GCC Active Travel Design Advice

Design Principles

Design Process

Design Detail

Decisions, News & Drafting Advice

This resource should help design teams to produce consistent and good quality design drawings for active travel as well as helping avoid common mistakes that crop up on active travel schemes by providing:

- Background on GCC design decisions relating to active travel
- A quick reference guide illustrating good practice when designing active travel facilities
- Provide checklists to support right first-time design
- Provide general advice on the production of active travel drawings

Design Principles

Published 9/26/2022

This section outlines some of the key principles that should be considered as part of the design process as well as the primary sources of guidance that should be considered and referenced on all proposed active travel schemes.

Sections

Design Principles

Sources of Guidance for Active Travel Infrastructure Design

There are various sources of guidance (and standards) on the planning and design of infrastructure for active travel. **Tables 1** and **2** cover the primary guidance that should be used and referenced in relation to scheme design in England however as outlined below there are various other sources of advice on active travel design that can be useful to consult. These additional documents described in **table 3** although not directly applicable in England in some instances contain additional information or more detailed descriptions of design elements that expand on the advice given in LTN1/20. Design teams should use this list as a secondary source of information for active travel design.

Table 1 **Primary Active Travel Guidance and where to apply it**

Document	Applicable to	Description
LTN 1/20 Traffic Signs Manual Chapter 6 Manual for Streets 1 & 2 Inclusive Mobility	The Local Road Network	Guidance on the design of active travel infrastructure applicable to the local road network and all roads in built up areas unless the road is part of the strategic road network
CD 143 Designing for Walking, Cycling and Horse-Riding CD 195 Designing for Cycle Traffic	All-purpose Trunk Road and Motorway Network	Documents outlining mandatory requirements for active travel infrastructure on the trunk road and motorway network

Table 2 **Primary Active Travel Guidance**

Document	Description
LTN 1/20	This is the new national design guidance and is the standard by which the Department for Transport, and the new Active Travel England regulator, will judge all cycling infrastructure paid for through national government funding. It is therefore the primary design guidance tool for designers of cycling infrastructure and in cases of conflict between documents, LTN 1/20 should take precedence. It does not, however, cover walking-specific issues or broader considerations of the quality of public space and rural routes.
GG 142	This is an assessment process that is required when considering active travel facilities in and around the all-purpose Trunk Road and Motorway Network. The process covers many of the common planning elements required when considering active travel in a holistic way and is therefore also relevant more broadly.

Table 3: **Other useful sources of guidance on Active Travel**

Document	Description
Cycling by Design & Active Travel Act Guidance	National guidance for other parts of the UK, recently updated and while not applicable in England both have useful guidance on the design of many key cycle infrastructure design elements such as geometric values as well as addition considerations for specific design elements, including how to provide infrastructure in more rural settings.
London Cycle Design Standard Leicester Street Design Guide & Manchester Active Travel guidance	These local design guides provide useful additional information on the design of active travel facilities and should be used as a wider reference for designers looking for more information on specific design elements. The London Cycle Design Standards remains a useful and detailed source on many aspects of cycling design. It is particularly useful for sign design providing significant additional detail expanding on what's covered in LTN1/20. The Manchester guidance includes a technical note on the concept and design of Cycle Optimised Protected Signal (CYCLOPS) junctions providing design information not covered in other documents. The Leicester guide covers both walking and cycling in significant detail.
A guide to inclusive cycling	Provides more detailed guidance on designing cycling facilities that are accessible to all and should be used in addition to the inclusive mobility guidance.
Pedestrian comfort levels	A specific guidance tool for assessing levels of pedestrian activity and determining appropriate levels of pedestrian provision. This tool is referenced in LTN1/20 and forms part of the Level of Service tool in appendix A
Planning for walking toolkit	Along with the Welsh Active Travel Act Guidance this guidance is the best current source of guidance on the planning and design of dedicated walking facilities.
Sustrans traffic-free routes	As the guardians of the National Cycle Network, Sustrans has been designing and maintaining high quality off-road cycling and walking infrastructure for many years. This publication represents the most up-to-date UK guidance on the design of such infrastructure.

Design Principles

User-focused Design

Active Travel

"Active travel refers to modes of travel that involve a level of activity. The term active travel is often used interchangeably with walking and cycling, but active travel can also include trips made by wheelchair, mobility scooters, adapted cycles, e-cycles, scooters, as well as cycle sharing schemes." [1]

From the outset, it is important to define who we are designing for, since the terms 'pedestrian' and 'cyclist' are used as catch-all terms encompassing a variety of different street users with specific design needs.

Walking

In the context of this advice note 'people walking' refers to "all pedestrians using the public realm including wheelchair users and people with buggies. Walking activities can be subdivided as utility walking, including walking to and accessing daily services as part of a regular routine as well as recreational walking.

"People do not just move from A to B but are likely to undertake a range of other activities as part of a walked trip including resting, standing and sitting so these activities also need to be considered as part of the planning process. Most journeys involve walking at some point and so the public realm needs to be designed to enable walking, by making it a convenient part of an integrated transport system." [2]

Cycling

The term 'cyclist' not only applies to people riding conventional bicycles, but a number of other types of cycle which require specific design parameters based on their differing dimensions/manoeuvrability. As Wheels for Wellbeing [3] explains cycling includes a range of cycle types from wheelchair tandems to hand cycles as well as larger non-standard cycles such as cargo bikes. Within LTN1/20 this variation in size and shape is captured by the Cycle Design Vehicle which should be used to test scheme design as descried in the following design sheet: Tracking for Cycle Traffic

Cycle user requirements are unique. Cycles need to be planned for as vehicles within the road network,
but their detailed requirements at the beginning and end of journeys are more closely aligned with pedestrian movements. An integrated approach is therefore necessary to ensure the freedom of movement of different users, and to manage the interactions between these users on different parts of the network.

User Needs

Designers should understand user needs, and design infrastructure with all types of pedestrian and cyclist in mind. It is critical that, regardless of user type, cycling is recognised as a distinct mode of travel, operating at a significantly higher speed than walking and therefore with different requirements even though in some instances the needs of pedestrians and cyclists overlap. Table 1 outlines some of the typical characteristics and differences between walking and cycling while table 2 shows how some typical user needs can be translated into design features for a scheme.

Table 1 **Typical characteristics and needs associated with walking and cycling**

	Walking	Cycling
Common Characteristics	• Ability to stop and start and turn on the spot • Commonly a sociable activity with 49% of walked journeys accompanied on average • Also includes a wide range of other activities such as resting, standing and sitting • The speed of movement is significantly slower than other modes and varies with age and ability	• Cycling is a physical activity requiring both balance and a minimum speed to maintain stability (commonly 10kph) • Cycling can also be a social activity • Cycle traffic is capable of speed and can travel significantly faster than the mean walked speed. Speed can vary significantly amongst users ranging from 5 to 40kph •
User Need	• Space to walk both alone and with others • Ability to cross the street easily • Places to stop and rest	• Conditions that feel safe and are safe • Direct and safe routes

Table 2 **User needs translated into design principles and features**

User Need	Design Principle	Design Feature
To feel safe and be safe	Safety	• Treatment of all side roads along a link • Road geometry that limits speeds of general traffic
Facilities that take you where you want to go	Directness	• Minimal delay at crossings through good detection equipment and short wait times • Active travel routes through a city centre that are shorter than general traffic routes
Streets that are easy to cross	Safety & directness	• Priority single stage crossings every 400m along a busy street

