Gloucestershire County Council
Cycle Facility Guidelines

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1.0 Introduction

The Local Transport Plan for Gloucestershire sets out a framework for an integrated approach to transport provision, advocating an increase in journeys by bicycle as an important part of that approach. Furthermore, the County Council has adopted its own set of policies which give support and encouragement to cycling.

The Client Manager and Design Engineer should therefore use this guidance in the context of seeking to increase the number of journeys by bicycle, in as safe a manner as possible. The main objective for the designer is “How can I carry out this design in such a way as to encourage people to cycle”? The two key criteria are directness of route and safety; the right balance needs to be found between them. Few cyclists wish to be disadvantaged compared with the general flow of traffic. They wish to travel at reasonable speeds and as directly as possible between their origin and destination, while being and feeling safe.

Most cycling takes place on the road, and this will continue to be the case. It is therefore essential that the road network is made suitable for cycling. Segregated cycle routes and networks will play an important role in some areas, but they will be of limited use if cyclists are unable to use ordinary roads freely.

Designers should aim to give advantage to cyclists, looking first at enabling them to use the carriageway. This can be achieve either by providing appropriate facilities, or by altering the nature of the road (e.g. by traffic calming) to make it safe and attractive for cyclists.

A flexible approach to the use of this design guidance is required, with particular attention directed towards reducing hazards rather than inhibiting the movement of cyclists.

Finally, pedestrians can often benefit from provision of measures to aid cyclists, and this should also be borne in mind during scheme design.
2.0 Purpose of these Guidelines

These Guidelines were first produced in 1999 to replace all versions of “Gloucestershire County Council Cycle Facility Guidelines Sections 1 to 5” previously issued as five separate documents. This latest issue of the Guidelines (2012) refreshes the information provided using several sources of best practice Guidance. The main references used inform these Guidelines are:

- Local Transport Note 2/08
- Cycling England - Design Portfolio
- London Cycle Design Standards
- Lancashire County Council - A code for planning, designing and maintaining roads and tracks for cyclists
- Cycling by Design - Transport Scotland
- Think Cycling! – A Guide for Local Authorities
- Design Manual for Bicycle Traffic (CROW)

The above references provide a great deal of useful additional information that can be used to supplement the information provided in these Guidelines.

The information provided in these Guidelines is aimed at influencing the decisions of those stakeholders involved in the promotion and provision of facilities and services for cyclists. The Guidelines should be supported as necessary by other sources of information to inform the “how?” questions relating to the challenging task of improving conditions for cycling in Gloucestershire.

Definitions

Cycle lane - part of carriageway delineated as for use by cycles.

Cycle track - either shared with pedestrians or segregated route off the carriageway but within the highway boundary.

Cycleway - off highway route e.g. forest track.

Vehicle Flow - two-way all vehicle peak hour flow

3.0 Planning for Cyclists

To understand the required type of cycle facility, an understanding of the “design type” of cyclist is helpful. Cyclists may be grouped into the following skill levels:

- fast commuter – confident in most on road situations and will use a route with significant traffic volumes if it is more direct than a quieter route;
utility cyclist – may seek some segregation at busy junctions and on links carrying high speed traffic;

inexperienced and/or leisure cyclist – may be willing to sacrifice directness, in terms of both distance and time, for a route with less traffic and more places to stop and rest;

child – may require segregated, direct largely off road routes from residential areas to schools, even where an on road solution is available. Design needs to take account of personal security issues. Child cyclists should be anticipated in all residential areas and on most leisure cycling routes; and

users of specialised equipment – includes users of trailers, trailer cycles, tandems and tricycles, as well as disabled people using hand cranked machines. This group requires wide facilities free of sharp bends and an absence of pinch points or any other features that force cyclists to dismount. Cycle tracks and lanes where adult cyclists frequently accompany young children should be sufficiently wide to allow for cycling two abreast. This enables adults to ride alongside children when necessary.

Any changes proposed to routes used by cyclists should be assessed in terms of the five core principles which summarise the desirable requirements for cycling infrastructure.

- **Safety**: Design should minimise the potential for actual and perceived accident risk. Perceived risk is a key barrier to cycle use and users should feel safe as well as be safe. It is important to provide consistency of design and avoid ambiguity.

- **Coherence**: Cycling infrastructure should form a coherent network which links origins and destinations. Coherence is about giving people the opportunity to access places by bicycle and to integrate cycling with other modes of travel. Routes should be continuous from an origin to a destination, easy to navigate and of a consistently high quality.

- **Directness**: Cyclists should be offered as direct a route as possible based on existing and latent trip desire lines, minimising detours and delays. It should be recognised that directness has both geographical and time elements, and delays at junctions and crossings as well as physical detours will affect use.

- **Comfort**: Non-sports cyclists prefer sheltered, smooth, uninterrupted, well-maintained surfaces with gentle gradients. Routes should minimise the mental and physical stress required. Routes should meet surface width, quality and gradient standards and be convenient, avoiding complex manoeuvres.

- **Attractiveness**: The perception of a route is important, particularly in attracting new users. Infrastructure should be designed in harmony with its surroundings in such a way that the whole experience makes cycling an attractive option. A route should complement and where possible, enhance the area through which it passes. The treatment of sensitive issues including lighting, personal security, aesthetics, environmental quality and noise are important considerations.

The above criteria can be applied to almost every situation in which a cycling intervention is planned and are therefore very useful in terms of demonstrating an understanding of the cycle users needs. The Dutch CROW Design manual for bicycle traffic provides in-depth definition of these criteria for both “link” and “junction” based cycling issues.

These criteria are interpreted below as a series of actions to maximise and minimise in terms of the design of cycle facilities.
Maximise:
- advantage to cycle traffic;
- the speed range over which it is comfortable to cycle;
- accessibility for cycle traffic using the network; and
- Integration with public transport.

Minimise:
- journey times;
- the number of stops required;
- the number of cycle give ways required;
- the gradient required to ascend and descend; and
- obstacles and barriers along a route.

4.0 On Road or Off Road provision
Planning and designing high quality infrastructure involves developing individual site specific solutions, but there are some common requirements that need to be satisfied. The underpinning principle is that measures for pedestrians and cyclists should offer positive provision that reduces delay or diversion and improves safety. Common situations where on road or off road provision is most suitable are described below:

- High traffic volume/speed routes: Off road generally preferred, but see next item
- Large number of side road junctions or property accesses along route: Makes on road more attractive, as it reduces the potential for conflict at these locations
- Busy pedestrian traffic along the route: On road preferred, as it reduces the potential for conflict
- High levels of on street parking / High levels of HGV traffic: Makes on road less attractive, but needs careful consideration in view of the potential for increased conflict using off road provision

The road network is the most basic (and important) cycling facility available, and the preferred way of providing for cyclists is to create conditions on the carriageway where cyclists are content to use it, particularly in urban areas. There is seldom the opportunity to provide an off carriageway route within the highway boundary that does not compromise pedestrian facilities or create potential hazards for cyclists, particularly at side roads. Measures that reduce the volume or speed of motor traffic benefit other road users by making the roads safer and more pleasant for them to use. New build situations provide good opportunities for creating attractive high quality infrastructure for cyclists, either in the form of quieter roads or direct cycle routes away from motor traffic.

5.0 General Design Parameters

The space needed for a cyclist in which to feel safe and comfortable depends on:
- the cyclist’s dynamic envelope, i.e. the space needed in motion;
- the clearance when passing fixed objects; and
- the distance from, and speed of other traffic.
These factors, and their impact on the design process, are critical to achieving a cycle friendly environment. As the speed differential between cyclists and motor traffic increases, greater separation is required. This principle also applies where cyclists share space with pedestrians. If the design allows for relatively high cycling speeds, larger separation distances are beneficial. At very low speeds and on uneven surfaces, cyclists require additional width to maintain balance.

For simplicity, the dynamic (or kinematic) width i.e. actual width plus deviation of a cyclist on the road may be taken as 1 metre. Further information can be found in LTN 2/08 Chapter 2.
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1.0 Geometric requirements for new design

1.1 On highway

- Design speed 32kph (20mph) average for commuter adults and ‘sports’ cyclists.
- Desirable minimum forward visibility 30m (20m absolute min).
- Minimum radius 15m.
- Cross falls 2.5% (1 in 40) or no more than is required for drainage purposes.
- Longitudinal gradients:

<table>
<thead>
<tr>
<th>Length</th>
<th>Recommended maximum gradient</th>
</tr>
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<tbody>
<tr>
<td>Over 100m</td>
<td>3%</td>
</tr>
<tr>
<td>30 – 100m</td>
<td>5%</td>
</tr>
<tr>
<td>0 – 30m</td>
<td>7%</td>
</tr>
</tbody>
</table>

1.2 Off highway

Design standards as for “On highway” above, except

- Minimum radius 6.0 metres
- Minimum forward visibility 20.0 metres
- Cross fall - camber maximum +35mm at mid-point.
  Always fall from outer edge to inside on bends. Cross fall 2.5% or no more than is required for drainage purposes.
- Headroom 2.7 metres (2.4m minimum)

1.3 General

- Two visibility parameters determine whether cyclists can ride comfortably at their own desired speed and react safely to hazards. They are the sight distance in motion (SDM) and the stopping sight distance (SSD). Further information can be found in LTN 2/08 Chapter 8.
- Designers should allow for site specific factors such as gradient or surface quality when applying them SSD. For example, it is estimated that minimum stopping distances should be increased by around 50 per cent for unsurfaced tracks. Where longitudinal gradients are steeper than 7% the forward visibility in the down direction should be increased to 40m.
- Cyclists should be able see an object at a minimum stopping distance from an eye height of 1.0m to 2.2m – see Figure 1.
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Notes

1) Cyclists should be able to see an object at minimum stopping distance from an eye height of 1 metre to 2.2 metres. The object height should be taken from ground level (e.g. a pothole) to 2.2 metres high.

Figure 1: Cyclists’ eye height
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2.0 Provision of cycle lanes on carriageway

2.1 Hierarchy of design solutions

The following comment taken from DoT document “Cycle-friendly Infrastructure” recommends a hierarchy of design solutions.

“There is no single correct solution to providing a suitable infrastructure for cycling. Much will depend on the broader traffic, environmental and planning objectives. Cycle provision must be integrated into these strategies and work within these frameworks. Measures are likely to be more easily funded and implemented if they directly benefit the wider community, not just cyclists. Strategies that emphasise traffic restraint, speed reduction and a promotion of environmentally-friendly modes – those based on sustainable development – will tend to benefit cyclists’.

The following hierarchy of measures should be carefully considered before the design solution is chosen.

2.1.1 Traffic reduction. Can traffic volumes be reduced sufficiently to achieve the desired improvements in attractiveness and safety? Can heavy lorries be restricted or diverted?

2.1.2 Traffic calming. Can speeds be reduced and driver behaviour modified to achieve the desired improvements?

2.1.3 Junction treatment and traffic management. Can the problems that cyclists encounter, particularly accident locations, be solved by specific junction treatment or other traffic management solutions such as contra-flow cycle lanes?

2.1.4 Redistribution of the carriageway. Can the carriageway be redistributed to give more space to cyclists, perhaps in conjunction with buses?

2.1.5 Cycle lanes and cycle tracks. Having considered and, where possible, implemented the above, what specific cycle lanes or tracks are now necessary?

The type of cycle facility appropriate for traffic conditions is described in Table 1.
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#### Table 1 – Approximate Guide to Provision

<table>
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<th>85th percentile speeds</th>
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<tr>
<td></td>
<td>&lt;20 mph</td>
<td>20–30 mph</td>
<td>30–40 mph</td>
<td>&gt;40 mph</td>
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<tr>
<td>&lt;1,500 vpd, or &lt;150 vph</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1,500–3,000 vpd, or 150–300 vph</td>
<td></td>
<td></td>
<td></td>
<td>Cycle lanes or tracks</td>
</tr>
<tr>
<td>3,000–8,000 vpd, or 300–600 vph</td>
<td>Cycle lanes may be appropriate</td>
<td></td>
<td></td>
<td>Cycle tracks</td>
</tr>
<tr>
<td>8,000–10,000 vpd, or 600–1,000 vph</td>
<td>Cycle lanes</td>
<td>Cycle lanes</td>
<td>Cycle lanes or tracks</td>
<td>Cycle tracks</td>
</tr>
<tr>
<td>&gt;10,000 vpd</td>
<td>Cycle lanes or tracks</td>
<td>Cycle lanes or tracks</td>
<td>Cycle lanes or tracks</td>
<td>Cycle tracks</td>
</tr>
</tbody>
</table>

#### Notes:
1. vpd = number of motor vehicles in typical 24-hour weekday.
2. vph = number of motor vehicles in typical morning peak hour.
3. Where traffic speeds/flows are low, the designer should assume a default position of no signs/markings specifically for cyclists. However, there may be situations where it is appropriate to indicate the cycle route using cycle symbol markings to diagram 1057 with advisory route signs to diagram 967.
4. Cycle lanes used in the higher speed/flow situations should provide good separation between cyclists and motorists. Wide cycle lanes or buffer zones can help here.
5. Where cycle lanes or tracks are shown in the table, cycle lanes should be considered first. In general, cycle tracks should only be considered if cycle lanes cannot be made to work.
6. In congested areas cycle lanes can be useful even when traffic speeds/flows are low.

**NB** This table is not to be used prescriptively but is for general guidance only.
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2.2 Two-way vehicle traffic, urban roads

A cycle lane offers cyclists some separation from motor traffic. Under the National Cycle Training Standards, cyclists are trained to ride in a safe position in the carriageway which is usually at least 1 metre from the kerb edge to avoid gulley grates and debris, and to ensure that they are within the sightlines of drivers waiting at side roads.

