Bonneagar Iompair Éireann
Transport Infrastructure Ireland

TII Publications

GE PE DN CC OP AM RE

Rural Cycle Scheme Design (including Amendment No. 1, dated December 2014)

DN-GEO-03047
April 2014

DN Design

Standards

About TII

Transport Infrastructure Ireland (TII) is responsible for managing and improving the country's national road and light rail networks.

About TII Publications

TII maintains an online suite of technical publications, which is managed through the TII Publications website. The contents of TII Publications is clearly split into 'Standards' and 'Technical' documentation. All documentation for implementation on TII schemes is collectively referred to as TII Publications (Standards), and all other documentation within the system is collectively referred to as TII Publications (Technical). This system replaces the NRA Design Manual for Roads and Bridges (NRA DMRB) and the NRA Manual of Contract Documents for Road Works (NRA MCDRW).

Document Attributes

Each document within TII Publications has a range of attributes associated with it, which allows for efficient access and retrieval of the document from the website. These attributes are also contained on the inside cover of each current document, for reference. For migration of documents from the NRA and RPA to the new system, each current document was assigned with new outer front and rear covers. Apart from the covers, and inside cover pages, the documents contain the same information as previously within the NRA or RPA systems, including historical references such as those contained within NRA DMRB and NRA MCDRW.

Document Attributes

TII Publication Title	*Rural Cycle Scheme Design (including Amendment No. 1, dated December 2014)*
TII Publication Number	*DN-GEO-03047*

Activity	*Design (DN)*
Stream	*Geometry (GEO)*
Document Number	*03047*

Document Set	*Standards*
Publication Date	*April 2014*
Historical Reference	*NRA TD 300*

NRA DMRB and MCDRW References

For all documents that existed within the NRA DMRB or the NRA MCDRW prior to the launch of TII Publications, the NRA document reference used previously is listed above under 'historical reference'. The TII Publication Number also shown above now supersedes this historical reference. All historical references within this document are deemed to be replaced by the TII Publication Number. For the equivalent TII Publication Number for all other historical references contained within this document, please refer to the TII Publications website.

An tÚdarás um Bóithre Náisiúnta
National Roads Authority

Volume 6 Section 3
Part 5
NRA TD 300/14

Rural Cycle Scheme Design (including Amendment No. 1, dated December 2014)

April 2014

St. Martin's House, Waterloo Road, Dublin 4 Tel: +353 1 660 2511 Fax +353 1 668 0009
Email: infoDMRB@nra.ie Web: www.nra.ie

Summary:

This document provides design standards for cycle facilities in a rural environment. This standard is intended principally for National Roads in Ireland which include for projects that are part of the National Cycle Network. These design standards may also be applicable to other cycle schemes in the country. Where they are used for schemes not on the National Road Network or as part of the National Cycle Network, it will be the relevant Road Authority who will decide on the extent to which the documents in the manual are appropriate.

Published by National Roads Authority, Dublin 2014

VOLUME 6 ROAD GEOMETRY

SECTION 3 HIGHWAY FEATURES

PART 5

NRA TD 300/14

RURAL CYCLE SCHEME DESIGN

Contents

Amendment No. 1

1 INTRODUCTION

Scope

1.1 The purpose of this Design Standard is to outline the design standards and factors that need to be considered by Design Organisations when providing cycling facilities in rural areas. This Standard supersedes the February 2012 version of NRA IAN 03/12 'Provisions for Cyclists and Pedestrians on Type 2 and Type 3 Single Carriageway National Roads in Rural Areas'.

1.2 This Standard is applicable for the design of cycle facilities in rural areas only. The appropriate standard to be used for urban situations is the National Cycle Manual (National Transport Authority), in conjunction with the Design Manual for Urban Roads and Streets (DMURS).

Definitions

1.3 For definitions of general road elements referred to in this Standard, such as central reserve, grassed verge, hard shoulder, hard strip, etc., see NRA TD 27 Cross-sections and Headroom and NRA TD 9 Road Link Design.

