. If this cannot be achieved, other solutions should be considered in line with the hierarchy of provision.
- 5.11.9 An alternative to conventionally marked advisory lanes could be to provide differently paved / coloured strips with cycle symbols to indicate the area to kept free of vehicles – this may be a more suitable treatment for advisory lanes in sensitive areas. Signing requirements are as for conventional advisory cycle lanes.
- 5.11.10 Treatment of advisory cycle lanes at bus stops will be similar to that for mandatory cycle lanes. Where an advisory cycle lane and a traffic lane narrower than the dimensions suggested in section 5.5 are proposed in the vicinity of the pinch point, care should be taken to ensure that the layout does not force cyclists to veer into the path of vehicles. For this reason, while this approach may prove to be a reasonable compromise at refuges and shallow narrowings (i.e. those at tapers consistent with the guidance in Table 14-1, *Traffic Signs Manual Chapter 5* (Department for Transport, 2003)), it is unlikely to be appropriate at nearside build-outs. The traffic lane should not be less than 2.0m wide, and the cycle lane should never be narrowed further than 1.5m. This is not an ideal layout for cyclists, but it does highlight the amount of space they require to other road users and may be the only feasible way to provide continuity for cyclists at some locations.
- 5.11.11 Short lengths of cycle lane should not be provided solely to indicate gaps in traffic calming features, such as next to speed cushions. Doing so results in cycle facilities which are not continuous or legible, and risks undermining the credibility of cycle infrastructure generally. In such instances, it is better if such gaps are self-evident from the design of the traffic calming measure; for example, in the case of speed cushions, the cushions could be constructed in a colour-contrasting material to the adjacent carriageway. Where it is felt essential to protect a gap from parked vehicles, yellow line waiting restrictions should be used instead of cycle-specific infrastructure (i.e. cycle lanes). Providing advisory cycle lanes to deter parking in locations without waiting restrictions will mean parking in the cycle lane is likely to occur in practice. This will devalue the cycle infrastructure in Cardiff.

Further guidance on advisory cycle lanes is provided in the following documents:

- Paragraphs 17.12-17.16, Traffic Signs Manual, Chapter 3 (Regulatory Signs) (Department for Transport, 2008c);
- Paragraphs 16.9-16.10 of the Traffic Signs Manual, Chapter 5 (Road Markings) (Department for Transport, 2003); and,
- Sections 5.3 and 7.3, LTN 2/08 Cycle Infrastructure Design (Department for Transport, 2008b).

5.12 Bus Lanes and Bus Stops

5.12.1 Where cycle lanes pass bus stops, the lane will ordinarily either continue regardless, or where clearway markings are provided, will stop and recommence either side of the bay marking. Where the bus stop is in a lay-by, the cycle will ordinarily continue along the outside edge of the lay-by.

5.12.2 Some bus stops may be used as timing points, and/or by a high frequency of services. In these instances stationary buses might obstruct a cycle lane for an unacceptable length of time, particularly on core cycle routes. Consideration should be given to diverting the cycle lane around the outside of the bus stop in these circumstances. Where there is insufficient width to achieve this, it may be appropriate to provide cycle symbols to indicate to other road users that cyclist will have to leave the cycle lane to pass stationary buses.



Photo 27 – Example of road markings at heavily used bus stop on a narrow carriageway¹²

5.12.3 Bus lanes within Cardiff are permitted to be used by cyclists. Whilst not specifically a cycle facility per se, bus lanes can provide a certain degree of segregation for cyclists in so far as they minimise the amount of motorised traffic in the affected lane (Reid & Guthrie, 2004).

5.12.4 Where bus lanes are proposed and are expected to form the main provision for cyclists along a route, the bus lane should ideally be 4.6m wide – the ideal minimum width for a bus passing a cyclist at 20mph (Department for Transport, 2008b). However, it is recognised that bus lanes will typically only be provided where carriageway space is under considerable pressure, and that this width may not be available. Where 4.6m cannot be achieved, 4.0m is the preferred minimum width.

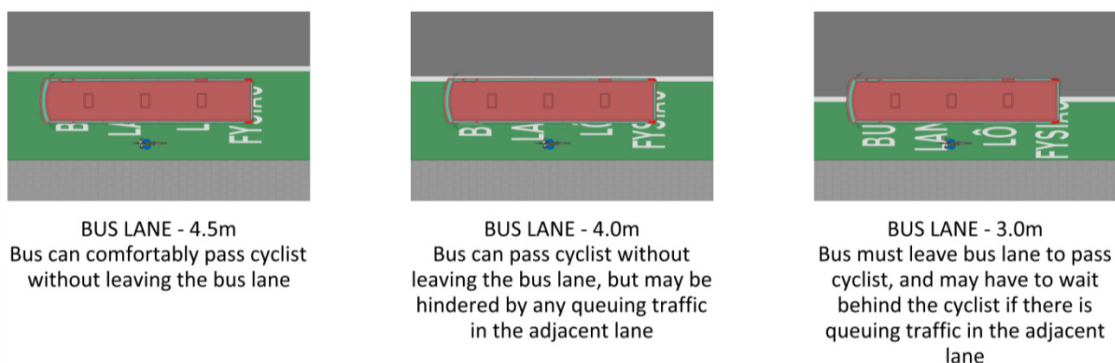


Figure 13 – Buses and cyclists in different widths of bus lane

5.12.5 Where the flow of permitted traffic in the bus lane is relatively high, on main cycle routes, or on uphill gradients, consideration should be given to providing a cycle lane within the bus lane. The cycle lane should be at least 1.5m wide, and the minimum width for the bus lane outside of the cycle lane should be 2.7m. The cycle lane would normally be advisory in this instance, to keep TROs simple; authorisation would be needed from the Welsh Assembly Government to omit signs to diagram 967.

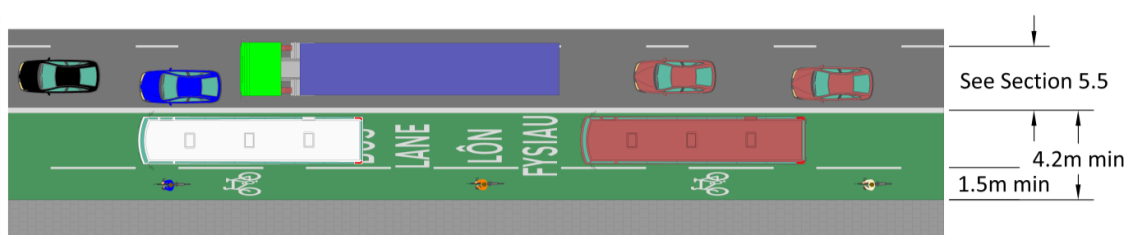


Figure 14 – Cycle lane within a busy bus lane

Further guidance on bus lanes is provided in the following documents:

- Paragraphs 15.8-15.17, Traffic Signs Manual, Chapter 3 (Regulatory Signs) (Department for Transport, 2008c);
- Paragraphs 17.3-17.11 of the Traffic Signs Manual, Chapter 5 (Road Markings) (Department for Transport, 2003);
- LTN 1/97 Keeping Buses Moving (Department for Transport, Local Government and the Regions, 2001);
- Bus Priority: The Way Ahead (Department for Transport, 2006a); and,

- Sections 6.1 and 6.2, LTN 2/08 Cycle Infrastructure Design (Department for Transport, 2008b).

5.13 Signage on Cycle Tracks

- 5.13.1 Consideration should be given to reducing the amount of posts – for example, by collating street furniture on a reduced number of posts by using cantilever structures to support signs in preference to multiple posts, and by removing unnecessary signs.



Photo 28 – Poor treatment at bus stops on cycle tracks can destroy route continuity



Photo 29 – Post clutter can obstruct cycle tracks when not carefully located



Photo 30 – Cantilever mounted signs can reduce post clutter

- 5.13.2 Any signs located above the cycle track should leave an absolute minimum of 2.4 metres headroom for cyclists. Where the resulting sign assembly would still be visible and would be acceptable in aesthetic terms, headroom of 2.7 metres should be considered.

6.0 OFF-ROAD FACILITIES

6.1 Introduction

- 6.1.1 Off-road cycle facilities can exist either adjacent to a carriageway (see section **Error! Reference source not found.**) or away from roads altogether. Off-road cycle facilities should provide a pleasant, fast and convenient route for cyclists that are contiguous with adjacent cycling infrastructure and quiet streets.
- 6.1.2 In order to achieve this it is important that such routes are designed with the needs of both pedestrians and cyclists in mind recognising that cyclists have different needs and expectations, particularly with regard to speed of travel. Simply erecting cycle track signs on existing pedestrian infrastructure may not provide an attractive cycle route.
- 6.1.3 Off-road cycle tracks can be well used by both pedestrians and cyclists, particularly along the city's river corridors. As with all schemes, the safety concerns of disabled groups should be addressed through engagement with the Council's Equalities team.
- 6.1.4 Cycle tracks, and cycle facilities generally, should be designed so that movements between off-road facilities and the carriageway are kept to a minimum. However, there will be times where such movements need to be accommodated, and where this is necessary, the following points should be borne in mind –
- Cyclists require flush kerbs between cycle tracks and the carriageway (see paragraph 3.6.10);
 - Any changes of direction should have a minimum inner radius of 4 metres;
 - Any one-way cycle link should be at least 1.5 metres wide; and,
 - Requiring cyclists to give way should be avoided - ideally cyclists should be able to flow easily from off-carriageway onto the carriageway, and vice versa.



Photo 31 – This cycle facility is difficult to negotiate, and risks conflict with motor vehicles on the carriageway



Photo 32 – Example of a transition with a convenient layout with minimal conflict

6.2 Cycle Tracks Adjacent to the Carriageway

- 6.2.1 Geometric design issues for cycle tracks are covered in Section 6.0. This section includes some additional guidance, which may be pertinent on sections of cycle track adjacent to the carriageway.

- 6.2.2 It is recommended that a buffer is provided between the carriageway and the cycle track. The buffer can include any hard strip or hard shoulder adjacent to the carriageway and may also consist of grass verge or areas of differently coloured or textured surfacing. The buffer should be between 0.5m and 1.5m wide, depending on traffic flows and speeds. The 1.5m wide buffer is recommended where adjacent motor vehicle speeds are in excess of 40mph.
- 6.2.3 Use of white lining to provide a buffer is not recommended, as this could be misinterpreted as marking the edge of carriageway by passing motorists, who are then at risk of striking the kerb and losing control.
- 6.2.4 Care needs to be taken where a cycle track passes private accesses, to ensure drivers emerging from the access can see cyclists. Cyclists should not generally be required to give way to vehicles using accesses.

6.3 Segregated and Shared Use Cycle Tracks

- 6.3.1 One of the key design decisions to be made on off-carriageway cycle tracks is whether the route should provide segregated paths for pedestrians or cyclists, or whether the two groups should share a single, undivided path. The majority of Cycling City and Towns (CCTs a programme overseen by Cycling England and funded by Dept.s for Transport and Health) generally implement unsegregated shared use cycle and pedestrian routes. Where off-carriageway cycle tracks are necessary, Cardiff Council will also look to implement unsegregated shared use cycle and pedestrian routes, in consultation with all user groups.

6.4 Segregated cycle tracks

- 6.4.1 The audit of Cycling England's 'Cycling Demonstration Towns' made the following comments:

'There is marked variation between the CCTs (Cycling City and Town) in the treatment of shared-use pedestrian and cycling infrastructure. A minority of towns segregate pedestrians and cyclists, using the full palette of signing, lining and tactile surfacing. However the majority of CCTs generally implement unsegregated shared use cycle and pedestrian routes.'

*In those authorities that implement the **segregated** approach, it was observed that:*

- *the resulting design provided a lower quality facility for cyclists*
- *the resulting design had less width and more complexity*
- *segregation added to scheme construction and maintenance costs,*
- *segregation rarely catered for observed user behaviour – either by pedestrians or cyclists' (Cycling England, 2010b).*
- *segregation is also likely to result in a less sensitive treatment in countryside areas*

- 6.4.2 The report *'The Merits of Segregated and Non-Segregated Traffic Free Paths'* (Phil Jones Associates, 2008) discusses both approaches, and suggests indicators which could be used to inform the decision whether to segregate a path or not.

6.4.3 Other issues noted in relation to segregated facilities include:

- the perception of segregation may encourage higher cycling speeds.
- Cyclists often ride on the pedestrian side, and vice versa, where segregation is by white line only.
- They require considerably greater width than shared facilities (see Table 10) and
- They tend to be more visually intrusive as they require more markings.

6.4.4 It should also be noted that pedestrians are not obliged to keep out of the cyclists' side of a segregated track, whereas cyclists must keep to their side. This means that when pedestrians legitimately enter the cyclists' part of the cycle track, cyclists will often find it difficult to pass the pedestrians lawfully. This can undermine the convenience of the facility, and the credibility of segregation.

6.5 Shared use cycle tracks

6.5.1 Shared facilities can be more efficient in terms of physical space and street clutter, but the mixing of cyclists and pedestrians can lead to vulnerable road users having concerns for their safety.



Photo 33 – Divided cycle track



Photo 34 – Shared-use cycle track

Further guidance on the issues surrounding divided and shared use cycle tracks can be found in:

- *LTN 2/86 Shared Use by Cyclists and Pedestrians (Department of Transport, 1986b)*¹³; and,
- *The Merits of Segregated and Non-Segregated Traffic Free Paths (Phil Jones Associates, 2008).*

6.6 Cross Sections of shared and segregated cycle tracks

6.6.1 The minimum width of the divided cycle track will be the sum of the required widths for the pedestrian and cycle sides, as seen in Table 10.

Table 10 – Recommended minimum widths for segregated cycle tracks¹⁴

	Cycle side	Pedestrian side	Total width
<i>Desirable minimum</i>	3.0m	2.6m	5.6m
Preferred minimum	3.0m	2.0m	5.0m
<i>Absolute minimum</i>	2.0m	1.5m	3.5m

6.6.2 These widths should be kept clear of obstructions, such as sign posts. It is recommended that the absolute minimum width is used for stretches of at most 30 metres and that the preference be given to reducing the width of the cycle side and maintaining the 2.0m width for pedestrians.

6.6.3 The cycle side may be reduced to a minimum of 1.5m where it is for one-way use only, or where expected pedestrian and cycle flows are low.

6.6.4 For undivided cycle tracks, the following widths are recommended:

Table 11 – Recommended minimum widths for undivided cycle tracks

	Total width
<i>Desirable minimum</i>	4.0m
Preferred minimum	3.0m
<i>Absolute minimum</i>	2.0m

6.6.5 It is recommended that the absolute minimum width is used over a maximum length of 6.0 metres. Longer lengths of 2.0m facility may be acceptable with caution, where pedestrian and cycle flows are low and consultation indicates that this will be acceptable.

6.6.6 Wider facilities should always be considered where space permits and especially where cycle and/or pedestrian flows are high.

6.6.7 Where site constraints dictate narrow facilities over any significant distance, it may be possible to alleviate this issue by providing passing places at spaces of preferably no more than 50 metres.

6.7 Geometry & Alignment

6.7.1 In order to be attractive and convenient, cycle tracks need to be as direct as possible and provide for speeds of up to 20mph. Design parameters will often be the same as those for motor vehicles, as detailed in various other publications, for a design speed of 20mph.

6.7.2 Notwithstanding the above, the needs of other users of the route will need to be taken into account. At some locations (which may be particularly busy, constrained or suffer poor visibility), lower design speeds may be appropriate to promote the safety and comfort of the other users of the cycle track. Features may need to be provided to encourage cyclists to slow down on the approach to these areas. It may also be desirable to use a lower design speed where the cycle track is not divided.

6.7.3 Where a 20mph design speed cannot be provided for, this should not prevent the installation of a cycle track; instead, as high a standard facility as can be provided should be aimed for, with speed reducing features considered where deemed

necessary.

- 6.7.4 A summary of the key parameters for design speeds of 30km/h (20mph), 20km/h (12mph) and 10km/h (6mph), is provided in Table 12.