Cycle lanes should be 2 metres wide on busy roads, or where traffic is travelling in excess of 40 mph. A minimum width of 1.5 metres may be generally acceptable on roads with a 30 mph limit. For cycle feeder lanes to advanced stop line arrangements, a minimum width of 1.2m may be acceptable. Cycle lanes less than 1.2 metres wide cannot easily accommodate tricycles or child carrying cycle trailers wholly within the lane. If no feeder lane can be provided (following efforts to reallocate of road space for example) a stub feeder lane should be provided to allow cyclists legal access into the ASL reservoir across the vehicle stop line.

Cyclists can overtake each other within a 2 metre wide lane and easily remain within it when looking back to check for traffic, or when avoiding kerbside drainage grates, etc. Drivers do not always realise that cyclists need to move away from the kerb to avoid surface hazards and may expect cyclists to stay in lane regardless of its width. A narrow cycle lane may therefore give motorists (misplaced) confidence to provide less clearance while overtaking than they would in the absence of a cycle lane. At localised carriageway width restrictions, designers can continue a full width advisory cycle lane alongside a substandard all purpose lane, or the cycle lane can simply be discontinued. A narrow cycle lane should not be used here.
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2.2.1 Consider traffic calming measures when vehicle speeds are between 72kph (45) and 97kph (60)mph and vehicle flows are less than 200 veh/hr. However, if practical, traffic calming should also be considered even when vehicular traffic speeds and flows exceed the above criteria. This could produce benefits not only for the cyclists but also the environment generally.

2.2.2 When creating a cycle lane ensure that sufficient room is available for two way motor vehicles to pass each other on the remaining carriageway; various scenarios are described in Figure 1.

![Figure 1 – Cross sections](image)

2.2.3 Where mandatory cycle lanes are provided on carriageways, special treatment will be required at side road junctions. It is essential that mandatory cycle lanes are discontinued across the junction mouth. A mandatory cycle lane excludes all motor vehicles but it is not compulsory for cyclists to remain in the lane. The benefit of the mandatory cycle lane is that the cyclist has exclusive use of the road space allocated. Mandatory lanes are however difficult to implement because of the requirement for making traffic orders and the likelihood of objections.

2.2.4 An advisory cycle lane allows the occasional encroachment of motor vehicles, it is therefore not dedicated to cycle use and some waiting or loading may be allowed, although not encouraged.

The advisory cycle lane has the advantage of being readily implemented but the disadvantage is that excessive driving across the cycle lane to parking bays or loading/unloading areas will diminish the effect of the cycle lane.
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2.3 One-way streets

Table 2 recommends cycle lane widths for various cycle movements

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<th>Cycle lane width (metres)</th>
<th>Comments</th>
</tr>
</thead>
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<tr>
<td>With flow (one-way)</td>
<td>2.0 1.5</td>
<td>In all cases an additional 1.0m (0.50 minimum) should be added for passing parked vehicles.</td>
</tr>
<tr>
<td>Contra flow</td>
<td>2.0 1.5</td>
<td>Contra-flow lanes need to be wider at bends where otherwise encroachment by on-coming motor traffic might occur.</td>
</tr>
</tbody>
</table>

Key          Rec = Recommended
DM = Desirable Minimum

Table 2 – Cycle Lane widths

2.3.1 If practical, waiting and loading restriction orders should be considered. This will enable a mandatory cycle lane to be created.

2.3.2 Advisory cycle lane can be created where parking/loading is allowed. In these cases the parking/loading bays should be marked out with allowance for doors opening.

2.3.3 False one-way streets enable cyclists to bypass ‘no entry’ signs and use a contraflow advisory cycle lane.
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Figure 2 – False one-way street

2.4 Cycle/bus lane (shared use)

Bus lanes form an important part of cycle route networks. They are often placed on primary transport routes, providing cyclists with direct routes to town centres and other important destinations. Bus lanes are generally popular with cyclists (Reid and Guthrie, 2004). They are often preferred over off road facilities as a result of the advantage of remaining in the carriageway and therefore having priority at side roads (Pedler and Davies, 2000). Cyclists in bus lanes are able to avoid queues, and they value the separation from general traffic that these lanes afford.

A bus lane width of 4.5 metres will enable buses to safely pass cyclists without having to leave the lane. Widths below 4 metres generally result in buses moving out of the lane when overtaking cyclists, but this may be difficult if the adjacent lane is congested. Widths below 4 metres are not recommended for bus lanes physically bounded on both sides, unless they are over very short distances. The following summarises bus lane widths in terms of their benefit to cyclists.

- **Tight**: 3.6 metres width and less: a bus would have to move out of the lane to overtake a cyclist;

- **Critical**: 3.6 metres to 4.4 metres: can create the impression that there enough room to pass when there is not in reality;

- **Spacious**: 4.4-5.2 metres wide at 30 mph, greater widths required at higher bus speeds.

Contraflow Cycle Lane

Contraflow cycling provides permeability for cyclists when the movement of other traffic is restricted by oneway systems. Where oneway systems are introduced, consideration should always be given to maintaining twoway working for cycles through contraflow working, if it can be safely accommodated. TAL 6/98 Contraflow Cycling (DETR, 1998a) gives additional advice on the technique and the latest Traffic Signs Regulations and General Directions (2011) provides guidance on signing cycle contra flows (including contra flows using no cycle lane).

An alternative to providing a contraflow cycle lane is a false oneway street thus providing a twoway street with entry to the street prohibited at one end. Twoway
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working is possible by turning around in the street, but in practice they often operate as oneway streets.

Contraflow mandatory cycle lane desirable minimum width 2.0m, absolute minimum 1.5m.

Figure 3 – Cycle Advisory Cycle Lane Contra-flow

Other example layouts on contra-flow cycle facilities can be found at http://www.tfl.gov.uk/assets/downloads/businessandpartners/no-entry-except-cycles-signing-review.pdf

Cycle Lanes at Bus Stops

Cycle lanes cannot be taken through a marked bus stop area – the cycle lane is simply discontinued over the length of the bus stop markings.

Where the stop is located within a bus (or all purpose) lane less than 3.5 metres wide, cyclists will need to leave the lane to pass a stopped bus. The flow and speed
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of general traffic will determine whether this proves hazardous. Where there is enough room, localised widening of the lane at the bus stop may be feasible.

Figure 3 – Cycle Lane discontinued at bus stop
3.0 **Cycle track off carriageway - within highway boundary**

3.1 *Cycle track/footway widths*

The minimum widths given in this section relate to what is physically required for the convenient passage of a small number of users. They do not take into account the need for increased width to accommodate larger user flows.

Wherever it is possible, widths larger than the minimum should be used. Practitioners should not regard minimum widths as design targets. When cyclists are climbing steep gradients, they will need additional width to maintain balance. Similarly, when descending steep gradients, they can quickly gain speed, thus additional track width or separation will reduce the potential for conflict with pedestrians.

The minimum recommended width for urban footways on local roads is 2 metres. This is sufficient to allow a person walking alongside a pushchair to pass another pram or wheelchair user comfortably. A minimum width of 1.5 metres is recommended for a oneway cycle track. The minimum recommended width for a twoway cycle track is 3 metres. If these widths cannot be realised, the facility may become difficult for some people to use.

Narrow stretches should be kept to short lengths, with passing places interspersed along the route. Passing places should be within sight of adjacent ones. The distance between passing places should not exceed 50 metres.

Where there is no segregation between pedestrians and cyclists, a route width of 3 metres should generally be regarded as the minimum acceptable, although in areas with few cyclists or pedestrians a narrower route might suffice. In all cases where a cycle track or footway is bounded by a vertical feature such as a wall, railings or kerb, an additional allowance should be made, as the very edge of the path cannot be used.

Note that the widths of the cycle track facility are affected by the type of segregation i.e. kerb or line. This additional width can be referenced against the requirements in Table 8.2 of LTN 2/08 which recommends slightly reduced widths.

Figure 2 illustrates how these figures might be applied to a 2 metre cycle track alongside a 1.5metre footpath.
Section 1 – Links in Urban Areas

<table>
<thead>
<tr>
<th>Facility</th>
<th>Width (m)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Segregated cycleway or cyclepath</td>
<td></td>
<td></td>
</tr>
<tr>
<td>One way cycles only</td>
<td>Desired</td>
<td>2.0 Operates satisfactorily for one-way flows of up to 150 cycles per hour with minimal overtaking anticipated.</td>
</tr>
<tr>
<td></td>
<td>Minimum</td>
<td></td>
</tr>
<tr>
<td>Absolute</td>
<td>Absolute</td>
<td>1.5 The running width required that is free from obstructions such as debris, gullies, line markings and street furniture.</td>
</tr>
<tr>
<td>Minimum</td>
<td>Minimum</td>
<td></td>
</tr>
<tr>
<td>Two way cycles only</td>
<td>Desired</td>
<td>3.0 Operates satisfactorily for two-way flows up to 300 cycles per hour.</td>
</tr>
<tr>
<td></td>
<td>Minimum</td>
<td></td>
</tr>
<tr>
<td>Absolute</td>
<td>Absolute</td>
<td>2.0* Operates satisfactorily for two-way flows of up to 200 cycles per hour free from obstructions such as debris, surface gullies, line markings and street furniture.</td>
</tr>
<tr>
<td>Minimum</td>
<td>Minimum</td>
<td></td>
</tr>
<tr>
<td>Pedestrian only space</td>
<td>Desired</td>
<td>2.0 The minimum width in normal circumstances to permit unobstructed passage by opposing wheelchairs.</td>
</tr>
<tr>
<td></td>
<td>Minimum</td>
<td></td>
</tr>
<tr>
<td>Absolute</td>
<td>Absolute</td>
<td>1.5 Acceptable over short distances in specifically constrained environments, such as at bus stops or where obstacles are unavoidable (Transport Scotland 2009).</td>
</tr>
<tr>
<td>Minimum</td>
<td>Minimum</td>
<td></td>
</tr>
<tr>
<td>Shared cycleway or cyclepath</td>
<td>Pedestrian and cycle space</td>
<td>3.0 Typically regarded as the minimum acceptable for combined flows of up to 300 per hour.</td>
</tr>
<tr>
<td></td>
<td>Minimum</td>
<td></td>
</tr>
<tr>
<td>Absolute</td>
<td>Absolute</td>
<td>2.0 Can operate for combined flows of up to 200 per hour but will require cycles and pedestrians to frequently take evasive action to pass each other.</td>
</tr>
<tr>
<td>Minimum</td>
<td>Minimum</td>
<td></td>
</tr>
</tbody>
</table>

* Widths narrower than 2m can present a hazard to cyclists.

Table 4 – Widths of off-carriageway provision
Figure 2 – Widths for Cycle tracks and footpaths

Almost all off carriageway routes for cyclists are used by pedestrians, and the potential for user conflict needs careful consideration. Where there is potential for conflict, separating user flows is an option but if room is limited, this may not be making best use of the width available. Alternatively, cycling speed can be reduced or accommodated.

It can be counterproductive to reduce cyclist speeds by restricting forward visibility where a route is intended to encourage more cycling and walking – doing so disadvantages pedestrians too and may create conflict points. In a study of user interaction on cycle tracks (Uzzell et al., 2000), the speed of cyclists was significant in perceived conflict, but limited visibility was the most important factor in actual conflict.

Where cycle flows exceed 200/hr then segregation must be adopted.

If flows (cycle plus pedestrian) exceed 350 per hour, increase width by 0.5 metre. If flows exceed 700 per hour, increase width by 1.0 metre.

Note no edge marking (diag 1049) is required on bounded sides of cycle tracks.

Cycle tracks at Bus Stops

Where shared use routes pass bus stops, there is increased potential for conflict between pedestrians and cyclists, especially where room is limited. Passengers alighting from buses are unlikely to consider that cyclists may be passing.

It is common practice for cyclists to be placed closest to the carriageway when a footway is converted to a segregated shared use cycle track. At bus stops, this arrangement is not ideal, as it is more likely to bring cyclists into conflict with bus users.

Where space permits, conflict may be reduced by swapping the footway and cycle track positions so that cyclists pass behind the bus shelter and any waiting passengers. Additional space for cyclists and pedestrians can be made available where bus lay-bys can be filled in such that the bus stops in the traffic lane.
Section 1 – Links in Urban Areas

Figure 3 – Segregated cycle track becoming shared use at bus stop
Section 2 – Junctions and Crossings

Section 2 – Junctions and Crossings
## Section 2 – Junctions and Crossings

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<td></td>
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</tr>
<tr>
<td>5.3</td>
<td>New subways</td>
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</tr>
<tr>
<td>5.4</td>
<td>Existing bridges</td>
<td>54</td>
</tr>
<tr>
<td>5.5</td>
<td>New bridges</td>
<td>54</td>
</tr>
</tbody>
</table>
1.0 General requirements at crossings and junctions

1.1 General requirements

1.1.1 Crossing and junctions are the areas that cyclists find the most hazardous and where the majority of cycle accidents occur. It is therefore essential that visibility and signing at crossings and junctions are clear and unambiguous, enabling drivers to know where to expect cyclists to come from and their intended destination. The design of complex junctions should not unreasonably impede the passage/safety of cyclists. The attention of the designer is also drawn to the potential for conflict with motor traffic at left hand slip/merge lanes.

The approach taken to design facilities for cyclists at junctions and crossings should consider the guidance in Section 1 and 5 core principles for cycle friendly infrastructure as referenced in the Introduction to this document.
Section 2 – Junctions and Crossings

2.0 Crossings

2.1 General requirements

2.1.1 Discontinuity of cycle tracks should be avoided, wherever practical and consideration given to ensuring cyclists have priority at minor roads and accesses, i.e. minimising the number of occasions when a cyclist is required to stop and/or give way.

Where a cycle track meets a road, visibility splays are required to ensure cyclists can see and be seen by approaching motorists. Splays are defined by their X and Y distances; Figure 1 illustrates the general junction layout.

![Figure 1 – X and Y splays](image)

A minimum X distance of 2 metres is suggested. Providing longer X distances makes it easier for cyclists to use the junction without stopping. This is acceptable, because a cyclist, even when moving, is unlikely to fail to notice a car approaching from the side. Cyclists are generally reluctant to stop, because they like to conserve energy, so allowing them to see along the main road while approaching it may give them more time to check properly.