1.4 For this Design Standard specific terms have been defined as follows:

a) *Rural Cycle Scheme Design:* is the design associated with the construction of cycle facilities in a rural area.

b) *Cycle Facilities:* refers to all types of measures which improve conditions for cyclists and include:

   i) Cycleways

   ii) Cycle Tracks

   iii) Cycle Lanes

   iv) Shared Cycle Tracks with Pedestrians

   v) Shared roads with Motor Vehicles under low speed/low traffic flow conditions

c) *Cycle Network:* is a defined collection of routes which connect key origins and destinations in a specified area for cyclists.

d) *Cycle Track:* a facility located within the road corridor which is dedicated for the sole use of cyclists and, if permitted, pedestrians.

e) *Off-Road Cycle Track*: a facility which is segregated from the road carriageway generally by means of a grassed verge or a kerb.

f) *Cycle Lane:* part of the carriageway of a road reserved primarily for use by cyclists. The cycle lane forms part of the road and it is located within the contiguous road surface. A cycle lane can also be referred to as an on-road cycle track.

g) *Cycleway:* a public road or proposed public road reserved for the exclusive use of cyclists or cyclists and pedestrians

h) *Greenway:* a cycleway that caters for pedestrian and cyclists in a recreational environment.

i) *Shared Use Cycle and Pedestrian Facility:* An off-road cycle track or cycleway that is provided for both cycle and pedestrian use.

j) *Rural Area:* an area outside of a built-up area which is generally controlled by speed limits greater than 60 km/h;

k) *Urban Area:* an area within a built-up area which is generally controlled by a speed limit of 60 km/h or less.

l) *Rural Road:* a road that is not an urban road or urban street as defined in NRA TD 9 Road Link Design.

m) *Carriageway Separation Distance:* is the distance between the road carriageway edge and the edge of the cycle track.

n) *Design Organisation:* The organisation responsible for undertaking and/or certifying the design.

o) *Road Authority:* The authority responsible for the road construction or improvement scheme.

Relaxations and Departures from Standard

1.5 The standards contained in this document represent the various criteria and maximum/minimum levels of provision whose incorporation in the design would achieve a minimum desirable level of performance in average conditions in terms of safety, operation, economic and environmental effects and sustainability. Design parameters in excess of the geometric parameters presented in this standard should be considered by the designer to ensure the resulting scheme best meets the requirements of cyclists and other road users.

1.6 In most cases, with care, designs can be achieved which do not utilise the lowest levels of design parameters given. However, at some locations, it may not be possible to justify even the lowest levels of design parameters in economic or environmental terms, due to high costs, low demand projection, and/or environmental damage, etc. In such cases, sufficient advantages might justify either a Relaxation within the standards or, in more constrained locations, a Departure from the standards. The various parameters quoted in this Standard are not, therefore to be regarded as sacrosanct in all circumstances. Relaxations and Departures should be assessed in terms of their effects on the economic worth of the scheme, the environment, and the safety of the user. See NRA TD 9 Road Link Design for further information on Relaxations and Departures.

1.7 The scope for Relaxations has been set so as to allow designers to consider parameter values that would generally be approved if they were put to the National Roads Authority as Departure proposals. The designer is required to consider carefully the benefits and any potential disadvantages of Relaxations. Relaxations are considered to conform to standards.

1.8 Three levels of standard values have typically been defined in this Standard. This allows for a flexible approach to be applied to a range of situations, where the strict application of the highest standards could lead to disproportionately high construction costs or severe environmental impacts upon people, properties or landscapes. The three levels are as follows:

a) Level 1 is considered the Desirable Minimum standard, which will produce a high standard of safety.

b) Level 2 is One Step Below Desirable Minimum standard, where the level of service may remain generally satisfactory and the facility may not become unsafe where these values are reduced. The application of this level of standard should be considered carefully and where difficult circumstances can be shown to justify using One Step Below Desirable Minimum standard. Design elements incorporating One Step Below Desirable Minimum standards shall be considered Relaxations.

c) Level 3 is Two Steps Below Desirable Minimum standard, where the level of service may be further reduced yet remain satisfactory and safe. Typically, this level of standard should be applied sparingly, over short sections and where difficult circumstances can be shown to justify using Two Steps Below Desirable Minimum standard. Design elements incorporating Two Steps Below Desirable Minimum standards shall also be considered Relaxations.