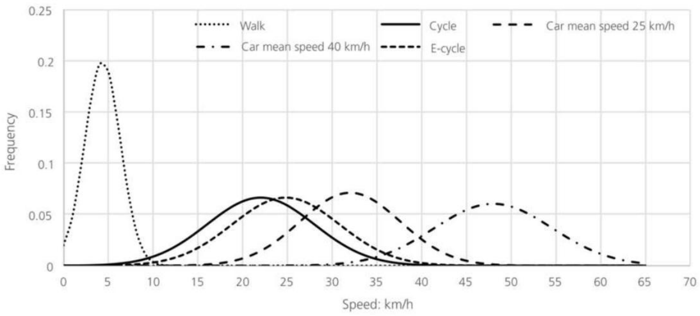
[1] Active travel: local authority toolkit - GOV.UK (www.gov.uk)
[2] The Planning for Walking Toolkit, Transport for London, March 2020
[3] A Guide to Inclusive Cycling, Wheels for wellbeing, 2019

Speed Difference

As shown in figure 1 the mean speed of cycle traffic is five times greater than the mean walking speed resulting in a significant difference in design requirements. This speed difference should be a prime consideration throughout the design process.

Source: Designing for Cycle Traffic, J Parkin, 2018

Figure 1 Commuter Speeds (Leeds)



User Hierarchy

Designers should consider the road user hierarchy throughout the design process. This should be incorporated into decision-making at all stages but especially for decisions resulting in trade-offs between different modes. The user hierarchy is now referenced in multiple guidance documents as illustrated by the Traffic Signs Manual exert below, additionally this is supported in legislation by the updated highway code (2021).

Traffic Signs Manual, Chapter 6, Section 1.7.4

> ***There has been considerable shift in street design in recent years, with an increasing focus on 'place' over 'movement', particularly in urban areas. The advice in this chapter takes its lead from the Manual for Streets and Manual for Streets 2, which include a hierarchy of provision putting pedestrians at the top and motor traffic at the bottom. While recognising that the primary function of traffic signals is to control vehicular traffic, this type of approach is likely to be more suitable for dense urban areas***

Source: Traffic Signs Manual Chapter 6

Multi Modal Streets

A design approach that both re-distributes street space and re-thinks traffic management can have significant benefits in terms of capacity for the movement of people and goods as shown in figure 1.5. It can also free up space for street scape improvements such as seating and planting. Section 2 of this document outlines further detail on the local authorities' approach to key design parameters and illustrates how design teams can take a multi-modal approach to the design process.

Standard Design Process

1. Roads/junctions are for motor traffic and are primarily designed for the movement of motor vehicles
2. Provision can be made for active travel although roads are high risk therefore designs should segregate and discourage interaction

Decisions reinforce speed and volume of motor traffic and lead to congestion

Multi-Modal Design Process

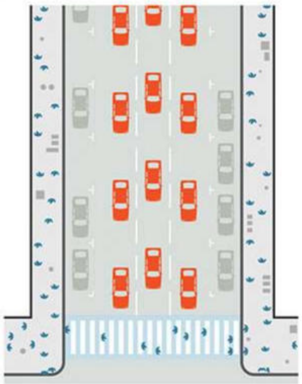
1. Roads and junctions are gateways for movement that are primarily designed to manage the movement of people and goods
2. Movement occurs via different modes and design decisions are made based on the user hierarchy and should reduce risk

Decisions encourage appropriate interactions and promote modal shift

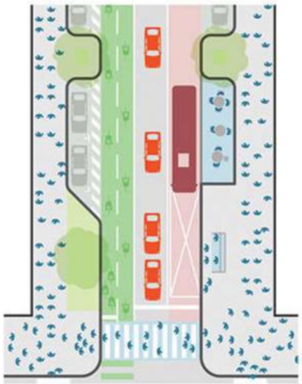
Source: Ben Clarke, University of West England & NACTO Global Street Design Guide

For more Information FLOW Multi-Modal Capacity Modelling

Car-Oriented Street



Multimodal Street



The capacity of car-oriented streets and multimodal streets.
These two diagrams illustrate the potential capacity of the same street space when designed in two different ways. In the first example, the majority of the space is allocated to personal motor vehicles, either moving or parked. Sidewalks accommodate utility poles, street light poles and street furniture narrowing the clear path to less than 3 m, which reduces its capacity.

In the multimodal street, the capacity of the street is increased by a more balanced allocation of space between the modes. This redistribution of space allows for a variety of non-mobility activities such as seating and resting areas, bus stops, as well as trees, planting and other green infrastructure strategies. The illustrations show the capacity for a 3-m wide lane (or equivalent width) by different mode at peak conditions with normal operations.

Hourly Capacity of a Car-Oriented Street

4,500/h	x2	**9,000 people/h**
1,100/h	x3	**3,300 people/h**
0	x2	**0 people/h**

Total capacity: 12,300 people/h

Hourly Capacity of a Multimodal Street

8,000/h	x2	**16,000 people/h**
7,000/h	x1	**7,000 people/h**
6,000/h	x1	**6,000 people/h**
1,100/h	x1	**1,100 people/h**
0	x1	**0 people**

Total capacity: 30,100 people/h

Global Designing Cities Initiative NACTO

Design Principles

Inclusive Mobility

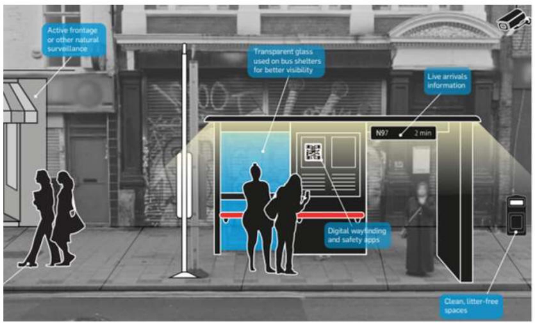
Definition

Inclusive Design is about designing for everybody. Its consideration is an essential part of design evaluation. It is not only about disabled people but designing to a performance envelope for transport and/or the built environment that is inclusive of all people with diverse requirements, whether that be due to disability, age, gender, belief, identity, pregnancy, childhood, language, neurodiversity or any other reasons. It involves anticipating the likely User Experience and Service function of a design when completed. If considered early enough, in conjunction with safety and sustainability, it should not add cost but add significant social value.

Example: **'Get Home Safe' guidance**

This guidance looks specific at the user experience of 'woman getting home safely' and illustrates how understanding the needs associated with this experience can help identify design improvements. Much of inclusive design should follow a similar process of first understanding user experience then adjusting designs based on these needs and specific user narratives.

Source: Get home safe (snclavalin.com)



The Legislative Context and requirements

Public sector organisations have duties under the Public Sector Equality Duty and some require Diversity/Equality Impact Assessments (DIAs / EqIAs) to be undertaken as part of the design process, for which a traceable Inclusive Design evaluation process is essential. The Equality Act 2010 (EA) is not a design standard, but civil rights legislation for which it is not possible to give a literal undertaking to provide "EA compliance".

Inclusive Design principles

Account for diversity as a whole

Age, gender, belief, identity, pregnancy, childhood, language, etc. can influence design decisions, such as safety, signage, toilets, and quiet spaces. However, it is the insights gained from people's experience of disability and neurodiversity that have the most extensive and detailed impact, which to a large extent also benefit the above.

