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**VOLUME 6    ROAD GEOMETRY**  
**SECTION 3    HIGHWAY FEATURES**

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**PART 5**

**TA 90/05**

**THE GEOMETRIC DESIGN OF  
PEDESTRIAN, CYCLE AND  
EQUESTRIAN ROUTES**

**SUMMARY**

This Advice Note provides guidance on the geometric design for NMU off-carriageway routes associated with trunk road or motorway improvement schemes.

**INSTRUCTIONS FOR USE**

This is a new document to be inserted into the manual.

1. Remove Contents pages from Volume 6.
2. Insert new Contents page for Volume 5 dated February 2005.
3. Insert TA 90/05 into Volume 6, Section 3.
4. Please archive this sheet as appropriate.

Note: A quarterly index with a full set of Volume Contents Pages is available separately from The Stationery Office Ltd.



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**THE DEPARTMENT FOR REGIONAL DEVELOPMENT  
NORTHERN IRELAND**

# **The Geometric Design of Pedestrian, Cycle and Equestrian Routes**

**Summary:** This Advice Note provides guidance on the geometric design for NMU off-carriageway routes associated with trunk road or motorway improvement schemes.

**REGISTRATION OF AMENDMENTS**

Amend No	Page No	Signature & Date of incorporation of amendments	Amend No	Page No	Signature & Date of incorporation of amendments

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# 1. INTRODUCTION

## General

1.1 A variety of guidance exists on aspects of designing for non-motorised users (NMUs). NMUs are considered to be pedestrians, cyclists or equestrians. Particular consideration needs to be given to the needs of disabled people, who may use any of these modes.

## Scope

1.2 This Advice Note provides guidance on the geometric design for NMU off-carriageway routes associated with trunk road or motorway improvement schemes. The advice is also relevant for NMU routes away from trunk roads constructed as part of a trunk road improvement, and for aspects of crossing the trunk road not dealt with in BD 29 (DMRB 2.2.8), TD 36 (DMRB 6.3.1) or TD 50 (DMRB 6.2.3). For general advice covering on-carriageway routes, designers should refer to 'Cycle Friendly Infrastructure' (IHT, 1996), the Traffic Signs Manual Chapter 5 (DfT, 2003) and other guidance.

1.3 This Advice Note does not cover issues of route choice, scheme assessment, signing, or more general aspects of designing for NMUs. These are covered in TA 91 (DMRB 5.2.4), which should be referred to in conjunction with this document. Designers are also referred to HD 42 (DMRB 5.2.5), which sets out procedures for ensuring that scheme designs have considered the needs of NMUs.

1.4 This Advice Note and those identified above wholly supersede TA 67 (DMRB 5.2.4) and Chapters 8 and 11 of TA 57 (DMRB 6.3.3).

1.5 For the purpose of this Advice Note, users of electrically assisted pedal cycles or powered wheelchairs and invalid carriages, that conform with current Department for Transport Regulations and may legally be used on pedestrian and cycle facilities, are also considered as NMUs. Where there is known to be regular use of these vehicles, design parameters for cyclists should be used.

1.6 As with all highway design, there is a need to balance issues of safety and practicality. This Advice Note provides 'preferred' and 'acceptable' minimum values based on best available evidence, but in

exceptional circumstances it may be appropriate to apply some flexibility in using these figures over short distances and where other measures are used such as 'SLOW' markings to encourage lower speeds.

## Implementation

1.7 This Advice Note should be used forthwith on all schemes for the construction, improvement and maintenance of trunk roads currently being prepared provided that, in the opinion of the Overseeing Organisation, this would not result in significant additional expense or delay progress. Design Organisations should confirm its application to particular schemes with the Overseeing Organisation. Where this is confirmed, the contract documents for the Works should be written to reference this Advice Note.

1.8 This Advice Note does not apply in Scotland.

## Definitions

1.9 The following definitions have been used within this document:

- a **shared use** route is an unsegregated facility used by more than one type of NMU, for example pedestrians and cyclists or pedestrians, cyclists and equestrians;
- an **adjacent use** route is one with clearly defined segregated areas for different types of NMU. Segregation may be by white line or by a physical feature such as a verge, a fence or a kerbed level difference.

## 2. DESIGN SPEED

2.1 In designing facilities for pedestrian-only use, it is not necessary to consider design speed. However, it is important in designing facilities for use by cyclists and equestrians, as it affects other design parameters such as visibility.

### Cyclists

2.2 Design speeds for cyclists can vary according to different types of user. The design cyclist types are:

- fast commuter;
- other utility cyclist;
- inexperienced utility cyclist (may travel more slowly than regular cyclists);
- child; and
- users of specialised equipment.

2.3 Different authorities in the UK and overseas have used a range of design speeds, from 10 kph to 50 kph. However, cyclists travelling in excess of 30 kph are less likely to be using off-carriageway facilities.

2.4 A design speed of 30 kph should be adopted for most off-carriageway cycle routes. However, where a cyclist would expect to slow down (e.g. on the approach to a crossing or a subway) the design speed may be reduced to 10 kph over short distances, with use of 'SLOW' markings.

2.5 The design speeds appropriate for different route types are summarised in Table 2.1.

	Design Speed
Acceptable minimum (over short distances)	10 kph
General off-carriageway cycle route provision	30 kph

**Table 2.1 – Design Speed for Off-Carriageway Cycle Routes**

### Equestrians

2.6 The concept of design speed for equestrians is unusual, as there are different speeds at which horses progress, depending upon the type of activity being undertaken (such as leisure or fitness training) and the surrounding environment.

2.7 There are three basic speeds of travel: walk, trot and canter. The speed is particularly affected by route surface. Grass and wood chip bark can provide adequate surfaces for cantering, whereas routes surfaced with bituminous materials are generally discouraged and would only make walking or a slow trot possible. In areas close to motorised traffic, horses may be walking, or occasionally trotting briskly, to minimise the time spent by a busy road.

2.8 Tables 2.2 and 2.3 show design speeds for different circumstances. In Table 2.2 'remote from carriageway' means that the road is either:

- generally not visible due to screening or planting; or
- visible, but more than 6m from the equestrian route.