Table 12 – Key design criteria for cycle infrastructure¹⁵

Parameter		Design speed		
		30 km/h 18mph	20 km/h 12mph	10 km/h 6mph
Minimum forward visibility (see Section 3.5)	<i>Desirable</i>	80m	50m	
	Preferred	30m	15m	10m
	<i>Absolute</i>	25m	15m	10m
Horizontal curvature <i>minimum inner radius</i>	Minimum	25m	15m	4m
Vertical curvature <i>minimum K crest value¹⁶</i>	<i>Desirable</i>	5.0		
	Preferred	1.6		
Gradient <i>maximum</i>	<i>Desirable</i>	3.0%		
	Preferred	5.0%		
	<i>Absolute¹⁷</i>	7.0%		

- 6.7.5 The ‘desirable’ forward visibility relates to the ‘Sight Distance in Motion’. This is the distance a cyclist needs to be able to see ahead in order to make cycling feel comfortable and should be provided wherever possible (unless it is desirable to control cycling speeds at a point of risk). The preferred and absolute figures relate to Stopping Sight Distance; this being the distance a cyclist requires to recognise a hazard and come to a halt.
- 6.7.6 Every effort should be made to achieve the highest of the above standards. Where an absolute value is shown, lower standards than the absolute value should only be used in exceptional circumstances and in practice it may be desirable to consider alternative solutions (especially where the cycle track is proposed adjacent to an existing street).
- 6.7.7 Where an off-road cycle track meets another cycle route (be this a carriageway or another off-road route), it is suggested that corner radii of 2m would be ideal, although if site constraints dictate, tighter radii are acceptable. If such corner radii are not provided it is common for cyclists to overrun the corner which can be uncomfortable, look unsightly and can be a maintenance liability.
- 6.7.8 Maintenance access needs to be considered at the design stage. Alignment should allow for maintenance vehicles to be able to access the cycle track as necessary.

6.8 Links to Adjacent Streets

- 6.8.1 It is important that cycle tracks away from roads are not designed in isolation to the

surrounding highway network and offer full connectivity to adjacent streets. Spur routes linking between streets and main off-road routes should also be of a high standard, and clear signing should be provided to assist cyclists.

6.9 Access Control

6.9.1 Whilst it is assumed that access control is not necessary until it is proven to be needed, in some areas, misuse of off-road cycle routes can be a problem, with motorcycles and other motor vehicles being used and abandoned in an anti-social manner. Such use is unlawful and can be dealt with by the police.

6.9.2 At particularly problematic areas, or where there are local perceptions of problems, there may be demands to install physical obstructions to prevent improper use. This should be considered with caution, and the following should be considered:



Photo 35 – This access control arrangement inconveniences legitimate users while doing little to prevent unlawful access

6.9.3 Access controls will not work unless the entire area can be secured against entry from prohibited vehicles. Where gaps exist, motor vehicles can simply be brought onto the cycle track around the access control measures. In practice it will often be impractical to provide a secure perimeter.

6.9.4 Those prone to misusing cycle facilities are likely to be prone to anti-social and/or criminal behaviour generally, and may simply vandalise access controls and/or adjacent fencing in order to gain access.

6.9.5 Durham County Council experimented with the removal of access controls to walking and cycling routes in the late nineties. It was found that little increase in misuse followed, although there were deemed to be benefits in providing access control on new routes for an initial period, while legitimate use was becoming established. It should be noted that Durham Constabulary operated a robust enforcement regime during this period, including the confiscation of motorcycles being ridden off-road (Sustrans, 1998).

6.9.6 In Cardiff, access controls have been removed from parts of the Taff Trail in recent years to improve the access to the trail for wheelchair and mobility scooter users and those with pushchairs. There has been no increase in misuse of the trail by motorcycles as a consequence. It should however be borne in mind that the Taff Trail is well used by legitimate users and this may help deter misuse.

6.9.7 Where access control is proposed, it should always be remembered that:

6.9.8 Any access control arrangement that does not allow for the passage of all traffic (unless lawfully prohibited) risks being an unlawful obstruction in the highway – this includes allowing for larger cycles, and those towing trailers. (HMSO, 1980)

6.9.9 Section 1(1) of the Disabled Persons Act 1981 requires the that highway authorities

shall have regard to the needs of disabled persons and blind persons *“in executing works in a street which may impede the mobility of disabled persons or blind persons highway authorities, local authorities and any other person exercising a statutory power to execute works on a highway shall have regard to the needs of such persons”* (HMSO, 1981).

- 6.9.10 Gates can be provided with RADAR locks, for which disabled persons can obtain keys. These can provide a by-pass for more restrictive access controls. However, this may be unpopular with users, and could be deemed to be discriminatory, which would run contrary to the requirements of the Equality Act 2010 (HMSO, 2010). It also does not address difficulties for other lawful users, such as cycles with panniers or towing trailers, and in practice motorcycles can simply be lifted over these gates.

- 6.9.11 In practice, it is not practical to provide access controls that effectively prevent motorcycle access without impinging (possibly unlawfully) on legitimate access. Access for larger motor vehicles can be effectively prevented with the erection of bollards, allowing gaps of 1.5 metres (absolute minimum 1.2 metres). Two staggered rows can be provided to provide an additional deterrent against motorcycles (Department for Transport, 2008b).



Photo 36 – Staggered bollards can act as a deterrent to misuse

- 6.9.12 Access barriers should only be installed with the agreement of the Council’s Equalities team.
- 6.9.13 Access controls should be visible by day and night to reduce the risk of cyclists colliding with the obstruction. This can be particularly important on unlit paths, and where vegetation limits light levels.

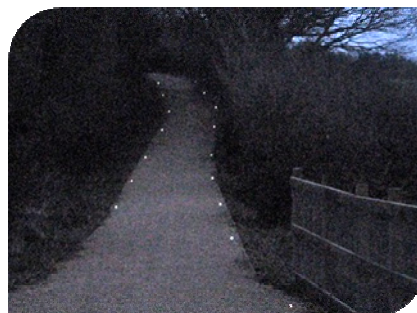
Further guidance on access control is provided in the following documents:

- *Section 8.14, LTN 2/08 Cycle Infrastructure Design (Department for Transport, 2008b); and,*
- *Information sheet FF22 Access Controls (Sustrans, 1998).*

6.10 Illumination

- 6.10.1 Cycle tracks which form core routes, and are expected to be used by commuters and utility cyclists, should be illuminated. Where adjacent to a carriageway, existing street lighting will usually be sufficient to achieve this.

6.10.2 On sections of cycle track away from streets, street lighting may be expensive, and may not be desirable on environmental or aesthetic grounds, particularly in parkland or green spaces. Lighting on isolated cycle tracks can also be susceptible to vandalism. In these circumstances, and where personal security issues do not warrant conventional street lighting, solar powered road studs have been successfully installed on a section of the Taff Trail to help delineate the route of the cycle track at night. These can be installed at a fraction of the cost of street lighting whilst still significantly improving the comfort of cyclists, by providing a degree of illumination.



Photo

**37 – Solar powered illuminated studs
(High Woods Cycle Route, Colchester)**

*(courtesy William Bramhill, Colchester
Cycling Campaign)*

6.10.3 Where mains powered lighting is necessary, in order to save energy use, it may be acceptable to light cycle tracks only during the hours which they are likely to be used. Between the hours of, say, 9 pm and 5 am, there may be only marginal benefit in providing lighting, even where this is appropriate during the 'rush hour'.

Further guidance on the lighting of cycle tracks can be found in TR23 Lighting of Cycle Tracks (Institution of Lighting Engineers, 1998).

6.11 Signing

6.11.1 Only minimal road marking and signing should be required on off-carriageway routes. The only essential signing is to indicate that the route is open to cycles, with direction signing often desirable. However, it is important that off-road routes are signed to and from adjacent highways in order to 'advertise' the presence of the route to potential cyclists (including motorists), who may not otherwise be aware of the existence of the route. Guidance on the design of signing and road markings can be found in Sections 8.3 - 8.6.

6.11.2 There may be instances where warning signs, or signs regulating priority, may be appropriate at certain locations. It is permissible to use these signs on cycle tracks. In some instances, it may be desirable to use non-prescribed variants (i.e. with a smaller triangle height, or with the image of a car altered to show a bicycle). Special authorisation should be sought in these instances, even if the sign is not located on a highway open to all traffic (a cycle track is still classified as a highway - see paragraph 8.3.4)



**Photo 38 – Example of
a cycle-specific
warning sign**

6.11.3 Care should be taken to ensure that any signing provided is sympathetic to its setting, as well as being legible for cyclists. Guidance on this matter is provided by the Cardiff

Cycle Network Signing Strategy (Local Transport Projects, 2010a). Signs on off-road cycle tracks will need to be durable, as vandalism can be an issue, particularly in more isolated locations. Sign assemblies should also not be capable of being rotated – the use of rectangular posts can provide a suitable solution.

6.12 Bus Stops and Street Furniture

6.12.1 Bus stops can pose a difficulty on cycle tracks adjacent to the carriageway, as street furniture and waiting pedestrians associated with the bus stop can cause an obstruction. There is no standard layout for cycle tracks at bus stops that can address all considerations – each site will need considering on its own merits. The following points require particular consideration:

- There will need to be somewhere for pedestrians to wait where they do not pose an obstruction to persons proceeding along the cycle track and where they can be seen by bus drivers;
- There should be good intervisibility between pedestrians (those waiting for a bus as well as those passing) and cyclists, to minimise potential for conflict;
- The bus stop should be apparent to cyclists, who will need to be able to adjust their behaviour and speed to reflect the additional risk of conflict; and,
- Any street furniture (e.g. shelters) overhanging where cyclists will travel will need to be of sufficient headroom (min 2.4m)

6.12.2 Street furniture generally needs to be located carefully. When a cycle track is proposed, the locations of street furniture (signposts, telegraph posts, post boxes, lighting columns, etc) should be examined. Ideally street furniture should be relocated outside of the cycle track altogether, but where this is not possible, street furniture should be located as far to the back of the cycle track (including any segregated pedestrian areas) as possible – signs can be cranked or bracketed outwards where this allows the post to be located at the back of the cycle track. The needs of other users will also need to be considered – but all should benefit from reduced and better located street furniture provided this is considered with due care. Guidance regarding this can be found in *Accessible Cardiff Guidance Booklet 7: Street Furniture* (Gravelle, 2010).

6.13 Maintenance

6.13.1 It is important that cycle tracks are maintained to a high standard, to ensure they offer a high level of convenience and comfort. Neglected infrastructure can also lead to perceived increases in the fear of crime (see Section 3.7.3). Where surfaces deteriorate, or where vegetation is allowed to overgrow, cyclists may be put off the cycle facilities, and cycling generally.

6.13.2 In order to ensure cycle tracks are properly maintained, budgets and responsibility for maintenance should be agreed prior to the construction of a new cycle track.

6.13.3 Broken glass can be a problem on off-road cycle routes, especially away from roads. This can result in punctures and therefore significant delays for cyclists, and also may give poor impression of the safety of the area through which the cycle route runs.

Regular sweeping may be required to minimise such issues.

- 6.13.4 Hawthorne hedges which are trimmed and then not swept sufficiently can also be problematic for cyclists. 'Thorny' species should not be planted adjacent to cycle tracks.

Section 8.17 of LTN 2/08 Cycle Infrastructure Design (Department for Transport, 2008b) offers guidance on the maintenance of off-road cycle routes, including a suggested maintenance programme.

7.0 JUNCTIONS AND CROSSINGS

7.1 Introduction

- 7.1.1 Junctions and road crossings can pose some of the greatest difficulties for cyclists, both in terms of convenience and safety. A common complaint about cycle facilities across the country is that they sometimes abandon cyclists before a junction where cyclists feel they need most assistance. This section offers guidance on means of accommodating cyclists at these locations.

7.2 Priority Junctions

- 7.2.1 Where on road cycle lanes are provided these will often pass priority junctions, and there will be a need to ensure cyclists can access side roads from cycle lanes, and vice versa.
- 7.2.2 Where off-carriageway cycle tracks pass priority junctions, care should be taken to ensure the design fully considers the needs of cyclists wishing to join the cycle track from the side road, and vice versa. This is especially true where the side road is on the opposite side of the carriageway from the cycle track. In this instance appropriate links should be provided to connect the side road to the cycle track - typically just a short link and dropped kerb opposite the side road will suffice. Signing may be appropriate to highlight the cycle track to cyclists approaching from the side road.
- 7.2.3 It is recommended that where a cycle track crosses a side road that the crossing is placed on a flat-top road hump, and that corner radii are tightened, to reduce the speed of turning vehicles. This treatment is widely used in London, and has been shown to result in a statistically significant reduction in pedal cycle collisions at priority junctions.
- 7.2.4 'Jug-handle' arrangements may be appropriate at some sites, to allow cyclists to cross the main road in a single movement without having to wait in the centre of the carriageway. This will only typically be necessary on busy segregated streets where mandatory cycle lanes are provided – in these circumstances, cyclists may find it uncomfortable to wait in the middle of the carriageway in order to turn right. In other circumstances jug-handle arrangements can be an 'over-engineered solution' and may not be used by cyclists in practice.
- 7.2.5 At difficult locations where significant numbers of cyclists need to turn right, or where cyclists have difficulty emerging from a side road, changing the junction control may also be appropriate (i.e. to a mini-roundabout or by providing traffic signals).
- 7.2.6 Each side road needs to be considered individually. Reference should be made to the speed and volume of turning traffic and to the available visibility between turning motorists and cyclists



Photo 39 – Example 'jug-handle' arrangement to aid right-turning cyclists

- 7.2.7 The preferred approach is to require motorists to give way to cyclists crossing the cycle track, as this affords cyclists the same priority as they would have if cycling on the carriageway. It will typically be necessary to align the cycle track away from the main road to achieve this to allow space for a car to wait for a cyclist having turned into the junction.
- 7.2.8 Where it is not possible to locate the cycle track sufficiently far back into the side road to allow for two sets of give way markings, and where visibility allows, it may be possible to afford cyclists some priority by locating the give way line before the cycle track.
- 7.2.9 Where site conditions are such that neither of the above options are feasible, owing to flows, speeds or visibility, it will not be possible to give the cycle track priority. In this instance, it may be acceptable to not provide any formal priority in terms of the cycle track crossing. Requiring cyclists on the cycle track to give way should be a last resort for use only at difficult locations.
- 7.2.10 Care should be taken to ensure that, as far as is possible, junction treatments are consistent along a route so as to avoid confusion.

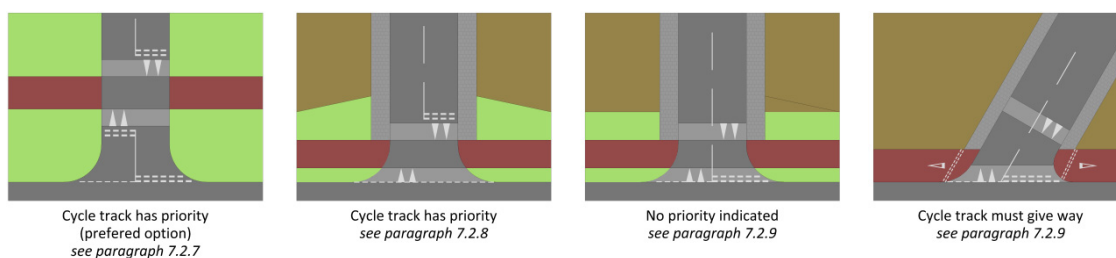


Figure 15 – Examples of cycle tracks crossing side roads



Photo 40 – Example of a cycle track crossing a side road with priority



Photo 41 – Example of a cycle track crossing a side road without priority

(Photographs courtesy John Grimshaw)

- 7.2.11 Care should be taken to provide sufficient visibility at side road crossings, for both motorists and cyclists (see Section 3.5).

Further guidance on the treatment of cycle tracks at side road crossings is given by Section 10.3 of LTN 2/08 Cycle Infrastructure Design (Department for Transport, 2008b).