Test

Get into the habit of using the perspectives of at least 5 diverse Persona Narratives to test your design assumptions. Persona Narratives are best developed using a range of requirements within the following 5 universal realms of human need shown in table 1 below. Simple projects will benefit from a quick check against these 5 different perspectives from which the design can be reviewed. However, some projects will warrant a full methodological use of persona narratives and envisaging of persona journeys informed by stakeholder engagement.

Table 1 **Testing Using Persona Narratives**

Human Need	User	Typical design focus
Mobility	Wheelchair, walking aid users & people with stamina or dexterity difficulties	Gradients, resting places, footway widths, dropped kerbs etc.
Visual	Blind, partially sighted, and colour-blind people	Pedestrian only routes, cane/guide dog detectable edges, tonal contrast of pedestrian routes from other routes for modes, tactile surfaces etc.
Auditory	Deaf & hard of hearing people	Visual cues as to what is happening and avoiding situations where people are placed at risk if they cannot hear cyclist, e-scooters, vehicles etc
Neurological	People on the autistic spectrum, living with dementia, etc.	Navigational and wayfinding clarity; visual calm and avoidance of patterns likely to cause issues; acoustically calm routes where possible; considering how children, people with learning difficulties and or dementia may perceive designs; people's likely perception of personal safety; etc.
Metabolic	People with diabetes, continence needs etc	Availability of refreshment facilities and toilet facilities – especially at nodal points

Assess

When designs are conceived and reviewed, account should be taken of the impact of the design on the above 5 realms of human need, by considering how the design addresses the following strategic Inclusive Design Themes:

Table 2 **Strategic Inclusive Design Themes**

Theme	Consideration
Logistics	how people plan for and move about the proposed environment
Legibility	how people navigate through and around the proposed environment
Clarity	both the visual & auditory clarity of the proposed environment
Psychology	including the neurological & sensory processing implications of the proposals
Ergonomics	the physical interaction (size, reach, manipulation etc.) implications of proposals

Design Process

Published 9/26/2022

This section outlines the preferred process for integrating the design of active travel into highway schemes. Good quality design for active travel is relatively new to the UK and therefore there will often be design elements that have not been considered locally to date and that need further discussion to agree a desired outcome.

This section covers some of the agreed methods for resolving and documenting these issues such as the Safety Risk Assessment process. The section also covers what is considered good practice in terms of the design process for active travel.

Sections

Design Process

Key Requirements

This section details items that should be considered for inclusion as standard on active travel schemes.

Key Active Travel Requirements as part of the Design Process

Design Stage	Key Requirement	Considerations
Prerequisites	**Background Information** Collision Data User Flow & Speed Data Propensity to Cycle Data Network Assessment Quality Assessment (optional)	Background information can be vital to help understand existing movement patterns and conditions as well as helping evidence and support design decisions throughout the design process. A quality assessment of existing conditions can be useful in some cases to help identify issues/ barriers and to help identify appropriate provision
Concept & or Prelim Design	**Design Parameters** See Example for B4063 below	Project teams should agree design parameters relating to key geometric and highway design elements described in the section on making space
	Design Impact Log See Template file below	Project teams should document each design decision with specific focus on decisions where a compromise has to be made based on constraints especially if this reduces the level of service for active travel
	Quality Assessment CLoS/JAT (LTN 1/20 Appendix A&B)	Should be carried out as part of the design process and updated with new iterations of the design
Detailed Design	**Update Design Impact Log**	Project teams should document any adjustments that occur following detailed design/ investigation. Issues that impact the level of service for active travel require careful consideration and should be documented in the design impact log.
	Quality Assessment CLoS/JAT (LTN1/20 Appendix A&B)	Updated as part of the design process

Managing Safety Risk (Active Travel)

Background

LTN 1/20 provides guidance on the implementation of facilities that align with current best practice, but it is inevitable that some situations will not be covered by guidance, especially where schemes are proposed in constrained locations. The development of new and innovative walking and cycling schemes therefore requires the ongoing management of risk to all road users in order to provide a safe route, crossing or junction.

There are many ways of considering safety in active travel schemes such as road safety audit and designer's risk assessments but these aren't always appropriate mechanisms for identifying and mitigating specific hazards relating to the operational use of active travel schemes.

Safety Risk Assessments (SRA)

Another way to manage safety risk is the application of safety risk assessments. Whilst not strictly applicable outside the trunk road and motorway network, DMRB GG 104 provides an exemplar process to follow that enables the identification of specific hazards for all road users, encourages mitigation measures to be identified, and, crucially, allows an objective view of the overall risk to all road users in a quantified way rather than a subjective way in the case of road safety audit.

We have successfully used a GG 104 safety risk assessment for a variety of active travel schemes at both a concept and scheme-specific level.

Implementation

Safety risk assessment should be used at the earliest possible stage to help inform and refine the design, rather than used as an audit tool. It won't be necessary to use safety risk assessment on every scheme, but it is suggested that it would be appropriate to provide an assessment for schemes that:

- Require wholescale redevelopment of large junctions
- Include innovative elements not covered by existing standards or guidance
- Include a number of relaxations or departures from standard/guidance in order to understand the cumulative impact of these from a safety perspective.

Safety risk assessment should be undertaken by those experienced in road safety matters, such as those aligned with the competencies of road safety audit and familiar with GG 104, but should not necessarily be undertaken as an exercise independent from the design team.

Design Process

Making Space: Setting Design Parameters

This section outlines the agreed approach to the management of constraints and details some key design parameters to facilitate the delivery of active travel infrastructure. The standard positions given should be taken as the default covering most situations however project teams should consider the context of each scheme and agree required departures from this standard using the format shown in appendix A. The section is broken down into two sections:

- Re-balancing the street: Parameters impacting link design
- Re-thinking traffic management: Parameters concerning traffic management

For each section a table is provided outlining the standard position that has been produced in consultation with GCC officers and outlines key considerations in relation to each parameter.

Re-balancing the Street (Road Space Re-allocation)

Management of this set of parameters is mainly focused on making the most of existing highway space by economising on some existing features to allow road space re-allocation and better active travel infrastructure within the existing highway envelope. These are primarily about making space on links to provide better active travel provision through minimising or reducing the existing.