Situation	Expected Speed
Adjacent to carriageway	Walk
On approach to crossing	Walk
Remote from carriageway (for <50m length)	Walk
Remote from carriageway (for > 50m length)	Trot/Canter

**Table 2.2 – Expected Speeds for Equestrian Routes**

<b>Type of Use</b>	<b>Design Speed</b>
Trot/Canter	20 kph
Walk	10 kph

**Table 2.3 – Design Speeds for Equestrian Routes**

**Shared Routes**

2.9 Where routes are shared with other users, the design speed of these routes should be relevant to that of the fastest user (see Table 2.4).

<b>Shared Users</b>	<b>User for determining Design Speed</b>
Pedestrian/Cycle	Cycle
Pedestrian/Equestrian	Equestrian
Cycle/Equestrian	Cycle
Pedestrian/Cycle/Equestrian	Cycle

**Table 2.4 – Design Speeds where Use is Shared**



### 3. VISIBILITY

3.1 The following require consideration:

- the forward visibility for cyclists and/or equestrians along a route, such that an appropriate Stopping Sight Distance (SSD) and eye to object height are met; and
- the visibility at junctions or crossings, to enable both the NMU to see approaching traffic, and for other users on the main route to see NMUs about to cross.

#### Stopping Sight Distances on NMU Routes

3.2 SSD is the distance for a rider to perceive, react and stop safely in adverse conditions, such as on wet asphalt or where the surfacing is loose. It is measured in a straight line between any two points on the centre of route, and sighting across the highway boundary line is not permitted. It should, however, be noted that cyclists and equestrians generally have a greater ability to avoid momentary obstructions than vehicular traffic. SSDs for cyclists are given in Table 3.1, and the corresponding figures for equestrians are shown in Table 3.2.

Design Speed	Preferred Minimum Stopping Sight Distance
30 kph	30 m
10 kph	10 m

Table 3.1 – SSD for Off-Carriageway Cycle Routes

Design Speed	Preferred Minimum Stopping Sight Distance
20 kph	30 m
10 kph	10 m

Table 3.2 – SSD for Equestrian Routes

#### Eye and Object Heights

3.3 Designers should ensure that an object at the minimum SSD is visible from a range of eye heights. For cyclists, an eye height range of 1.0m to 2.2m should be used, which accommodates a range of cyclists from children and recumbent users to adults (see Figure 3.1). The object height should be taken as a range from ground level to 2.2m, as cyclists need to be able to observe deformations, holes and objects which could interfere with safe progress.

3.4 For equestrians the rider's eye height should be taken as 1.5m to 2.7m. This accommodates a range of horse riders from children on ponies to adults on larger horses (see Figure 3.2). The object height should again be taken as a range from ground level to 2.2m, so that riders can observe deformations, holes and objects which could interfere with the horse's safe progress.