1.9 The Design Organisation shall record the fact that a Relaxation has been used in the design and the corresponding reasons for its use. The Design Organisation shall report all Relaxations incorporated into the design as part of the project report at the end of each project management phase.

1.10 Design elements below Two Steps Below the Desirable Minimum standards shall only be considered under an Approved Departure from the NRA as per the requirements of NRA GD 100 Departures to Standards and Specification.

Disclaimer

1.11 Please note that all drawings in this standard are diagrammatic only. No reliance should be placed upon them for road marking layouts for which reference should be made to the Traffic Signs Manual.

2 RURAL CYCLE SCHEMES

National Cycle Network Policy

2.1 A National Cycle Policy Framework 2009-2020 (NCPF) identified the requirement to develop and implement the National Cycle Network to promote cycling as a transport mode, leisure activity and tourist activity in Ireland.

2.2 The National Roads Authority published the National Cycle Network Scoping Study in August 2010, which identified a core network of corridors between the larger towns and cities, and through the regions of greatest interest for tourist and recreational cycling.

2.3 This Design Standard will assist in the delivery of the National Cycle Network and will ensure a consistent approach is applied to the design of cycle schemes in rural areas.

Design Principles

2.4 In order to develop appropriate design standards for rural cycling facilities, there are a number of core design principles that need to be implemented. The principles include Coherence, Convenience, Directness, Safety, Comfort, Attractiveness and Access.

2.5 *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 consistent Quality of Service. Cycle signage should be clear and logical at the approaches to and exits from junctions.

2.6 *Convenience:* A cycle network should serve main destinations, and new cycle facilities should offer an advantage in terms of safety and attractiveness compared with the existing provision. Routes and key destinations should be properly signed, and place names should be clearly visible. Routes should be unimpeded by street furniture, and other obstructions which can be hazardous to users. Designers should consider the future ease of maintenance, including access to motorised vehicles for sweeping, trimming grassed verges and surface / lighting repairs along off-road facilities.

2.7 *Directness:* Rural routes need to take into consideration the distance an average cyclist can travel in a day and the linking of intermediate destinations and attractions will be an important consideration with respect to the route design. It should be recognised that directness has both geographical and time elements. The presence of complicated junctions and crossings as well as physical detours will affect use.

2.8 *Safety:* Cycle facilities need to be safe for all users including motorists, pedestrians and cyclists. Reduced traffic volumes and speeds can create safer conditions for cycling and walking. At higher traffic speeds the provision of segregated facilities will improve safety along the route and encourage increased usage. With very popular facilities the potential for conflict between pedestrians and cyclists should be minimised through the introduction of segregation between these users. Surface defects should not be allowed to develop to the extent that they become a hazard, and vegetation should be regularly cut back to preserve available width and sight lines. Junctions are generally the most dangerous parts of the cycling journey and the needs of all road users should be considered where cycle facilities cross roads and entrances.

2.9 *Comfort:* Generally cyclists prefer sheltered, smooth, uninterrupted, well-maintained surfaces with gentle gradients. Cycle facilities should meet surface width, quality and gradient standards and be convenient, avoiding complex manoeuvres. Dropped kerbs are particularly beneficial to users of wheelchairs, pushchairs and bicycles at interface points. Cyclists who are familiar with particular junctions will also appreciate good sightlines on approach, this allows them to gauge their environment and minimise any loss of momentum.