Table 1 **Parameters relating to Road Space Re-allocation**

Standard Position	Considerations & Design advice
Speed limits *Changes to posted speed limits can be considered including both a reduction and/or a change to existing extents*	• Speed limit reduction can improve overall safety along a link as well as reducing the space requirements for cycle facilities. Speed limit changes also open-up more design options as well as allowing for a more compact layout for elements such as side road geometry. • In the case of a reduction to 20mph the police will require a full set of self-enforcing measures and/or a significant change in the road environment to warrant such a change • Schemes can design for 20mph even if the posted speed limit cannot be changed
Carriageway Lane Widths *A reduction to a 3m minimum lane width is acceptable on active travel schemes. An absolute minimum of 2.5m can be considered on residential streets.*	• Carriageway lane widths should generally be minimised on active travel schemes to make space and help encourage mode shift. Narrow lanes along with other measures can also help support a slow speed environment. • Exact widths on bends should be determined using visibility and tracking but should generally avoid widths between 3.2 and 3.9m
Dedicated turning lanes *Removal of ghost island right turn lanes along a link is acceptable to make space for active travel provision*	• Turning lanes are commonly used to smooth the flow of general traffic rather than deal with a significant capacity issue meaning that many existing turn lanes can be considered for removal • Removal should be subject to traffic modelling and engagement but generally there are opportunities to remove both existing turn lanes and those planned for delivery by developers • The impact of removal needs to be assessed to ensure removal does not have an unacceptable level of impact
Footways *Should be retained or widened wherever possible*	• 2m is generally the target width with greater widths required for higher flow environments. Footways less than 1.8m are below minimum requirements and presents problems for wheelchair users. • Footways on both sides of the street should be retained as standard • The user hierarchy should be applied when reducing available space and all options exhausted before footway widths are reduced significantly
Pay & Display *Can be considered for removal and/or rationalisation*	• Removal and rationalisation can be considered on a case-by-case basis and any decision based on further investigation in terms of usage • The TRO Manager should be consulted on any changes • A net loss should be avoided unless deemed absolutely necessary and design teams should consider mitigation in the first instance such as relocation to side streets
Blue Badge *Coverage and adequate provision should be protected and improved as part of any scheme*	• Removal and rationalisation can be considered on a case-by-case basis • The TRO Manager should be consulted on any changes • The parking team should be able to provide information on dedicated bays as well as information on usage of existing blue badge parking
Residential Parking *A small net loss is acceptable to improve active travel provision*	• Improvements at side roads and the associated small net loss is acceptable • More substantial removal and rationalisation can be considered on a case-by-case basis • Any change should include positive consultation with the adjacent residents
Loading *Can be rationalised and relocated although business should still be provided with acceptable provision*	• The user hierarchy should be applied when considering loading requirements and balanced against other user needs • Engagement should be carried with local businesses around any changes • Reduction and rationalisation can be considered on a case-by-case basis • Footway level and half-on/half-off loading is acceptable
Bus stop lay-by *Replacement with on carriageway provision can be considered*	• Early engagement with the bus operator is recommended to agree an approach for individual schemes • Removal can support better bus service reliability as it reduces the requirement for buses to wait for a gap to re-enter the traffic flow although this should be balanced against bus dwell times • Some timing points will still be required for service regulation
Bus stop relocation *Can be considered to provide high quality active travel provision*	• Early engagement with the bus operator is recommended to agree anm approach for individual schemes • Any relocation should tie into existing or new crossing points for pedestrians as well as local key destinations • The Integrated Transport Unit can provide information/data on stop volume and spacing

Rethinking Traffic Management

Measures focused on adjusting how the road network is managed to facilitate a more efficient movement of people and goods.

Table 2 **Parameters: Crossings, Junctions and Traffic Management**

Standard position	Considerations & Design advice
Uncontrolled crossings *Can be considered for removal and replacement with controlled crossings*	• Uncontrolled crossings only provide a basic level of service therefore removal is acceptable • Loss should be mitigated by net improvement to crossing facilities along a link such as an upgrade to priority or controlled facilities
Controlled crossings *Should be single stage by default and include parallel pedestrian and cycle facilities where crossing forms part of the cycle network*	• 400m spacings should generally be considered as standard although this can be adjusted based on local demand to cross • Any new crossings need to be justified by sufficient demand as well as approval from the infrastructure team • Single stage crossings should be considered as the default option
Capacity and prioritisation of sustainable transport *The redistribution of time to sustainable modes with some negative impact on general traffic journey times is acceptable*	• Increased journey times for general traffic are acceptable providing there are no significant safety or unacceptable wider impacts on the network or emergency service access • Increases in queueing and some restrictions to movement can be considered on a case-by case basis
Side road access arrangements *Changes to access arrangements can be considered as part of new schemes*	• Should be considered on a case-by-case basis • Any change should include positive consultation with the adjacent residents
Removing lanes and banning turns at junctions *Rationalisation of lanes is acceptable although turning restrictions need careful consideration on a case-by-case basis*	• Should be considered on a case-by-case basis

Design Detail

Published 10/6/2022

This section deals with the specifics and detail relating to the design of common active travel infrastructure elements. Design sheets are provided covering individual elements with information grouped under the following heading:

- **Function:** What the design element does
- **Application:** Where or when should it be used
- **Reference**: Links to key sections of existing guidance for further details
- **Implementation**: Key advice and considerations for design and delivery
- **Geometry**: key geometric requirements
- **Typical layout**: The standard layout for this element as well as common variations

Design Sheets

Tracking for Cycle Traffic

Signs and Lines

Cycle Traffic and Bus Stops

Crossings of Cycle Tracks

Side Road Continuous Crossings

Design Detail

Design Sheet

Tracking for Cycle Traffic

Function

- Ensures the movement requirements of the cycle design vehicle are provided for
- Tests a design layout is usable and accessible by a range of cycle types
- Practically checks geometry meets the requirements in LTN 1/20 Tables: 5-1, 5-4, 5-7

Application

- Should be carried out on all schemes, where cyclists are likely to be an end user
- Should be applied to all cycle facilities at Preliminary and Detailed design stages

Reference

- LTN 1/20, Chapter 5 tables 5-1, 5-4, 5-7
- AutoTurn, Knowledge Page

Implementation

Cycle vehicle tracking should be used to ensure suitable design of the following elements:
- Horizontal alignment (bends and corner radii) & vertical alignment (headroom at underpasses)
- Access-controls
- Junction and crossing layouts as well as approaches
- Widths of cycle tracks and shared use facilities

Tracking Parameters: **Design Speed**

30 kph	Default speed
20/10 kph	Limited situations (see LTN 1/20 section 5-9)

Tracking Parameters: **Cycle Design Vehicle**

Dimensions		Turning circle	
Length	2.8m	Outer radius	3.4m
Width	1.2m	Inner radius	0.1m

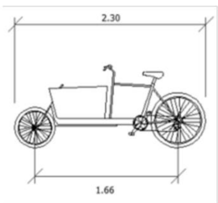
Cycle vehicle tacking should be carried out for the following:

1

A Cargo Delivery Bicycle (Long John) & Bicycle with Child Trailer to cover the cycle design vehicle

2

A bicycle with a 0.5m offset run along the outer edges of a facility to check compliance with LTN1/20 table 5-3



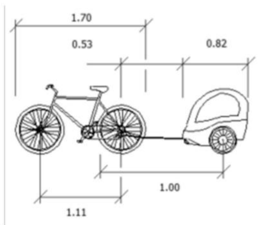
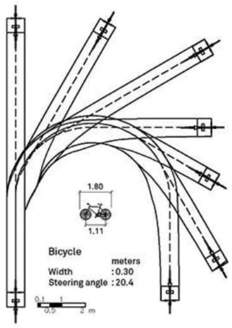


Figure 1: **Turning circle requirements for cycle traffic**

The diagram compares the turning circle requirements of a standard bicycle to a cargo bike which illustrates why more relaxed geometry and wider corner radii are required to accommodate the movement requirements of the full range of cycle vehicles that a scheme will potentially need to cater for.