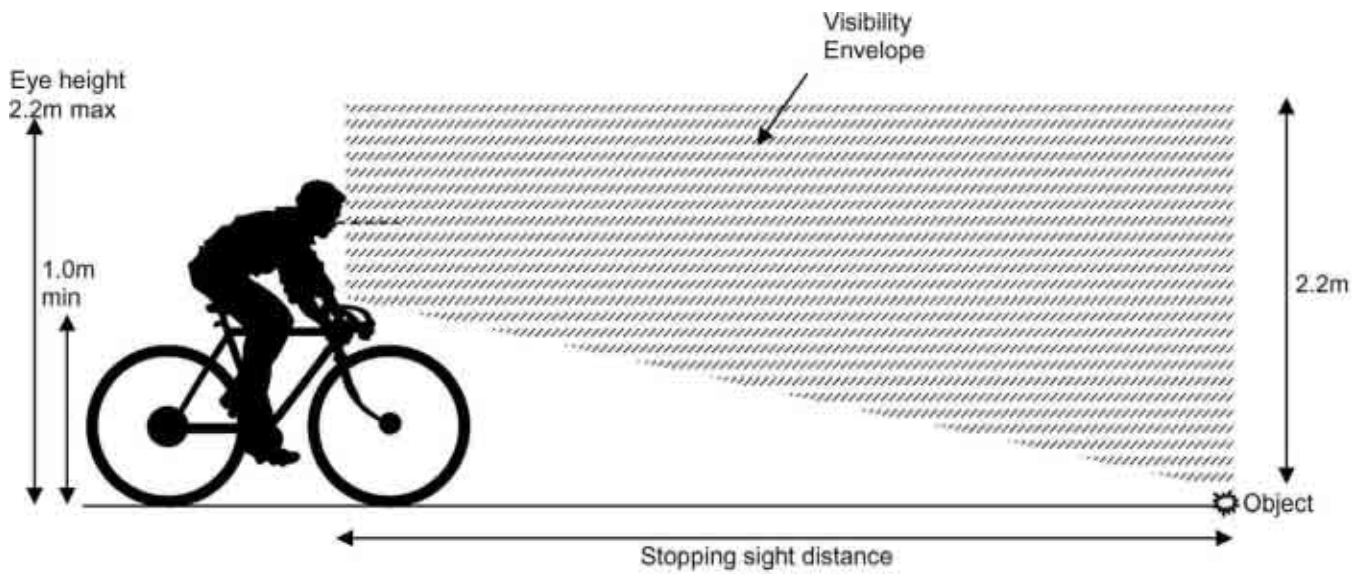


Figure 3.1 – Forward Visibility for Cyclists

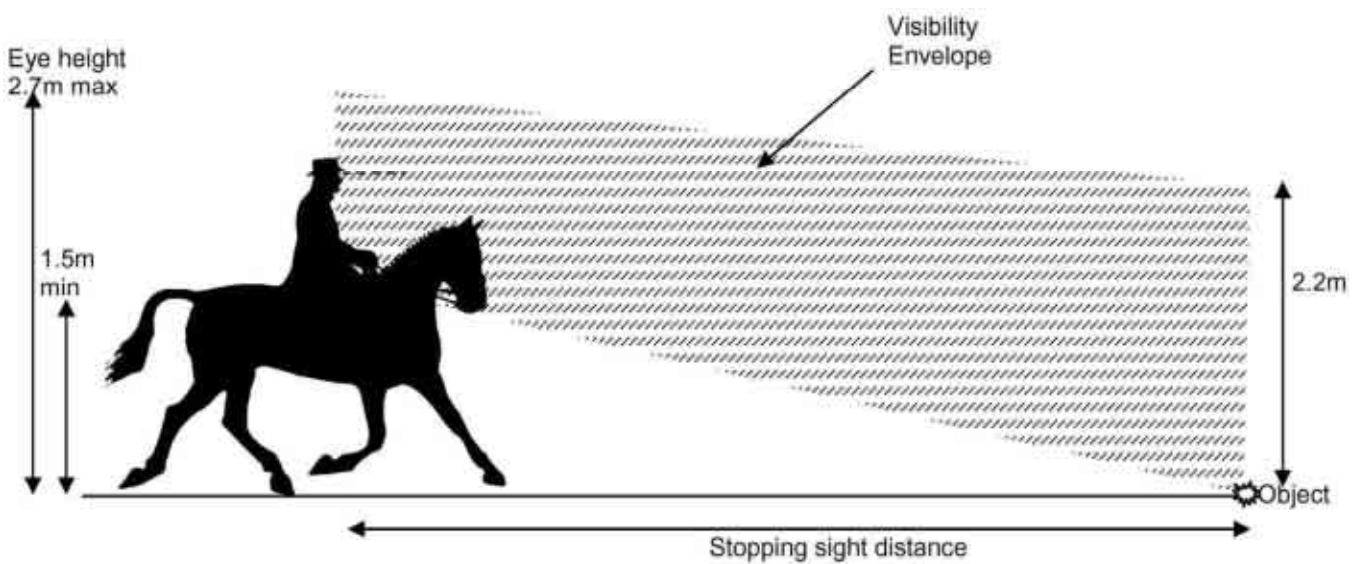


Figure 3.2 – Forward Visibility for Equestrians

### Momentary Obstructions

3.5 Street furniture, trees and shrubs should be located outside of the envelope of SSD where practical. In particular, trees can obscure pedestrians from approaching cyclists. Isolated objects with widths of less than 300mm are unlikely to have a significant effect on visibility and may be ignored if removal is not practicable. For unmovable obstructions wider than 300mm it may be necessary to provide markings to guide cyclists and equestrians accordingly.

### Visibility to and from NMU Crossing Points

3.6 Any crossing of a trafficked road should be located such that drivers of vehicles have full visibility of NMUs wishing to use the crossing point. Desirable minimum SSD to TD 9 (DMRB 6.1.1) should be available for drivers on the highway approaching an NMU crossing point.

### Visibility Splays at NMU Route Junctions

3.7 A visibility splay should be provided for NMUs approaching crossings and junctions where they have to stop or give way. "x" and "y" distances are defined, as shown in Figure 3.3.

3.8 The "x" distance is normally measured from a give way line, back along the centre line of the minor

arm. The "y" distance is measured along the edge of the main road or NMU route.

3.9 For pedestrians, the preferred "x" distance is 2.0m, to allow for the needs of disabled people and users with prams.

3.10 In designs for motorised vehicles, the "x" distance is based on the position of a second vehicle approaching the junction being able to see the full "y" distance without stopping. However, this does not need to be applied to cyclists in the same way. A longer "x" distance provides greater capacity for emerging vehicles, but too great an "x" distance encourages greater minor route approach speeds.

3.11 The preferred "x" distance for cyclists is 4.0m, which equates approximately to the length of two cycles. This provides a reasonable distance for cyclists to slow down and observe the full "y" distance necessary. While every effort should be made to achieve the desirable value of 4.0m, in practice, the "x" distance that can be achieved for existing roads may be limited by the trunk road verge width. In these cases the "x" distance can be reduced to a minimum of 2.5m.

3.12 Where the crossing is approached by means of a "jug handle" from a route parallel to the trunk road, the speed of approach of cyclists is less than for a route which approaches the crossing at right angles. In these circumstances, the "x" distance can be reduced to 1.0m.

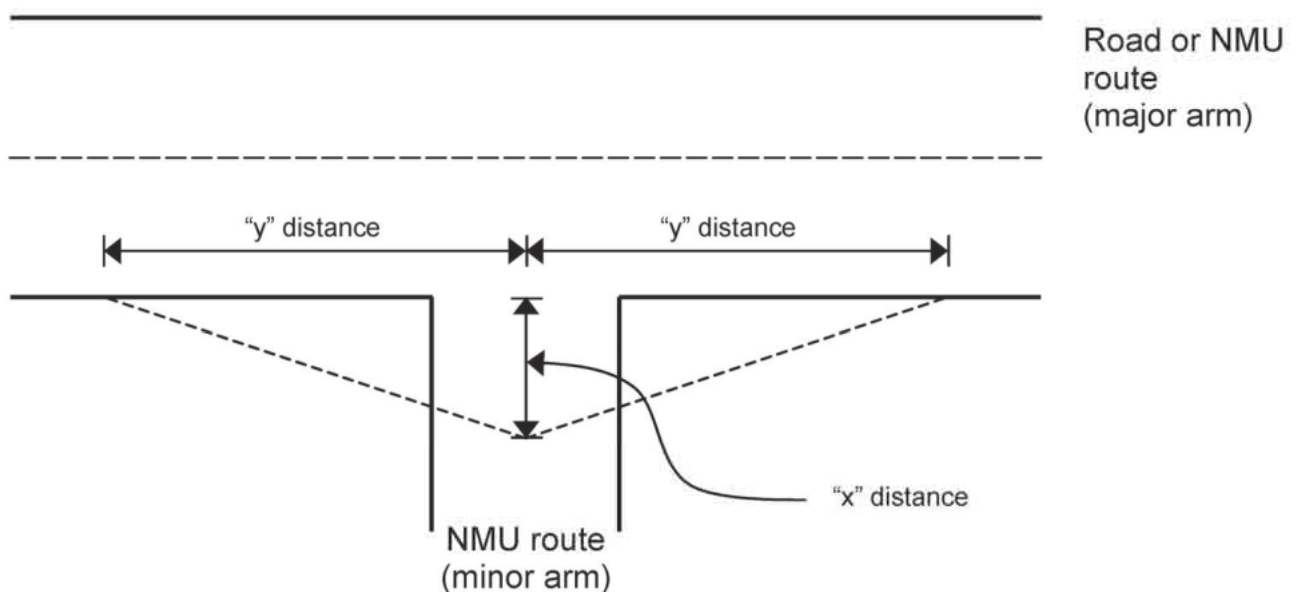


Figure 3.3 – Visibility Splay for NMU Route

(A “jug handle” is a left hand diverging lane loop, as defined and illustrated in paragraph 2.17 and Figure 2/4 of TD 42 (DMRB 6.2.6)).