2.10 *Attractiveness:* Cycle facilities should be designed in harmony with their environment such that the whole experience makes cycling an attractive option. A route should complement and where possible, enhance the area through which it passes. The cycle route should pass through interesting places and their design should be sensitive to environmental issues including lighting, personal security, aesthetics, environmental quality and noise. Cycle facilities should be well maintained and free from litter and broken glass. The ability for people to socialise by walking or cycling two abreast, or to stop and rest or look at a view, makes for a more pleasant experience.

2.11 *Access:* Cycling routes should link trip origins and key destinations along convenient and comfortable routes. Cycling routes should be accessible to all types of bicycles, including bikes with panniers and trailers as well as trikes and recumbents. The cycle route should be provided into and through areas normally inaccessible to motor vehicles, such as parks and other motorised vehicle restricted areas, if possible.

3 CYCLE FACILITIES IN A RURAL AREA

Provision for Non-Motorised Users

3.1 The provision of facilities for non-motorised users in accordance with this NRA TD 300 is mandatory for all new and upgraded rural National Road Schemes, with the exception of Motorway, Type 1 Dual Carriageway and Type 1 Single Carriageway National Roads.

3.2 There may be occasions where a facility for non-motorised users under paragraph 3.1 above is not justified, due to the existence of a suitable alternative off line route or where there is minimal demand for such a facility anticipated. In such exceptional circumstances, the omission of a facility for non-motorised users shall only be accepted under an approved Departure from standards.

Cycling Facilities for New National Road Schemes in a rural area

3.3 Cycling facilities as part of a new National Road scheme should be provided in consultation with the NRA.

3.4 When considering the provision of a cycle facility as an integral part of a new road scheme, where the design speed is 60km/h or greater, an off-road cycle track shall be provided.

3.5 It is essential that the land requirements to provide any cycling facility are considered during the planning stage.

Cycling Facilities for Existing National Roads in a Rural Area

3.6 Cycling facilities retrofitted on existing National Road schemes should be provided in consultation with the NRA.

3.7 Cycling facilities should only be retrofitted on existing National Road schemes in consultation and with the permission of the NRA.

3.8 The primary retrofitting options are 1) the redistribution of the existing space within the road corridor cross section, 2) the reduction of motorised vehicle speeds on low trafficked roads or 3) the purchase of additional land to accommodate the proposed cycling facility

3.9 Where the road corridor cross section contains generous grassed verges, hard shoulder details, and/or wide carriageways it may be possible to provide cycling facilities through the re-distribution of the space within the road corridor cross section. The construction of cycle facilities within the road corridor cross section should only be undertaken when the desirable minimum standards for both motorised vehicles and cyclists are not compromised.

3.10 Where traffic flows are low (< 1000 motorised vehicles per day) there may be an opportunity to introduce traffic calming measures to improve the cycling environment.

3.11 Where the re-distribution of existing space within the road corridor or the reduction in traffic speeds is not viable then the buying of land, adjoining the existing road corridor is the only available option. This may involve engaging in implementing a Compulsory Purchase Order (CPO) to provide the required design standards for cyclists.

3.12 The design of cycle facilities along an existing road should consider the receiving environment and retain existing hedgerows where possible. The construction of new cycle tracks are best located inside existing hedgerows to both ensure cyclists are provided with an attractive environment and that the cycle scheme limits the impact on the receiving environment.

Other Cycling Facilities

3.13 The development of rural cycle facilities will comprise a mixture of new and retrofitted infrastructure which may on different routes be made up of any or all of the following:

a) On-Road Cycle lanes
b) Off-Road Cycle tracks
c) Disused Railway Lines
d) Canal Towpaths
e) River Banks
f) Forest Trails
g) Greenways
h) Existing Cycle Facilities
i) Existing Footways/ Footpaths
j) Cycleways
k) Low Speed Environments

Railway Lines

3.14 Before any potential consideration of retrofitting or redesign of a disused or abandoned railway, it is essential that approval from the relevant authorities is acquired. In the case of disused railway lines, Iarnród Éireann should be consulted and their permission sought. Even though such lines are not currently in use, there may be a desire in the future to re-commission them for reasons of tourism, commuting and / or logistical transport. In respect of abandoned lines the ownership of the full extent of the lands required should be clearly established, as parties other than Iarnród Éireann may have gained rights.