Where cycle tracks meet roads in built up areas, minimum Y distances can be taken from Table 7.1 of Manual for Streets. For higher speed roads, the Y distances given in the Design Manual for Roads and Bridges (HA, 1995) will be more appropriate.

Where a cycle track crosses a minor road consider the following:

i) Visibility should be in-line with LTN2/08.

ii) Dropped kerbs should be flush with the carriageway, and care taken to avoid problems with surface water.

iii) Gullies should not coincide with the line taken by cyclists.
iv) Channels to be crossed should be in reasonable condition i.e. not likely to cause discomfort or an accident to the cyclist.

v) Crossing should not be obstructed by parked vehicles. This may require waiting restrictions, yellow box markings or “keep clear” markings.

vi) The use of tactile paving at crossings to aid the visually impaired should be in accordance with “DETR Guidance on the use of Tactile Paving Surfaces”.

Where a cycle track meets a footway, an assessment of visibility between cyclists and pedestrians (and the risk of cyclists using the footway) should be made, based on a common sense approach. As a guide the Y distance to be achieved where a cycle track meets shared use cycle track is 25m for a 85%ile cycle speed on the shared use cycle track of 20kph – with a minimum X distance of 2.0m.

### 2.2 Evaluation of crossing facility

Where cycle routes cross roads with speed limits above 30 mph or where vehicle flows are high, it can be difficult to find an adequate gap in the traffic to cross the carriageway in one movement. A central refuge allows crossing to be undertaken in two easier movements, but the arrangement needs to be carefully designed to avoid the refuge creating pinch points that can disadvantage cyclists using the carriageway.

A straight line crossing is generally preferred, as central sheep pen refuges increase the potential for conflict with pedestrians.

Use Table 1 to evaluate a suitable crossing facility.

### 85%ile Vehicle speed kph (mph)

<table>
<thead>
<tr>
<th>Veh/hr</th>
<th>≤ 50 (30)</th>
<th>60 (40)</th>
<th>80 (50)</th>
<th>100 (60)</th>
<th>&gt;100 (60)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 400</td>
<td>A</td>
<td>B</td>
<td>B</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;600</td>
<td></td>
<td>B</td>
<td>C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;800</td>
<td></td>
<td></td>
<td>C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 1000</td>
<td></td>
<td></td>
<td></td>
<td>C</td>
<td></td>
</tr>
<tr>
<td>&gt; 1000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 1
Section 2 – Junctions and Crossings

NB: This table is not to be used prescriptively but is for general guidance only.

Key A = Consider using speed table or similar giving cyclists priority when crossing.

B = Priority crossing at grade. Cyclists give way.

C = Priority crossing at grade. Refuge island in carriageway if space available

2.3 Methods of assisting cyclists at uncontrolled crossings

There is a range of infrastructure solutions to assist cyclists at uncontrolled crossings.

Using a central refuge can assist cyclists. Recommended dimensions of the crossing section of refuge island are preferably not less than 3 metres (HA, 2005a), especially where family groups are likely. The central refuge should be at least 2 metres deep to ensure that a typically sized bicycle does not encroach upon either carriageway. A depth of 3 metres will accommodate a cycle towing a trailer, or a tandem.

The impact of a refuge island on cyclists using the carriageway, should be assessed.
Section 2 – Junctions and Crossings

Notes

1) Motor vehicles turn into the path of cyclists at refuges and sometimes race them for the gap. They may overtake too closely and this intimidates.

2) Only normally use refuges if there is demonstrable demand for pedestrians and where the following minimum width criteria are met: 40mph: 5.0m / 30mph: 4.5m

3) A 3.0m gap is acceptable at low speed such as at the exit from a mini-roundabout or slow entry to a side road.

4) These minima must be strictly adhered to on gradients, uphill or downhill, or if there are significant numbers of wider vehicles.

5) Consider using a zebra or puffin to cater for pedestrian demand.

6) An over wide advisory cycle lane through an existing narrow gap will help deter traffic from dangerous overtaking by leaving only a token residual motor traffic lane. It is important that the vehicle lane width left does not encourage drivers to overtake cyclists. To achieve this, the cycle lane may need to be wider than the minimum 1.5 metres and the vehicle lane less than a car width.
Section 2 – Junctions and Crossings

7) Narrow cycle lanes should not be used past a refuge, as they encourage drivers to drive dangerously near to cyclists in the gap.

8) Space taken from the footway to widen the carriageway should not be considered.

9) A cycle symbol should be placed in advance of the refuge.

10) As shown it may be worth while using colour for the cycle lane at pinch-points.

Where a cycle track meets a side road there are a range of infrastructure solutions to assist cyclists at uncontrolled crossings.

To help improve the safety of cyclists at side road crossing points, it is possible to bring cyclists onto the carriageway prior to the side road and then back onto the cycle track after the side road.

Cyclists join the road in line with the main flow on buildouts ramped to carriageway level and use an advisory cycle lane that continues past the junction until it rejoins the cycle track. If a buildout is not possible, the cycle track may need to give way where it joins the carriageway.

The advantage of this arrangement is that it gives the cyclist unambiguous priority at the junction. The solution precludes two-way use of the cycle track. The merge onto the carriageway should be at least 30 metres from the junction to reduce the risk of conflict with left turning traffic.

Figure 2- Preferred options for crossing side roads
Section 2 – Junctions and Crossings

Figure 2- Cycle Track Crossing a Minor Road

Notes
1) Ensure that consideration is given to all moves that cycle traffic will make onto and off the track.
2) Roadside parking on approaches should be restricted to ensure visibility.
3) Speed humps should be constructed on a speed table. The use of a table is not permitted in isolation and must use other speed reducing features along the carriageway.
4) To help limit speed the horizontal alignment of the minor road may be adjusted.
Section 2 – Junctions and Crossings

Figure 3 - In-line Crossing

Notes
1) Ensure that consideration is given to all moves that cycle traffic will make onto and off the cycle track.
2) The proximity of the table to the junction may cause difficulties for larger vehicles turning and this junction arrangement may be unsuitable where there are large HGV flows.

Give-way on cycle track may or may not be provided
Kerb line may be adjusted so that the crossing is in line with the cycle track/pathway, provided not many cyclists are on the road
Section 2 – Junctions and Crossings

Figure 4 - Cycle Track Crossing with Cycle Track Priority
2.4 Staggered crossing of dual carriageway with central refuge

2.4.1 It is recommended that:

- Staggered crossings should be provided where there is a two lane dual carriageway and should be considered where there is a single lane dual carriageway 15.0m wide. If carriageway is wider than 11.0m a staggered crossing should be considered.

- If possible avoid mixing pedestrians with cyclists at a staggered crossing central refuge.

- Entrance into the refuge should be 2.5m minimum and cyclists should turn left and be facing oncoming traffic as they approach the exit.

- A minimum length of 10m for the refuge is recommended however, clearly this will depend on the position of the exit/entry points of the cycle route.

- An effective width of 3.0m should be provided for the cycle refuge between guard rails. These should generally be see-through and set at a height of between 1.1 and 1.2m above the surface of the cycle refuge.
Section 2 – Junctions and Crossings

- In urban areas, where the 85 percentile speed is 80kph (50mph) or more, speed reduction measures may be introduced to improve safety for an at-grade crossing. Traffic signal control may be appropriate.

**Figure 4 Staggered Crossing**

“Jug handle” or “Pan Handle” crossings can aid cyclists on a cycle track or on the carriageway, that are required to make a right turn movement across a carriageway. The design may improve the safety of cyclists but will make the crossing less direct.

A central refuge may be provided at the crossing point in 30mph urban situations. Where a straight transition is provided, a length of cycleway or kerb-segregated cycle lane may be provided parallel to the road carriageway.
2.5.1 There is often no reason (except for safety) why cyclists should be included in banned turning movements. Allowing cyclists to make turning movements that are banned to other vehicles can often be an inexpensive method of providing cycle priority.

2.5.2 Consideration should be given to including cycle exemptions with bus/taxi only turning movements.

2.5.3 If straight ahead or right turn movements are allowed, protector islands with bollards and road markings are advisable.
Section 2 – Junctions and Crossings

3.0 Signal controlled crossing/junction

3.1 Signal controlled crossings general

3.1.1 Where a cycle route crosses a carriageway and vehicle speed and flow dictates the use of traffic signal control (see Table 1) this can be provided in the form of either a Parallel crossing or a Toucan crossing.

3.1.2 Research has shown that pedestrians and cyclists can quite successfully share a crossing facility. Cyclists should not be required or expected to dismount and should have their own clearly defined route. At many existing signal controlled crossings the Pelican, and more recently the Puffin crossing, has been installed. These crossings are for pedestrian use only, and from a legal point of view, cyclists, whether riding or wheeling their bicycles, are committing an offence if they use the crossing. However there is very little case law on the subject and the courts would probably not treat cases of cyclists wheeling a bicycle across a Pelican or Puffin crossing seriously. Even so some thought to the legal implications should be given when designing a cycle route.

3.1.2 Clearly proposed routes which require a signal controlled crossing should use the Toucan in preference to a Pelican crossing. Also if in an existing situation, problems are encountered with cyclists using a pedestrian crossing (Pelican or Puffin) then conversion to a Toucan crossing may be a solution.

3.2 Parallel crossing (Fig 7)

3.2.1 This can be used where the cyclist and pedestrian flows are high. The cyclist crossing is parallel to the pedestrian crossing and at a distance of up to 5.0m from it. It is marked on the carriageway by white squares (WBM 294) commonly called “elephant footprints”. A separate set of signal heads is provided in addition to the pedestrian signal heads, which have red, amber and green aspects with the cycle logo on the amber and green. The cyclist phase is called up by push button or buried loop detection.

3.2.2 If there are cycle turning movements at the crossing this may cause conflict between pedestrians and cyclists. Also these crossings require considerable space plus two sets of signal heads and other equipment which makes it expensive and often difficult to accommodate. This led to the development of the Toucan crossing.
Section 2 – Junctions and Crossings

3.3 Toucan crossing (see TAL 10/93) (Fig 8)

3.3.1 This provides a controlled unsegregated crossing for cyclists and pedestrians and is to be preferred unless the level of use is so high that there is a potential for serious conflict between the two user groups. Signal control is via three signal aspect a “red man” and “green man”, as Pelican crossing, but in addition there is a “green cycle” aspect.

The use of tactile and blister paving layouts at Toucan crossings should be based on DfT Guidance Note on the use of Tactile Paving Surfaces”.

The Toucan crossing can be incorporated into a signalised junction.

3.4 Junctions – Advance Stop Lines - (ASL) (Figs 9 & 10)

3.4.1 Traffic signal controlled junctions can be hazardous for cyclists turning right and to a lesser extent, going straight ahead if there is a high volume of left turning vehicle movements. To reduce this hazard the ASL has been introduced to enable cyclists to position themselves in a safe reservoir ahead of the motor vehicle traffic. (See TAL 5/96) i.e. they can clearly be seen by drivers.

The ASL is marked using diagram 1001.2. Cyclists can feel intimidated by motor vehicles waiting behind them when the signals are red. The ASL allows cyclists to wait a safe distance ahead of other traffic. The reservoir of the ASL extends across the full width of the lane/s and includes a cycle symbol that is an integral part of the marking. Part width ASLs covering only one lane or part of a lane require authorisation.

3.4.2 Associated with the advance stop line and reservoir is a cycle lane which can be either on the near side or the centre of the carriageway approach to the traffic signal.

When designing an ASL, it is important to assess the way the junction operates. The main design issues concern the position and width of lead-in cycle lanes. The following should be considered:

- the number of all purpose lanes approaching each arm;
- the predominant motor vehicle and cycle movements at the junction, and the potential for these to conflict;
- the presence of left or right turning filters;
- the red time at the junction in relation to the green time (sites with longer red times work better for cyclists approaching the reservoirs);
- the normal and peak time length of traffic queues;
Section 2 – Junctions and Crossings

- the available width of carriageway; and
- the length of time it takes a cyclist to clear the junction.

The lead in cycle lane of an ASL arrangement can be mandatory or advisory. The main function of a nearside lead in lane (apart from allowing cyclists to legally gain access to the reservoir) is to allow cyclists to get past stationary vehicles waiting at the lights. As such, a minimum width of 1.2 metres is acceptable except for where non nearside lanes are used. Non nearside lanes often place cyclists between two rows of moving traffic, they should ideally be at least 2 metres wide to provide adequate separation (although narrower lanes may be acceptable on lightly trafficked roads).

Narrower lead-in lanes cannot be ruled out, but should not be less than 1m. A lead-in lane of some sort is a legal requirement so if an ASL is installed where space is very limited, there may only be enough room to include a very short lead-in lane.

It may be better to use a wide advisory lane, accepting that some vehicles may encroach, rather than a narrow mandatory one. It may be necessary to reduce the width of the adjacent traffic lanes to accommodate the lead in lane. A substandard traffic lane width may be acceptable where there is limited use by HGVs. The provision of nearside lead in lanes that are as long as the normal peak time traffic queues can help to keep the route to the ASL clear of queuing vehicles.

3.4.3

The reservoir area and the approach cycle lane should normally be surfaced with a red material to aid conspicuously and reduce encroachment by motor vehicles.
Figure 7 – Parallel Crossing
Figure 8 – Toucan Crossing
Section 2 – Junctions and Crossings

Figure 9 – Typical Layout of Advance Stop Line
Segregated cycleway or a kerb-segregated cycle lane at carriageway level. This may also be used at an unsignalised junction and at a junction where a left turn is prohibited. (The relevant TRO will exempt cyclists)

Kerb arrangement flush with carriageway.

Diag No.957

Advanced Stop Line

Segregated cycleway.

Unsegregated area at crossing.

Staggered Stop Lines can be used as an alternative to Advanced Stop Lines where a right turn is not possible or not permitted.