3.13 The preferred minimum “x” distance for equestrians is 5.0 m. Where an “x” distance of 5.0m is not achievable, it may be reduced to a minimum of 3.0m. It should be noted that a horse may view the major route vehicle before the rider.

3.14 A summary of “x” distances is provided in Table 3.3.

3.15 Where the main route is a public road, the “y” distance for pedestrian and cycle route crossings should be the same “y” distance identified for vehicles in TD 42 (DMRB 6.2.6). However, equestrians require greater visibility, as there is a reaction time between rider perception and the movement of the horse, and it takes additional time for the horse to move fully into the carriageway. Only at this point does it become a visible hazard to the motorist, and at this stage it will

not normally be possible for the rider to turn back or stop. As such, at equestrian crossings, it is recommended that visibility be provided as shown in Table 3.4. However, see also paragraph 3.18.

3.16 Where an NMU route meets a cycle or equestrian route at a junction, the “y” distance should be equivalent to the SSD for the major cycle/ equestrian route, as shown in Tables 3.1 and 3.2.

3.17 A summary of “y” distances is provided in Table 3.4. These should be measured from an eye height of 0.9m to 2.0m for pedestrians, 1.0m to 2.2m for cyclists and 1.5m to 2.7m for equestrians. The object height should be taken as 0.26m to 2.0m in accordance with TD 9 (DMRB 6.1.1).

3.18 Where it proves difficult to achieve the visibilities set out in this chapter, measures that reduce speeds on the major arm, commensurate with the maximum visibility that can be practically provided, should be considered.

	<b>Preferred</b>	<b>Acceptable</b>	<b>Minimum for “Jug Handle” crossing</b>
Pedestrian	2.0 m	1.5 m	N/A
Cycle	4.0 m	2.5 m	1.0 m
Equestrian	5.0 m	3.0 m	N/A

**Table 3.3 – Minimum “x” Distances for NMUs at Crossings**

<b>Minor Route</b>	<b>85<sup>th</sup> percentile approach speed on mainline</b>	<b>Main Route</b>		
		<b>Mainline carriageway</b>	<b>Off-carriageway cycle route</b>	<b>Equestrian Route</b>
Pedestrian/Cycle	All	As in TD 42 (DMRB 6.2.6)	As in Table 3.1	As in Table 3.2
Equestrian	50kph	135m	As above	
	60kph	168m		
	70kph	211m		
	85kph	270m		
	100kph	345m		
	120kph	At-grade crossing not recommended (See Chapter 9 and TA 91 (DMRB 5.2.4) for further details)		

**Table 3.4 – Preferred Minimum “y” Distances for NMU Routes at Crossings**

## 4. ALIGNMENT

4.1 NMU routes need to be practical to use. NMUs will avoid routes that include diversions, frequent obstacles and fragmented facilities. The principles of good overall design are described further in TA 91 (DMRB 5.2.4).

### Horizontal

4.2 Changes in horizontal alignment should normally be via simple circular curves, rather than straight sections with occasional sharp curves. Providing appropriate radii in both horizontal and vertical planes should help to ensure that appropriate forward visibility for cyclists and equestrians is achieved.

4.3 At corners and junctions, the internal corners of footways should be splayed to assist the passage of wheelchairs and pushchairs. Surface undulations, steps and gaps may cause problems for people with mobility or sensory impairments.

4.4 The preferred minimum radius for cycle routes is 25m. For sections of the route where the design speed is 10kph, a preferred minimum radius of 4m should be provided and consideration should be given to widening the track and providing warning signs. Table 4.1 summarises the preferred minimum radii for cyclists.

Design Speed	Preferred Minimum Radii
30 kph	25 m
10 kph	4 m

**Table 4.1 – Preferred Minimum Radii**

### Vertical

4.5 Severe crest curves are unlikely to occur along cycle tracks or equestrian routes and hence achieving adequate forward visibility in the vertical direction will rarely cause difficulties. However, this should be checked.

4.6 For comfort, there should be a preferred minimum crest K value of 5.0, and an acceptable minimum crest K value of 1.6, along off-carriageway cycle routes. For the definition of crest K value, refer to TD 9 (DMRB 6.1.1).

## 5. GRADIENT

### Pedestrian-Only Routes

5.1 Gradients along new pedestrian routes are considered in HD 39 (DMRB 7.2.5). Gradients of NMU routes across footbridges are considered in BD 29 (DMRB 2.2.8). Further information is also given in 'Inclusive Mobility – A Guide to Best Practice on Access to Pedestrian and Transport Infrastructure' (DfT, 2002).

### Off-Carriageway Cycle Routes

5.2 Care should be taken in designing off-carriageway cycle routes to ensure that gradients are kept to a minimum. The type of surface is important on slopes, since the ability of the cycle tyres to grip the surface will depend upon the frictional resistance of the surface, as well as its gradient.

5.3 The speed of travel is another important factor to consider, as well as the length of the gradient. Steep gradients can lead to relatively high speeds for descending cyclists or very low speeds for climbing cyclists, which can create hazards for all users of the route. Stopping distances also increase significantly on gradients in excess of 5%. Obstacles and sharp bends at the top or bottom of steep and/or long gradients should be avoided.

5.4 The preferred maximum gradient for off-carriageway cycle routes is 3%, with an acceptable maximum of 5%. Where new routes are constructed adjacent to the existing carriageway, the gradient will often need to reflect conditions on the adjacent road. As such, where it is not practicable to provide gradients less than 5%, steeper gradients may be considered over short distances. In these circumstances, signs advising cyclists of the need to proceed with care should also be considered.