7.3 Traffic Signal Junctions – General

- 7.3.1 By its nature, traffic signal control introduces delays for all road users by requiring

them to stop and wait at certain times. This problem is particularly acute for cyclists, who will expend considerably more effort stopping and re-starting at traffic signals than they might at other forms of junctions which allow for smoother flow. Other junction arrangements should be considered in line with the Hierarchy of Provision outlined in Section 1.3, as these may provide a better environment for cycling.

- 7.3.2 Notwithstanding this, in many cases signals will be the most appropriate form of control. However, care should be taken to ensure that the proposed junction is as cycle friendly as possible without relying on cycle-specific infrastructure. Any cycle specific infrastructure should be appropriate for the traffic flows and speeds at the junction - a large, complex, high speed motor-vehicle-dominated junction will not be made cycle-friendly simply by the provision of advance stop lines, for instance.
- 7.3.3 Any cycle specific infrastructure at traffic signals should be designed and reviewed to ensure they are fully integrated with adjacent highway and off-carriageway links.
- 7.3.4 Where cyclists are accommodated on-carriageway on an approach divided into lanes which are separately signalled (i.e. with green arrow signals), this can cause difficulties for cyclists. These problems are particularly acute where lanes are separated by physical islands. Cyclists may find themselves obstructing and/or intimidated by filtering traffic, or may not be able to position themselves correctly to make their manoeuvre. It may be best for cyclists if such phasing arrangements were removed, though this may not always be acceptable in light of capacity or safety concerns.
- 7.3.5 At large, busy or complex junctions, cycle lanes can be continued through the junction. Such cycle lanes will normally be advisory. It may not be possible to provide such an arrangement where box junction markings are also required, and cycle lanes should not be marked within studs marking pedestrian crossings.



Photo 42 – Example of a cycle lane continuing through a signal-controlled junction

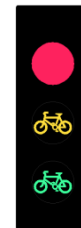
- 7.3.6 It is vitally important that, where traffic lanes are altered or re-aligned, or where the stop line is relocated e.g. to accommodate an advance stop line, detection systems are reviewed to ensure vehicles (including cycles) are correctly detected. Failure to do this may result in loss of capacity and needless additional delays for all road users, including cyclists. Consideration should also be given to the detection of vehicles waiting or proceeding in cycle lanes and to the detection of pedal cycles more generally.

Further guidance on traffic signals can be found in the following documents:

- Sections 9.2 & 9.3 of *LTN 2/08 Cycle Infrastructure Design* (Department for Transport, 2008b);
- *TAL 1/06 General Principles of Control of Traffic by Light Signals* (Department for Transport, 2006b);
- *TD 50/04 The Geometric Layout of Signal-Controlled Junctions and Signalised Roundabouts* (Highways Agency, 2004);
- *MCH 1969 Traffic Control System Design for All Purpose Roads (Compendium of Examples)* (Highways Agency, 2003); and,
- *LTN 1/86 Cyclists at Road Crossings and Junctions* (Department of Transport, 1986a).

7.4 Traffic Signal Junctions – Cycle Phases

7.4.1 Where a cycle track joins one or more on-carriageway routes at a set of traffic signals, one or more dedicated phases can be provided for cyclists. This can allow cyclists approaching from the cycle track to enter the junction as if the cycle track were another road approach to the junction.



**Figure 16 –
Signal for a
dedicated cycle
phase**

7.4.2 Cycle phase(s) will typically be appropriate where cycle movements are expected between cycle track(s) and carriageway(s) at signal controlled junctions.

7.4.3 Cycle phase(s) may also be appropriate if an on-road cycle route enters a junction where the approach is for cycles only – for instance, at the end of a contra-flow cycle facility or where the road is closed to vehicles other than cycles.

7.4.4 Detection of cycles approaching a dedicated cycle phase will ordinarily be by loops, rather than by a push-button as at Toucan crossings. However, it is recommended that a push-button unit is provided, as this would give a secondary means of detection should the loop not work. The illuminated ‘wait’ panel also offers reassurance to cyclists waiting for their stage. It should be noted that provision of a push button unit at a cycle phase requires authorisation from the Welsh Assembly Government.



**Photo 43 – Example of a
dedicated cycle phase**

7.4.5 Cycle phases can also be used where a cycle track meets a road. This approach is particularly useful where the cycle track meets a road at a T-junction, where all of the manoeuvres to or from the cycle track will emanate from the carriageway. It may also be appropriate where a cycle track crosses a road and there are significant movements between the carriageway and the cycle track.

7.4.6 In some circumstances, it may be desirable to provide a dedicated cycle phase where cyclists are on road i.e. in a mandatory cycle lane. This may help cyclists negotiate

large busy junctions more comfortably, particularly where they need to make difficult manoeuvres, such as right turns (see TAL 8/89 (Department of Transport, 1989)).

- 7.4.7 Where it is desired to provide a simpler alternative to a dedicated cycle phase to assist cyclists make difficult manoeuvre such as a right turn, it may be possible to provide a filter phase for cyclists, similar to commonly found left-turn filters. This, when used in conjunction with an advanced stop line, gives cyclists priority, enabling them to make awkward manoeuvres like right turns or starting up-hill in relative comfort, shortly before motor vehicle flows are released. This would require authorisation from the Welsh Assembly Government.

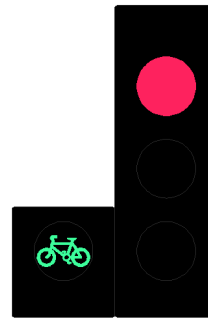


Figure 17 – Signal for a cycle ‘head start’ filter phase (requires special authorisation)

- 7.4.8 Unlike toucan crossings, cycle phases do not in themselves provide a facility for pedestrians. The needs of pedestrians will need to be considered as part of any design.

Further information regarding cycle phases can be found in the following documents:

- *TAL 8/89 Innovative cycle scheme Manchester - Mancunian Way signalled cycle crossing (Department of Transport, 1989)*
- *LTN 1/86 Cyclists at Road Crossings and Junctions (Department of Transport, 1986a)*

7.5 Traffic Signal Junctions – Advance Stop Lines

- 7.5.1 Advance Stop Lines (ASLs) were originally introduced in the UK to improve the safety and attractiveness of cycling at signal controlled junctions by –

- Providing a place for cyclists to wait that is in full view of other road users, rather than in the blind spot to the left of traffic (especially HGVs);
- Minimising conflict between cyclists pulling ahead from rest and left-turning vehicles;
- Minimising conflict between cyclists turning right and vehicles proceeding ahead.



Photo 44 – Example of an advance stop line

- 7.5.2 Cyclists can also derive further benefits from ASLs (assuming a cycle lane of adequate width and length is provided), namely –
- Cyclists are given visible and practical priority over other vehicles upon departing the signals,

- Cyclists can by-pass any queuing traffic on the approach to the signals,
 - Cyclists are afforded somewhere to wait in an area relatively free of exhaust fumes,
 - Cyclists can position themselves to turn right more easily, particularly in busy situations.
- 7.5.3 Advance stop lines can also improve conditions for pedestrians, as they result in motor vehicles stopping a greater distance in advance of crossings than would otherwise be the case.
- 7.5.4 Currently, the TSR&GD (HMSO, 2002) requires that the cycle reservoir extends for the full width of the stop line for motor vehicles. Generally, this will provide the best solution as this accommodates all manoeuvres cyclists may wish to make. However, there may be some instances where a reservoir across only part of the stop line may be advantageous; for instance, where cyclists are prohibited from turning right. Research has also indicated these partial reservoirs may be less prone to encroachment than the prescribed layout in the TSR&GD (Atkins, 2006) – such partial reservoirs would require special authorisation from the Welsh Assembly Government. Alternatively, a staggered stop line could also be considered.
- 7.5.5 The cycle reservoir should be 5.0 metres deep. An absolute minimum width of 4.0 metres may be acceptable where site constraints require this. Where cycle flows are particularly high and capacity of the reservoir is an issue, there may be advantages in increasing this depth, particularly where access to the reservoir is regularly obstructed by cyclists waiting at the nearside kerb.
- 7.5.6 A cycle lane must be provided on the approach to the reservoir to enable cyclists to by-pass any queuing traffic on the approach to the stop line¹⁸ (HMSO, 2002). This lane will generally tie in to a mandatory or advisory cycle lane, as detailed in Sections 5.8 and 5.10. Where the approach to an ASL is treated as a shared street, an advisory cycle lane should be provided to feed the ASL – this should preferably be 1.5m wide, with an absolute minimum width of 1.3m (but see paragraph 3.2.4), and should extend as far back as required for cyclists to by-pass peak-time queues. Waiting restrictions may also be required to protect the lane from parked vehicles.
- 7.5.7 The cycle lane should generally be located adjacent to the nearside kerb, as this is where cyclists generally prefer to cycle. Notwithstanding this, there may be occasions where the cycle lane would be better placed to the offside of one or more traffic lanes.
- 7.5.8 Where the carriageway is widened to provide a left-turn entry lane (i.e. where the left turn only has to give way), the cycle lane should generally be continued from the kerbside prior to widening, to the offside of the left turn lane.
- 7.5.9 Where there is a significant left-turn of motor vehicles but most cyclists continue ahead, it may be advantageous to provide the cycle lane to the offside of any left turn lane(s). Care should be taken in this instance to ensure that cyclists would be able to access such a lane safely and without undue obstruction by queuing traffic in both peak and off-peak conditions. Traffic composition and speed will need to be carefully considered. It may be better for the lane to extend across the nearside traffic lane(s)

from the nearside kerb than for the lane simply to start between two traffic lanes.

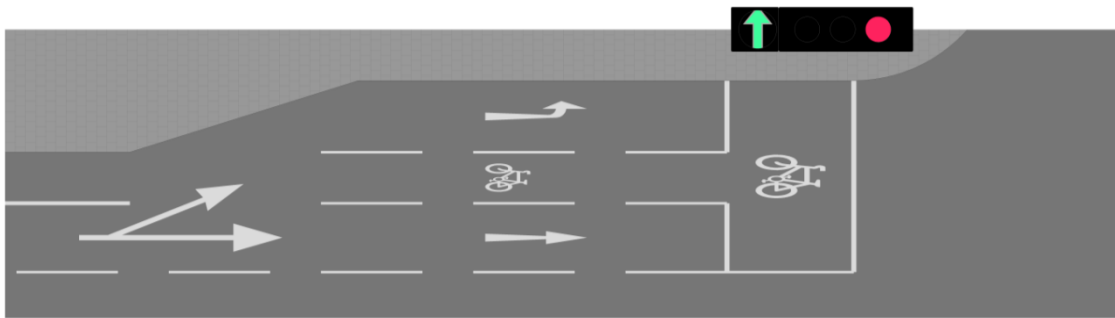


Figure 18 – Example of where a central feeder lane may be appropriate

- 7.5.10 Feeder lanes provided between two general traffic lanes should be advisory, and should preferably be at least 2.0 metres wide, and never less than 1.5m wide.
- 7.5.11 In some instances, it may be beneficial to provide more than one cycle lane on each approach to the reservoir. This may be particularly useful where a relatively narrow carriageway widens dramatically on the approach to the stop line, or where one or more manoeuvres are controlled separately. Special authorisation is required for advance stop lines with more than one approach lane.
- 7.5.12 Where ASLs are installed, intergreen times should be recalculated using the stop line for motor vehicles (i.e. the furthest back) in accordance with TAL 1/06 (Department for Transport, 2006). In many cases, no changes will be required to intergreen times, and where they are, any change will be generally minimal (Wall, Davies, & Crabtree, 2003). It may be possible to reduce the distance between the cyclists' stop line and any pedestrian crossing from the recommended 3m to further reduce impact on signal timings where capacity is marginal.
- 7.5.13 At large junctions or where there is a significant gradient, consideration of intergreen periods may be required to ensure cyclists clear the junction safely. Provision of an 'all-red' detector to extend the green time for any lagging cyclists may be appropriate – in this instance, an ASL may improve junction capacity by helping cyclists 'jump' any queue and depart at the start of the green time, reducing the chance that the green time will need to be extended.

Further information regarding advance stop lines can be found in the following documents:

- *Traffic Signs Manual, Chapter 5 paragraphs 16.20-16.22 (Department for Transport, 2003);*
- *LTN 2/08 Cycle Infrastructure Design Section 9.4 (Department for Transport, 2008b);*
- *TAL 8/93 Advanced stop lines for cyclists (Department of Transport, 1993b); and,*
- *TAL 5/96 Further development of Advanced Stop Lines (Department of Transport, 1996).*

7.6 Priority Cycle Crossings

- 7.6.1 Where a cycle track crosses a relatively lightly trafficked street, the cycle track can be given priority over the road. Care needs to be taken to ensure it is clear to motorists that they must give way, and that there is sufficient visibility along the cycle track.
- 7.6.2 Priority cycle crossings may be suitable where main road flows are up to 4,000 vehicles per day, and speeds are up to 30mph (Cycling England, 2008a).
- 7.6.3 In such instances, the cycle track must cross the carriageway on a flat-top road hump (HMSO, 2002). Although not mandatory, give way signs to diagram 602 will usually be required as the cycle track crossing and road markings may not be sufficiently obvious to approaching drivers on their own. The give way sign should be supplemented with a variant of diagram 962.1, varied to read 'Cycle track.'

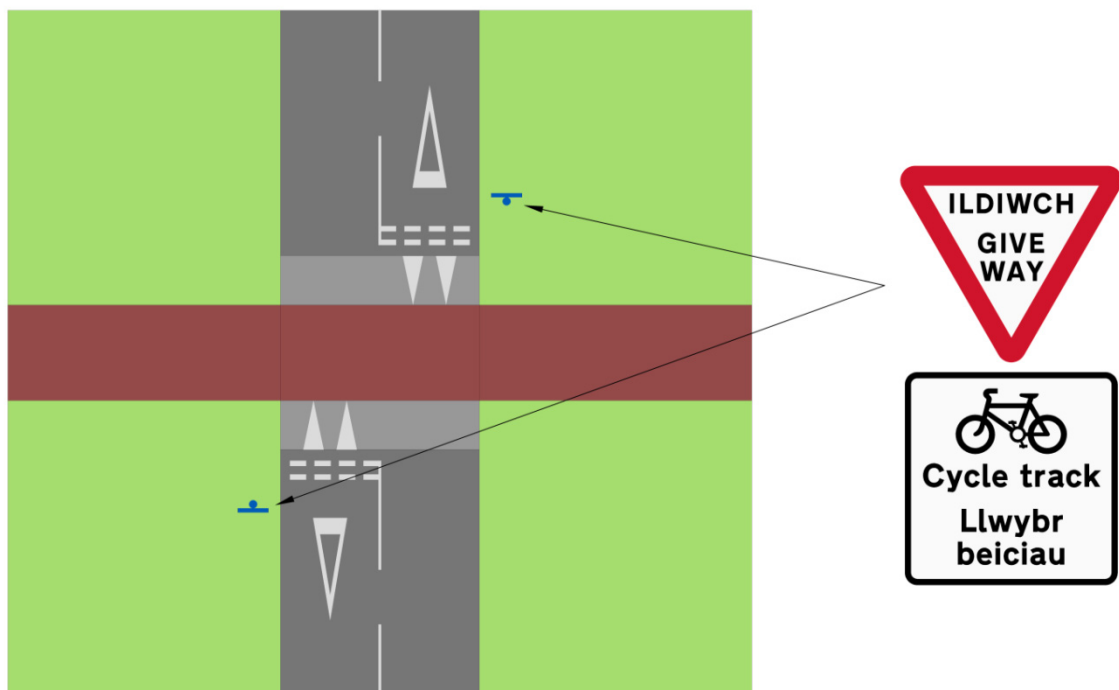


Figure 19 – Cycle priority crossing

- 7.6.4 In the instances where a priority cycle track crossing can be considered, the road traffic flow will typically be light and cyclists may not need the additional advantage of formal priority. In this instance, it may be possible to dispense with give way signs and road markings.
- 7.6.5 Care should be taken to provide sufficient visibility at road crossings (see Section 3.5). The crossing itself should be visible and readily apparent to approaching motorists at their stopping sight distance.