Diag No.957

Figure 8 – Typical Layout of Advance Stop Line with cycle bypass
Section 2 – Junctions and Crossings

4.0 Roundabouts

4.1 General

Cyclists and conventional roundabouts do not mix well. Cyclists are 14-16 times more likely than car users to suffer an accident at a roundabout, and also over 50% of these accidents are due to motorists entering the roundabout and colliding with cyclists who are circulating. Mini, continental and signalised roundabouts present fewer problems. Segregated vehicular left turn lanes are inherently unsafe for cyclists and should be avoided.

Solutions to the problems encountered by cyclists at roundabouts require careful consideration. The aim of the designer should be to minimise accidents. The aspects of roundabout design which make the “continental style” roundabout safer for cyclists than the typical UK roundabout are: reduced entry width (preferably single lane) reduced circulating width (preferably single lane) and increased angle of entry. The greatest emphasis in design must be placed on speed reduction.

Consider the following solutions for:

4.2 Conventional Roundabouts - General

4.2.1 Signalise the roundabout - in conjunction with the advance stop line it is a good method of improving the safety of cyclists on the roundabout by reducing speeds and platooning traffic. However there is a hazard for cyclists who having positioned themselves ahead of the other traffic could find that they are circulating across an exit at the same time as other vehicles begin to use the exit.

The London Cycling Design Standards (TfL, 2006) recommendations include the provision of segregated cycle tracks with signalised (Toucan) crossings of appropriate arms if the total junction flows exceed about 25,000 vehicles per day.

4.2.2 The dedicated cycle signal phase provides independent signal control for cyclists. This would be in the form of a 3-aspect signal head with the cycle logo on the amber and green aspects. This option would only be possible if there is sufficient carriageway width available to ensure that a physical separation of cycles and motor vehicles can be achieved together with a mandatory cycle lane, and that the capacity of the roundabout is not seriously affected.

4.2.3 If land is available, provide a cycle track around the perimeter of the roundabout. However this creates its own problems with the cycle track having to cross each of the roundabout arms. Clearly from a cyclist point of view this will be the least direct route and will be extremely time consuming, although for some cyclists it may be preferable.
Section 2 – Junctions and Crossings

4.2.4 Change the geometry of the roundabout by increasing the entry deflection and narrowing the circulatory carriageway. In conjunction with this add circulatory lane markings and consider ways to reduce the circulatory traffic speed to 48 kph (30mph) or less.

Excessive visibility to the right for motorists approaching the roundabout can result in high speeds. Where this is a problem, it can be mitigated by installing sight screens on the right of the entry road so that this visibility is reduced. However, care is required to avoid this making cyclists on the circulatory carriageway more vulnerable to vehicles entering the junction.

4.2.5 Wherever the opportunity arises existing conventional roundabouts should always be converted to “continental style” roundabout.

4.3 New roundabouts

4.3.1 In view of the potential difficulties for cyclists at roundabouts there should be a general presumption against their use. As an alternative could traffic signal control/grade separation be used?

4.3.2 If a roundabout is the only solution, consider providing a form of physical segregation for cycles e.g. cycle lane with cycle priority. Consider providing cycle routes remote from the junction i.e. removing the need for cyclists to negotiate any part of the roundabout.

4.3.3 If routeing via a roundabout is unavoidable then consider solutions in 4.2.
Example of off carriageway provision at roundabout
Section 2 – Junctions and Crossings

Example of off carriageway provision at roundabout

Visibility to the right reduced by means of sight screens
Continental Roundabouts

Continental style roundabouts (also known as compact roundabouts) have tighter geometry that is more cycle friendly. They may be around 10–20 per cent safer for cyclists than signalised junctions (TRL, 2001) serving the same vehicle flows. As the geometry encourages lower speeds, cyclists generally pass through the roundabout with other traffic. Motorists are unlikely to attempt to overtake cyclist on the circulatory carriageway because of its limited width. These roundabouts can cope with flows of up to 8,000 vehicles per day (1,000 per peak hour) (Schoon and Minnen, 1994).

The key features of continental roundabout design are summarised as:-

i) The approach arms are perpendicular, rather than tangential to the roundabout.

ii) There should be single lane entries and exits (widths 4.0 - 5.0 metres).

iii) There should be minimal flare on entry.

iv) The inscribed circle diameter should be between 25 and 35 metres.

v) The circulatory carriageway should be between 5.0 and 7.0 metres wide.

The over-run area, of a textured surface material, provides space for long vehicles to manoeuvre but is not generally considered part of the circulatory lane.

<table>
<thead>
<tr>
<th>Design Feature</th>
<th>Continental Practice</th>
<th>UK Practice: DMRB V6, S2, TD 16/93 (DOT, 1993)</th>
<th>Variation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Approach arms</td>
<td>Perpendicular to roundabout centre. Preferably curved</td>
<td>Ideally perpendicular to carriageway however can be skewed if conforms to entry angle, entry path curvature</td>
<td>No</td>
</tr>
<tr>
<td>Entry width, r</td>
<td>Single lane. Usually 4m</td>
<td>Good practice to add at least one extra lane width to the entry approach</td>
<td>Yes</td>
</tr>
<tr>
<td>Entry radius, r</td>
<td>Not specified, but tight geometry required (approximately 15m from drawings)</td>
<td>Minimum 6m: desirable 20m</td>
<td>No</td>
</tr>
<tr>
<td>Entry angle, ø</td>
<td>Not specified, but tight geometry required (approximately 30 to 45 degrees from drawings)</td>
<td>If possible, between 20 and 60 degrees</td>
<td>No</td>
</tr>
<tr>
<td>Entry path curvature</td>
<td>Not specified but, from drawings, not to exceed 100m</td>
<td>The tightest radius of entry shall not exceed 100m</td>
<td>No</td>
</tr>
<tr>
<td>Exit arms</td>
<td>Perpendicular to roundabout centre</td>
<td>Easy exits (not perpendicular) encouraged with increased exit radius and space for faster vehicles to overtake</td>
<td>Yes</td>
</tr>
<tr>
<td>Exit radius</td>
<td>Not specified, but tight geometry required (approximately 100m)</td>
<td>Minimum 20m: desirable 40m</td>
<td>Yes</td>
</tr>
<tr>
<td>Exit width</td>
<td>Single carriageway</td>
<td>Where possible should allow for an extra traffic lane over and above that of the link downstream</td>
<td>Yes</td>
</tr>
<tr>
<td>Roundabout external diameter (inscribed Circular Diameter)</td>
<td>Maximum 35m</td>
<td>Minimum 25m</td>
<td>Minimum 26m: &gt;100 m acceptable: &lt;36 m = small (roundabout)</td>
</tr>
<tr>
<td>Central island diameter</td>
<td>Maximum 27m</td>
<td>Minimum 18m</td>
<td>Minimum 4m:</td>
</tr>
<tr>
<td>Circulatory carriageway</td>
<td>Single lane Exit width &lt; 5m</td>
<td>Width 3-7m</td>
<td>Lie between 1.0 and 1.2 times the maximum entry width. If the ICD is &lt; 36m (Continental requirement) the geometry varies.</td>
</tr>
</tbody>
</table>

Comparing roundabout design parameters (TAL 9/97)
Example of Modification to Roundabout Geometry

Mini Roundabouts

Mini-roundabouts share many characteristics with other roundabouts, the major difference being that the central island is small (normally a radius of 2-4m) and can be over-run, both by larger and smaller vehicles. In this way, mini roundabouts can be fitted into the space of normal junctions.
Section 2 – Junctions and Crossings

Provided they operate with single lane approaches, mini-roundabouts do not generally carry much higher risk to cyclists than signalised junctions. They can be used as a speed reducing feature in urban areas for the benefit of all road users. As with larger roundabout types, there should be adequate deflection on all arms to ensure low entry speeds.

For cyclists, they are particularly useful for facilitating right hand turns off major roads or right turns onto major roads from side roads. A mini-roundabout allows cyclists to make these manoeuvres in relative safety because the stream of traffic being crossed is obliged to give way, whereas it can be difficult for cyclists to cross the main traffic stream at a priority junction.

Research has suggested that Mini Roundabouts are no less safe to cyclists than signalised junctions (TRL Report 281).

**Cycle Lanes on Roundabouts**

Cycle Lanes on roundabouts are difficult to design such that they improve conditions for cyclists. There is little evidence that cycle lanes on roundabouts improve the safety of cyclists.

On busy roundabouts, it is important that the cyclist takes up a prominent position nearer the centre of the carriageway to ensure that drivers understand the intended manoeuvre, and, for this reason, annular lanes are not generally recommended.
Section 2 – Junctions and Crossings

5.0 Grade separation

5.1 General

At busy junctions and crossings grade separation of cyclists and motor vehicles may be considered. The facility should be well designed and of good quality, providing a route that is quick and safe for the user. Perceived as well as actual personal security should be integral to the choice of facility to ensure it is well-used. It needs to be pleasant to use at all times, well lit for night time use, and avoid blind corners where anti-socials can hide. Also consider the possibility of using CCTV.

Clearly the provision of such a facility would be very costly.

5.2 Existing subways

As above but take the following into account.

5.2.1 Cyclists should be slowed as they approach right angle turns.

5.2.2 In conjunction with 5.2.1 coloured barriers can be provided at turns on the ramps or subway tube which segregate pedestrians and cyclists.

5.2.3 Provide a handrail for pedestrians fixed to the ramp/subway wall on the pedestrian side only.

5.2.4 Provide convex mirrors at right angle turns to assist with visibility at corners.

5.2.5 Subway width minimum 2.7m - unsegregated - only suitable at existing subways.

The headroom in existing pedestrian subways is typically 2.3 metres, and routes under canal ten have less clearance. The restricted height or width available should not lead to automatic rejection of a proposal to permit cycling. It may represent the best available option if potential risks to users can be managed.

5.3 New subways

5.3.1 Subways (see TD 36/93) should have straight approaches and a straight-through visibility, flared entries and good lighting. The need for high quality maintenance must be taken into account.
Section 2 – Junctions and Crossings

5.3.2 Recommended widths for shared use (cyclist/pedestrian) can be found in Section 3.

![Typical Layout of Subway](image)

Figure 8 – Typical Layout of Subway

5.4 Existing bridges

Existing bridge ramp gradients and steps clearly cause a problem to cyclists not least is the necessity for the cyclist to dismount and wheel their bicycle over the bridge. However to assist with this, “wheeling channels” (also called wheeling ramps) at the side of the steps may be provided.

Where steel wheeling ramps are used the width of the channel should be 100mm wide and 50mm deep. Where concrete gullies/channels are used typical dimension of channel is 50mm wide x 40mm deep. Maintenance of the channel must be considered.

Parapet heights should be a minimum of 1.4m where cyclists use a bridge.

5.5 New bridges

5.5.1 Ideally ramp gradients should not be steeper than 5% (1 in 20). If limitations of space make this unachievable an absolute maximum of 8% (1 in 12) may be used.

5.5.2 The minimum widths for a footpath (or footway) and a cycle track on a bridge and ramps shall be:
Section 2 – Junctions and Crossings

(a) 1.75m wide each when segregated by kerb
(b) 1.95m wide each when segregated by railings
(c) 1.20m wide footpath (or footway) and 1.50m wide cycle track when segregated by white line, colour contract or surface texture.
(d) 2.00m wide for unsegregated facility.

5.5.3 BD 29/87 – “Design Criteria for Footbridges” should be referred to for more detailed design criteria.
Section 3 – Links in Rural Areas
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1.0  Geometric requirements for new design

See Introduction section and Section 1 – Links in Urban Areas Chapter 1.0
Section 4 – Signs and Markings

2.0 General considerations

One of the five main requirements of a cycling infrastructure is “directness” i.e. routes should be as direct as possible based on desire lines. Detours and delays may deter use, but in the case of rural areas this may have to be compromised for safety reasons. In rural areas the most direct route between destinations is often along high traffic speed and high volume roads which are not generally cycle friendly. Therefore the designer should be looking at the overall network of roads available to ascertain the safest and most attractive route available, even if in some cases this may mean that it is not necessarily the most direct. However, a positive side to this is that substituting a slightly longer route for the most direct route may satisfy three of the other five main requirements of a cycling infrastructure i.e. attractiveness, safety and comfort. In this context “detour routes” often pass through places of interest and the volumes of traffic including HGV’s are less. The other main requirement is, of course, coherence.

Consideration should be given to consulting with Sustrans when designing/investigating rural routes as they have had a wide experience in the design of rural routes.
3.0 Routes and the environment

Designers must be aware of the behaviour of drivers on minor rural roads. Research into how the existing road network operates and local knowledge is often invaluable.

As an example, consider the location of a school relative to its general catchment area. Clearly in term time the minor road network leading to the school is likely to have higher flows of motor vehicular traffic. The routes to schools may then become part of a rural cycle network in an effort to reduce the amount of car use and encourage the switch to a different mode of transport.

The above example not only applies to schools but also to commuter routes as well as routes to shopping areas or leisure facilities.

Each rural route will need to be assessed individually on its own merit to establish its particular needs. To assist with the assessment the following factors should be taken into account.

1) Cycle volumes
   
   Assess the number of existing and potential users and the type of user e.g. commuter, shopper, school children or leisure use. The number of pedestrians can also provide useful additional information.

2) Vehicle volumes
   
   Assess the volume of the general traffic, including the percentage of HGV’s, and obtain 85 percentile speeds. Clearly if the volumes and speeds are high then consideration should be given to providing off carriageway cycle facilities. There may also be benefit in considering the potential for modal transfer to cycling e.g. for journeys to school.

3) Carriageway alignment
   
   The characteristic of the road, along which the route is proposed should be considered. For example, the visibility which is available from the horizontal and vertical alignments, and the number and frequency of junctions and crossings, gradient and width.

4) The length of route
   
   Consider the overall length of the cycle route between the main centres that are to be connected. Long distance routes may require different treatment to short distance routes even though the traffic volume and
Section 4 – Signs and Markings

speed criteria may be similar. This is because it may not be practical or economical to provide a sustained high quality route over a long distance.