5.5 At the base and top of gradients exceeding 2%, a level plateau at least 5m long is desirable in advance of give way or stop lines.

### Equestrian Routes

5.6 Care should be taken in designing equestrian routes to ensure that gradients are kept to a minimum for the rider and horse to progress safely. The ability of

the horse's hooves/shoes to grip the surface will depend upon the frictional resistance of the surface, as well as its gradient, and whether the horses are shod with horseshoe road studs or similar.

5.7 Most routes that cater for equestrian use will also be available to cyclists, and as such the advice in paragraph 5.4 will apply. For equestrian routes where cycle use is prohibited, the preferred maximum gradient is 20%.

5.8 Where gradients are at the maximum for an equestrian route, the material on this gradient should be non-slip surfacing (refer to HD 37 (DMRB 7.5.2)). On any gradient, the surfacing should be of a consistent material that does not create loose debris; for further information refer to TA 91 (DMRB 5.2.4).

5.9 Where the design of an equestrian facility is such that values in excess of those described above are likely to be encountered, provision of steps of height 0.15m and length 2.8m, and with gradients of half of the maximum values quoted, may be considered. However, use of such steps should be avoided where possible.

## 6. CROSSFALL

6.1 HD 39 (DMRB 7.2.5) considers footway crossfalls. For cycle and equestrian facilities, the values used for footways may be adopted up to a maximum of 5%, as higher values may create manoeuvring difficulties. Crossfalls greater than 3% can create difficulties for cyclists when the surface is icy.

6.2 Crossfall can be either to one side or cambered to both sides. However, on bends, adverse crossfall should be avoided.

## 7. CROSS-SECTION

7.1 The cross-section of an NMU facility will depend upon a number of factors, including:

- whether it is a shared use, adjacent use or unsegregated route;
- visibility;
- boundary design;
- whether the route is adjacent to a highway or away from it; and
- the need for street furniture within the facility.

7.2 Where obstructions are unavoidably present, the width of routes described in the following sections should be increased by at least the width of the obstruction. Obstructions at or near the centreline of a route may render the site too hazardous or too narrow to use.

7.3 Detailed advice on cross-sections of NMU routes is provided in draft LTN 2/04. Widths of NMU routes across footbridges are covered in BD 29 (DMRB 2.2.8). The remainder of this chapter summarises the key parameters of most relevance to typical routes adjacent to rural trunk roads.

### Pedestrian-Only Routes

7.4 Table 7.1 provides values for the surfaced widths of unbounded pedestrian routes. A route is considered unbounded when it is not adjacent to a physical barrier such as a wall or fence at the edge of the route. Where it is not practicable to provide widths of 2.0m for the full length of a route, widths of 1.3m may be provided over short distances.

Preferred Width	2.6m
Acceptable Minimum	2.0m

**Table 7.1 – Surfaced Widths of Pedestrian-Only Routes**

### Off-Carriageway Cycle Routes

7.5 Table 7.2 provides values for the surfaced widths of unbounded cycle-only routes.

Preferred Width	3.0m
Acceptable Minimum	2.0m

**Table 7.2 – Surfaced Widths of Cycle-Only Routes**

7.6 Where it is not practicable to provide widths of 2.0m for the full length of a route, widths of 1.5m may be provided over short distances.

7.7 At gates and where routes are signed for single file use at pinch points, the surfaced width of the route may be reduced to 1.2m.

7.8 Sections of off-carriageway cycle route where single file use is unavoidable should be signed accordingly. Single file sections should be no longer than the SSD for the route. Where there are different design speeds on either side of a single file section, the lower value of SSD should be used.

7.9 Transitions from one width to another should normally be tapered at a rate no sharper than 1:7 for design speeds greater than or equal to 30kph. For lower design speeds, the taper may be reduced to 1:5.

### Equestrian Routes

7.10 There are very few equestrian-only routes, as in practice most rights of way are shared with other users. Therefore, the cross-section of a route will normally depend upon the likely interaction of equestrians with other users.

7.11 Ridden horses can occupy a width of around 1.5m, and a surfaced width of 2.0m should be provided as a minimum to accommodate this. Where horses are expected to pass, a minimum width of 3.0m should be provided.

7.12 Equestrian routes where single file use is unavoidable should be signed accordingly. Single file



sections should be no longer than the SSD for the route. Where there are different design speeds on either side of a single file section, the lower value of SSD should be used.

7.13 At gates, the likelihood of two equestrians meeting in opposite directions is low. BS5709:2001 specifies a minimum width for bridle gates of 1.525m between posts. A rider would expect to be able to turn 90° after passing through the gate to be able to close it from horseback. Hence, there should be a paved width of 3.0m on either side of the gate for a distance of 5.0m. Fencing for 1.5m each side of a gate should be free of barbed wire and overhanging trees.

7.14 There may be a need to turn a horse around at some point on an equestrian route. Designers should ensure that locations are available at intervals of no more than 1 km where this can be easily and safely undertaken. The surfaced width of the route at such locations should be a minimum of 3.0m.

7.15 There should be no sudden changes of cross-section on equestrian routes, except at gates, as these may unnerve the horse. Where changes in cross-section are necessary, tapers of no sharper than 1:7 should be used.

**Shared and Adjacent Use Routes for NMUs**

7.16 Shared use facilities should generally be restricted to where flows of either cyclists or pedestrians are low, and hence where the potential for conflict is low. Unsegregated shared facilities have operated satisfactorily down to 2.0m wide with combined pedestrian and cycle use of up to 200 per hour. However, the preferred minimum width for an unsegregated facility is 3.0m.

7.17 The potential for conflict between users increases where flows of more than one group are high. In this case it is normally necessary to have some form of segregation along the route. Route segregation should also be considered if disabled people, people with pushchairs or other vulnerable users are likely to make frequent use of the facility. When determining the method of segregation, consideration should be given to the issues above and site-specific factors. For more detailed information refer to draft LTN 2/04.

7.18 The preferred separation between different types of NMu is 1.0m, with an acceptable separation of 0.5m. Greater verge widths facilitate maintenance. Verges adjacent to field boundaries and existing hedgerows

should be a minimum of 0.5m wide to allow hedges to overhang the route without interfering with its use.