7.7 Toucan Crossings

- 7.7.1 Toucan crossings are a form of signalised pedestrian crossing which cyclists are permitted to use. As such, they are best suited to link off-road footpath / cycle tracks on opposite



sides of a carriageway.

- 7.7.2 Crossings should be at least 3.0 metres wide. 0.5m should be added to this width for every 125 pedestrians per hour above 600, as per paragraph 15.2 of the *Traffic Signs Manual Chapter 5* (Department for Transport, 2003). Crossings should also be widened as cycle flows increase. Wider crossings will bring greater comfort at lower flows, and should be considered where they can be accommodated easily. The maximum permitted crossing width is 10.0 metres.

Figure 20 – Example far-side toucan crossing signal

- 7.7.3 Where cycle and/or pedestrian flows are high, it may be better to treat the crossing as a junction with parallel cycle and pedestrian phases to provide greater segregation.

- 7.7.4 The crossings themselves should be aligned with reference to cycle and pedestrian desire lines as far as possible. Crossings do not have to be perpendicular to the carriageway (HMSO, 1997); diagonal crossings are preferable for cyclists over providing a perpendicular crossing with 90° switchbacks on the cycle track either side of the crossing. Care should be taken with the use of tactile paving at non-perpendicular crossings.



Photo 45 – Diagonal toucan crossing (Fen Causeway, Cambridge)

(courtesy Sustrans)

- 7.7.5 Toucan crossings should generally cross the carriageway in a single stage, although multiple stage arrangements may be acceptable at junctions if reasonably direct and necessary to accommodate the crossing. Staggered crossing arrangements including 'sheep pen' guard railing are to be avoided, as these can be claustrophobic and difficult for cyclists to negotiate. It will also be seldom possible to accommodate sufficiently large islands for cyclists to negotiate guardrailing and other pedestrians comfortably. The one exception to this might be a dual carriageway with a wide central reservation.
- 7.7.6 Where islands are proposed as part of multiple stage crossings, care should be taken to ensure these are large enough to accommodate cycles, having regard for the dimensions of pedal cycles (see Section 3.0), the necessary turning circles for cycles, directness for cycling and the expected flows of both pedestrians and cycles (see Figure 21).
- 7.7.7 In circumstances where manoeuvres are expected between an off-carriageway facility and the carriageway, care should be taken with the use of toucan crossings. In some instances, cyclists can come into conflict with traffic phases running in the same stage if they leave the crossing to join an on-carriageway route (see Figure 22). This can be mitigated to an extent by providing additional cycle tracks, toucan crossings and slips onto the carriageway at appropriate points, however, this will likely result in several additional crossings for cyclists, and indirect and illegible routes through the junction.

A dedicated cycle phase may be more appropriate in these instances (see Section 7.3).

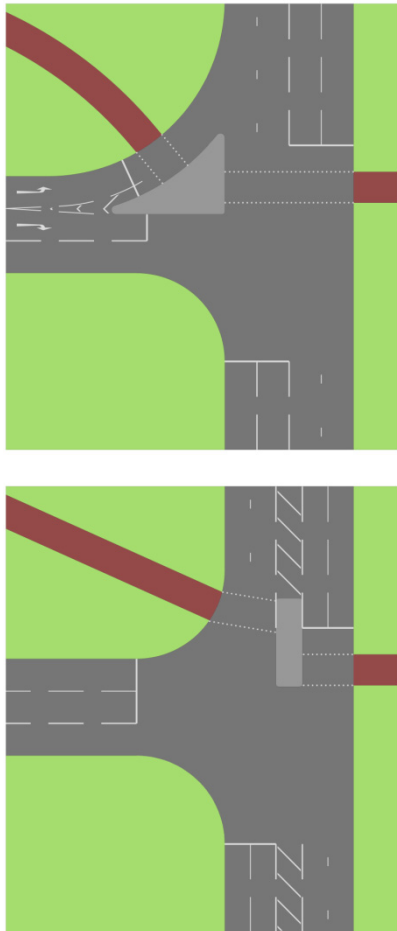


Figure 21 – Examples of two-stage toucan crossings

In the top example, although the crossing is in two stages for cyclists the route between the two crossings is reasonably direct and is legible. There is also plenty of room on the island for modest cycle and pedestrian flows. This might form an appropriate design in some circumstances.

In the bottom example, the crossing also operates in two stages for cycles. However, in this instance the route is very tortuous for cyclists (especially as guardrailing would usually be provided on the central island in this circumstance). The island is also small, and unlikely to be able to accommodate only one or two pedestrians or cyclists comfortably. This design is therefore unlikely to be appropriate.

These examples are illustrative only.

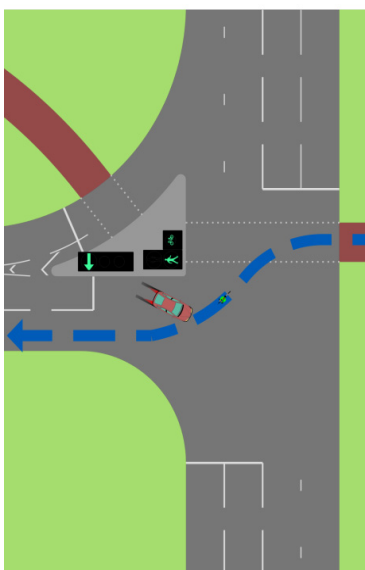


Figure 22 – Examples of conflict at signal controlled junction with a toucan crossing where movements occur between a cycle track and the carriageway

In this instance, the toucan crossings operate as walk (cycle) with traffic stages – however the design does not accommodate movements between the cycle track and the side road (the blue dotted line), and conflicts and confusion can arise when cyclists wish to make this manoeuvre. If the cycle flow along the blue dotted line is significant, a cycle phase would be likely be a more appropriate solution.

- 7.7.8 Two types of signal displays can be used at toucan crossings (both mid-block and at junctions) – nearside signals and farside signals. Nearside signals provide red and green light signals for pedestrians at the kerbside, incorporated into the push button

unit, as with puffin pedestrian crossings. Farside signals are provided on the opposite side of the carriageway in pedestrians' and cyclists' line of sight, as at pelican pedestrian crossings.

- 7.7.9 Nearside signals have advantages in terms of permitting the use of on-crossing detection, and avoiding the 'blackout' stage which some pedestrians and cyclists find confusing. They have the disadvantages of not being in the line of sight of pedestrians and cyclists, and can become obscured where crowding occurs at busier crossings (although the latter can be addressed by providing additional repeater nearside signals at a higher level – these will require special authorisation¹⁹). The choice between the two types of signalling should be made on a site-by-site basis, in consultation with road user groups.
- 7.7.10 Push buttons are required at toucan crossings to enable pedestrians and cyclists to register a demand. There are benefits in providing additional detection for cyclists (i.e. loops) where the layout permits this, as this can be used to register a demand immediately before the cyclist arrives at the crossing without requiring them to push the button, improving the perception and convenience of the crossing facility.

Further information regarding mid-block toucan crossings can be found in the following documents:

- *LTN 1/95 The Assessment of Pedestrian Crossings (Department of Transport, 1995a);*
- *LTN 2/95 The Design of Pedestrian Crossings (Department of Transport, 1995b);*
- *Traffic Signs Manual, Chapter 5, Section 15 (Department for Transport, 2003)*

TAL 5/05 Pedestrian Facilities at Signal Controlled Junctions (Department for Transport, 2005b), although not dealing specifically with toucan crossings, provides useful guidance on pedestrian facilities at signal controlled junctions which is relevant to toucan crossings.

Further background information can be found in TAL 10/93 (Department of Transport, 1993a) and TAL 4/98 (Department for the Environment, Transport and the Regions, 1998a).

7.8 Zebra Crossings

7.8.1 Zebra crossings can provide a more demand-responsive and lower cost solution to accommodate crossing movements, compared to signalised facilities for pedestrians and/or cyclists.

7.8.2 The regulation of traffic at zebra crossings is detailed in the *Zebra, Pelican and Puffin Pedestrian Crossings Regulations and General Directions 1997* (HMSO, 1997). Under the regulations, cyclists are vehicles and are permitted to ride on the part of a Zebra crossing that is carriageway, providing they give way to pedestrians crossing or waiting to cross. However, the Highway Code states that cyclists should dismount and walk across Zebra crossings.



Photo 46 – Cyclists and pedestrians sharing a zebra crossing

- 7.8.3 Cyclists do not have any priority over other vehicles on a Zebra crossing. Designs which may encourage cyclists to believe they have priority over road vehicles and do not encourage cyclists to treat the crossing with due caution may result in unacceptable risk, particularly if cyclists are able to approach the crossing at speed in a straight line. The risk of cyclists entering the crossing unexpectedly can be mitigated with speed-reducing measures on the cycle track approaches to the crossing; the risk of injury to cyclists while on the crossing in any event can be reduced with speed reducing measures on the carriageway (for instance, the crossing could be placed on a flat-top road hump).
- 7.8.4 Some authorities have erected diagram 966 'Cyclists dismount' signs at zebra crossings intended for use by cycles. However, this practice may defeat the objective of providing a crossing to assist cyclists. It may also be unlikely to provide any real mitigation to any risks identified in association with the crossing, as cyclists may typically choose to ignore the instruction.
- 7.8.5 As a zebra crossing is not specifically a cycle facility, it may not be clear to cyclists that the facility is intended for their use. It may be better on flagship core routes, or on other routes that may be used by occasional or less-confident cyclists, to provide a cycle-specific facility, such as a 'toucan' crossing or a cycle-priority crossing.
- 7.8.6 Zebra crossings for use by cyclists should be at least 3.0 metres wide. 0.5m should be added to this width for every 125 pedestrians per hour above 600, as per paragraph 15.2 of the *Traffic Signs Manual Chapter 5* (Department for Transport, 2003). Crossings should also be widened as cycle flows increase. Wider crossings will bring greater comfort at lower flows, and should be considered where they can be accommodated easily. The maximum permitted crossing width is 10 metres.

Further information regarding zebra crossings can be found in the following documents (although none address their use by cyclists):

- *LTN 1/95 The Assessment of Pedestrian Crossings (Department of Transport, 1995a);*

- *LTN 2/95 The Design of Pedestrian Crossings (Department of Transport, 1995b);*

- *Traffic Signs Manual, Chapter 5, Section 15 (Department for Transport, 2003)*

Transport for London have conducted investigations into the use of zebra crossings by cyclists:

- *The note Cyclists' Use of Zebra Crossings (Transport for London, 2008) gives further detail on current knowledge on the subject.*

- *Shared Zebra Crossing Study (Greenshields, Allen, York, & Paradise, 2006) details a study conducted by TRL on the shared use of zebra crossings by cyclists.*

7.9 Roundabouts

7.9.1 Roundabouts can be hazardous and intimidating to cyclists, particularly where the circulatory carriageway is large in diameter, as this can encourage higher speeds. Collisions between entering vehicles and circulating cyclists are also more common at roundabouts, particularly where speeds are high. The need for cyclists to position themselves away from the nearside kerb when negotiating larger roundabouts can also be intimidating for all but the most confident of cyclists.

7.9.2 Where the need to improve a roundabout for cycling is identified, it is recommended that the junction be reviewed in line with the hierarchy of provision (paragraph 1.4.2). The following hierarchy is suggested for use in Cardiff regarding roundabouts specifically:

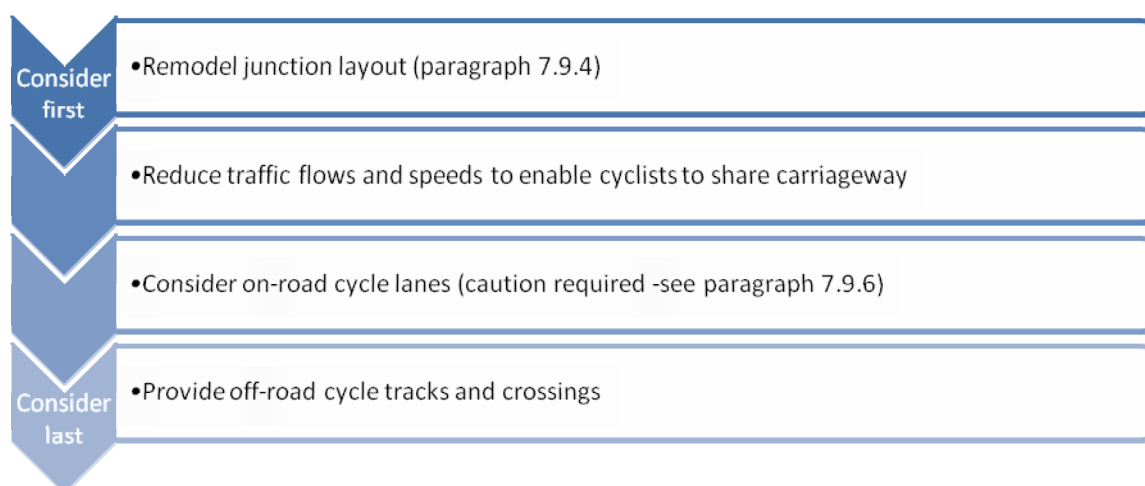


Figure 23 – Suggested hierarchy for improving roundabouts

7.9.3 As with the hierarchy of provision generally, the most-preferred options towards the top of the hierarchy may not be feasible in light of capacity concerns. However, these options should be fully explored and opportunity to reduce traffic speeds and flows to facilitate these options considered, before the topmost options are dismissed.

7.9.4 Where the roundabout is large and/or fast, the best option would be to remodel the junction to a more cycle-friendly layout. A simple signalised junction (not a signalised roundabout) may be the best approach for cycling that may offer high capacity for

motor vehicles. Conversion of the roundabout to a compact roundabout is another option which can improve conditions for cyclists (see TD 16/07 *Geometric Design of Roundabouts* (Highways Agency, 2007) and TAL 9/97 *Cyclists at Roundabouts – Continental Design Geometry* (Department for the Environment, Transport and the Regions, 1997b)). All of these options may have cost, capacity and land-take implications.

7.9.5 It may be possible to calm traffic on the roundabout and its approaches in order to achieve reduced vehicle speeds and facilitate cycling by enabling the sharing of the roundabout.

7.9.6 On-road provision at roundabouts (i.e. cycle lanes) can be difficult, particularly at larger junctions. The problem is that cycle lanes will typically encourage cyclists to keep to the nearside, which may give the impression that they are leaving at the next exit. Where a cyclist in fact wishes to continue circulating, this may lead to conflicts with exiting vehicles, and perhaps even with vehicles emerging from the next entry. Notwithstanding this, carefully considered roundabout cycle lanes have proven effective in reducing casualties at some sites (Pheby, 2004), and can improve route legibility and conformity.



Photo 47 – Example of cycle lanes at a roundabout

7.9.7 The signalisation of roundabouts can bring benefits to cyclists by greatly reducing the potential for conflict at entries. Advance stop lines can also be provided at signalised roundabouts as at other signalised junctions. However, roundabouts large enough to allow for signalisation may still be intimidating to many less-confident cyclists, so signalisation may only be appropriate as a dual provision to cater for the most confident cyclists, with off-road cycle tracks provided for everyone else. It should also be noted that signalisation can facilitate the introduction of toucan crossings and thus cycle tracks at a roundabout.

7.9.8 At the largest roundabouts, off-road cycle tracks, perhaps with toucan crossings, may actually be more convenient than on-road provision, as for some layouts the cycle track can reduce the distance cycled compared to rounding the circulatory carriageway. Such layouts may in some circumstances bring greater benefits than measures higher up the hierarchy (although dual provision may still be appropriate in these instances). Care also needs to be taken with transitions between on-road and off-road sections of infrastructure, to ensure these are legible and convenient for cyclists.