Source: Transoft



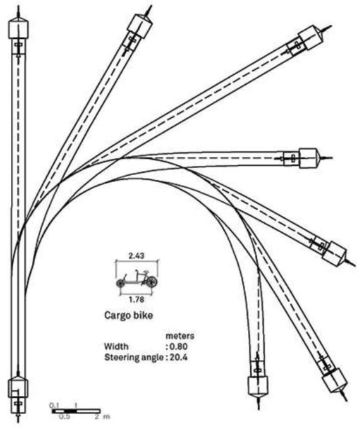
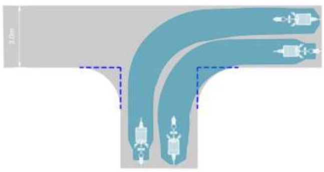


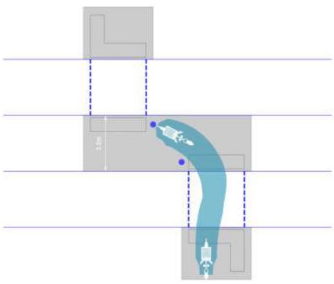
Figure 2: **Cycle vehicle swept path analysis applied to common scheme design elements**

Horizontal alignment: Corner radii



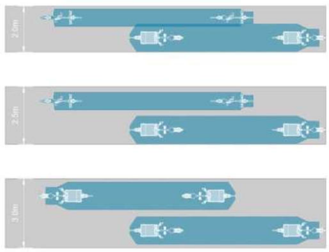
This example illustrates how 90-degree corners on a cycle track arrangement would stop two cargo bikes passing each other at a T-junction, therefore reducing the usability of the facility.

Crossing layout: Turning movements



This example of a typical staggered crossing arrangement shows how standard geometry can stop cycle traffic being able to negotiate the arrangement. This illustrates why staggered crossings on cycle routes should be avoided.

Cycle track width: Vehicle passing requirements



This example shows why generally a 3m width should be used as the benchmark for a two-way cycle track, as it allows two cargo bikes to pass each other comfortably.

Design Detail

Design Sheet

Sign and Marking Requirements

Function

- There are three main types of sign: **regulatory, functional** (Warning & Informatory) and **wayfinding**
- Signs and markings should provide clarity and legibility making the street environment easy to read and access for those walking and cycling
- Signs and lines should meet regulatory and legibility requirements without negatively impacting level of service

Application

- Signing should be treated as an integral part of the design process with:
  - sign schedules included as part of Preliminary and Detailed design stages
  - functional surface markings indicating operation should be included in all drawings
- Within the highway boundary signs should be TSRGD compliant, more flexibility is allowed for off highway locations such as parks

Reference

- TSRGD 2016
- LTN1/20, Chapter 13, Traffic signs, road markings and wayfinding
- London Cycle Design Standards, Chapter 6, Signs and Markings
- Sustrans Design Guide, Chapter 5, Signing and Wayfinding

Implementation

Key Principles

Minimum Size Plate signs & surface markings
- Minimum size signs & lines should be used as the default
- There are exceptions to this such as the cycle symbol used at an Advanced Stop Line (see guidance for further information LCDS, Chapter 6)

Consistent location, quantity, type & position
- Signs and markings should be used in a consistent manner in terms of location, quantity, type and position
- Providing a consistent location especially for wayfinding and function signs is important in terms of legibility and ease of use

Minimise sign clutter wherever possible
- lighting columns, existing signposts, walls, railings and bollards should be considered as a sign fixing point in the first instance
- Regulatory repeater signs should generally be limited to just what is required to avoid unnecessary clutter & maintenance

Minimise surface markings at signal junctions & crossings
- Markings deteriorate under high vehicle throughput reducing legibility over time and adding unnecessary maintenance costs as well as reduced ride quality therefore coloured surfacing & optional markings should be minimised
- Exceptions to this rule can be made based on safety, legibility or awareness requirements for specific arrangements

For marked priority crossings coloured surfacing must be used
- This supports awareness by drivers, safety and legibility

Figure 1 **Standard Size Specifications**

Sign	TSRGD Ref	Default	Considerations
Centre line marking	1004	50mm wide, 2000mm dash, 4000mm gap	50mm line width is a permitted variant of the standard 100mm 1004 line for use on cycle tracks
Give way double dashes	1003B	100mm wide, 300mm dash, 150mm gap	
Give way triangle	1023B	1875mm x 625mm	

Cycle symbol marking	1057	750mm x 1215mm for cycle tracks	Medium and larger size for on-carriageway cycle infrastructure
Cycle plate signs	955, 956, 957	300mm diameter	150mm for sensitive environments and to support decluttering

Figure 2 **Signs to avoid**

Sign		**TSRGD Ref**	**Considerations**
	End of lane, route, or track	965 & 1058	Onward wayfinding signs should be provided indicating how cycle traffic should progress such as 'cyclists re-join carriageway'
	Cyclist's dismount	966	Should never be used as some cyclists, especially disabled users may not be able to dismount.
	Riding of pedal cycles prohibited	951	Requirement for use of this signs is normally a symptom of a network issue to be addressed. If this sign is existing and needs replacing like for like, then an exemption for disabled cyclists should be considered on a case-by-case basis

PLEASE NOTE: **PDS Software limitation**

PDS does not contain the permitted variations and minimum size signs & lines available in TSRGD for cycle infrastructure

Figure 3: **Sign and marking requirements by design stage**

Concept Design onwards

Basic functional signs and line markings should be included from the concept design stage onwards including:

Surface markings	• Giveway markings, stop lines and crossing markings • Centre lines and cycle symbols at crossings and junctions
Plate signs	Functional signs such as 'two-stage turn' signs should be included

Preliminary Design Requirements

Location	Plate sign or surface marking
Sign Type	TSRGD reference
Installation	Existing or new post
Sign Content	• Route patch • Content (symbols + arrow direction) • Text (destination etc)

Detailed Design Requirements

At this stage location, sign type and content should be finalised along with the following additional requirements:

Location	Exact location with spacing dimensions
Sign Size	Correct size and 'x' height specifications for surface markings and plate signs
Installation	Construction details of new posts + specification of post type etc

Design Detail

Design Sheet

Cycle traffic and bus stops

Function

- Allows continuation of cycle track provision past bus stops
- Provides two options to manage conflict between cycle traffic, bus movements and pedestrians at bus stops

Application

- Corridor schemes with bus routes
- Two types of solution currently exist:
  - A Bus Stop Bypass where cycle traffic is routed behind the stop
  - A Bus stop Boarder where cycle traffic is routed between carriageway and bus wait area

Reference

- LTN 1/20 6.6 Cycling on bus and tram routes
- CD195, E/315, Bus stops on Cycle Routes
- Cycling by Design, 3.10 Bus Stops

Implementation

Order of Preference

Order	Type	Considerations
1	Bypass	If lack of space at existing bus stop, consider relocation
2	Boarder (with buffer)	Boarder arrangements are only suitable at stops with low bus passenger volumes
3	Boarder (no buffer)	Not suitable for use with 2-way cycle tracks

Making Space: **User Hierarchy order of compromise**

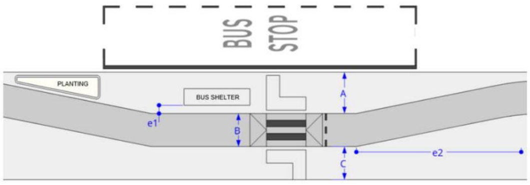
Order	Mode	Description
1	General traffic	Can carriageway be narrowed to make space?
2	Public transport	Can bus stop be relocated to a location with more space? (50 - 100m)
3	Cycle traffic	Can track be minimised past the bus stop?
4	Pedestrians	Can the footway and/or wait area be minimised?