5) “Rat runs”

These are often created in rural areas by using minor roads to link between major routes. Therefore, consideration should be given to deterring this practice by positive traffic calming measures if the route is likely to be used as a cycle route.

6) Road closures

Closures of minor roads can also be considered where there is an adequate alternative for motorised traffic. Closure could be enforced by physical features e.g. bollards, or the enforcement could be by means of a gate. The gate option gives the opportunity for it to be locked if limited access is required. Clearly motor vehicles should be warned of the status of the road and adequate turning areas provided. An example of a road closure is shown in Figure 1.

Provision must be made to ensure that emergency vehicles can gain access to closed roads at all times.

Traffic Regulation Orders under the Road Traffic Regulation Act 1984 would be required before any closure could be brought into operation or be legally effective.

Figure 1 - Typical Gated Road Closure
Section 4 – Signs and Markings

Figure 2 - Typical Gated Road Closure

Gateways

Gateways are a feature of traffic calming schemes at the approach to settlements but they may also be useful in rural areas to highlight to drivers that they are entering an area of changed use or character, such as the entrance to a length of traffic-calmed road which may involve physical measures such as carriageway markings and signing and/or a change of speed limit. The Gateway can be suitably named to heighten the impact on drivers. Recent experience from nine sites at villages on major roads monitored by the Department for Transport suggested reductions of inbound speed of 3-13mph with an average decrease of 5mph. An important issue in the design of Gateways is achieving a good balance between ‘visual impact’ and the local environment. Gateways can be designed using sympathetic local materials whilst still conveying the required message to drivers.
4.0 On carriageway options

The preference should be for cyclists to be on the carriageway with the provision of cycle lanes, if necessary. In this context the following points should be considered.

i) The alignment and visibility of minor rural roads may often create situations where cyclists are at risk from being struck by a motor vehicle, for example at bends and junctions, or “pinch points” in the carriageway. (However, conditions often appear more hazardous to motorists, who cannot hear the sound of approaching vehicles, than to cyclists who can. Therefore, the likely presence of cyclists using the carriageway must be conveyed to the motorist through the use of well placed signs. In addition, local physical improvements to the carriageway should be considered in order to enhance cycle safety.

ii) An advisory cycle lane width of 2.0 metres is desirable. An absolute minimum cycle lane width is 1.5 metres.

iv) The width of a cycle lane on an uphill gradient should not be below the absolute minimum width of 1.5 metres to allow additional movement by the cyclist.

v) Details of appropriate signs and markings for cycle lanes will be found in Section 4 of these guidelines - Signs and Markings. However, measures that may be considered to warn drivers approaching a bend, junction or other hazard where they could encounter cyclists are:-

- Cycle logo (diag no. 1057 of the TSR GD 1994)
- Slow marking
- Warning signs
- Rumble strips (with cycle bypass) – Not within 200 metres of residential properties
- Coloured surfacing

vi) Similarly the measures referred to in v) and other traffic calming measures can also be used to reduce the speed of traffic along roads which are to be used as cycle routes, however the issues described in Table 1 should be reviewed.
### Section 4 – Signs and Markings

#### Table 1 – Review of Traffic Calming Measures

<table>
<thead>
<tr>
<th>Traffic calming measures</th>
<th>Desired effect</th>
<th>Detrimental effect on cycle traffic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traffic islands/refuges</td>
<td>• Prevent overtaking; • Control speeds; • Pedestrian crossing points; • Create gateways; • Separation of traffic lanes.</td>
<td>• Tend to push motor traffic into line of travel of cyclists; • Causes localised narrowing of the carriageway to create a pinch point.</td>
</tr>
<tr>
<td>Ghost islands</td>
<td>• To facilitate right turn without causing delay or conflict with following traffic.</td>
<td>• Tend to push motor traffic into line of travel of cycle traffic; • Causes localised narrowing of the traffic to create a pinch point.</td>
</tr>
<tr>
<td>Kerb buildouts e.g.</td>
<td>• To protect designated parking bays; • To attempt to slow traffic; • To create shorter distances for pedestrians to cross and improve visibility for pedestrians.</td>
<td>• Tend to push cycle traffic into line of travel of motor traffic; • Causes localised narrowing of the pedestrian carriageway to a pinch point.</td>
</tr>
<tr>
<td>chicanes, throttles etc</td>
<td>• To separate opposing traffic streams; • To reduce lane widths to control speeds; • To improve forward; • To control sight lines around bend; • To discourage overtaking.</td>
<td>Longer sections of route that are of a tight or critical profile; • On bends tends to push motor traffic into line of travel of cycle traffic; • To improve conspicuity of road layout.</td>
</tr>
<tr>
<td>Central Hatching</td>
<td>• Additional capacity • Slower traffic speeds</td>
<td>Encourage traffic to squeeze past cyclists.</td>
</tr>
<tr>
<td>Additional narrow lanes</td>
<td>vii) Local road closures are sometimes appropriate to prevent a potential cycle route being used by motor traffic other than for local access.</td>
<td></td>
</tr>
</tbody>
</table>
Off carriageway options

There are many locations where footways exist either on one or both sides of major routes where the average annual daily traffic (AADT) is likely to be in excess of 10,000 vehicles. In these cases the existing footway may be converted to joint cycle/pedestrian use. However, a number of points will need to be considered to ensure that a safe, comfortable route is created.

i) The overall width of the paved area available in relation to the existing pedestrian usage and the likely cycle use. As a guide to the recommended cycle track/footway widths for various combinations of segregation types and boundary constraints see Chapter 3.0.

ii) Existing footways in rural areas have often received little maintenance and verges have overgrown the surface, therefore, ensure that the full surface width is reclaimed and is in good condition.

iii) The existing footway width may be too narrow for combined use by cyclist and pedestrians either segregated or unsegregated. However there may be scope to widen the area to full footway/cycleway width by utilisation of the verge, land acquisition, or reduction in carriageway width at critical locations.

iv) A major disbenefit of an off carriageway cycle track for cyclists is the number and frequency of junctions and crossings. If side road junctions are occurring at a frequency of more than one per 800 metres the effectiveness of the cycle track may be negated. A cycle track frequently interrupted by side roads can have a significantly worse potential for accidents than the equivalent on carriageway facility.

v) Careful consideration of the terminal points is required to ensure that cyclists can leave and rejoin the carriageway safely. Details of safe methods of merging cyclists into the general traffic flow can be found in Section 4 of these guidelines - Signs and Markings.

vi) In some instances an existing footway will only exist on one side of the carriageway. This clearly presents its own problems for cyclists travelling contraflow. In these cases consideration should be given to either:-

a) Providing a means for cyclists to cross and recross the carriageway as necessary; or

b) Providing a cycle track on the opposite verge if sufficient land is available within the highway. (Or can be made available by land acquisition or reduction in carriageway width).
Section 4 – Signs and Markings

vii) The general maintenance of the route must be considered especially during the winter to ensure that the route is usable all year.

viii) The existing street lighting should be assessed and, if necessary, improved to give lighting levels that meet current standards, particularly at junctions and crossings.

ix) The procedure to convert all, or part, of a footway to a cycle track involves “removing” the footway under Section 66 of the Highways Act 1980, and then “constructing” a new cycle track under Section 65(1) of the 1980 Act. The extent of physical conversion work which is needed may be minimal but there must be clear evidence of the change in terms of signs and markings.

x) A guide to the widths to be provided for cyclists and pedestrians either segregated or unsegregated is shown in Table 1.

<table>
<thead>
<tr>
<th>Facility</th>
<th>Width (m)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Segregated cycleway or cycle path</td>
<td></td>
<td></td>
</tr>
<tr>
<td>One way cycles only</td>
<td>Desirable</td>
<td>2.0 Operates satisfactorily for one-way flows of up to 150 cycles per hour with minimal overtaking anticipated.</td>
</tr>
<tr>
<td></td>
<td>Minimum</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Absolute</td>
<td>1.5 The running width required that is free from obstructions such as debris, gullies, line markings and street furniture.</td>
</tr>
<tr>
<td></td>
<td>Minimum</td>
<td></td>
</tr>
<tr>
<td>Two way cycles only</td>
<td>Desirable</td>
<td>3.0 Operates satisfactorily for two-way flows up to 300 cycles per hour.</td>
</tr>
<tr>
<td></td>
<td>Minimum</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Absolute</td>
<td>2.0* Operates satisfactorily for two-way flows of up to 200 cycles per hour free from obstructions such as debris, surface gullies, line markings and street furniture.</td>
</tr>
<tr>
<td></td>
<td>Minimum</td>
<td></td>
</tr>
<tr>
<td>Pedestrian only space</td>
<td>Desirable</td>
<td>2.0 The minimum width in normal circumstances to permit unobstructed passage by opposing wheelchairs.</td>
</tr>
<tr>
<td></td>
<td>Minimum</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Absolute</td>
<td>1.5 Acceptable over short distances in specifically constrained environments, such as at bus stops or where obstacles are unavoidable (Transport Scotland 2009).</td>
</tr>
<tr>
<td></td>
<td>Minimum</td>
<td></td>
</tr>
<tr>
<td>Shared cycleway or cycle path</td>
<td>Pedestrian and cycle space</td>
<td>Desirable</td>
</tr>
<tr>
<td></td>
<td>Minimum</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Absolute</td>
<td>2.0 – Can operate for combined flows of up to 200 per hour but will require cycles and pedestrians to frequently take evasive action to pass each other.</td>
</tr>
<tr>
<td></td>
<td>Minimum</td>
<td></td>
</tr>
</tbody>
</table>

* Widths narrower than 2m can present a hazard to cyclists

Table 1 – Cycle Track Widths
Figure 6 - Types of off-carriageway provision

Notes
1) Widths are indicative
Section 4 – Signs and Markings

6.0 Off highway options

i) The legal status of each length of footpath should be examined. There is no legal right to cycle on the footpath, but an Order may be made by the Highway Authority under Section 3 of the Cycle Tracks Act 1984 to convert it to a cycle track. If there are unwithdrawn objections, the Order has to be confirmed by the Secretary of State, and usually a public local inquiry is held. If there are no objections, or all objections are withdrawn, the Order can be confirmed by the Highway Authority.

ii) On a bridle path there is a legal right to cycle, provided precedence is given to equestrians and pedestrians.

iii) Lighting may not be appropriate in very rural areas.

iv) There is a need to create an “open feel” about the route. Avoid blind corners so as to discourage anti social activities and ensure that users of the route be they cyclists or pedestrian “feel safe”.

v) Points raised in Chapter 5.0 are generally relevant to off highway options including footpaths and possibly bridlepaths.

vi) Initial contact should be made with the Highway Authority “rights of way” staff.

vii) Early discussions with landowners, Parish Councils and the Ramblers Association is essential if problems are to be avoided later, but in any event, after complying with vii) above.

ix) Barriers should be provided where there is potential for abuse by motor vehicles or safety issues have been identified. Barriers should be used where there is a need to remind cyclists of the presence of pedestrians especially children crossing or joining a cycle route. (See Chapter 8.0 - Barriers to Motor Vehicles).
Section 4 – Signs and Markings

7.0 Canal side routes

For a cycleway alongside a canal, a safety strip 1.2 metres wide should be provided which can be used by anglers, and allow for waterside furniture and mooring ropes.

At canal bridges appropriate signs should be provided indicating that:-

- headroom is restricted
- the path/track is narrow
- danger of falling in the canal

and if necessary cyclists should be advised to dismount.

Consideration should be given to reinforcing or reclaiming the bank by using gabions, sheet piles or similar engineering methods. This will enable additional width to be obtained if necessary.

A 0.5m margin should also be provided on the land side. This strip should be kept clear of obstructions that are likely to obscure forward visibility or be a hazard to cyclists.

NB. A 0.5 metre margin is reserved for canal side routes only, but can be applied to other off carriageway or off highway cycle tracks also.
Section 4 – Signs and Markings

At bridges over canal towpaths, the width is generally 1.5m over short lengths with good visibility. This will often provide the safest crossing of a busy road.

Balustrades to have a smooth top.

Section through Canal Bridge.
8.0 Barriers to motor vehicles

There should be a presumption against providing barriers on cycle routes unless it is necessary to deter use by motor cycles or other vehicles. Dimensions and setting out requires particular accuracy to ensure that barriers prevent unwanted use, but at the same time allow cyclists, disabled cyclists or wheelchair users easy access.

The preferred option is the use of bollards spaced across an access to provide a clear gap between them of between 1.2 metres minimum and 1.5 metres maximum. The installation of a removable lockable bollard will often be necessary in order to provide sufficient temporary additional width for maintenance and emergency service vehicles to gain access to the cycle route.

In the event of the bollards not providing enough of a deterrent to unauthorised use then a chicane should be considered. The maximum clear opening should be 1.2 metres with a 1.5 metre longitudinal distance between the barriers. Again if no other access points are available along the route, provision should be made to allow maintenance and emergency service vehicles access via the removal of a barrier. This option may require modification to allow wheelchair users access.

Bollards should ideally be placed at least 5 metres from any bend or junction, so that riders can approach them straight on. Bollards can be hazardous on unlit routes and at sites where forward visibility is restricted by the layout or by other users.
Section 4 – Signs and Markings

Figure 9 - Motor Cycle Barrier Access

Figure 10 – Bollard Arrangement
Figure 11 – Chicane Barrier Arrangement

Initially omit barriers shown as shaded. These can be installed later if there proves to be a problem.

Section A - A

Height may be raised to 0.5m where scramble motor cycles are foreseen as a problem.

Adjacent boundary

Minimum 150mm concrete foundation

Dimensions bracketed are essential for the effective operation of the barrier.

Figure 12 – Barrier with wheelchair bypass
Section 4 – Signs and Markings

Other types of access barrier
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Section 4 – Signs and Markings

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<td>Miscellaneous signs</td>
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1.0 Signs and markings for cycle lanes

1.1 General

Diagram numbers (diag no.) mentioned in the text, or adjacent to illustrations, refer to the sign diagram numbers in The Traffic Signs Regulations and General Directions 2002.