Figure 24 – Example of off road cycle track at roundabout reducing cycling distance

*(reproduced from LTN 1/09
(Department for Transport,
2009b))*

Further information regarding roundabouts can be found in the following documents:

- *Sections 9.7-9.11, LTN2/08 Cycle Infrastructure Design (Department for Transport, 2008b);*
- *TAL 9/97 Cyclists at Roundabouts – Continental Design Geometry (Department for the Environment, Transport and the Regions, 1997b);*
- *Mini Roundabouts Good Practice Guidance (County Surveyors Society, 2006);*
- *TD 16/07 Geometric Design of Roundabouts (Highways Agency, 2007);*
- *LTN 1/09 Signal Controlled Roundabouts (Department for Transport, 2009b); and,*
- *TD 50/04 The Geometric Layout of Signal-Controlled Junctions and Signalised Roundabouts (Highways Agency, 2004).*

8.0 OTHER ISSUES

8.1 Disability Access Issues

- 8.1.1 The design of cycle infrastructure needs to consider the needs of the mobility and/or visually impaired. The Council is obliged under the Equality Act 2010 to protect and further equality, including for people with disabilities. Particular concerns can arise where it is proposed to introduce cycling in areas currently for the sole use of pedestrians.
- 8.1.2 It should be borne in mind that whilst some people with disabilities may express concerns relating to cycle infrastructure, others may have disabilities such that they may benefit from the use of cycle infrastructure, as cycling affords them greater independence and mobility.
- 8.1.3 Tactile paving should be provided to advise the visually impaired of the presence of cycle tracks. Tactile paving will need to be considered where flush kerbs are provided for cyclists, even where this is not intended as a crossing point for pedestrians; such paving may be necessary to guide the visually impaired along a footway where the kerb is absent, so they do not inadvertently enter the carriageway. Chapter 5 of *Guidance on the Use of Tactile Paving Surfaces* (Department for Transport, 2005a) gives further advice – bespoke layouts may be appropriate in some circumstances (see paragraph 3.6.14 and Sight Line (Atkin 2010 – CABE & Helen Hamlyn Research Centre))
- 8.1.4 Particular care should be taken where arrangements including direct slips for cyclists between off- and on-carriageway facilities are proposed, to ensure that the visually impaired do not inadvertently enter the carriageway at such locations.
- 8.1.5 Often, proper engagement with people with disabilities can help develop designs that are more practical and usable than those based simply on standard details. It should be noted that guidance on subjects such as tactile paving is not mandatory; where engagement with stakeholders identifies a non-standard layout as being preferable, designers should not be afraid to implement such solutions, even where this is acting outside of guidance, provided that due consideration is given to the needs of all stakeholders.
- 8.1.6 A common mistake with regard to tactile paving is the use of hazard ‘corduroy’ paving on cycle tracks, where ‘ladder’ or ‘tramline’ tactile paving should be used instead. ‘Corduroy’ paving may give a misleading indication to the blind and partially sighted and can be a hazardous surface to cycle over.
- 8.1.7 Corduroy paving should only be used on footpaths approaching a cycle track, not on a cycle track itself (Department for Transport, 2005a).



Photo 48 – Example of incorrect use of ‘corduroy’ paving

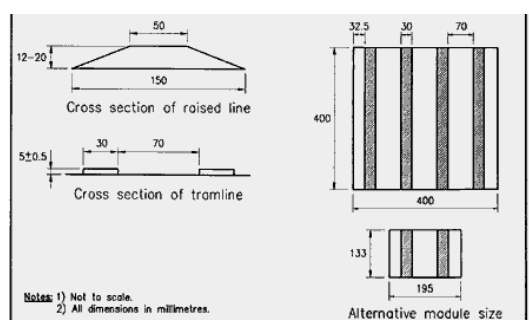
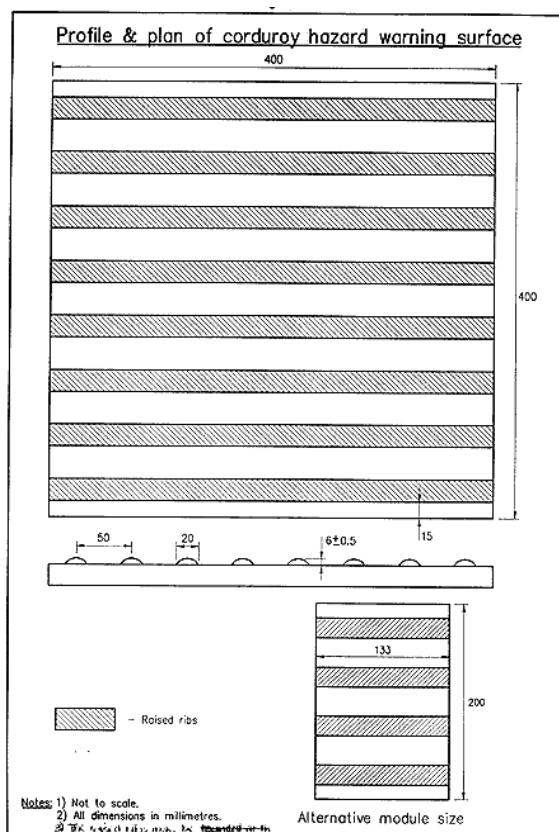


Figure 25 – Examples of corduroy (left) and ladder/tramline (above) paving modules

Corduroy paving (left) is not suitable on cycle tracks; ladder/tramline paving (above) might be

reproduced from Guidance on the Use of Tactile Paving Surfaces **(Department for Transport, 2005a)**

- 8.1.8 It is recommended that wherever a scheme to introduce cycling into an area currently for the sole use of pedestrians is proposed, or where significant works involving the dropping or removal of kerbs is proposed in a manner not considered by *Guidance on the Use of Tactile Paving Surfaces* (Department for Transport, 2005a), that an access audit is conducted to identify possible issues with the proposed design, so these can be addressed before implementation – see paragraph 2.5.6. Engagement with access groups will also be appropriate.
- 8.1.9 The design and location of street furniture should recognise the needs of people with disabilities. Guidance regarding this can be found in *Accessible Cardiff Guidance Booklet 7: Street Furniture* (Gravelle, 2010).

Further information regarding inclusive design, including with regard to cycle infrastructure, can be found in the following documents

- Inclusive Mobility (Department for Transport, 2002a);
- Guidance on the Use of Tactile Paving Surfaces (Department for Transport, 2005a); and,
- Accessible Cardiff Guidance Booklet 7: Street Furniture (Gravelle, 2010)

8.2 Streetscape and Aesthetics

- 8.2.1 Dedicated cycle facilities by their very nature introduce additional street furniture, as do many traffic calming features. If these facilities are to be publically acceptable and form pleasant cycle routes which are attractive for potential cyclists, they should be designed in a fashion which allows them to function and be clear to all road users, whilst not appearing cluttered, unsightly or untidy.

- 8.2.2 Consideration should always be given to removing other street furniture as part of any design. Existing traffic signing in particular should be considered for removal – existing diagram 637 ‘no waiting at any time plates’ should always be removed as part of any scheme, and it may be possible to remove some warning signs where traffic calming is introduced, for example.
- 8.2.3 Sensitive use of materials such as thermoplastic road markings and coloured surfacing is appropriate although the Council’s experience of using coloured surfacing for cycle lanes in Cardiff shows that some surfaces tend to be of variable quality and prone to wear. Therefore, the Council will generally seek to avoid the use of colour surfacing, except in specific circumstances where it is advisable to highlight the presence of a particular infrastructure design feature.
- 8.2.4 Care should be taken to ensure every road sign and marking has a clear, necessary purpose. Other techniques (such as colour contrasting paving materials) should be explored where these can achieve the desired effect, especially in sensitive places such as Conservation Areas. Consideration should also be given to removing whatever hazard or issue requires signing, as this will likely provide a better result in any event.



Photo 49 – Intrusive cycle lane layout.

It would be possible to omit areas of hatching in this instance, and provide only boundary lines. Consideration could also be given to omitting the nearside cycle lane boundary.



Photo 50 – Advisory contra-flow cycle lane sensitively provided using contrasting paving



Photo 51 – Intrusive road markings highlighting a post box.

Relocating the post box would be a better solution

- 8.2.5 It is important to note that cluttered and unsightly designs are also likely to be illegible to some degree. Such cycle infrastructure is unlikely to succeed in its aim of facilitating and encouraging cycling.
- 8.2.6 Section 8.3 gives guidance on the use of traffic signs associated with cycle infrastructure, including ideas to reduce the negative aesthetic impact of cycle infrastructure.

Further information regarding streetscape and public realm concerns can be found in the following documents:

- Cardiff City Centre Public Realm Manual (*Cardiff Council, 2009a*) (*Cardiff Council, 2009a*) (*Cardiff Council, 2009a*);
- LTN 1/08 Traffic Management and Streetscape (*Department for Transport, 2008a*);
- Manual for Streets (*Department for Transport, 2007b*); and,
- Manual for Streets 2 – Wider Application of the Principles (*Chartered Institution of Highways & Transportation, 2010*).

8.3 Traffic Signing - General

- 8.3.1 Designers should start from a position of having no signs and introduce them only where they serve a clear function (*Department for Transport, 2007b*). Where signs are proposed only to meet a legal requirement, consideration should be given to seeking special authorisation to omit the sign(s).
- 8.3.2 Clear signing of cycle routes and infrastructure is important if the cycle network is to be visible and attractive to potential cyclists. It is also important that cycle facilities are clear to other road users to maximise compliance and to aid enforcement, as well as to encourage people to consider cycling.
- 8.3.3 The use of traffic signs is governed by the *Traffic Signs Regulations and General Directions 2002* as amended (*HMSO, 2002*). Guidance is given in the various chapters of the *Traffic Signs Manual*. The Traffic Signs Regulations have the force of law, and the Traffic Signs Manual has the status of non-obligatory guidance.
- 8.3.4 It is important to note that the Traffic Signs Regulations do not require the use of traffic signs per se and instead regulate what form signs should take, how they should be used, and what signs should be provided in combination with other signs. The regulations apply to roads as defined by the Road Traffic Regulation Act 1984 –
- ‘in England and Wales, [road] means any length of highway or of any other road to which the public has access, and includes bridges over which a road passes’* (*HMSO, 1984a*).
- It should be noted that ‘highway’ includes footpaths, bridleways and cycle tracks (*HMSO, 1980*), and that therefore the Traffic Signs Regulations apply to cycle tracks away from roads as much as they do to roads open to all traffic.
- 8.3.5 In Wales, the Traffic Signs (Welsh and English Language Provisions) Regulations and General Directions 1985 also apply (*HMSO, 1985*). These give requirements and provide the necessary diagrams regarding bilingual English-Welsh traffic signs.
- 8.3.6 Where the use of a sign not prescribed by the regulations is felt appropriate, or where it is felt to omit a requirement to use a sign in combination with another sign, the Traffic Signs Regulations do not rule this out – special authorisation can be sought from the Welsh Assembly Government.
- 8.3.7 Coloured surfacing is not considered to be a traffic sign, as it has no meaning in itself

to convey to road users. It is instead usually used to highlight other road markings or points of conflict. As such, it is not bound by the requirements of the Traffic Signs Regulations. Further guidance is provided in Section 8.7.

- 8.3.8 This section is not intended to be a comprehensive guide, but offers additional guidance pertinent to Cardiff, in addition to the cited documents. Where guidance is not provided here, reference should be made to the *Traffic Signs Manual*.

8.4 Signing of Cycle Facilities

- 8.4.1 Guidance on the signing of cycle facilities can be found in the *Traffic Signs Manual* (full references follow at the end of this section). This section offers additional guidance pertinent to Cardiff.

- 8.4.2 The sign to diagram **950 'Cycle route ahead'** can be used to warn where a cycle route joins or crosses a road. It should not be used where this is controlled by traffic signals, or at a zebra crossing (diagrams 543 & 544 are more suitable in these instances). It is recommended that this sign is only provided where a specific risk has been identified (for instance where it is not possible to provide sufficient visibility splays for emerging cycles, or where stopping sight distance on the approach to a crossing is substandard), so as to maintain the sign's impact. The addition of a plate to diagram 950.1 reading 'Cycles crossing' can add clarity where this is accurate; a sign to diagram 962.1 varied as appropriate may also be used as a plate i.e. where a cycle track crosses a road.



Figure 26 – Cycle route ahead (warning sign)

- 8.4.3 **Diagram 951 'Pedal cycles prohibited'** should only be used to back up a traffic regulation order. It should not be used at the end of an off-carriageway cycle track – the layout in this circumstance should be designed so the continuation of the route(s) for cyclists is readily apparent. If a sign is deemed necessary, a variant of diagram 966 reading 'Cyclists rejoin main carriageway' is usually more appropriate – this will require special authorisation²⁰.



Figure 27 – Pedal cycles prohibited (regulatory sign)

- 8.4.4 **Diagram 955 'Route for use by pedal cycles only'** is the preferred sign where a road closure has been provided with an exemption for cyclists (paragraph 4.4.4). It may also be used in certain circumstances to indicate a cycle contra-flow (Figure 9). The 450mm diameter will usually be appropriate for these applications. It will not typically be used for cycle tracks, as these will typically be used by pedestrians as well.



Figure 28 – Route for pedal cycles only (regulatory sign)

- 8.4.5 **Diagrams 956 and 957 indicating shared-use and divided cycle tracks** should be provided at the start of cycle track. Repeater signs should be used within reason and only where necessary.



Figure 29 – Shared use cycle track (regulatory sign)

- 8.4.6 Some authorities have taken to providing signs at every

feature that they have deemed to 'break' the cycle track, such as accesses and bus stops – this is not considered necessary in Cardiff, although there may be benefit in providing signs at side road junctions so cyclists approaching from the side roads know they can use the cycle tracks.

- 8.4.7 The spacing of repeater signs will depend on the nature of the cycle track. For routes adjacent to the carriageway a maximum spacing of 300m is suggested for divided tracks, and 150m for undivided tracks; for routes away from carriageways, repeater signs may suffice at intervals of 400 metres or more.



Figure 30 – Divided cycle track (regulatory sign)

- 8.4.8 The sign is prescribed in varying sizes, ranging from 100mm to 600mm diameter. The 300mm diameter is recommended for signs on cycle tracks adjacent to the carriageway. Smaller signs will normally be appropriate for entirely off-road cycle tracks – the 150mm diameter will typically suffice. 450mm (and exceptionally 600mm) diameter signs may be appropriate where it is necessary to indicate to cyclists the presence of an off-road cycle track; they may need to join to follow the continuation of a route from an on-carriageway section.

- 8.4.9 These signs are not appropriate for use on bridleways or restricted byways, where classes of traffic other than pedestrians and cyclists are permitted.

- 8.4.10 The sign to **diagram 958.1 'Mandatory cycle lane ahead'** is not required. It is recommended that this sign is only provided where there is a risk of conflict at the start of the cycle lane, such as where a lane is lost, or where traffic is moving fast (e.g. at the transition from a rural area without a cycle lane to an urban area with a cycle lane). The sign should never be used with advisory cycle lanes.



Figure 31 – Mandatory cycle lane ahead (informatory sign)

- 8.4.11 Signs to **diagrams 962.1** indicate where a cycle lane or track crosses the road. In the interests of reducing clutter, these should not generally be provided, but may be useful in the following circumstances –



Figure 32 – Cycle lane or track crosses (informatory sign)

- 8.4.12 **To mark where a cycle track crosses a road away from a junction**, where this is not otherwise apparent. The sign should be located as per Figure 19 – the 'Give way' sign can be omitted where there is no requirement for traffic on the road to give way, or where the cycle track must give way.
- 8.4.13 **In addition to the 'give way' sign**, at a road junction where there is a cycle track crossing which also has priority over the minor road.
- 8.4.14 **Where a specific risk has been identified** in relation to a cycle lane or cycle track layout which cannot reasonably be addressed without resorting to the use of traffic signs.
- 8.4.15 **Diagrams 965 'End of cycle route' and diagram 966 'Cyclists dismount'** signs are not used within Cardiff as these leave cyclists abandoned and do not provide useful

information as to how cyclists can continue their journey. Provision of warning signs (which may be of a non-standard cycle-specific design) may be more appropriate than negative instructions in many cases. 'Cyclists dismount' signs may exceptionally be used following a risk assessment that identifies unacceptable risk if cyclists were to continue riding. There are many circumstances where signs to diagram 965 and 966 have been erected where there are better approaches. The following are examples of where such signs should not have been used:-

8.4.16 **Where an off-carriageway cycle track ends and cyclists should continue on the carriageway** – in this instance a smooth transition should be provided between the cycle track and the carriageway, making the intention readily apparent. Where a sign is deemed appropriate, a variant of diagram 966 reading 'Cyclists rejoin main carriageway' should be used – this will however require special authorisation²¹.