- Careful consideration of pedestrian, bus passenger and cycle interactions are required
- Early engagement with accessibility stakeholders is recommended
- Consider planting at either end of the bus wait area if space is available

Geometry

	1-way cycle track		2-way cycle track	
Type	**Desirable** minimum	**Absolute** minimum	**Desirable** minimum	**Absolute** minimum
Bus Stop bypass	6.5m	5m	7.5m	5.5m
Boarder (with buffer)	5.5m	4m	6.5m	5m
Boarder (no buffer)	4.5m	4m	-	-

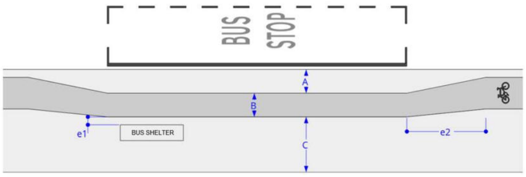
Figure 1 **Typical Layouts**



Parameter	**Desirable** minimum	**Absolute** minimum
A Wait area	2.5m	2m
B Cycle track	2m	1.5m
C Footway	2m	1.5m
Total	**6.5m**	**5m**
e1	0.5m buffer from cycle track to shelter	
e2	Desirable 10m (1:10) - 5m (1:5) taper	

Bus Stop Bypass

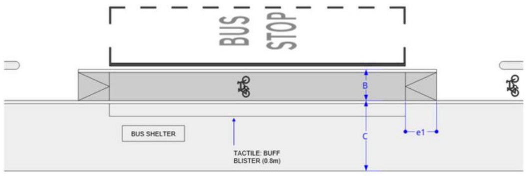
- Layout should include an offset zebra crossing of the cycle track
- Crossing should always be placed on the bus approach side of the shelter
- Footway width can be reduced but should retain a pedestrian comfort level of C minimum



Parameter	**Desirable** minimum	**Absolute** minimum
A First step	1.5m	1m
B Cycle track	2m	1.5m
C Footway	2 (+) m	1.5m
Total	**5.5 (+) m**	**4m**
e1	0.5m buffer from cycle track to shelter	
e2	Desirable 5m (1:5) taper but can be less	

Bus Stop Boarder (with buffer)

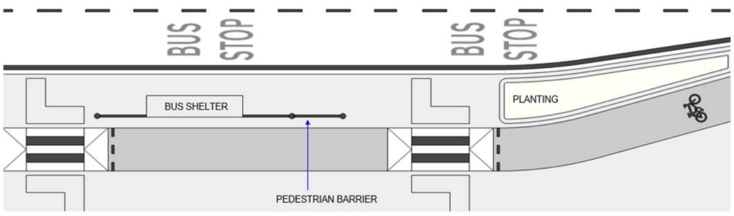
- Buffer **must** extend across the length of the bus cage
- Requires bus stop shelter with no end panels
- **Should not** include a crossing of the cycle track
- Requires good intervisibility between pedestrians and cyclists



Parameter	**Desirable** minimum	**Absolute** minimum
A Wait area	-	-
B Cycle track	2m	2m
C Footway	2.5 (+) m	2m
Total	**4.5 (+) m**	**4m**
e1	Desirable 2m (1:20) ramp	

Bus Stop Boarder (no buffer)

- **Should not** include a crossing of the cycle track
- Requires good intervisibility between pedestrians and cyclists



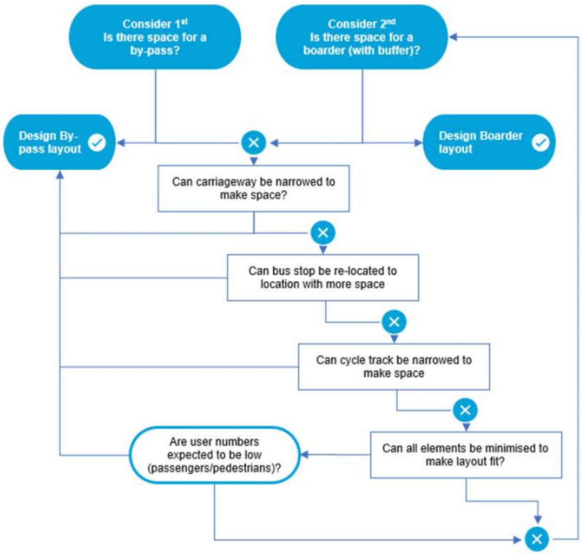
Bus Stop By-Pass (lay-by) with multiple stops

- Planting and barriers help naturally bound pedestrian wait areas and separate cyclists and pedestrians.
- They can be used to channel pedestrians to crossing points to reduce conflict
- Boundary features make bus stop bypass layouts easier to navigate for visually impaired users and help reduce conflict
- Planting **should not** impact sight line

Reference Examples

Type	**Features**	**Example**	**Link**
Bypass	Standard	London	126 Whitechapel High St - Google Maps
	Lay-by / planting	Manchester	164 B5117 - Google Maps
Boarder	Buffer	Waltham Forest	237 Lea Bridge Rd - Google Maps
	Kerb buffer	Enfield	50 Ridge Ave - Google Maps
	No buffer	Camden	4 Royal College St - Google Maps

Figure 2 **Provision Selection**


Consider 1st
Is there space for a by-pass?
Consider 2nd
Is there space for a boarder (with buffer)?
Design By-pass layout
Design Boarder layout
Can carriageway be narrowed to make space?
Can bus stop be re-located to location with more space
Can cycle track be narrowed to make space
Can all elements be minimised to make layout fit?
Are user numbers expected to be low (passengers/pedestrians)?

Design
Detail

Design Sheet

Crossings of Cycle Tracks

Published 24/09/22

Function

- Provide pedestrians with safe crossings of cycle tracks
- Manage and define priority where pedestrians and cycle desire lines cross

Application

- Cycle tracks at junctions, bus stops and mid link crossings along main roads

Reference

- LTN 1/20 6.2 Pedestrian crossings across cycle tracks
- TSRGD 2016, Schedule 14, Part 1, 25 & 18.2
- London Cycle Design Standards, Chapter 5, Section 5.2.10

Implementation

Order of Preference

Order	Type	Considerations
1	Zebra	**Should not** be placed in close proximity to locations where cyclists exit a junction or crossing unless the location is ≥5m from the exit point
2	Uncontrolled	Provides a lower level of service for pedestrians
3	Offset crossing	May not be used if significant deviation from the desire line

Making Space: User Hierarchy order of compromise

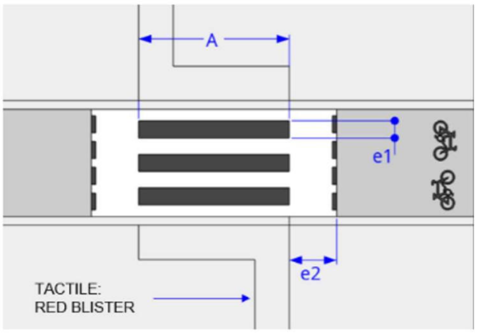
Order	Type	Considerations
1	General traffic	Can carriageway be narrowed to make space?
2	Cycle traffic	Can cycle track be minimised past the crossing?
3	Pedestrians	Can the footway and or wait area be minimised?