Signs and carriageway markings generally fall into three groups.

1) Route definition and regulatory signs
2) Warning signs
3) Direction signs

Signs defining a cycle route tell cyclists, pedestrians and motor vehicle drivers what type of route they are approaching. It is essential, for the cyclists safety, that their position on the highway is made clear to the motorist. This will also help the motorist to know where to expect cyclists to be and where they will cross or join the carriageway. Signs in this group also give information about who can use the facility i.e. cyclists and pedestrian or cyclists and buses, and some signs show how and when the facility can be used e.g. cycle contra flow in one way street.

In the UK there are two shapes used for route definition signs. The circular signs are mandatory and signify that cyclists have sole (or in the case of sharing with pedestrians or buses) legal right to use the route. The rectangular signs are advisory and are used mainly on cycle routes which have been implemented without the use of a Traffic Regulation Order.

Appendix A gives illustrations of the signs currently most commonly used for cycle routes.

The purpose of signing and marking a cycle lane is to define the route itself, to make it clear to motorists and cyclists where each should be on the carriageway.

Markings will be required on almost every cycle lane and can be used singularly or in combination with upright signs for the following purposes.

- To segregate cyclists from vehicles
- To mark a cycle junction
- To give or reinforce instructions.

Table 1 summarises the available markings, their diagram number, description and size.
Section 4 - Signs and Markings

Upright signs should be used to sign with-flow and contra-flow cycle lanes and to warn drivers and pedestrians of the lane marked out for cyclists. Advisory lanes should be signed using the sign to diag no. 967 at the commencement of the lane together with the carriageway marking diag no. 1057 (bicycle logo). These signs and markings should also be used at every point where a significant number of cyclists join the route. It is not necessary to erect large numbers of such signs, strategically positioned signs at all junctions will often be all that is required.

1.2 Segregating cyclists from vehicles on carriageway

1.2.1 Mandatory cycle lanes (traffic regulation order required)

These are bounded by a 150mm wide continuous line to diag no 1049. This may be interrupted for the length of any bus stop incorporated within the lane. At road junctions the markings may be interrupted or replaced by the warning line to diag no. 1004 (1004.1 if speed limit exceeds 40mph). The marking to diag no. 1049 may be continued across private driveways, but the Traffic Regulation Order should provide exemptions for accesses. The start of a cycle lane is delineated by a 150mm wide inclined intermittent line to diag no. 1009 (200mm wide if the speed limit is in excess of 40mph). Normally it should be laid to a taper of 1 in 10. Other markings to be used are diag no. 1057 (cycle symbol) and 1058 (END).

Traffic Regulation Orders will be required to prohibit parking and this will also involve the introduction of appropriate signs and markings.

1.2.2 Advisory cycle lanes

These lanes are marked by a white intermittent line to diag no. 1004 (40mph design speed limit or less) or 1004.1 where speed limits exceed 40mph. See table 1 for recommended sizes. The inclined line at the start of the lane and other marking will be as for the mandatory lane above. Again it may be necessary to prohibit parking.

1.2.3 Shared lanes cycles/buses

Cycles are generally allowed to use with-flow bus lanes; the standard diag 1048 (BUS LANE) marking is used. Upright signs to diag no. 958 and 959 indicate that cycles may use the lane. Where cycles are permitted to use contra-flow bus lanes, markings to diag no. 1048.1 (BUS AND cycle symbol LANE) must be used in place of diag no. 1048. If a highway authority wishes to prohibit cyclists from using a withflow bus lane, sign authorisation is required.
<table>
<thead>
<tr>
<th>Diag No</th>
<th>Description</th>
<th>Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>1001</td>
<td>Advance stop line for cyclists</td>
<td>200mm wide</td>
</tr>
<tr>
<td>1003</td>
<td>Transverse Give-Way line</td>
<td>300mm mark, 150mm gap 100mm wide</td>
</tr>
<tr>
<td>1004</td>
<td>To indicate the boundary of an advisory with-flow cycle lane when the speed limit is 40mph or less</td>
<td>4m mark, 2m gap 100 or 150mm wide to match the centre line marking</td>
</tr>
<tr>
<td>1004.1</td>
<td>To indicate the boundary of an advisory with-flow cycle lane when the speed limit is more than 40mph</td>
<td>6m mark, 3m gap 100 or 150mm wide to match the centre line marking</td>
</tr>
<tr>
<td>1009</td>
<td>Marking laid diagonally across a part of the carriageway of a road, to indicate the start of a cycle lane</td>
<td>300mm mark, 150mm gap 150mm wide</td>
</tr>
<tr>
<td>1023</td>
<td>Give Way symbol</td>
<td>625 x 1875mm</td>
</tr>
<tr>
<td>1024</td>
<td>SLOW</td>
<td>800mm</td>
</tr>
<tr>
<td>1048</td>
<td>BUS LANE</td>
<td>1600mm</td>
</tr>
<tr>
<td>1048.1</td>
<td>Contraflow bus and cycle lane marking</td>
<td>1100mm wide symbol</td>
</tr>
<tr>
<td>1049</td>
<td>Boundary between mandatory cycle lane and remainder of carriageway.</td>
<td>150mm wide reflectorised</td>
</tr>
<tr>
<td></td>
<td>Boundary between that part of a route reserved for pedal cycles and that part reserved for pedestrians</td>
<td>150mm unreflectorised</td>
</tr>
<tr>
<td>1057</td>
<td>Cycle symbol marking to indicate a lane or track reserved for pedal cycles</td>
<td>750 x 1215mm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1100 x 1780mm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1700 x 2750mm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Size to suit width of cycle lane</td>
</tr>
<tr>
<td>1058</td>
<td>End marking may be used with diagram 1057 to indicate the termination of a lane, track or route reserved for pedal cycles</td>
<td>750 x 705mm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1100 x 1035mm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1700 x 1600mm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Size to suit width of cycle lane</td>
</tr>
<tr>
<td>1059</td>
<td>Arrow marking to be used with diagram 1057 to indicate the direction in which pedal cycles should travel</td>
<td>2000mm long</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(1000mm alternative may be used at constricted sites)</td>
</tr>
</tbody>
</table>

Table 1
1.3 *Merging cycle tracks with cycle lanes*

At the transition of cycle tracks to cycle lanes and visa-versa the preferred method is to merge the cyclist gradually from one to the other on a ramped area not exceeding 7% (1 in 14).

At the cycle track to cycle lane situation vehicular traffic may need to be gradually deflected towards the centre of the carriageway to allow for the additional cycle lanes. The opposite will occur where the cycle lane merges into a cycle track.

Appropriate upright signs and road markings will be necessary to warn motorists and to direct cyclist.

Where space is not available or it is not possible to provide a gradual merge, Give Way markings (diag No 1003) should be provided at the position where the cycle track is to rejoin the carriageway and there are no special facilities for the cyclist thereafter. If the cycle track is to terminate at a minor road it is desirable to set it back a distance of 10 metres from the mouth of the junction in order to improve the safety of cyclists when crossing the carriageway.
1.4 **Surfacing colouring**

On carriageways where there is an increase in risk to cyclists from motorists, a red coloured surface shall be provided e.g.:-

- At advance stop lines and the approaches
- In the vicinity of traffic calming
- In the vicinity of traffic signal junctions
- In the vicinity of junctions and crossings
Section 4 - Signs and Markings

- In the vicinity of roundabouts
- At other locations where there is a perceived high risk to cyclists.

Off carriageway where there is an increased risk of conflict between cyclists and pedestrians a red coloured surface (normally slurry seal) shall be provided e.g.:

- On unsegregated footway/cycle tracks
- On segregated cycle tracks in urban areas
- At other locations of perceived high risk

Preferred shade of colour is Poppy red.
2.0 Signs and markings for cycle tracks

The main purpose of signing, and marking a cycle track is to identify the route to cyclists, or in the case of a shared track, to cyclists and pedestrians.

A comprehensive set of drawing indicating signing and markings can be found in the London Cycle Design Standards (an extract of a selection of cycle facilities is included at the end of this Section). However the latest Traffic Signs (Amendment) (No.2) Regulations and General Direction 2011 should be referenced as it impacts on some of the design guidance provided in this section. The 2011 TSRGD provides for the following benefits:

“In order to reduce sign clutter, signs indicating mandatory turns, no entry, cycling prohibition and cycle routes or shared cycle / pedestrian routes may be mounted on internally illuminated or retro-reflective self-righting bollards conforming to the appropriate British Standard. However, those signs mounted on retro-reflective self-righting bollards must be accompanied by an additional fixed illuminated sign.” and

“Cycling - A variant has been introduced of the cycle advanced stop line with a ‘gate’ rather than a lead-in lane, for use at sites with space constraints which prevent a full lead-in lane. Journey times may now be shown on cycle route signs; and signs have been introduced for contra flow cycling, either with or without an advisory lane marked on the carriageway.”

The sign which is to be used will depend on the type of facility being provided, as shown below.

<table>
<thead>
<tr>
<th>Diag No.</th>
<th>Facilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>955</td>
<td>Track for pedal cycles only</td>
</tr>
<tr>
<td>956</td>
<td>Unsegregated track for pedal cycles and pedestrians</td>
</tr>
<tr>
<td>957</td>
<td>Segregated track for pedal cycles and pedestrians</td>
</tr>
</tbody>
</table>

These signs also indicate to other road users that the use of motor vehicles is prohibited.

It is recommended that repeater signs are erected at all locations along a cycle track where permitted users can join it. On unbroken lengths of track, repeater signs should be placed at 200 metre intervals. The recommended diameter of the signs is shown below.
Section 4 - Signs and Markings

<table>
<thead>
<tr>
<th></th>
<th>Desirable</th>
<th>Absolute minimum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Terminal signs</td>
<td>600mm</td>
<td>450mm</td>
</tr>
<tr>
<td>Repeater signs at junctions and at 200 metre intervals</td>
<td>450mm</td>
<td>300mm</td>
</tr>
</tbody>
</table>

Where cycle tracks pass through parks or environmentally sensitive areas it will be undesirable to clutter the area with repeater signs on poles. In this situation it may be possible for signs to be mounted within bollards or use a road marking in place of an upright sign. However, careful consideration must be given to the type of signing and marking and it would be advisable to consult with the owner of the land or the Authority responsible for its maintenance. Also discuss proposals with a landscape architect if the cycle route passes through a particularly sensitive area.

The recommended minimum mounting height for signs above a cycle track, i.e. where users will pass directly beneath the sign is 2.4 metres.

The minimum edge distance for signs erected beside a cycle track is 0.5 metres.

**2.1 Markings on shared routes**

**2.1.1 Segregated**

Where cyclists and pedestrians share the same track but are segregated by means of a white line, this should be continuous to diag No. 1049 and be 150mm wide.

**2.1.2 Unsegregated**

No markings are necessary on unsegregated routes.

**2.1.3 Safety strip**

It should be apparent that where a safety strip is provided it clearly does not form part of the cycle track.

**2.2 Markings at junctions and crossings**

Where a cycle track crosses a carriageway, and there is no means of control, the cycle track is to be treated the same as a minor road at a priority junction. The cycle track approach to the junction or crossing should be marked using markings to diagram no. 1003, 1023 and 1057 (segregated only) with the optional addition of diagram no. 1059 (arrow). To increase motorists awareness of the possibility of cyclists crossing the carriageway, signs to diagram no. 950 could be erected in
Section 4 - Signs and Markings

advance of the crossing or junction. Illumination of these signs will be in accordance with the requirements of The Traffic Signs Regulations and General Directions 1994.

The marking to WBM 294 (Elephants footprints) should never be used across the major road at a priority junction. It is liable to cause confusion, and be misunderstood as giving cyclists priority over main road traffic. It may however be used when the crossing point is signal controlled, if necessary to emphasise the path to be followed by cyclists. It should be noted that special authorisation must be sought from the Secretary of State for its use in any location.

The bicycle symbol diag No 1057 should be used at the beginning of segregated cycle tracks and lanes and repeated at all intersections. If there are no intersections, or they occur at more than 200 metre intervals, repeater symbols (diag No 1057) should be used approximately every 200 metres adjacent to the repeater signs.

In some circumstances, cyclists travelling in the opposite direction on a two-way cycle track should be separated by a 50mm wide intermittent line to diag No 1004 along the centre of the track. Examples of this use are:- when flows are particularly high, the track is narrow, where there are tight bends, steep gradients which give poor visibility and at the approach to junctions.

At junctions and crossings where the cycle track does not have priority the track should be marked with diag No 1003, 1023 and 1057. Markings to diag No 1009 complement diag No 1003 for a two-way cycle track at such locations.

Where an unsegregated cycle track with pedestrian usage joins an all purpose road, the marking to diag No 1003 should be used across the full width of the track and the cycle symbol to diag No 1057 IS NOT TO BE USED.

2.3 Tactile paving

Attention is drawn to the Guidance on the use of Tactile Paving Surfaces issued by the Department of the Environment, Transport and the Regions. Also Traffic Advisory Leaflet 4/90 which gives guidance on the use of Tactile markings. Both of these documents contain text and diagrams relating to the use of tactile paving surfaces at segregated shared cycle track/footway surface and central delineator strip.

Where it is not possible to achieve segregation by means of cycle lanes, physical barriers or level difference the advice contained in the above two documents should be followed.
Section 4 - Signs and Markings

2.4  

**Sign posts**

Sign posts shall not be erected within cycle tracks.

Where room is available a clearance of 0.5m should be provided between the edge of cycle track and edge of sign posts.
Access to shared cycle track from carriageway
Exit from shared cycle track to carriageway

Segregated Shared Use Route at Crossing Point
Section 4 - Signs and Markings

Cycle Track at cross over (cycle priority)
3.0 **Direction signs**

Direction signs are used to give cyclists:-

- Guidance in finding a cycle route
- Warning of and instructions at junctions
- Information about the route destination and distance
- Examples of direction signs are shown in Appendix A.