8.4.17 **Where an on-road cycle lane ends** – in Cardiff this should occur only when there is an alternative means of accommodating cyclists beyond the cycle lane (i.e. the route becomes a shared street). In this instance, signs will usually not be necessary. Where signs are required, the provision of diagram 967 'advisory cycle route' and 883 'Traffic calmed area' can better indicate that the route continues, but as a shared street as opposed to a segregated one.

8.4.18 **Where an off-road cycle track joins a zebra crossing** – see Section 7.8 for guidance on the use of zebra crossings by cyclists.

8.4.19 **Where cyclists should use caution at difficult locations on cycle tracks** – in this case warning signing should be used instead – bespoke designs based on diagram 966 may be appropriate; these would require special authorisation.

8.4.20 The signs to **diagram 967 'Advisory cycle route'** may be provided as a confirmation for cyclists that they are on a cycle route, although direction-style signing may be more effective for this purpose.



Figure 33 – Advisory cycle route (informatory sign)

8.4.21 Diagram 967 is also required for use where advisory cycle lanes are provided. However it is considered that these signs may not provide much practical information in this instance and it is recommended that consideration be given to seeking authorisation to omit these signs as part of advisory cycle lane schemes.

8.4.22 Signs to **diagrams 968 & 968.1 'Parking Place for Pedal Cycles'** are not necessary to mark cycle parking places. However, some designs of cycle stand incorporate diagram 968 into the tapping rail, which can emphasise the provision of cycle parking with minimal additional clutter. Post-mounted signs may occasionally be appropriate in busy environments in order to highlight parking places – this may particularly be useful in pedestrian streets where cycling is prohibited during parts of the day and cycle parking is provided near the start of the prohibition to assist those wishing to leave cycles to



Photo 52 – Cycle stand incorporating sign

continue on foot.

Further information regarding the signing of cycle facilities can be found in the sections of the Traffic Signs Manual:

- Chapter 3 (Regulatory Signs), Section 17 (Department for Transport, 2008c);
- Chapter 4 (Warning Signs), Section 22 (Department for Transport, 2004); and,
- Chapter 5 (Road Markings), Section 16 (Department for Transport, 2003).

8.5 Direction Signs for Cyclists

- 8.5.1 A Signage Strategy is being produced for Cardiff's cycle network (Local Transport Projects, 2010a). Reference should be made to that document for information regarding the design of sign faces.
- 8.5.2 Care should be taken with the design of sign assemblies to avoid clutter and to reduce the risk of vandalism and sign rotation. Where fingerpost arrangements are proposed, purpose built products are available which can provide aesthetically pleasing designs which prevent the rotation of signs. Alternatively, rectangular posts should be used for cycle direction signs as these will help prevent rotation.
- 8.5.3 It is also important to ensure signs are located where they will be visible. Care should also be taken to ensure foliage does not grow to obscure signs – signs should be located where vegetation is not an issue; where this is not practical, maintenance programmes should be in place to trim foliage.



**Photo 53 – Cluttered cycle signing
prone to rotation**



**Photo 54 – High quality rotation
resistant sign product**

- 8.5.4 In some parts of the United Kingdom, stickers are used as cycle direction signs. In practice, these stickers seldom comply with legal requirements, and can be difficult for cyclists to follow given their small size. Where stickers are provided in Cardiff, it is recommended that over time, more permanent signing be erected in line with the signing strategy in liaison with appropriate stakeholders (i.e. Sustrans for the National Cycle Network); these will then eventually replace any existing stickers.

8.6 Road Markings

- 8.6.1 Guidance on the signing of cycle facilities can be found in the *Traffic Signs Manual* with this section providing additional guidance pertinent to Cardiff.

- 8.6.2 Road markings should be kept to a minimum to provide essential information and/or guidance only. Lines should be of the minimum width suitable, having regard for aesthetics, traffic speed and composition, and maintenance liability. Aesthetic considerations are particularly important in Conservation Areas.
- 8.6.3 Lane lines to divide motor traffic should only be provided where there is an identified need. Lane markings should also use modules of the least intrusive design appropriate – for example, overprovision of warning lines (diagram 1004) where lane or centre lines (diagrams 1005 and 1008 respectively) would suffice is a common cause of excessive street clutter.
- 8.6.4 It is illegal to drive in **mandatory cycle lanes (diagram 1049)**, but parking inside these lanes can not be enforced against unless they are augmented with double yellow lines to indicate parking restrictions. Any loading bans can be signed and marked as normal.
- 8.6.5 The same marking (**diagram 1049**) can be used to segregate the pedestrian and cycle parts of a segregated cycle track – a raised version to assist the visually impaired is also preferred (diagram 1049.1). Where segregation is provided, this can also be delineated using differently coloured and/or textured surfacing, or by a kerb. These means may be more aesthetically pleasing, easier to maintain and possibly more agreeable for people with disabilities than using conventional road markings. Care should be taken to ensure any upstands provided are detectable by the partially sighted and do not form a trip hazard for pedestrians.
- 8.6.6 **Diagram 1057 ‘cycle symbol’** can be used to mark a cycle route or facility. It is used in some form for most cycle facilities. It can be used to indicate a cycle route on its own (as might sometimes be desirable on a shared street) – however, authorisation is required to use the marking without upright signs. Care should also be taken with the use of the symbol on unsegregated footway / cycle tracks, as the design of such routes should not suggest cyclists have any greater right to use such facilities than pedestrians.
- 8.6.7 There are examples in the UK of upright signs being used to indicate cycle routes, sometimes instead of warning signs. This is not prescribed by the Traffic Signs Regulations, and requires special authorisation. Notwithstanding this, it can be a useful technique on off-road cycle tracks, particularly for direction signing, where there is a risk of vandalism – authorisation should be sought where this is proposed.

Further information regarding road markings at cycle facilities can be found in the sections of the Traffic Signs Manual:

- Chapter 3 (Regulatory Signs), *Section 17 (Department for Transport, 2008c); and,*
- Chapter 5 (Road Markings), *Section 16 (Department for Transport, 2003).*

8.7 Coloured Surfacing

- 8.7.1 Coloured surfacing may be used to enhance the conspicuity of the cycle facilities. It has also been suggested that colour can reduce encroachment into cycle lanes by motor vehicles (McKeown, 2006), although other studies have not been able to conclusively demonstrate this (Allen, Bygrave, & Harper, 2005).

- 8.7.2 The Council's experience of using coloured surfacing for cycle lanes in Cardiff shows that some surfaces tend to be of variable quality and prone to wear. Therefore, the Council will generally seek to avoid the use of colour surfacing, except in specific circumstances where it may be advisable.
- 8.7.3 For instance, coloured surfacing may be useful at points of conflict, at locations with poor safety records, or where enforcement and/or compliance is problematic. When several points of conflict exist where it is felt appropriate to provide coloured surfacing, it may be appropriate to colour the entire length of the facility. This will provide a more aesthetically pleasing layout compared with disparate areas of coloured surfacing.
- 8.7.4 The implementation cost, visual intrusion and increased maintenance associated with coloured surfacing should be considered before this treatment is proposed. Where necessary, red coloured surfacing should be used to keep the colour consistent with other cycle facilities in Cardiff.
- 8.7.5 Coloured surfacing should especially be avoided in Conservation Areas owing to its impact on historic street settings found in these areas.

Further information regarding coloured surfacing can be found in the following documents:

- *LTN 2/08 Cycle Infrastructure Design, Section 3.2 (Department for Transport, 2008b); and,*
- *TA 81/99 Coloured Surfacing in Road Layout (Excluding Traffic Calming) (Highways Agency, 1999).*

8.8 One Way Streets

- 8.8.1 One way streets create a significant barrier to cycling unless contra-flow cycling is accommodated. One way streets can require cyclists to undertake considerable detours, potentially increasing risk to cyclists on an alternative route, as well as reducing the legibility of signed cycle routes. In practice, many cyclists may choose to ignore one-way restrictions.
- 8.8.2 One way streets can also result in an increase in traffic speeds as they remove the risk of conflict between oncoming vehicles and the perception of this associated risk.
- 8.8.3 Where one way streets exist, or are proposed, the first action should be to review the situation to identify if a one-way street is appropriate or necessary. Alternative measures to a one-way order should also be considered to achieve the improvement sought. Maintaining two-way traffic for all vehicles is the clearest and simplest way of maintaining two-way movements for cyclists.
- 8.8.4 Where a one-way street is felt necessary following the aforementioned consideration, every effort should be made to provide a means for cyclists to cycle lawfully against the one-way order. The nature of the provision should be considered in line with the hierarchy of provision (Figure 1) and whether the street in question is considered to be a shared street as per Section 4.0, or a segregated street as per Section 5.0.

8.8.5 Where contra-flow cycling is proposed, care should be taken to ensure cyclists are adequately catered for at either end of the one-way section, particularly at junctions. Potential conflict with motor vehicles will need to be considered and it may be necessary to adjust traffic signal control arrangements, for instance.

8.8.6 On **shared streets**, the most appropriate approach is likely to be to allow for cyclists to run against the one-way order without providing a segregated lane. This can be achieved in two ways:

- A false one-way street can be created, where a one-way order is in place with an exemption for cyclists, but only for a nominal length (around 5 metres) at the end of the street where entry by motor vehicles is prohibited; or
- Alternatively, a longer length of street can be made one-way where this is deemed necessary, with an exemption provided for cyclists. This will usually result in a greater number of signs being installed, and any diagram 652 signs will need replacing with a non-prescribed variant indicating that cyclists are exempt – these signs will require special authorisation from the Welsh Assembly Government²²



Figure 34 – Sign for one way street with exemption for cyclists (requires special authorisation)

8.8.7 DfT guidance (Department for Transport, 2008c) recommends that an advisory cycle lane is provided where flows exceed 1,000 vpd or speeds are in excess of 25mph. It is recommended that for shared streets in Cardiff that an advisory lane is not generally provided and that instead every effort is made to reduce flows and speeds below these thresholds (see Sections 4.4 & 4.5).

8.8.8 On **segregated streets**, a mandatory contra-flow cycle lane should be provided. The design guidance for with-flow mandatory lanes (Section 5.8) is a good starting point for contra-flow lanes. Additional care should be taken to ensure the risk of cyclists having to leave the contra-flow lane to avoid obstructions (and therefore come into conflict with oncoming traffic) is minimised; short breaks in the mandatory lane at pinch points are not acceptable for contra-flow lanes, and loading may need to be prohibited at all times (with alternative provision considered where appropriate).



Figure 35 – Sign for a mandatory contra-flow cycle lane (diagram 960.1)

8.8.9 DfT guidance has historically tended to advocate the use of traffic islands (to separate cyclists from other traffic) where cycles enter a street against a one-way restriction for motor vehicles. Where speeds and flows of motor vehicles are relatively high (as on a segregated street), this is considered appropriate in Cardiff. However, on shared streets where vehicle flows and speeds are low, an island is likely to contribute little practical benefit while adding considerable cost and clutter. The island is also likely to result in a pinch point for cyclists and detritus may collect in the cycle gap. For these reasons, an island should only be provided on shared streets if there are compelling reasons to do so (if safety or enforcement problems are envisaged, or if it is deemed

necessary to provide a facility for pedestrians).

8.8.10 Where islands are not provided at the start of the contra-flow, DfT advice is currently that diagram 619 'No motor vehicles' signs are used to prohibit vehicles proceeding against the one-way street.

8.8.11 A trial of 'no entry except cycles' signing was conducted in 2010 on behalf of Cycling England and Transport for London. This study found the following:

- Compliance with 'no entry except cycles' signs amongst motor vehicles was greater than for 'no motor vehicles' signs; and,
- Contra-flow cycling levels increased when 'no motor vehicles' signs were replaced with 'no entry except cycles' signs, suggesting greater understanding amongst cyclists.

(MVA Consultancy, 2010)

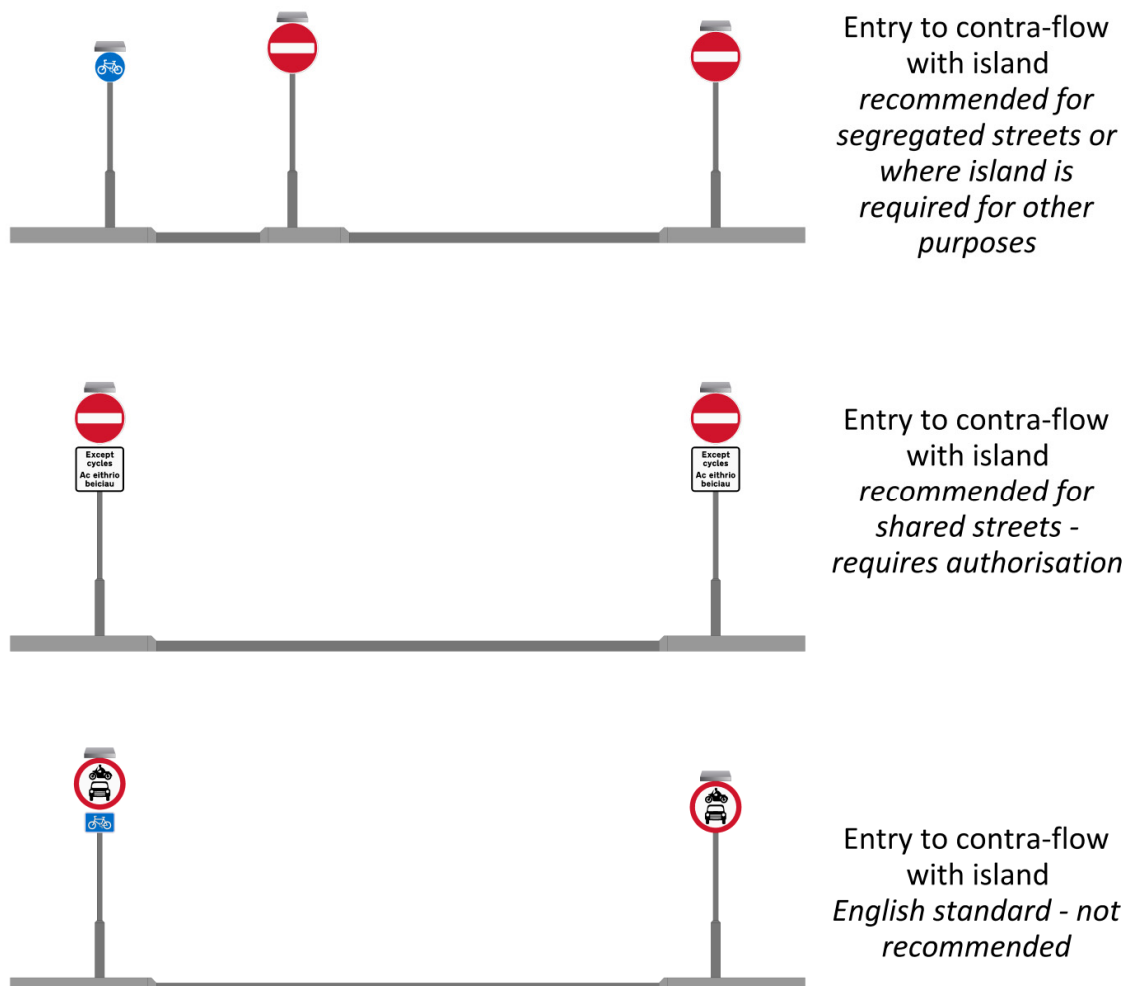


Figure 36 – Examples of entrances to contra-flows on one-way streets

Further information regarding cyclists and one way streets can be found in the following documents:

- *LTN 2/08 Cycle Infrastructure Design, Sections 7.6 & 7.7;*
- *Traffic Signs Manual, Chapter 3, paragraphs 17.17-17.30 (Department for Transport, 2008c);*
- *Traffic Signs Manual, Chapter 5, paragraph 16.8 (Department for Transport, 2003);*
- *TAL 6/98 Contra-flow Cycling (Department for the Environment, Transport and the Regions, 1998b); and,*
- *Design Portfolio – A06 Contra-flow Cycling (Cycling England, 2008c).*

8.9 Prohibited and Prescribed Manœuvres

- 8.9.1 Just as with one-way streets, prohibited and prescribed manoeuvres can cause significant detours and additional risk for cyclists and exemption for cyclists should always be explored.
- 8.9.2 Prohibited and prescribed manoeuvres are typically introduced in the following circumstances:
- As an effect of a one way street;
 - Where there is insufficient space for vehicles to wait to turn without excessively impeding the flow of through traffic;
 - Where owing to traffic flows or collision data, certain manoeuvres cannot be accommodated safely;
 - Where owing to the geometry of a junction, there is insufficient space for some or most vehicles to make a particular movement;
 - Where this is necessary to provide a pedestrian phase at traffic signals.
- 8.9.3 One way streets are considered in Section 8.8. Any contra-flow provided for cycles should be accessible from all approaches unless there are compelling safety reasons not to permit certain movements.
- 8.9.4 Where turns (usually right turns) are prohibited to prevent traffic being obstructed behind a vehicle waiting to make the affected turn, consideration should always be given to exempting cyclists from the restriction. It should be noted that cycles require less space than motor vehicles and that cycles are therefore much less likely to pose an obstruction to proceeding traffic. Right turn lanes for cyclists can be introduced to facilitate the flow of traffic by guiding motor vehicles past waiting cyclists – these should ideally be 2.0m wide and should not be less than 1.5m wide.