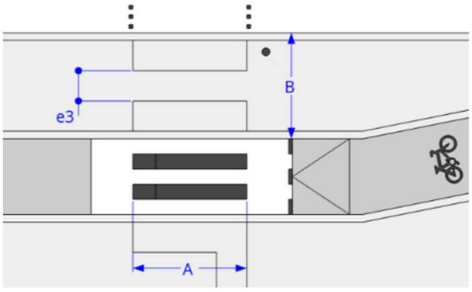
- Measures to slow cyclists should be considered such as ramps and narrowing
- Cycle track should include a ramp on the side cyclists' approach from
- Segregation should be maintained

Geometry

- Crossing width: desirable minimum 2.8m and absolute minimum 2.4m
- Cycle tracks can be reduced at crossing points: 1.5m (1 way) and 2.5m (2 way) and this should be considered ahead of reduction in footway widths

Figure 1: **Typical layouts**





Zebra & In-line zebra at junction or crossing

Parameter	Desirable minimum	Absolute minimum
A Zebra	2.8m (+)	2.4m
B Wait area	2.5m	2m
e1 380mm & minimum 2 stripes		
e2 1.1m Gap		
e3 0.8m / 0.4m absolute minimum		

- Zig-zag markings and Belisha beacons to be omitted
- Set crossing perpendicular to cycle track
- Include break in cycle track coloured surfacing over crossing area

Reference Examples

Type	Features	Example	Link
Zebra	In line 1-way	Waltham Forest	498 Forest Rd - Google Maps
	Offset 2-way	Waltham Forest	A104 - Google Maps
Uncontrolled	In line 2-way	Manchester	Blackburn St - Google Maps
	Offset 1-way	Manchester	28 Chorlton Rd - Google Maps
Continuous	In line	Bristol	Baldwin St - Google Maps

Design Detail

Design Sheet

Side Road Continuous Crossings

Function

- Provide priority by design at side roads for active travel users moving along the main road
- Act as a gateway feature marking the boundary between busy and quieter low traffic streets

Application

- Corridor schemes and residential area boundaries
- Do not use where a main cycle route enters the side street

Reference

- LTN 1/20, Chapter 5
- Edinburgh Street Design Guide
- UWE, Continuous side road study

Implementation

Key Principles

Flow	1. Active mode crossing movements should be ≥ turning vehicle flows 2. Interventions proposed to create these conditions (traffic management)
Consistency	Treatment of all or most side roads along a link between main junctions
Slow Speed	Vehicles turn at walking pace. Features to support this include ramps, corner radii, widths and vertical features
Continuous	1. Footway material (and cycleway if present) 2. Kerb line 3. Road markings
Simple	Reduce complexity through reduced turning movements (number + volume)
Unambiguous	Clear active mode priority with no mixed messaging

- Continuous elements should run unbroken along the main road over the side road
- Upstand should be retained between footway, cycle track and carriageway
- No markings should be used on the footway, cycle track or ramp (e.g. TSRGD diag. 1062)
- Reinforced construction can be used if vehicle loading is significant
- Buildouts should be used to reduce the side street widths at the junction

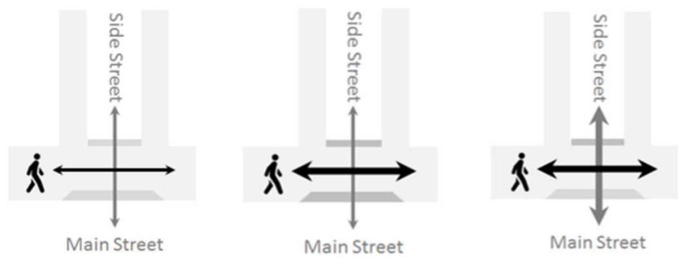
Design and Location Selection

Research from the University of West England has shown that the effectiveness of continuous crossing design is a function of two key principles. If designers create both suitable conditions and provide priority by design, then there is a high probability turning vehicles will give way.

(1) Flow

The relationship between the movement across the side road of people (walking, cycling, rolling) to the volume of turning traffic in and out of the side road. For continuous crossings to be appropriate and to function well crossing movements of people (walking, cycling, rolling) need to be greater than or equal to turning vehicle movements.

Research has shown the three scenarios on the right can function well.



Low flow / few interactions | **Crossing movements control turning movements** | **Turning movements/ interactions are balanced**

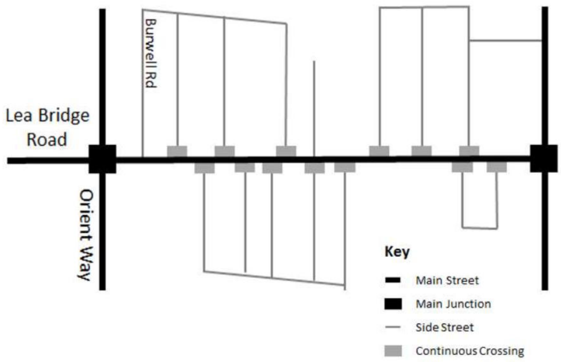
(2) Designed Priority

How effectively the design communicates the priority of people (walking, cycling, rolling) across the side road to all other road users. For more details on achieving priority by design see the drafting advice section.

Consistency

Schemes should aim to treat most side streets along a main road, between key junctions.

In the example shown all except two streets have been treated with similar continuous crossing designs. This creates continuity between the two main junctions, providing consistency of use and consistency in behavior for all users. Conditions were assessed by officers using a mix of community engagement, site observations and data to assess suitability of conditions.



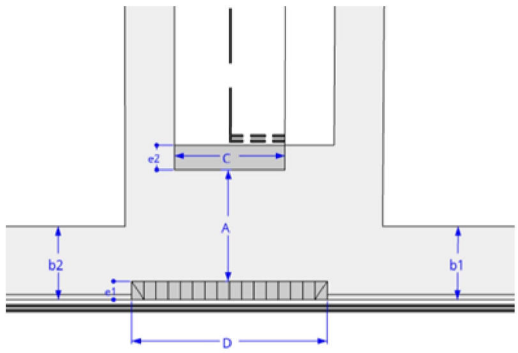
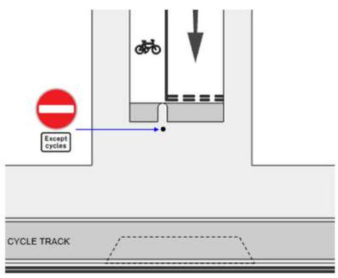
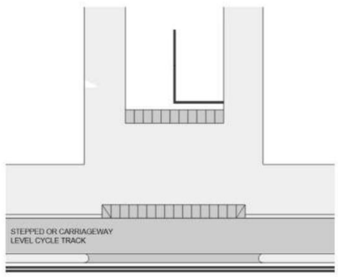


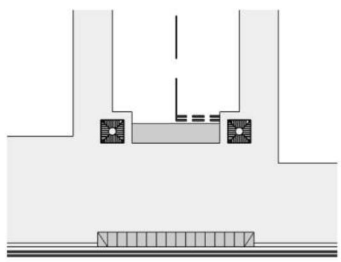
Figure 1 **Typical Layout**

A	Width (A) should be greater than the approaching footways (b1 & b2)
e1	Desirable width 0.75m & gradient 1:5
e2	Desirable width 1m & gradient 1:10
C	Not wider than 6.5m or narrower than 3.5m (to allow contraflow cycling)
D	Minimise to support slow speed but allow vehicle turning circles. Width (D) should generally be 2 - 4m greater than width (C)

Figure 2 **Variations**







If one-way operation, then a shallow ramp or gradual gradient can be used on the vehicle exit side over the cycle track

Modular entry kerbs can be placed on the footway side of the cycle track with a shallow ramp to carriageway.