Canal towpaths

3.15 The provision of cycling facilities along canal towpaths or river banks under the control of Waterways Ireland requires the approval of Waterways Ireland. It is essential that before a canal towpath be considered to be incorporated as part of the National Cycle Network consultation is undertaken with Waterways Ireland and their permission sought. As conditions, use and available space along the canal system varies consultation with Waterways Ireland is essential to establish any restrictions and conditions they may have to be incorporated with the cycling facilities along specific sections of towpath. The key issues associated with the canal system include, access control measures, available width through deep cuttings, the provision of edge protection and the suitability of existing embankments to accommodate cycle facilities.

Forest Trails

3.16 The provision of cycling facilities through forestry in the ownership of Coillte will require their permission and integration with their strategies with respect to the future management and development of cycleways or greenways within its lands.

Selection of Cycle Facility Type

3.17 The choice of cycling facility type will depend on whether the route runs adjacent to a road or not, the speed of the adjacent road, the volume of traffic using that road and the volume of potential users (cyclists and pedestrians).

3.18 On roads subject to urban speed limits of 60 km/h or less the guidance contained within the National Cycle Manual is to be applied. On roads subject to a speed limit of greater than 60 kph, the 85th percentile speed of the subject road should be recorded along with the AADT flow for the road and the type of cycle facility should be considered based on Table 3.1.

3.19 Table 3.1 sets out the motor vehicle speed and flow criteria which are relevant in determining if the cycling facility should be either a cycle track or a cycle lane or where shared facilities with motor vehicles is possible. Traffic volumes are based on AADT values and the speeds are based on the recorded 85th percentile speed of the road. Table 3.1 has identified a number of conditions where the designer can chose between an off-road cycle track or a cycle lane facility (i.e. roads with speeds between 50 km/h and 60 km/h and traffic between 1,000 and 6,000 AADT).

Table 3.1: Type of Cycle Facility

85th Percentile Speed (km/h) Motorised Traffic Volume (AADT)	**< 50 km/h**	**50 – 60 km/h**	**60 – 80 km/h**	**>80 km/h**
< 1000 AADT	Shared Road Space	Cycle Lane Off Road Cycle Track	Off Road Cycle Track	Off Road Cycle Track
1000 – 6000 AADT	Cycle Lane Off Road Cycle Track	Cycle Lane Off Road Cycle Track	Off Road Cycle Track	Off Road Cycle Track
> 6000 AADT	Off Road Cycle Track	Off Road Cycle Track	Off Road Cycle Track	Off Road Cycle Track

3.20 In general, most cycle facilities within rural areas will be either cycle tracks or cycleways, however on rural roads with an AADT of less than 1,000 motorised vehicles per day and with low traffic speeds it may be possible for cyclists to share the road space with motor vehicles.

3.21 The design of shared cycle facilities with motor vehicles needs to ensure that the 85th percentile speed of traffic is less than 50 km/h and preferably closer to 30 km/h. The preferred width of a shared cycle facility with motor vehicles should be at least 4.0 metres in width to allow motor vehicles pass cyclists/ pedestrians comfortably.

3.22 The environment along the shared cycle facility with motor vehicles should be modified through the introduction of traffic calming features (entry treatments, road narrowings, change in surface treatment, etc.) to achieve the required traffic speed. Signage notifying motorists approaching the shared facility that cyclists are present on the road must be included. In addition, signage approaching the shared use facility from an off-road cycle facility (i.e. cycle track or cycleway) must inform cyclists that their environment is to change from traffic free to mixed with motor vehicles.

3.23 Shared cycle facilities with motor vehicles are considered unacceptable for routes which will attract a high volume of cyclists and pedestrians (greater than 1500 users per day).