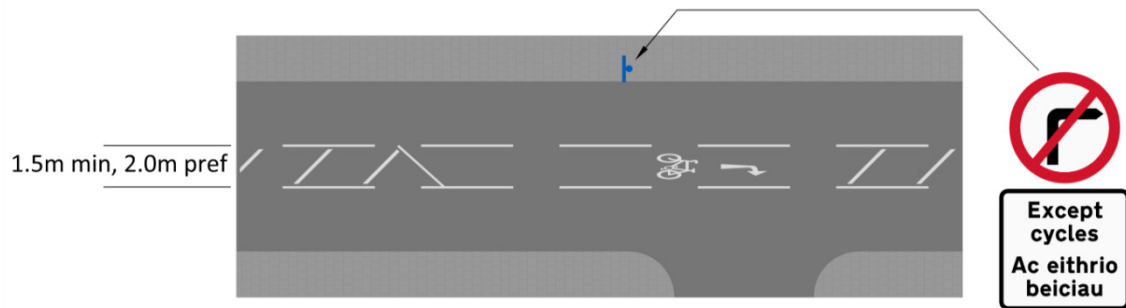


Figure 37 – Example of right-turn lane allowing an exemption for cycles from a right-turn ban without inhibiting through traffic

(this use of diagram 1057 cycle symbol requires special authorisation)

- 8.9.5 Where mandatory cycle or bus lanes are provided, the order should allow for vehicles to enter the bus lane to pass an obstruction. Therefore, it should not ordinarily be necessary to prohibit turns where drivers can encroach momentarily into an adjacent reserved lane to pass vehicles waiting e.g. to turn right.
- 8.9.6 Where flows or safety records suggest that a particular movement cannot satisfactorily be accommodated, first consideration should be given to altering the junction layout to better accommodate the relevant movement, for example, by installing a mini-roundabout or traffic signals. Turning prohibitions should only be proposed if this is not feasible.
- 8.9.7 Where turning restrictions are to be progressed, or are already existing, consideration should be given to exempting cyclists from the restriction. It may be that the problems associated with motor vehicles making the manoeuvre are not an issue when cyclists make the same movement. Remembering that cycles require less space than motor vehicles, it may also be possible to alter the junction to accommodate a safe movement for cyclists, even where it is not possible to make improvements for all vehicles wishing to make the affected manoeuvre.
- 8.9.8 In the example below, the right-turn out of the side road is to be prohibited as to allow the manoeuvre across a busy dual carriageway has been deemed to be an unacceptable risk. However, owing to the relatively small size of a bicycle, it has been possible to provide a refuge, enabling cyclists to cross in two stages, reducing the level of risk to an acceptable level to exempt cyclists.

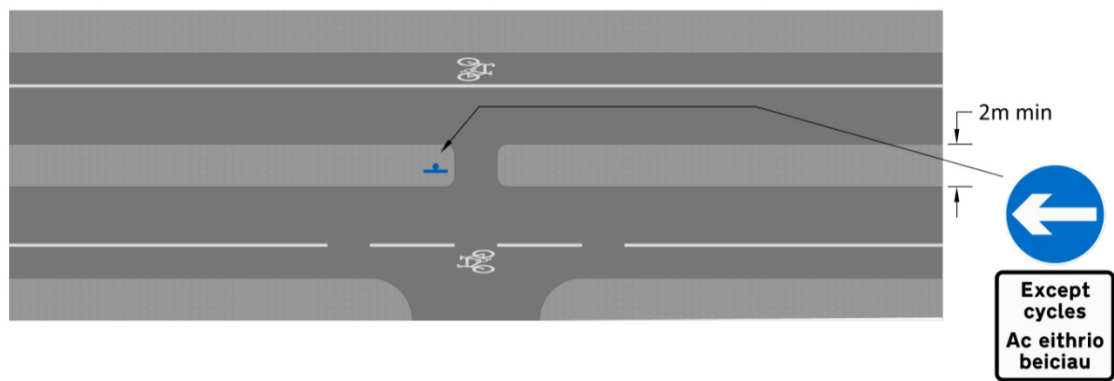


Figure 38 – Example of a facility provided to enable cyclists to be exempted from a turning ban

- 8.9.9 In some circumstances it may be necessary to prohibit a turn which is too constrained for some or all vehicles to negotiate. The lesser size and greater agility of cycles should be considered – it will almost always be possible to exempt cycles from prohibited turns introduced for reasons of geometric constraint.
- 8.9.10 Where prohibited turns are proposed to accommodate walk-with-traffic pedestrian phases at traffic signals, these can be problematic when considering cycle exemptions. Means of assisting pedestrians that do not require a prohibited turn should be explored in these circumstances.
- 8.9.11 Signs to diagram 954.4 ('Except cycles') can be used with all signs indicating mandatory or prohibited turns without authorisation, provided that the Traffic Regulation Order provides for the exemption for cyclists.
- 8.9.12 Elsewhere in the United Kingdom, a circular variant of the 'except cycles' plate is prescribed for use when mounted as part of a traffic signal display. However, no bilingual variant is prescribed for use in Wales. Signs separate from the traffic signal display will therefore need to be provided; alternatively, a less cluttered approach would be to seek authorisation for a bilingual version of diagram 954.5 from the Welsh Assembly (an example is shown in Figure 39).
- 8.9.13 Where cycle exemptions are provided at traffic signals, care should be taken with the use of replacement green arrow signals. For example, where an arrow aspect is used to re-enforce a mandatory turn, if an exemption for cyclists were introduced cyclists may be permitted to travel in additional directions, in which case a full green signal would be more appropriate – retaining the arrow signal would have the effect of nullifying the cycle exemption.

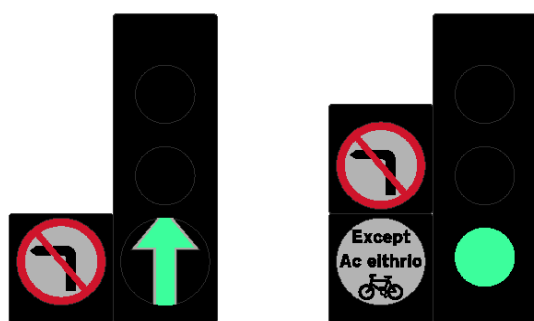


Figure 39 – Example of a where introduction of a cycle exemption renders use of a replacement green arrow aspect inappropriate

(left shows before exemption, right shows after) (bilingual version of diagram 954.5 requires authorisation)

Further information regarding exemptions for cyclists from prohibited turns can be found in LTN 2/08 Cycle Infrastructure Design, Section 4.2.

8.10 Contra-flow Bus Lanes & Bus Gates

8.10.1 Contra-flow bus lanes provide cyclists with a means of exemption from one-way streets. , As with with-flow

lanes, contra-flow bus lanes should ideally be 4.6m wide, with a preferred minimum width of 4.0m. An absolute minimum width of 3.0m is acceptable , although where a width of less than 4.0m is proposed consideration should be given to measures to reduce oncoming traffic speeds and flows, to facilitate buses moving out of the bus lane to pass cyclists.

8.10.2 The guidance contained in Section 5.12 should be considered for contra-flow bus lanes as for with-flow bus lanes.

8.10.3 There may be instances where it is necessary to prohibit cyclists from entering bus only areas, for example prohibiting general traffic from entering a dedicated bus station.

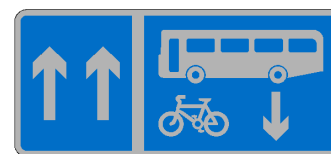


Figure 40 –Sign for a contra-flow bus lane admitting pedal cycles (diagram 960)

Further information regarding contra-flow bus lanes can be found in the following documents:

- LTN 2/08 Cycle Infrastructure Design, Section 7.8 (Department for Transport, 2008b);
- Traffic Signs Manual, Chapter 3, paragraphs 15.18-15.25 (Department for Transport, 2008c);
- Traffic Signs Manual, Chapter 5, paragraphs 17.12-17.15 (Department for Transport, 2003);
- LTN 1/97 Keeping Buses Moving (Department for Transport, Local Government and the Regions, 2001); and,
- Bus Priority: The Way Ahead (Department for Transport, 2006a).

8.11 Cycle Parking

8.11.1 *Manual for Streets* (Department for Transport, 2007b) recommends that for residential areas access to secure cycle parking at people's homes and other locations for both residents and visitors is critical and should be at least as convenient as access to car parking. Similar considerations apply at major trip generators, including shopping streets. Detailed guidance on the design of cycle parking facilities is also given in Section 8.2 of *Manual for Streets*, and also in Section 11 of LTN 2/08 *Cycle Infrastructure Design* (Department for Transport, 2008b).

8.11.2 Cycle parking can be provided in the carriageway or in lay-bys, as well as on footways. This may be a beneficial approach in areas where footways are constrained or congested. The provision of multiple cycle stands in place of one or two car parking spaces can also demonstrate the efficiencies of cycling over car use, and the loss of car parking associated with this approach can encourage modal shift. Care should be taken with such designs to minimise the risk of vehicles striking cycle stands or parked cycles.

8.11.3 Cycle parking can also be provided on private land (e.g. forecourts), with the agreement of the land owner. This may bring benefits to the landowner, in terms of making it easier for customers to cycle to retail premises, and reducing incidences of cycles left on footways in the vicinity of their premises.

8.11.4 Cycle parking places are provided by a Parking Place Order made under Section 32 of the Road Traffic Regulation Act 1984 (HMSO, 1984a). Stands or racks to secure cycles to may be provided at parking places under Section 63 of the same Act. The parking place order authorises cyclists to leave their cycles at the parking place and also may prohibit use of the parking place by other vehicles (mopeds and motorcycles in particular may attempt to use stands for pedal cycles).

8.11.5 Yellow-line waiting restrictions will typically apply to cycles as they do to any other vehicle.. There will ordinarily be an exemption in waiting restriction orders to allow for vehicles left at duly authorised parking places, which would include cycles left at cycle parking places (see paragraph 8.11.4).

8.11.6 At present cycle usage levels (2011), it will seldom be necessary to prohibit cycle parking in itself. However, should it arise that inappropriate cycle parking causes serious problems at locations where sufficient provision of high-quality cycle parking has been made, it may be appropriate to explicitly prohibit the parking of cycles at difficult locations. A TRO can be made to this effect under existing legislation, but any



Photo 55 – High quality covered cycle parking

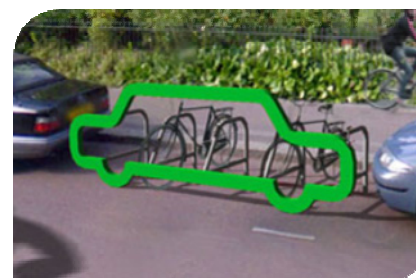


Photo 56 – On-carriageway cycle parking

special design highlights an efficiency of cycling (courtesy Cyclehoop Ltd.)

signs required to indicate the restriction will require special authorisation if the prohibition applies only to cycles (see also paragraph 8.11.5).

- 8.11.7 Cycle stands can create an obstacle in the street, and should be located where they will not obstruct pedestrian movement, accesses, or entrances to buildings. Where covered cycle parking is proposed, the covering structure will often be quite large and intrusive – care should be taken to ensure the structure is carefully located so that it does not obscure the setting of listed buildings, or important views or vistas. Engagement with the Council's Planning Section can help identify suitable solutions.
- 8.11.8 Similarly, where cycle parking stands or racks are proposed in parks or countryside, they should be of a design which is sympathetic to their setting.
- 8.11.9 Section 5.7 of the *Cardiff City Centre Public Realm Manual* (Cardiff Council, 2009a) (Cardiff Council, 2009a) gives further guidance on cycle parking facilities with *Supplementary Planning Guidance: Access, Circulation and parking Requirements* outlining cycle parking requirements for development.

Further information regarding cycle parking can be found in the following documents:

- *LTN 2/08 Cycle Infrastructure Design, Section 11* (Department for Transport, 2008b);
- *TAL 5/02 Key elements of cycle parking provision* (Department for Transport, 2002b);
- *TAL 6/99 Cycle Parking – Examples of Good Practice* (Department for the Environment, Transport and the Regions, 1999); and,
- *TAL 7/97 Supply and Demand for Cycle Parking* (Department for the Environment, Transport and the Regions, 1997a).

A comprehensive guide to the design and provision of cycle parking is given in the Danish Cyclists' Federation's Bicycle Parking Manual (Celis & Bølling-Ladegaard, 2008). This reference is strongly recommended for consideration as part of cycle parking schemes in Cardiff.

8.12 Enforcement

- 8.12.1 It is important that the enforcement of cycle facilities is given due consideration before the installation of cycle infrastructure. Legal deterrent may be sufficient in most circumstances, but physical measures should always be considered where disobedience is evident or expected.
- 8.12.2 The parties responsible for enforcement should be consulted at an early stage and given full opportunity to influence the design to ease the enforcement burden. For offences prosecuted under the Civil Parking Enforcement regime, this will fall to Cardiff Council's Parking section (the full list of these offences can be found in Annex A of *Operational Guidance to Local Authorities: Parking Policy and Enforcement* (Department for Transport, 2008e)). For most other matters, including most moving traffic offences, enforcement is the responsibility of South Wales Police.
- 8.12.3 Common offences that can cause particular problems for cyclists are:
- Parking (and loading where this is prohibited) in mandatory cycle lanes;
 - Parking on cycle tracks;

- Parking on yellow lines (particularly where advisory cycle lanes are provided);
- Encroachment into advance stop lines; and,
- Proceeding in a bus lane when not permitted.

8.12.4 Cyclists themselves can cause problems to other road users, particularly pedestrians, when carrying out prohibited movements. Cycling on footways, the running of red lights and cycling at night without lights are often-cited concerns. If cycling is to become a popular, mainstream mode of transport in Cardiff then these offences will need to be, and be seen to be, properly dealt with, and enforcement should allow for this. However, a high incidence of prohibited movements at particular locations can often be an indication of a strong cyclist 'desire line' which the existing infrastructure is not designed to facilitate. In such situations opportunities should always be explored to introduce changes to facilitate cyclists such as by providing a contra flow facility on a one way street Suitable awareness campaigns may help address specific problems of cyclists making prohibited manoeuvres.