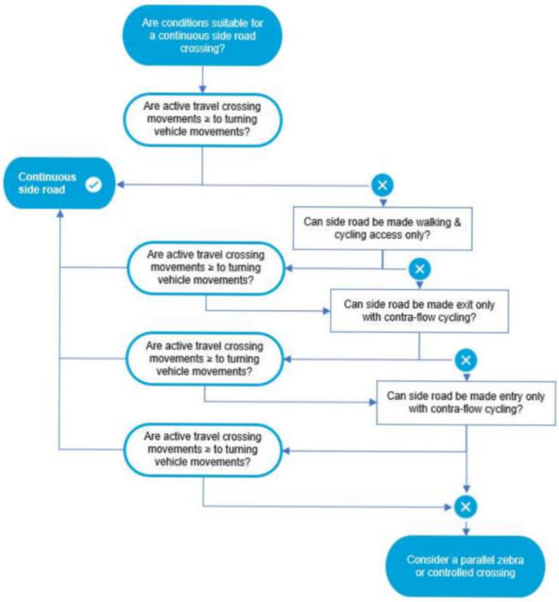
A stop line can be used instead of a give-way marking to help emphasise priority

Buildouts used to narrow side street approach at the junction and make space for planting

Table 1 **Reference Examples**

Features	Example	Link
Standard	Clapham	22 The Pavement
Standard	Glasgow	40 Gordon St - Google Maps
Standard	Sidcup	1 Hatherley Rd - Google Maps
Cycle track	Leeds	402 Kirkstall Rd - Google Maps
Cycle track	London	250 Kennington Park Rd - Google Maps

Figure 3 **Provision Selection**


Are conditions suitable for a continuous side road crossing?
Are active travel crossing movements ≥ to turning vehicle movements?
Continuous side road
Can side road be made walking & cycling access only?
Are active travel crossing movements ≥ to turning vehicle movements?
Can side road be made exit only with contra-flow cycling?
Are active travel crossing movements ≥ to turning vehicle movements?
Can side road be made entry only with contra-flow cycling?
Are active travel crossing movements ≥ to turning vehicle movements?
Consider a parallel zebra or controlled crossing

Drafting Advice

Published 10/17/2022

The purpose of this section is to act as a single source of information outlining drafting advice for active travel infrastructure for Gloucester County Council (GCC). This resource should help design teams to produce consistent and good quality design drawings for active travel as well as helping avoid common mistakes that crop up on active travel schemes.

This section contains additional advice and design guidance for specific active travel design elements and drafting. This builds on the information covered in the design sheets and provides additional information on:

- **Getting the design right**: examples of what good looks like
- **Checking designs**: checklists to support designers
- **Things to avoid**: advice on common mistakes and things to avoid in terms of design

Drafting Advice

General Drafting Advice

Geometry

Active Travel Design Elements

Checklists

This section includes checklists which should be used by designers as part of the quality assurance process. The checklist is set out as a set of questions to run down to ensure the design of that feature is correct both in terms of how it is designed and how it has been drafted.

Below is an example of an existing side road crossing that has been assessed using the design checklist on the right

Feature		Criteria	Y/N
1A	**Flow** *	Are active mode crossing movements ≥ turning vehicle flows?	Y
1B	**Consistency**	Have all or most side roads along a link been treated?	N
2A	**Low Speed** *	Will vehicles turn at walking pace: does the design include sufficient features to reduce the speed of turning traffic?	N
2B	**Continuous**	Is the material treatment of footway (and cycle track if present) continuous over the side road?	Y
		Does the kerbing run continuous and unbroken over the side road?	Y
		Do the main road line markings run continuous over the side road?	Y

2D	**Unambiguous ***	Is there clear active mode priority with no mixed messaging?	Y
Critical Fail * = features that should be addressed as a matter of safety			

Critical Fail

This is a feature that should be **addressed as a matter of safety**. As illustrated in table above the design has returned a number of negative scores for specific features. Such a result should be raised with the design/active travel team to resolve in the first instance. As one of the negative values is a critical fail the design should not be progressed in the existing format and the design should be altered to remove the issue.

Drafting Advice

Geometry

This section covers things to consider in terms of geometric design of active travel facilities.

Figure 1: **Critical Carriageway Lane Widths 3.2m to 3.9m**

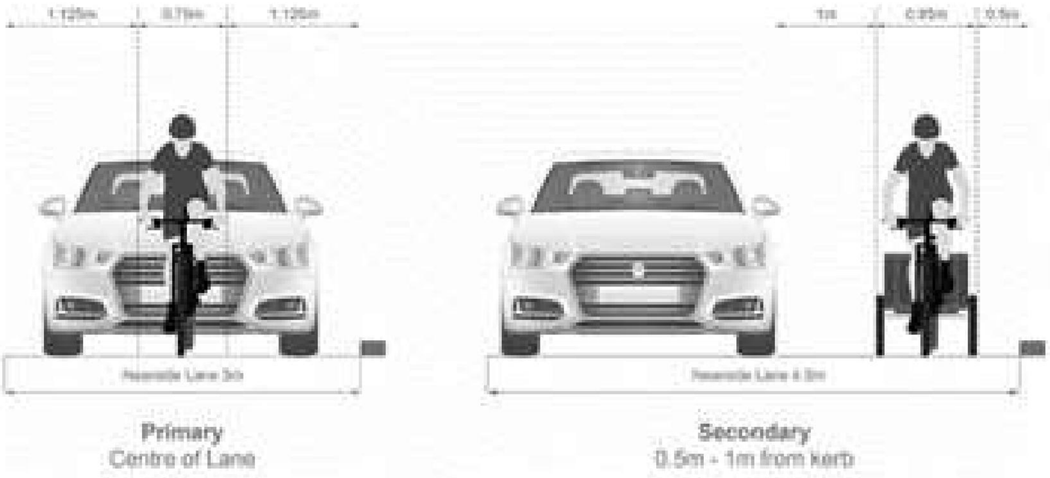
Carriageway lane widths of 3.2-3.9m are not acceptable for active travel routes on carriageway and should be avoided wherever possible on all schemes even if dedicated cycle facilities are provided adjacent to the carriageway.

The nearer the lane width is to the midpoint of the critical band (3.2-3.9m), the greater the risk.

The image on the right illustrates how either a tight or spacious lane width can be used to create safer on-road conditions for cyclists.

Tight

Spacious



Drafting Advice

Cycle traffic and bus stops (Bypass or Boarder)

In limited space a common solution involves making space by removing the footway and routing pedestrians through the wait area with two crossing provided over the cycle track. This should be avoided and alternative options such as stop relocation, or a bus boarder (with buffer) layout provided instead.

Figure 1 **Getting the Design Right Designs to avoid**

Negative Features

1. Pedestrians cross the cycle track twice to move along the main road
2. Additional crowding & conflict as pedestrian movement forced through wait area
3. No priority for pedestrians or clear features to slow cyclists
4. Vertical features within the cycle track
5. Risk pedestrians will simply walk along the cycle track on the desire line creating conflict

Table 1 **Designers Checklist: Bus stop (Bypass or Boarder)**

Feature		Criteria	Y/N
1A	Provision Type	Have all options been exhausted to accommodate the preferred provision type listed in the design sheet?	
1B	Layout	Does the drawing clearly show one of the three typical layout options shown in the design sheet?	
1C	User Needs	Is the layout suitable for expected numbers of bus passengers?	
2A	Geometry	Does the geometry meet the desirable minimum width requirements?	

2B	Cycle Traffic	Will design slow cyclists? Has a ramp been included and the cycle track narrowed?	
3A	Key Features	Tactile (where appropriate*)	
		Bus shelter (where required)	
		Bus cage	
3B	Tie-In	Has the feature been appropriately tied into the highway geometry either side of the bus stop for example does the cycle track have tapers between (1:10 – 1:5). If the track has been narrowed, has it been widened back out either side?	
3C	Measurements	Are width measurements clearly shown on the drawing	

* Bus stop by-pass and border (no buffer) only