3.24 Off road cycle tracks or cycle lanes shall be provided on existing roads with an 85th percentile speed of traffic greater than 50 km/h and/or with an AADT of greater than 1000 motorised vehicles per day.

3.25 Off-road cycle tracks remove cyclists from busy traffic conditions and provide a higher degree of comfort when compared to on-road cycle lanes. They are particularly appropriate in a rural environment where there are less accesses and junctions compared to an urban environment. The provision of off-road cycle tracks generally requires more land compared to on-road cycle lanes and the design of its interface with the public road requires significant consideration.

One-way Versus Two-way Cycle Facilities

3.26 Cycle facilities which travel adjacent to a road may operate as either a one-way or a two-way facility. A one-way cycle facility is a cycle facility on each side of the road with the direction of flow matching that of the adjacent carriageway. A two-way cycle facility is a cycle facility on one side of the road capable of accommodating two-way cycle flow.

3.27 A cycleway will generally operate as a two-way facility and shared cycle facilities with motorised traffic will operate in the same direction as motorised traffic.

3.28 The choice of one-way versus two-way cycle facilities should be considered in terms of the type of facility proposed (on–road versus off-road cycle facilities), the availability of land, the number of junctions, private entrances, the location of the facility with respect to the urban environment (many cycle facilities within urban areas are one-way), etc.

3.29 Cycle lanes shall only operate as one-way facilities.

3.30 Generally, one-way cycle facilities, located on each side of the road, minimise the need for cyclists to cross the road. They also create a more conventional arrangement at junctions compared to two-way facilities. One-way cycle facilities allow cyclists to approach junctions on the same side of the road and in the same direction as motorised vehicles, this places cyclists in the line of sight of drivers approaching junctions enabling them to give way where necessary.

3.31 A two-way cycle facility, located on one side of the road may reduce the amount of land take required and may minimise the number of conflicts with vehicle entrances and junctions by locating the cycle facility on the side of the road with the least number of side roads and vehicle entrances. The two-way cycle facility is a wider facility which gives a higher degree of comfort to users.

3.32 A two-way cycle facility has the disadvantage that it can increase the risk to cyclists at junctions and entrances due to motorised vehicles not expecting contra-flow cyclists approaching from the left, but this concern may diminish in time as drivers become more accustomed to the presence of such cycle tracks on the road network. Suitable signage an increased visibility will also reduce the risk of collision between motorised vehicles and cyclists at such junctions.

4 CYCLE SCHEME LAYOUT

Cross-section

4.1 Generally, rural cycle facilities will also provide for pedestrians as well, unless a separate pedestrian footway is provided for. When determining the cross-section widths, consideration needs to be given to the likely level of pedestrian and cyclist usage, the anticipated speed of the cyclist given the vertical profile, and the space that each user will occupy when using the facility.

4.2 Experience has shown that pedestrian and cycle flows can be catered for safely (even if it is with reduced comfort and convenience) on shared facilities of restricted width. However, a reduced width facility may inhibit the speed of cyclists and result in some faster cyclists choosing to remain within the road carriageway rather than using the dedicated facility.

4.3 The space needed for a cyclist to feel safe and comfortable depends on:

a) the space needed for a cyclist in motion, particularly at low speeds

b) the clearance when passing fixed objects

c) the distance from, and speed of other traffic

4.4 Sufficient width is required for a cyclist to maintain his/her balance. The average width of a cyclist and bike is 0.75 m but cyclists wobble as they apply power through the pedals particularly when starting, going up inclines and when accelerating. This width is called the cyclist's dynamic envelope.

4.5 At normal cycling speeds and in normal conditions this wobble movement is about 0.2 m. For most cyclists a speed of 11 km/h is required to ride comfortably in a straight line without a conscious effort to maintain balance. However, the wobble movement can increase considerably when considering inexperience, age, slow speeds, climbing and pulling away from stationary positions where the figure can increase to 0.8 m.