7.19 If the separation described above cannot be provided, segregation may be achieved by use of a post and single rail fence, railings, kerbs or delineator strips. Guardrails should only be used in short lengths, because over any appreciable distance the risk of cycle handlebars and pedals colliding with them is increased. Fences and guardrails can also trap users on the ‘wrong’ side. The principles are set out in more detail in draft LTN 2/04 and ‘Inclusive Mobility’ (DfT, 2002).

7.20 Table 7.3 provides values for the surfaced widths of pedestrian/cycle routes segregated by line.

Preferred Minimum	5.0m (3.0m cycle route, 2.0m pedestrian route)
Acceptable Minimum	3.0m (1.5m cycle route, 1.5m pedestrian route)

**Table 7.3 – Surfaced Widths of Unbounded Pedestrian/Cycle Routes Segregated by Line**

**Boundary Treatments**

7.21 The above widths for pedestrian and cycle routes should be modified in particular circumstances as follows (see Figure 7.1):

- for a route bounded on one side (where the boundary height is up to 1.2m), an extra 0.25m should be provided to allow for ‘kerb shyness’ between the route and the barrier;
- for a route bounded on one side (where the boundary height is greater than 1.2m), an extra 0.5m should be provided to allow for ‘kerb shyness’ between the route and the barrier; and
- for a route bounded on both sides, an extra 0.25m or 0.5m should be provided on each side as appropriate.

7.22 It is desirable to provide physical separation between NMu routes and carriageways. For pedestrians and cyclists the preferred separation between the NMu route and the carriageway is 1.5m, with an acceptable separation of 0.5m. The higher value of 1.5m should, where possible, be used on roads with speed limits in excess of 40mph. If a hardstrip is provided, this can be considered as part of the separation. Where new routes

are introduced, street furniture and all vegetation (except grass) within the separation distance should be removed or the verge widened.

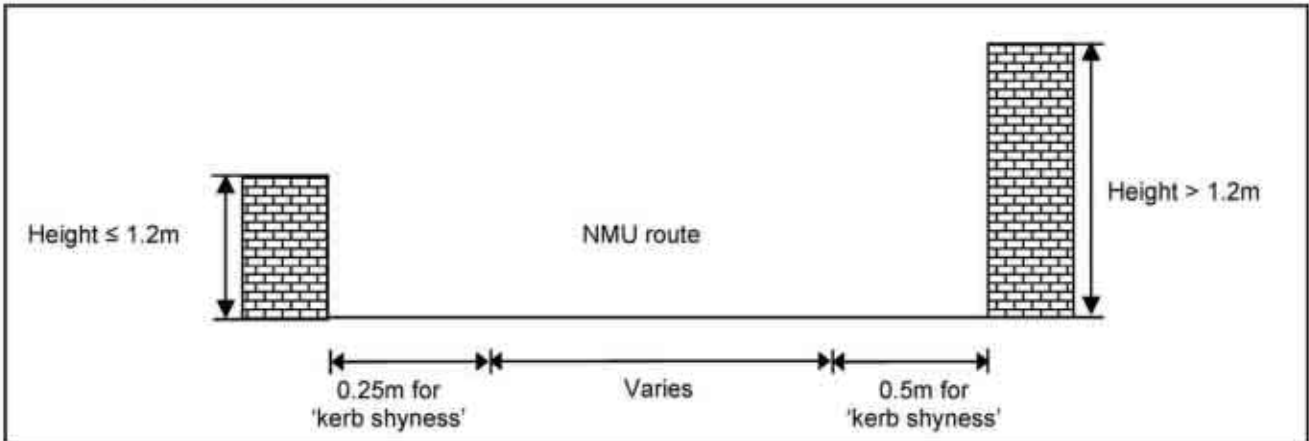
7.23 For routes used by equestrians, the separation of the route from the carriageway should be a preferred minimum of 1.8m. If a hardstrip is provided, this can be considered as part of the separation. Where near continuous screening is provided between the equestrian route and the carriageway, gaps should be avoided, as they may unnerve horses.

#### **Hazards Adjacent to NMU Routes**

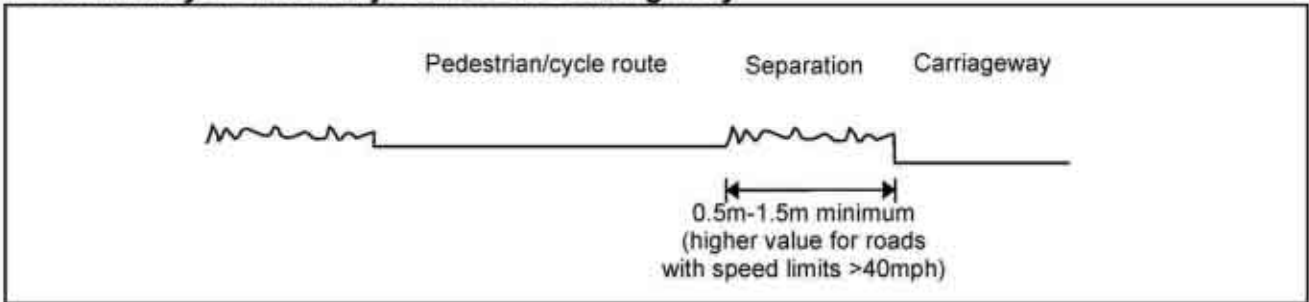
7.24 Where an NMU route is adjacent to hazards such as a ditch (or other water feature) or embankment slopes steeper than 1 in 3, a separation greater than that recommended in paragraphs 7.22 and 7.23 should be considered to minimise the risks. Designers should also consider providing physical barriers, such as dense shrubbery, guardrails or fences. Further information is provided in the Overseeing Organisations' standards for road restraint systems.

7.25 The risks described above are heightened at sharp bends, particularly for cyclists at night if the route is unlit. In such circumstances consideration should be given to lighting the bend, increasing the recommended separation and provision of warning signs.