Advance direction signs should be used where cycle routes meet or cross other routes (diag no. 2601). These can be mounted 1.0 - 1.5 metres above ground level if they are for cycles/pedestrian only. Where the route is on carriageway mounting heights and x heights stated in The Traffic Signs Regulations and General Directions 1994 are to be used.

The x heights used for cycle/pedestrian direction signs are generally 35mm minimum to 60mm maximum however, in Gloucestershire 40mm is considered the norm.

Flag signs (e.g. diag 2602) indicating the start or continuation of a cycle route should, where possible include the destination of the route and the distance.

Wherever bicycle parking facilities are provided, these should be marked with either a sign to diag no. 2603 or 2604. Also direction signs should be provided to direct cyclists to facilities for the carriage of bicycles on other modes of transport i.e. Bike and Ride facilities.

The clear visibility distance of advance direction sign should be 35 metres desirable and 25 metres minimum. For direction signs the clear visibility distance should be 30 metres desirable and 20 metres minimum.

![Figure 2 - Signs mounted on square posts to prevent rotation](image-url)
Section 4 - Signs and Markings

4.0 Warning signs

All warning signs contained within The Traffic Signs Regulations and General Directions 1994 apply to cyclists using the highway. However the most common warning sign to aid the safety of cyclists is the sign to diag no. 950 which warns motorists to be aware of the presence of cyclists, often used where a cycle route crosses a carriageway but their use should also be considered where a cycle route joins a carriageway.

These signs may be erected in advance of a cycle route crossing or joining a carriageway. The position of the sign relative to the crossing or joining point should be in accordance with Chapter 4 of the Traffic Signs Manual Table A.

Although rectangular in shape, signs to diag No 962.1 and 963.1 are effectively warning signs and used for two specific purposes:

i) Sign to diag No 962.1 is used to warn motorists that a cycle lane on a major road crosses the mouth of junction. The sign is generally used in the minor road but if circumstances allow it could be used on the major road opposite the junction.

ii) Sign to diag No 963.1 is used to warn pedestrians that they are about to cross a cycle lane.
5.0 Miscellaneous signs

5.1 No cycling signs

A commonly used regulatory sign is the prohibition of the riding of pedal cycles (diag 951) however there should be a presumption against their use. Clearly this sign is not popular with cyclists, because it may exclude cyclists from routes which are often less hazardous than busy main all traffic routes. Therefore, careful consideration should be given before using this sign. Also consider if an existing Order barring cycling can be safely revoked, this may then open up a route previously banned to cyclists and the sign can be removed.

There may be locations where the use of this sign on a carriageway will act as a safety measure for cyclists. For example at a location where a cycle track has been provided and should be used to ensure that cyclists are not using a potentially hazardous length of carriageway or across the entrance/exit of a slip road. This sign should be used sparingly, and only after all means of designing out potential hazards for cyclists have been explored.

5.2 Regulatory signs and markings

Other regulatory signs are less problematical than the above sign. This is because the other regulatory signs are in common use on the highway and are to be obeyed by all road users. For example the Give Way and Stop Signs (diag nos. 602 & 601.1). The ‘Give Way’ sign is not only used at carriageway junctions but also where there is a conflict between cyclists and pedestrians.

Clearly, all the regulatory signs which are used on the highway are to be obeyed by cyclists as well as any other road users. The only exception would be if exemption plates are used e.g. a ‘No Right Turn’ sign may also have a plate beneath it stating ‘Except Cycles’, provided a Traffic Regulation Order has been made. This applies irrespective of whether the cyclists are on the carriageway or segregated cycle track.

In some situations the advisory sign to diag no. 966 ‘Cyclists Dismount’ may be used. However, this sign should only be used after carefully considering the reasons why cyclists should dismount. The use of ‘cyclists dismount’ and ‘end of cycle route’ signs are rarely justified and usually indicating a flawed or inappropriate design. It should be borne in mind that any cycle route should be coherent and attractive. If cyclists are often being instructed to dismount, the route becomes unattractive or cyclists ignore the signs. There should always be a presumption against the use of this sign unless there are exceptional circumstances.
Examples of regulatory signs are shown in Appendix A.

**5.3 Illumination of signs**

The requirements for the illumination of the signs referred to in this section of the Cycle Facility Guidelines will vary according to the sign being used and its location. Schedule 17 of Traffic Signs Regulations and General Directions 1994 indicates the illumination requirements for each sign, and this must be consulted.

In some cases there is a choice of whether or not to provide direct illumination. In making a judgement it should be remembered that the cyclists own lights are of little assistance in illuminating a sign. Therefore, external illumination may be considered necessary. However, the cost of external lighting units and the attendant cabling and connection charges will also have an influence on the final judgement.
Section 4 – Signs and Markings

Typical Junction Layout
Signs and Markings

Figure 6 – cycle lane terminating at 20mph zone

Figure 7 – cycle lanes at junction with parked vehicles
Section 4 – Signs and Markings

Figure 8 – cycle lanes at road junction

Figure 9 – cycle lanes with no centre line
Section 4 – Signs and Markings

Type A (top) With cycle lane

Type B (bottom) With cycle symbols but no lane

Figure 10 – cycle lanes at parking bays

1. Diag 967
2. Diag 956.1
3. Diag 956.1
4. Diag 956.1

Figure 11 – cycle lanes segregation types

5. Diag 967 (or 959.1)
6. Diag 959.1
7. Diag 967 or 959.1
8. Diag 955 or 959.1

(Note – cycle surface at carriageway level)
Section 4 – Signs and Markings

Figure 12 – markings and surfacing types

Figure 13 – ASL feeder lane stub
Appendix A

Signs
Section 4 – Signs and Markings
Section 4 – Signs and Markings
Section 4 – Signs and Markings

$$\text{Bottesford 30 mins}$$

$$\text{Grantham 1 hr 10 mins}$$

2001.1A
Directions of numbered routes for pedal cycles
forming part of a national cycle route network with
an indication of journey times from a junction ahead

$$\text{Wells 15 mins}$$

$$\text{Glastonbury 15 mins}$$

2002.1B
Directions and journey time to destinations shown along a numbered
route for pedal cycles forming part of a national cycle route network
(Alternative types)
Appendix B

Markings
Section 4 – Signs and Markings

1004 40mph or less and 1004.1 over 40mph
Used in conjunction with diagram 967 to mark boundary of advisory with-flow cycle lane

1009 Longitudinal line to indicate the edge of a road junction, or where the line is laid diagonally across a part of the carriageway to indicate the start of a cycle lane

1049 Line used to indicate boundary of mandatory with-flow cycle lane, or divide segregated cycle/pedestrian path

1049.1 Division of a route into that part reserved for pedal cycles and that part reserved for pedestrians

1003 Transverse give-way marking (half-size option for cycle routes)

1057 To indicate a lane, track or route

1058 End of a cycle lane, track or route

1023 Give-way marking (half-size option for cycles used in combination with 1003)

1059 To indicate the direction in which pedal cycles should travel on a lane, track or route reserved for pedal cycles

WBM 294 Cycle crossing marking (requires site authorisation), only to be used at signal controlled junctions where the route for cyclists is otherwise unclear
Section 5 - Miscellaneous

Section 5 - Miscellaneous
<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Page No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0</td>
<td>Construction details</td>
<td>106</td>
</tr>
<tr>
<td>2.0</td>
<td>Drainage</td>
<td>110</td>
</tr>
<tr>
<td>3.0</td>
<td>Lighting</td>
<td>112</td>
</tr>
<tr>
<td>4.0</td>
<td>Cycle stands and parking</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4.1 Types of parking available</td>
<td>113</td>
</tr>
<tr>
<td></td>
<td>4.2 Legal considerations</td>
<td>114</td>
</tr>
<tr>
<td>5.0</td>
<td>New development</td>
<td>119</td>
</tr>
<tr>
<td>6.0</td>
<td>Cycle audit and review</td>
<td>124</td>
</tr>
<tr>
<td>Appendix A:</td>
<td>Bibliography</td>
<td>125</td>
</tr>
</tbody>
</table>
1.0 Construction details

When designing the structural section for a cycle track, either for joint pedestrian use or solely for cycle use, a major criteria is that the construction is capable of supporting the weight of maintenance vehicles which may, from time to time, need to gain access.

Machine laid cycle tracks are required. Hand laid surfaces may be acceptable for pedestrian use, but they are often uncomfortable for cyclists.

Good quality pavement is crucial. Even minor defects, which for motor traffic may not be significant, can become significant for cycle traffic in terms of:

- Comfort, a bumpy road is uncomfortable to cycle on;
- Effort, a poor surface will increase considerably the energy required to cycle;
- Safety, cycle traffic will naturally avoid any feature such as potholes and the resulting changes in direction are inherently less safe than continuing in a direct course and they can cause falls;
- Attention, a poor pavement distracts attention so that concentration is on avoiding the problem areas of the surface.

For Macadam cycle tracks e.g. those next to the carriageway, new construction should consist of 250mm sub-base in all cases, 50mm binder course and 25mm surface course. Clearly, the application of this standard depends on the type of sub-soil on which the track is to be constructed but in the majority of cases this standard will be adequate. It is normal in Gloucestershire to have a sub-grade consisting of weathered lias– hence 2% or more CBR is used for the determination of the construction thickness. It is recommended that precast concrete edgings are laid, along the edge of the track as this provides level control, prevents crumbling of the surface and makes surface laying easier. However, it is not a necessary prerequisite for all construction, for example, the construction of a track adjacent to a canal is likely to be more suitable without a formal precast concrete kerb edging.

The track surface should provide a route which is safe and comfortable to ride along. The polished stone value (PSV) of the material should provide a reasonable degree of skid resistance. This generally means that materials suitable for footways will be suitable as a cycle track surface course.

At critical locations (e.g. Advance Stop Lines or contraflow lanes) it may be desirable to colour the surface with a thin surfacing material. The materials most commonly used are:
Section 5 - Miscellaneous

- resin based materials with coloured chippings
- slurry seal

The choice of material will be influenced by its location.

- on cycle tracks a slurry seal is the likely choice because it provides a coloured surface at a low cost. The material, however, is not durable for use other than on cycle pedestrian tracks.

- on carriageway a resin based material may be used, this is expensive and the specification shall meet the requirements stated in the Specification for Highway Works clauses 918 and 924.

- the skid resistance of the material should have a minimum PSV of 55.

- it is recommended that naturally coloured chippings be used because there will be no colour loss with wear.

It will be necessary for the designer to make the choice of surfacing based on the following criteria:-

- aesthetic considerations
- suitability for purpose
- construction and maintenance costs
- construction methods
Table 1 gives guidance on cycle track construction.

<table>
<thead>
<tr>
<th>Surface</th>
<th>Layer</th>
<th>Construction details (in-line with BS594987:2007)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Macadam</td>
<td>Surface course</td>
<td>See Figure 1 (below)</td>
<td>Reference Manual for Gloucestershire Streets, Appendix P, Series 1100.</td>
</tr>
<tr>
<td></td>
<td>Binder course</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sub-base</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bredon Gravel</td>
<td>Surface course (Blinding)</td>
<td>5mm nominal thickness of limestone, 3mm to dust</td>
<td>Dust can spray when wet.</td>
</tr>
<tr>
<td></td>
<td>Sub-base</td>
<td>250mm thick Type 1 granular material</td>
<td>Alternative surface materials may be appropriate in some areas. Can be surface dressed.</td>
</tr>
<tr>
<td>Block paving</td>
<td>Surface course</td>
<td>80mm thick precast blocks or bricks</td>
<td>Unless carefully laid – gives a poor riding quality.</td>
</tr>
<tr>
<td></td>
<td>Binder course</td>
<td>35mm clean sharp sand to BS EN 12620 grading C.</td>
<td>Particularly hazardous in icy weather</td>
</tr>
<tr>
<td></td>
<td>Sub-base</td>
<td>225mm Type 1 granular material</td>
<td></td>
</tr>
</tbody>
</table>
Figure 1 – Cycle Track Construction Details

NOTES
1. Edgings and kerbs are measured separately.
2. Completion of formation is measured in Series 600.
3. Acceptable fill, measured in Series 600.
4. Peas, bedding, and edgings to be laid after completion of formation.
5. Macadam shall be copied to formation surface in accordance with Clause 1171 where specified in the contract.
6. Sub-base material to be granular Type 1 complying with Clause 686.
7. The flexible construction depths have been based on a Subgrade CBR of 3%. 
8. Refer to Contract Drawings & Appendix 11/1 for permitted flexible surfacing materials.

GROUP 4 Construction shall comprise:
25 Tarmac Course
50 Basecourse
250 Sub-base

GROUP 4.1 Tarmac Base, Construction shall comprise:
25 Tarmac Course
300 Tarmac Recycled Material

Note: Group 4.1 Construction shall be the preferred option when Tarmac Base is available

GROUP 5 Construction shall comprise:
370 Sub-base
Irrigated with 3mm lime-stone dust to completely cover the underlying sub-base
2.0  Drainage

The use of french drains should be considered if the construction is likely to become water logged.

The wearing/surface course should be laid to falls to prevent ponding on the track. A cross fall of 2.5% (1 in 40) is recommended. See Section 1 - Links in Urban Areas paragraph 1.2. Ensure that surface water can run off the track unimpeded as excessive water on bicycle wheels renders the braking system very ineffective.

Consider the use of a french drain on the uphill side of a track which is situated on the side of a hill, or at the bottom of an embankment. French drain to be constructed in accordance with the Manual of Contract Documents for Highway Works Volume 3.

Gullies

The use of gullies on a cycle track is likely to be rare because generally the longitudinal and crossfalls provide sufficient means for the surface water to run off the edge of the track. However, in the event of a gulley grating being necessary ensure that the frame and grating is positioned such that the grating slots are at right angles to the cycle flow.

Cycle lanes, if provided, constrain cycle traffic to a position in the road near to the kerb. Unless forced by the particular traffic circumstance, cyclists will not cycle over gully gratings.