4.6 Other considerations in determining cycle width are:

a) Cycling in a rural environment is a social activity and therefore sufficient width is required to allow cyclists to pair up or travel in groups

b) Not all cyclists travel at the same speed therefore room to overtake needs to be provided

c) When families travel together sufficient width for an adult to cycle parallel with young children for safety and reassurance reasons

d) The volume of cyclists

e) Cyclists with trailers/panniers

f) Trikes and recumbents

g) Whether the cross-section is shared with other users (pedestrians, motorised vehicles)

h) Whether the facilities are one-way or two-way operation

i) Distance cyclists stay out from obstacles such as kerbstones, lamp posts, bollards, trees and walls

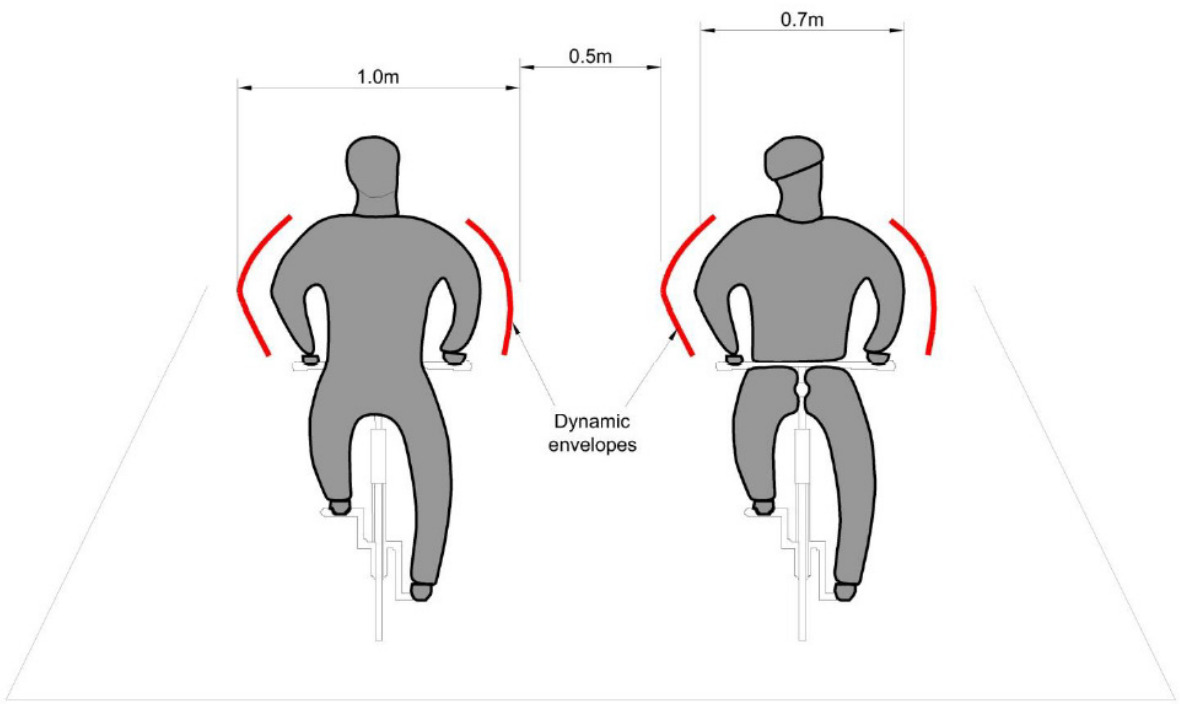


Figure 4.1: Width Requirements of Passing Cyclists

4.7 The recommended widths are presented under three levels of standard values. The first column is the desirable minimum which describes the minimum widths which should be implemented to provide a reasonable quality of service and that would satisfy all of the core design principles. These widths provide enough space for cyclists to maintain balance and control of the bicycle. As they are desirable minimums they should not be regarded as the recommended width but as the minimum allowable. It is imperative that the designer considers the location, function and probable use of the facility and provide as much width as is sustainable. It is recognised that these desirable minimums may not be attained for a variety of reasons and Table 4.1 allows for both One Step Below Minimum and Two Steps Below Minimum.