**NMU route bounded on both sides**



**Pedestrian/cycle route adjacent to the carriageway**



**Equestrian route adjacent to the carriageway**

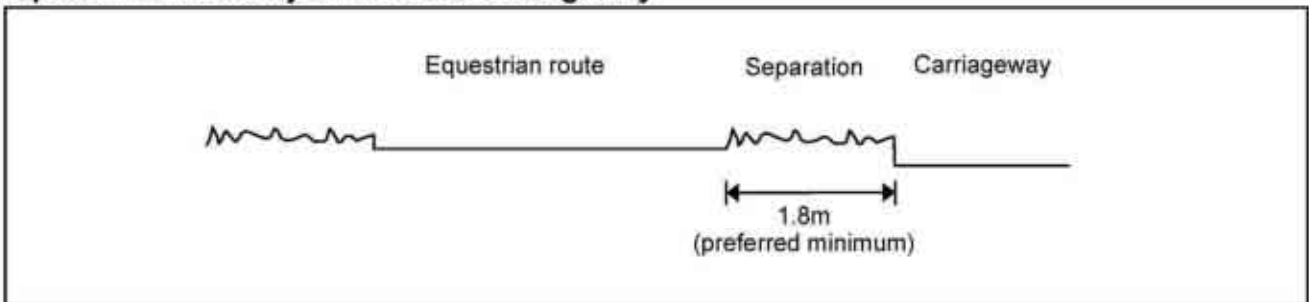


Figure 7.1: Boundary treatments for NMU Routes

## 8. HEADROOM

8.1 For subways and underpasses, guidance on headroom is provided in TD 36 (DMRB 6.3.1).

8.2 Away from subways and underpasses, adequate headroom for NMU routes should be provided under overhanging branches of trees, road signs and overhead structures. For vegetation the maintenance regime should be designed to be sufficient to maintain the required minimum headrooms. Paragraphs 8.4 to 8.6 describe the requirements for each type of user.

8.3 The need for equestrians and cyclists to dismount should be kept to an absolute minimum by careful planning and design of road signs and other street furniture.

### **Pedestrian Routes**

8.4 For obstacles longer than 23m, a minimum headroom of 2.6m should be provided. For shorter obstructions this may be reduced to 2.3m.

### **Off-Carriageway Cycle Routes**

8.5 For obstacles longer than 23m, a minimum headroom of 2.7m should be provided. For shorter obstructions, such as signs, this may be reduced to 2.4m. In exceptional circumstances, where 2.4m headroom cannot be achieved, signs advising cyclists to dismount will be required.

### **Equestrian Routes**

8.6 The desirable headroom for ridden horses is 3.4m, with an absolute minimum headroom for ridden use of 2.8m over short distances, such as at momentary obstructions. If horses are required to be led rather than ridden, the headroom may be reduced to 2.8m over longer distances, such as under bridges. However, this should be avoided wherever possible, as horses can be difficult to control when led. In cases where horses are to be led, mounting blocks should be provided at either side of the discontinuity, together with signs advising riders to dismount.

## 9. CROSSINGS

9.1 Visibility at crossings is covered in Chapter 3. Advice on the choice of crossing facility within a scheme is given in TA 91 (DMRB 5.2.4).

9.2 At crossings where there is a danger of NMUs inadvertently entering the carriageway (for example where an NMU route approaches at right angles to the carriageway with limited visibility, or where regular use by unaccompanied children might be anticipated), guardrailing should be provided to ensure NMUs slow down before crossing. However, excessive use of guardrailing should be avoided.

### Pedestrian Crossings

9.3 The desirable minimum crossing provision where pedestrian routes cross the carriageway is a dropped kerb laid flush with the carriageway, with associated tactile paving. Further advice on dropped kerbs is given in TA 57 (DMRB 6.3.3). Advice on assessing whether increased crossing provision is appropriate can be found in TA 68 (DMRB 8.5.1) and TA 91 (DMRB 5.2.4).

9.4 The ramp gradient across the footway to a dropped kerb should be between 1 in 12 and 1 in 20. For narrow footways, the steeper gradient will allow the width of the level strip at the back of the footway to be maximised. This will make it more comfortable for people with pushchairs or wheelchairs who do not wish to use the crossing.

### Cycle Crossings

9.5 Where cycle tracks join or cross carriageways or Private Means of Access (PMA), dropped kerbs laid flush with the carriageway should be used as carriageway edging.

9.6 Approaches to crossings should normally be at right angles to the carriageway. Where acute crossing angles cannot be avoided, non-slip kerb surfacing should be considered. Where cycle routes are located adjacent to the carriageway and lead to crossing points, 'jug handle' layouts should be used to place the cyclists at right angles to traffic flow (see TD 42 (DMRB 6.2.6)).

### Equestrian Crossings

9.7 For roads where at-grade equestrian crossings are unavoidable, a grassed holding area of 10m wide by 5m long should be provided in the verge. The holding area should be fenced to guide equestrians and highlight the presence of the facility to other users, as shown in Figure 9.1. BS5709:2001 requires structures associated with equestrian routes (i.e. bridle gates and/or horse stiles) to be a minimum of 4.0m from the carriageway.

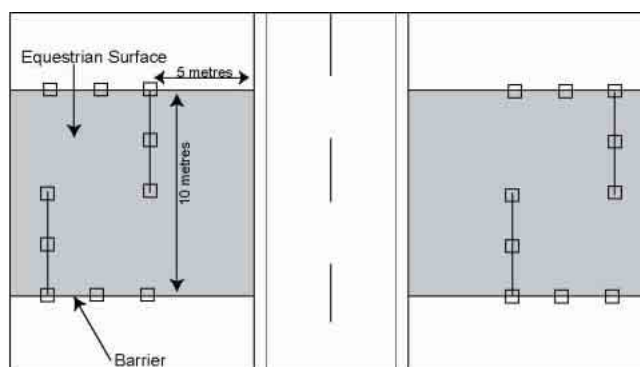


Figure 9.1: Bridleway Crossing with Holding Area

9.8 At-grade equestrian crossings of dual carriageways are not recommended, but may be necessary in certain circumstances. In these circumstances, a holding area should also be provided in the central reserve (5m wide by 3m long). Equestrian refuges are likely to require a 'U turn' prohibition for vehicles using the carriageway.