Where cycle lanes exist it is important that iron works are in good condition as there is a greater probability that they will have to be ridden over by cyclists. Gullies with gratings parallel to the kerb should be replaced.

It is essential that, when a cycle lane is created, the gully gratings and road surface in the channel are checked for smoothness of ride.

Alternative forms of drainage to be considered includes:

• narrow width gratings;

• combined kerb and drainage channels;

and

• side entry gullies in the kerb face.
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Gratings in gullies should be aligned perpendicular to the direction of travel. Otherwise square grid gully gratings should be used. The rigid nature of the structure beneath a gully will lead to high stresses in the surrounding bituminous road pavement.
3.0 Lighting

Cycle tracks which are within the highway boundary and particularly in urban areas will not generally require additional lighting units. The level of lighting provided for the carriageway will probably be sufficient for the cycle track. However, because of changing standards it is necessary to consult with street lighting section regarding each specific scheme. (A list of contact personnel is given below). Reference should also be made to the Institution of Lighting Engineers Technical Report Number 23 – Lighting of Cycle Tracks.

Technical design guidance may be found in TR23, Lighting of Cycle Tracks (ILE, 1998).

Where cycle tracks are not lit by the lighting units provided for the carriageway, consideration must be given to the design of a lighting system for that particular scheme. The lighting system must be designed to current standards and provide the correct level of lighting on the surface of the cycle track.

Cycle routes which pass through underpasses or make use of footbridges will require specialist lighting units. If an existing pedestrian subway is being converted to joint cycle/pedestrian use a review of the existing lighting system must be carried out. Avoid dark areas where those with antisocial tendencies can hide.

Consider additional lighting at intersections with all purpose highways, major accesses to footpaths and footways.

Clearly the location of lighting columns and other equipment associated with lighting must be located in a position which will not cause an obstruction to the user.

Consideration could be given to the introduction of flush solar powered road studs to mark the edges of the cycle track. Experience in Cambridgeshire has found these to be helpful in combating the effects of dazzle at 12m centres. Because the light the studs give out is directional the spacing should be tightened up at points such as bends, bollards and bridges. Red studs can used to denote where it is necessary to give way. Away from the carriageway the distance apart has been increased to 36m centres to good effect. Supply and installation costs can be expected to be in the region of £60 each for 120 with the price falling in the case of larger numbers.
4.0 Cycle stands and parking

Good quality cycle-parking can encourage the use of cycles especially if provided at key locations near shops and other businesses, railway and bus stations.

It is often the lack of parking facilities that deters many potential cyclists from using their machines for commuting or shopping because of the fear of having them stolen. It is estimated that some 600,000 pedal cycles are stolen nationally each year and only 10% of them are returned to their rightful owners.

Carefully planned provision of secure parking facilities will also give confidence to existing users that their machines will be where they left them when they return. Planning parking areas with proper parking facilities give a far neater and less cluttered appearance in the street scene than the use of railings, lamp columns and down pipes etc. The risk of obstructions to pedestrians, especially the visually impaired is also reduced. Generally 10 cycles can be parked in the space required for 1 car.

As a consequence of the nature of cycling – its mobility and the users ability to cycle right to the intended destination – cyclists will want to park immediately outside the venue they wish to visit. To achieve this, the designer would be advised to consult with local cycle user groups to review existing arrangements and to identify new sites. Local knowledge can be extremely useful. Where cycle parking provision is not conveniently placed cyclists will attach their machines to nearby fixed features. Clearly, a predicted usage needs to be assessed bearing in mind that by providing a well signed cycle facility to a particular venue will ultimately increase the number of cyclist arriving there.

As well as being conveniently located, cycle parking also needs to be secure, easy to use, well lit, signed, and if possible sheltered. It is also a plus point if the parking area is overlooked from people in buildings or passers by. It should not be hidden away in the back of a car park or some little used alley. The location of cycle parking in a prominent place within a car park is not only good for security but also gives the message that cycling is important and more convenient than car parking. To maximise security the facility should be such that it is possible to lock both the frame and the wheels to the fixture. The stands which support one or both wheels often known as butterfly holders are not so satisfactory and can result in damage to the bicycle.

4.1 Types of parking facilities available

For short to medium term parking say 30 mins or less at shopping centres or libraries where the main priorities will be security, ease of use and accessibility the Sheffield stands or wall loops are recommended.
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The Sheffield stand:
- provides good support to the machine
- the 1.0m space allows two cycles to be locked side by side
- space either end to allow cycles in and out

Wall loops or bars:
- simple and cheap
- not practical for securing wheel and frame unless long chain is used.
- useful if a substantial length of wall is available.
- permission required.
- almost maintenance free

For long stay, e.g., the commuter where parking in excess of two hours is required. The user will no doubt be looking for additional security, and shelter and may well be prepared to pay for the privilege. In these cases cycle lockers or supervised cycle parks will be appropriate.

Cycle lockers can be very secure but they do need regular surveillance. An advantage is that not only is the bicycle secured but also any accessories and clothing. They have been successfully installed at multi-storey car parks in positions that can be seen by the attendant.

Sheffield stands with the availability of luggage lockers nearby can be a substitute for cycle lockers.

Security of cycle lockers can be by means of one or more of the following:
- users provide their own padlocks
- unlocked by a SMART card
- can be hired long term weekly monthly or annually

A major disadvantage is the initial outlay which is in the order of £600 - £800 plus installation costs compared with the Sheffield stands which are in the order of £35 plus installation. (1998 costs).

Further information can be found in Traffic Advisory Leaflet 7/97 – “Supply and Demand for Cycle Parking.

4.2 Legal considerations

A brief mention of the legal position with regard to the provision of cycle parking facilities is given below.

Section 63 of the Road Traffic Regulation Act 1984 enables Local Authorities to make an Order to provide stands or racks for cycles on the highway. One Order is required for an administrative area but all sites must be listed on a schedule.
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There are also powers under section 249 of the Town and Country Planning Act 1990 which enables Local Authorities to introduce cycle parking into areas which have been pedestrianised.

Referring to Planning Policy Guidance note 13 – Transport (PPG13) and planning permissions for new developments and redevelopments para: 4.17 states that:

“Authorities should encourage the provision of secure cycle parking at public transport interchanges, including railway stations and park and ride facilities, to increase the opportunities to use cycles in combination with public transport and car sharing. Provision of secure cycle parking facilities should be sought in all major developments and in town centres and at educational institutions”.

Figure 4 – Sheffield Stand Layout
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Figure 4 – Cycle Store Layout

Figure 4 – Wall Bar Layout
### Cycle parking - Good practice

| **Visible:** Parking facilities should be well signed, easy to find and benefit from good natural surveillance. Good citing and high quality facilities will help demonstrate the importance of cycling as a transport mode. |
| **Accessible:** Parking should be located as close as possible to the final destination (generally within 30m). It should be easy to get to, involving no detours, and should be well laid out with no difficult ramps or awkward stands to deal with. |
| **Safe and Secure:** It should give cyclists the confidence that their bike will still be there when they return. Adequate provision should be made for the bicycle to be secured with its owners lock unless other security arrangements make this unnecessary. The facility should help users feel personally secure - those that make users feel at risk will not be used. |
| **Consistently available:** In places such as shopping areas, small clusters of stands at frequent intervals are usually better than larger concentrations at fewer sites. |
| **Covered:** The level of protection from the weather should be appropriate for the length of stay. Poor protection at long-term parking places will deter cycle use. |
| **Easy to use:** Parking facilities should be easy to use by all members of the community, accept all types of bicycle, and adequately support the frame. Cycle racks that require a bicycle to be lifted are often ignored in favour of locations requiring less effort, such as railings or street furniture. Bikes parked too close together can cause cables and handlebars to snag. Where provided, locking mechanisms should not be difficult to operate and instructions should be easily understood. |
| **Fit for purpose:** Racks and other support systems which only grip the front wheel should not be used since they provide poor stability and do not allow the frame to be secured. Also, if one bike falls it can damage not only itself but those next to it. Cycle parking should not be sited where it will get in the way of pedestrians, especially those whose vision is impaired. Abandoned bicycles should be promptly removed. |
| **Well managed and well maintained:** Charges (if any) should be set at a level that will encourage use. Coin-operated locks should be properly maintained and not attract thieves. The process of paying charges for renting lockers etc. should be as simple as possible. Automated systems or electronic smart card operation should not create delays at peak periods. |
| **Attractive:** The design of cycle parking facilities should be sensitive to the surrounding area. It should also be attractive in the sense that users do not feel personally at risk because it has been placed out of sight of passers-by. |
| **Coherent:** It should relate well to other cycle infrastructure. There should be no road safety hazards, such as dangerous junctions or severance by busy roads likely to create a barrier to its use. Where possible, signed identified routes leading directly to the cycle parking, should be provided. |
| **Linked to other needs of cyclists:** Where provided at public transport interchanges or in city centres as cycle centres, opportunities to combine with cycle hire, tourism etc. |
5.0 **New development**

Designers attention is drawn to the Gloucestershire County Council document – “Manual for Gloucestershire”.

The document is a guide for prospective developers and contains a section relating to the design of cycle tracks which will be to an adoptable standard. (paragraphs 4.1.106 to 4.1.112 inc).

Planning applications for development proposals should be examined to determine opportunities for improving conditions for cyclists. Particular attention should be given to GCC’s ‘Travel Plan Guidance’.

Facilities that are promoted by developers should be checked against the Safe, coherent, direct, comfortable and attractive core principles described in Introduction of this Guidance document.

Developers should link developments which would generate or attract a significant number of trips with the network of existing and intended cycle routes and in turn to populated areas and/or everyday existing facilities. In some cases, the enhancement or improvement of the existing network may also be required. Safe routes within the confines of a development site must also be provided, to ensure that cyclists can access any destination, in particular cycle parking, conveniently and safely.

New developments should aim to make cycling and walking more attractive while lessening the advantage of motor traffic.

The segregation of cyclists from fast flowing vehicular traffic on arterial routes is sometimes necessary. However, away from arterial routes, where the prime purpose of road space is one of local circulation, it is desirable for road space to be shared, this is particularly relevant for residential or home zones. New residential roads in particular should be designed with the needs of cyclists and with low traffic speeds in mind. Traffic calming may be required to achieve this as well as the use of ‘Home Zones’.

The type of provision to be proposed in the development’s planning permission should be in-line with the 5 core principles, the design type of cyclists expected and the hierarchy of provision.
Notes
1) Consider how the development site is best connected to nearby main routes, public transport, existing cycle links and local schools and facilities.

2) Aim to maximise integration and movement by offering direct links for cyclists and pedestrians. The layout of the site should aim to provide through routes for cyclists and pedestrians whilst limiting vehicle access.
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Development Control Checklist

*General issues* to be considered include the following:

• can development be easily accessed by bicycle?

• are there any road crossings needed?

• how does the proposal affect the need to travel?

• how does the proposal affect the lengths of trips?

• how might the development contribute to increased cycle use?

• how does development relate to cycle route proposals in area?

• can through cycle routes be created through the development?

• can more direct access to the site be provided by bicycle than car?

• what would a good Travel Plan for the development contain?

• how have the results of consultation with local cyclists been used to help to help capture local knowledge of cycling opportunities.

*Housing Sites*

Is it safe and attractive to cycle to:

• local primary and secondary school;

• local facilities e.g. library, sports centre, park;

• nearby employment areas;

• local shops and town centres; railway or bus station;

• is there a need for a green travel pack for people buying houses on the estate?

*Employment sites/Retail sites*

Is it safe and attractive to cycle to the site from:

• housing areas within one mile of the site?

• housing areas between one and three miles of the site?
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• nearby railway or bus station?

• nearby shops?

**Specific on-site issues** include the following:

• how is movement for cyclists catered for within the development?

• is the quantity of cycle parking proposed adequate?

• is cycle parking of the correct type, Sheffield stand or lockers; weather protection?

• is there a need for shower and changing facilities?

• are any off-highway cycle facilities adequately secure (lighting, CCTV etc.)?

• are through movements accommodated?

**Route issues** include the following:

• are the shortest routes being used?

• does the development location require network changes remote from the site, e.g. are essential connections needing to be opened up?

• would parked vehicles obstruct cycle links?

• are potential future leisure routes (e.g. disused railway lines) sufficiently protected from the development?

• does the development suggest a need for traffic volume reduction or speed reduction?

• can cycle links be provided through the development and to possible future developments

**Other off-site issues** include the following:

• would payment for off-site cycle parking be a possibility (e.g. at an originating railway station)?

• are there needs to enhance cycle integration with public transport (e.g. additional signing to public transport nodes?)
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*Post implementation considerations*

- do new facilities need to be promoted (e.g. leaflets)? (Can the developer contribute to this)?
- are there new enforcement issues created (e.g. speed and parking)?
- what maintenance issues are created (e.g. sweeping)?
- would it be useful to monitor cycle use?
- is there a need for developer contribution to future maintenance?
- are cycle monitoring sites needed?
- has adequate signing been provided?
6.0 Cycle audit and review

There is a need to audit or review all schemes to ensure that the needs of cyclists are built into the local transport planning process. Audit procedures can help ensure that the needs of cyclists are not overlooked in the building of new schemes. Also the review of existing schemes from the cyclists point of view can highlight places on a cycle route which are potentially hazardous and improvements can be made to assist the safety of the users.

To assist with the audit and review process a document entitled “Guidelines For Cycle Audit and Review” has been published by The Institution of Highways and Transportation (September 1998). As the title of this document suggests, guidance is given about what type of scheme should be audited, when the audit should take place e.g. different design stages and who should carry out the audit. Similar guidance is also given for the review process. Also contained in this document are samples of forms which provide a useful check list for the auditor or reviewer.

This guidance should be read in conjunction with the previously published National Cycle Strategy, The Cycle-Friendly Infrastructure and the Gloucestershire County Council Cycle Facility Guidelines.

The recent guidance on Quality Audits (TAL 5/11) also provides context to the use of Cycle Audit and Review.
Appendix A

Bibliography
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