8.13 Highways Act 1980

- 8.13.1 **Section 65 (Construction of cycle tracks adjacent to carriageways)** empowers highway authorities to provide cycle tracks within or next to highways including a carriageway (i.e. a street). This is not suitable for footpaths (i.e. where the only right-of-way across the entire width of the highway is by foot). There are no statutory requirements regarding the exercise of this power, although there needs to be evidence that the Highway Authority has exercised this power, particularly given such schemes may be contentious. The erection of the appropriate traffic signing will perform this role to an extent, though it is recommended that any conversion is formally made by a resolution of the relevant council committee, following consultation and engagement with stakeholders (Section 2.3).
- 8.13.2 Where a cycle track is proposed adjacent to a highway, but outside its adopted limits, this can be achieved by constructing a cycle track under section 65(1) of the Highways Act as a permitted development under Part 13 of Schedule 2 of the Town and Country Planning (General Permitted Development) Order 1995 (HMSO, 1995).
- 8.13.3 Annex A of LTN 2/86 *Shared Use by Cyclists and Pedestrians*²³ gives additional advice on legal procedures (Department of Transport, 1986b).
- 8.13.4 **Sections 90A-90F (Road humps)** allows Highway Authorities to construct road humps. Their design and installation is regulated by the Highways (Road Humps) Regulations 1999 (HMSO, 1999b). Advice relating to good practice and legal requirements with respect to design can be found in Section 4 of LTN 1/07 *Traffic Calming* (Department for Transport, 2007a).

8.14 Consultation requirements

- 8.14.1 Section 90G (1) of the Highways Act 1980 requires that the Chief Officer of Police is consulted before road humps are installed.
- 8.14.2 Sections 90G (2)-(5) of the same act require authorities carry out the following procedure before installing road humps –
- Notices should be placed in local press and on-street, detailing each individual

road hump proposed and inviting objections before a stated deadline not less than 21 days after the publication of proposals;

- Any objections received should be considered by the Highway Authority. Typically objections will be considered by the relevant committee of the Council.

8.14.3 Section 3 of the Highways (Road Humps) Regulations 1999 requires that the following bodies are consulted in addition to those above –

- The Chief Officer of the fire brigade;
- The Chief Officer of any body providing ambulance services; and,
- Any organisations appearing to the authority to represent persons who use the highway to which the proposal relates, or to represent persons who are otherwise likely to be affected by the road hump.

8.14.4 **Sections 90G-90I (Other traffic calming)** allows highway authorities to construct other traffic calming measures. These measures are regulated by the Highways (Traffic Calming) Regulations 1999 (HMSO, 1999a), which permit the following measures:

- | | |
|--------------|-----------------------------|
| • Build-outs | • Over-run areas |
| • Chicanes | • Pinch points |
| • Gateways | • Rumble devices |
| • Islands | • Combinations of the above |

8.14.5 The regulations impose limits on the design of over-run areas and rumble devices. Section 5 of LTN 1/07 *Traffic Calming* (Department for Transport, 2007a) offers design advice – additional care should be taken to ensure such features do not pose a hazard to cyclists.

8.14.6 Section 4 of the Highways (Traffic Calming) Regulations 1999 requires that the following bodies are consulted before measures are installed –

- The Chief Officer of Police; and,
- Such persons or organisations representing persons who use the highway or who are otherwise likely to be affected by the traffic calming work as the highway authority thinks fit.

8.14.7 **Sections 97 (Lighting)** empowers highway authorities to provide lighting on highways, including cycle tracks. There is no prescribed procedure for providing such lighting.

8.15 Road Traffic Regulation Act 1984

8.15.1 **Sections 1-5 (Traffic regulation orders)** empower highway authorities to make Traffic Regulation Orders (TROs) to regulate road traffic. TROs are usually required where any road traffic activity in any part of the highway is to be prohibited or restricted for any user, over and above what is prohibited by other legislation.

8.15.2 In terms of cycling infrastructure, the following will require the implementation or amendment of TROs:

- Pedestrianised streets²⁴
- Bus lanes (with-flow and contra-flow)
- One way streets (including with contra-flow cycling)
- Mandatory cycle lanes
- Prohibited & prescribed manoeuvres
- Exemptions from existing restrictions

8.15.3 TROs will also be required for other traffic restrictions introduced to facilitate cycling, including road closures and prohibitions of waiting and/or loading.

8.15.4 TROs can be made for a variety of reasons, prescribed under Section 1 of the 1984 Act. With regard to cycling infrastructure, it will typically be appropriate to state that the order is made for the purposes of facilitating the passage of pedal cycles along the affected street(s).

8.15.5 Where the cycling infrastructure is simply an exemption from a TRO applying to other traffic, the exemption for cycles **must** be written into the TRO. This means a new TRO will be required where it is proposed to exempt cycles from an existing restriction. Section 2 of the Act allows for such exemptions.

8.15.6 Care needs to be taken in the drafting of TROs to ensure the provisions match the definitions and signing and lining used. For example, the provisions for a contra-flow cycle lane will need to be more detailed than for where cycles are simply exempted from a one way street as, for instance, motor vehicles need prohibiting from entering a mandatory contra-flow cycle lane.

8.15.7 There are restrictions on TROs, although these will not generally be relevant to cycling infrastructure. One exception concerns pedestrianised streets. Where it is required to deny access to adjacent streets for any class of vehicle (cycles included) to adjacent premises for greater than 8 hours in any 24, it will be necessary to either seek the consent of the Welsh Assembly Government (this is only possible in certain circumstances), or make an order under the Town and Country Planning Act (see paragraph **Error! Reference source not found.**).

8.15.8 Speed limits, parking places and cycle tracks should not be made by Traffic Regulation Order (i.e. Orders made under Section 1 of the Road Traffic Regulation Act). These are made using different mechanisms –

- Speed limit orders are made under sections 81-91 of the Road Traffic Regulation Act (see paragraph 8.15.20);
- Parking places are designated under sections 32-63A of the Road Traffic Regulation Act (see paragraph **Error! Reference source not found.**);
- Cycle tracks in highways incorporating a carriageway are constructed under section 65 of the Highways Act 1980 (see paragraph 8.15.1);
- Conversion of footpaths away from highways incorporating a carriageway is made under Section 3 of the Cycle Tracks Act 1984 (see paragraph 8.16.1); and,
- New cycle tracks outside of the highway are made under the Highways Act and planning legislation – advice of a planning officer should be sought in this instance.

- 8.15.9 **Procedure for TROs** is governed by the Local Authorities (Traffic Orders) (England and Wales) (Procedure) Regulations 1996 (HMSO, 1996). This is summarised in the document *Traffic Regulation Orders – Your Questions Answered* (Department for Transport, 2007c), and described in greater detail in Annex F of *Operational Guidance to Local Authorities: Parking Policy and Enforcement* (Department for Transport, 2008e).
- 8.15.10 **Sections 23-25 (Pedestrian crossings)** empower highway authorities to provide pedestrian crossings. These are prescribed by the Zebra, Pelican and Puffin Pedestrian Crossings Regulations 1997 (HMSO, 1997). Where it is proposed to install, alter or remove a pedestrian crossing, the traffic authority is required to -
- Consult the Chief Officer of Police;
 - Give notice to the public of the proposals; and
 - Inform the Secretary of State in writing.²⁵
- 8.15.11 There is no requirement in legislation for the Council to consider objections to pedestrian crossings.
- 8.15.12 Toucan crossings and signal-controlled crossings at junctions are not prescribed under this Section of the act, but under Sections 64-80 (traffic signs).
- 8.15.13 **Sections 32-63A (Parking places)** empower traffic authorities to designate parking places. Orders are made under Sections 32 (unpaid parking) or 45 (paid parking) of the Act where a parking place is to be designated, including cycle parking places. Section 63 allows for the provision of stands or other devices to be provided for the safe keeping of cycles at designated parking places.
- 8.15.14 Parking place orders are made for the relief or prevention of traffic congestion – in the case of cycling parking places, this will be by encouraging modal shift onto pedal cycles. Cycle parking places can also relieve congestion on footways where cycles may be left haphazardly in the absence of proper facilities.
- 8.15.15 These powers are also used to provide limited waiting, permit parking and pay and display parking. The procedure is as for traffic regulation orders (paragraph 8.15.9).
- 8.15.16 **Sections 64-80 (Traffic signs)** empower traffic authorities to provide traffic signs and road markings. Traffic signals are also prescribed under this mechanism. No specific procedure is prescribed for the erection of signs generally.
- 8.15.17 All traffic signs²⁶ must conform to regulations or special authorisations issued by the Secretary of State – usually these will be the Traffic Signs Regulations and General Directions 2002 (HMSO, 2002). The requirement for signs to be prescribed in this way applies to ‘any length of highway or any other road to which the public has access, including bridges over which a road passes’ (HMSO, 1984a). It should be noted that ‘highway’ includes footpaths, bridleways and cycle tracks (HMSO, 1980)²⁷.
- 8.15.18 In Wales, the Traffic Signs (Welsh and English Language Provisions) Regulations and General Directions 1985 also apply (HMSO, 1985). These give requirements and provide the necessary diagrams regarding bilingual English-Welsh traffic signs.
- 8.15.19 The Regulations require TROs or other enactments to be in place where certain signs

or markings are provided.

8.15.20 **Sections 81-91 (Speed limits)** concern speed limits. Guidance can be found in *Setting Local Speed Limits in Wales* (Welsh Assembly Government, 2009) - Section 4 deals with the legislative framework. Procedure is as for traffic regulation orders (paragraph 8.15.9).

8.15.21 **Sections 92 & 93 (Bollards)** authorise highway authorities to provide bollards or other obstructions to enforce a traffic regulation order. No additional process is required above and beyond that necessary for a traffic regulation order.

8.16 Cycle Tracks Act 1984

8.16.1 **Section 3 (conversion of footpaths to cycle tracks)** allows highway authorities to convert footpaths (i.e. highways with right-of-way by foot only) to cycle tracks.

8.16.2 Where the footpath crosses agricultural land, Section 3(2) requires the written consent of anyone with a legal interest in the land is obtained before the cycle track order can be made.

8.16.3 The procedure for making a cycle track order is governed by the Cycle Tracks Regulations 1984 (HMSO, 1984c). Before making a cycle track order, the authority must consult-

- One or more organisations representing persons using the footpath, or are likely to be affected by the proposed order, unless it appears to the authority that no such organisations exist;
- Any parish council within whose area the footpath lies;
- Those statutory undertakers whose operational land is crossed by the footpath; and,
- The Chief Officer of Police.

8.16.4 Upon making the Order, notices should be placed in local press, at each end of the affected footpath and on any public notice boards in their locality, detailing the proposals and inviting objections before a stated deadline not less than 28 days after the publication of proposals, and send this notice to all consultees.

8.16.5 If no objections are received, the authority can confirm the Order itself. If objections are received, application must be made to the Secretary of State to confirm the Order. A public inquiry will be conducted, and following that the Secretary of State will decide whether to confirm the Order (as made or amended), or to reject the application.

8.16.6 Legal and physical works to accommodate the cycle track are a permitted development under section 10 of the Act, so planning consent is not required. This also applies when providing a metalled way for cyclists where none exists presently.

8.16.7 Annex A of LTN 2/86 *Shared Use by Cyclists and Pedestrians*²⁸ gives additional advice on legal procedures (Department of Transport, 1986b).

8.16.8 Conversion of a footpath to restricted by-way can be a less onerous means of permitting cycling than that provided by the Cycle Tracks Act (see paragraph **Error! Reference source not found.**).

8.16.9 **Section 4 (provision of barriers in cycle tracks etc)** allows the highway authority to provide barriers or other features to safeguard users of the cycle track (whether adjacent to a carriageway or otherwise), and to segregate foot and cycle traffic. There are no procedural requirements for the installation of such features.

8.16.10 Notwithstanding the above, it should be reiterated that the requirements of Section 130 of the Highways Act 1980 (HMSO, 1980), and Section 1 of the Disabled Persons Act 1981 (HMSO, 1981) apply when installing barriers under this power.

8.17 Town and Country Planning Act 1990

8.17.1 Provisions within the Town and Country Planning Act 1990 (HMSO, 1990) and the Highways Act 1980 (HMSO, 1980) will apply where it is proposed to provide a cycle route where no right-of-way or physical path exists at present. In these instances, legal and planning advice should be sought.

8.17.2 **Section 249** of the Town and Country Planning Act provides a means of providing pedestrianised streets by extinguishing vehicular rights over highways. This can be a useful mechanism where the provisions of the Road Traffic Regulation Act are not robust enough for the desired level of restriction. Such Orders can only be made, altered or revoked by the Secretary of State – this includes any amendments to existing Orders that may be necessary to permit cycling at any time of the day.

8.17.3 Where s.249 Orders are proposed, or are existing and are proposed to be amended to accommodate cycling, planning and legal advice should be sought.

8.18 Bridleways and Restricted Byways

8.18.1 The legislative measures outlined above do not allow for the use of horses on cycle routes away from roads, or for the use of cycles on existing bridleways.

8.18.2 Section 30 of the Countryside Act 1968 (HMSO, 1968) permits cyclists to use bridleways, so it is not necessary to change the status of a bridleway to allow cycling. However, there are a number of issues where cycle routes are to follow bridleways –

- Section 30(3) of the Countryside Act 1968 specifically does not obligate the highway authority or any other responsible party to maintain bridleways to a standard able to accommodate cycling, or to do anything to facilitate cycling along the route. This risks bridleway sections of cycle route not being maintained sufficiently for cycling; and,
- Cycle route signs are unlikely to be appropriate on bridleways and regulatory signs indicating a cycle track cannot be lawfully erected on bridleways. Providing route continuity along a bridleway section may therefore be difficult.

8.18.3 On key cycle routes, it may be appropriate to give cyclists a greater claim to the facility than can be provided with bridleway status, in which case the bridleway can be converted to a restricted byway²⁹ under section 26 of the Highways Act 1980 (HMSO, 1980), as modified by the Restricted Byways (Application and Consequential Amendment of Provisions) Regulations 2006 (HMSO, 2006).

8.18.4 The procedure for the conversion of a footpath or bridleway to restricted byway

under Section 26 of the Highways Act 1980 is governed by the Public Path Orders Regulations 1993 (HMSO, 1993) and is described in *A Guide to Definitive Maps and Changes to Public Rights of Way* (Countryside Council for Wales, 2008).

- 8.18.5 Where the use of bridleways or restricted byways is proposed, care should be taken to ensure that facilities for equestrians are maintained and where possible extended into the countryside.

8.19 Experimental Schemes

- 8.19.1 Where traffic regulation orders, speed limit orders or parking place orders are proposed, but prove to be controversial, it is possible to install the scheme experimentally before considering objections, so as to evaluate it.

- 8.19.2 This power is provided by Sections 9-13 of the Road Traffic Regulation Act 1984 (HMSO, 1984a). The procedure is described in Annex F of *Operational Guidance to Local Authorities: Parking Policy and Enforcement* (Department for Transport, 2008e), and can be summarised as follows:

- Notices should be placed in local press and on-street, detailing the proposals, as for an ordinary TRO, at least 7 days before the Order is made;
- The experimental order can be left in place for up to 18 months, during which people may lodge objections;
- After a maximum of 18 months, any objections received should be considered by the Highway Authority, after which the Council may (subject to consideration of those objections) make the Order permanent, or let the Order lapse.

- 8.19.3 This procedure can be used to alleviate public concerns by demonstrating the actual impact of the scheme, rather than simply relying upon expectation and speculation. However, it may also be interpreted as forcing proposals through without regard for public concerns, so this procedure should be used carefully. Experimental schemes should be carefully monitored so that their real impact can be reported on and amendments can be considered to mitigate for any issues observed.

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