9.9 At equestrian crossing points, a 10.0m band of high friction surfacing to HD 37 (DMRB 7.5.2) should be provided on the carriageway to prevent horses from slipping. Where possible, the high friction grip material should be of the same colour as the carriageway, as brightly coloured surfacing may unnerve horses.

9.10 For further information on equestrian crossings see TA 91 (DMRB 5.2.4).

## **Obstructions**

9.11 Where a cycle or equestrian route is crossed by vehicular accesses to the carriageway, and where there is a risk of obstruction to the NMU route, e.g. by parking or deposition of farm equipment, then protective posts may be used. These may be of wood 150mm square by 1.2 m high, set at 1.8 m spacing across the mouth of the NMU route. Metal or concrete posts may also be considered for urban situations.

9.12 Care should be taken to ensure that protective posts are not a hazard. Reflectors should be fitted near the tops of the posts to help cyclists to see them at night. A yellow or white non-reflectorised band may also be provided to help partially sighted pedestrians to see the posts.

## 10. REFERENCES

1. Cycle-Friendly Infrastructure: Guidelines for Planning and Design (IHT/Bicycle Association/ CTC/DfT, 1996)
2. Traffic Signs Manual Chapter 5, Road Markings (DfT, 2003)
3. BD 29 (DMRB 2.2.8) Design Criteria for Footbridges
4. TD 36 (DMRB 6.3.1) Subways for Pedestrians and Pedal Cyclists. Layout and Dimensions
5. TD 50 (DMRB 6.2.3) The Geometric Layout of Signal-Controlled Junctions and Signalised Roundabouts
6. TA 91 (DMRB 5.2.4) Provision for Non-Motorised Users
7. HD 42 (DMRB 5.2.5) Non-Motorised User Audits
8. TA 67 (DMRB 5.2.4) Providing for Cyclists (superseded)
9. TA 57 (DMRB 6.3.3) Roadside Features (Chapters 8 and 11 superseded by this advice note)
10. TD 9 (DMRB 6.1.1) Highway Link Design
11. TD 42 (DMRB 6.2.6) Geometric Design of Major/Minor Priority Junctions
12. Inclusive Mobility – A guide to best practice on access to pedestrian and transport infrastructure (DfT, 2002)
13. HD 37 (DMRB 7.5.2) Bituminous Surfacing Materials and Techniques – [Incorporating Amendment No.1 dated May 1999]
14. HD 39 (DMRB 7.2.5) Footway Design
15. LTN 2/04 Adjacent And Shared Use Facilities For Pedestrians And Cyclists (Consultation Draft, 2004)
16. BS 5709 : 2001 Specification for Gaps, Gates or Stiles
17. TA 68 (DMRB 8.5.1) The Assessment and Design of Pedestrian Crossings

## 11. BIBLIOGRAPHY

### DMRB:

1. TD 27 (DMRB 6.1.2) Cross-Sections and Headrooms
2. BD 52 (DMRB 2.3.3) The Design of Highway Bridge Parapets
3. TD 40 (DMRB 6.2.5) Layout of Compact Grade Separated Junctions
4. BD 2 (DMRB 1.1) Technical Approval of Highway Structures on Motorways and Other Trunk Roads Part III: Procedures for Tunnels: Part 4:1990
5. BD 24 (DMRB 1.3.1) The Design of Concrete Highway Bridges and Structures Use of BS5400
6. DMRB 11.3.8 Pedestrians, Cyclists, Equestrians and Others and Community Effects
7. HD 33 (DMRB 4.2.3) Surface and Sub-surface Drainage Systems for Highways
8. HA 83 (DMRB 4.2.4) Safety Aspects of Road Edge Drainage Features
9. HA 90 (DMRB 10.0.5) Planning and Policy Features (Section 4.4 Public Rights of Way)
10. HA 91 (DMRB 10.0.6) Environmental Database System
11. Interim Requirements for Road Restraint Systems (IRRRS) (Highways Agency)

### DfT Traffic Advisory Leaflets (TALs) and Local Transport Notes (LTNs)

12. TAL 1/97 Cyclists at Road Narrowings
13. TAL 15/99 Cyclists at Road Works
14. TAL 2/03: Signal Control at Junctions on High-speed Roads
15. TAL 3/03 Equestrian Crossings

16. LTN 1/04 Policy, Planning and Design for Walking and Cycling (Consultation Draft, 2004)
17. LTN 1/86 Cyclists at Road Crossings and Junctions

### Other Documents

18. Guidelines for Providing Journeys on Foot (IHT, 2000)
19. Guidelines for Cycle Audit and Cycle Review (DETR/IHT/The Scottish Office/Department of Environment for Northern Ireland)
20. Cycling By Design – A Consultation Paper (Scottish Executive, 1999), in use in Scotland
21. National Cycle Network: Guidelines and Practical Details (Sustrans, 1997)
22. California Highway Design Manual – Chapter 1000 – Bikeway Planning and Design
23. Collection of Cycle Concepts – Danish Road Directorate
24. Guide for the development of bicycle facilities: American Association of State Highway and Transportation Officials (AASHTO), 1999
25. Traffic Signs Manual Chapter 3, Regulatory Signs (DfT, 2003)

### Sustrans Information Sheets:

26. Information Sheet FF04 - Shared Use Routes
27. Information Sheet FF05 – Disabled People and the National Cycle Network
28. Information Sheet FF06 – Traffic-free Paths
29. Information Sheet FF09 – Removing Barriers on the National Cycle Network
30. Information Sheet FF21 – Designing for Security on the National Cycle Network



31. Information Sheet FF22 – Access Controls
32. Information Sheet FF26 – Direction Signing on the National Cycle Network

**British Horse Society Leaflets:**

33. Surfacing of Bridleways
34. Bridleway Gates (A Guide to Good Practice)
35. Obstruction of Rights of Way
36. Diversion of Bridleways
37. Width of Bridleways
38. Some Practical Recommendations on Standards and Dimensions
39. Rights of Way
40. Horse Crossings (Roads)
41. Highways Margins and Verges

## 12. ENQUIRIES

All technical enquiries or comments on this Advice Note should be sent in writing as appropriate to:

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