4.8 The second column presents the One Step Below Minimum widths that should be applied to the design of cycle facilities. These values will satisfy the core design principles but will provide a minimum acceptable quality of service. There will be situations whereby the cycle facility will travel along canal towpaths, disused railway tracks, forest trails etc. In these situations the desirable width may not be achievable due to a number of factors such as land constraints, historical sites infringing on the proposed facility and other obstacles that could be encountered.

4.9 The final column presents the Two Step Below Minimum widths. These values cover those situations where the desirable minimum width cannot physically be provided and should only be considered over short lengths, whereby the sight line is greater than the length of the reduced width. These values will require departures from the standard to be incorporated into the design.

4.10 Table 4.1 demonstrates the required cross sections based on whether the cycle facility is one-way, two-way or a shared facility with pedestrians.

Table 4.1: Range of Mandatory Widths for Cycle Facilities

		Desirable Min (m)	One Step Below Desirable Min (m)	Two Steps Below Desirable Min (m)
One Way (Cycle Facility)	Low Volume	2.0	1.75	1.5
	High Volume	3.0	1.75	1.5
Two Way (Cycle Facility)	Low Volume	2.5	2.0	1.75
	High Volume	3.0	2.5	1.75
Shared Use One Way (Cycle Facility) with pedestrians	Low Volume	3.0	2.0	1.75
	High Volume	4.0	3.0	2.0
Shared Use Two Way (Cycle Facility) with pedestrians	Low Volume	3.0	2.0	1.75
	High Volume	5.0	3.0	2.5

4.11 As part of the design process it is important to define whether the facility will attract low or high volumes of pedestrian/cyclist traffic to give the designer the choice to make an informed decision on cross section dimensions and whether or not segregation of cyclists and pedestrians is necessary. Low volume facilities are those considered to attract less than 1500 users a day and high volume facilities are those expected to attract greater than 1500 users a day.

4.12 On shared facilities that cater for high pedestrian and cycle flows the segregation of the pedestrian and cyclist facilities is preferred.

Grassed verge Width

4.13 If vertical objects such as a wall, a fence or a safety barrier are located immediately adjacent to a cycleway or off-road cycle track the effective width of the cycle facility will be reduced. It is therefore necessary to provide a buffer between the object and the cycle facility to avoid limiting the effective capacity of the cycle facility. Table 4.2 provides the additional widths required where vertical objects are located adjacent to cycleways or off-road cycle tracks.

4.14 The provision of a grassed verge or a separating island between the cycle track and the road carriageway will increase safety and comfort and Table 4.2 provides the grassed verge or separating island width required between the cycle track and the road carriageway. This grassed verge width forms part of the Carriageway Separation Distance described below.

Table 4.2: Lateral Clearances for Cycle Facilities

Type of Edge Constraint	Desirable Min (m)	One Step Below Desirable Min (m)	Two Steps Below Desirable Min (m)
Vertical features (sign posts, fencing, etc.)	1.00	0.50	0.25
Road Carriageway	1.5	1.0	0.50

Carriageway Separation Distances

4.15 When cycle facilities follow the route of a road a separation area needs to be provided between the road and the off-road cycle track through the provision of a grassed verge or a separating island or a combination of both. The carriageway separation distance can include any hard strips and the desirable minimum width of / kerbing between the road and cycle track is 1.5 metres, as noted in Table 4.2.

4.16 Cyclists have a preference to cycle as far as possible from motorised traffic. However, the distance should not be so great that they are outside the visible zone of drivers when approaching junctions or private access points

4.17 The following table presents the required separation distances between the road carriageway and the off-road cycle track.

Table 4.3: Carriageway Separation Distances

Road Type	Desirable Min (m)	One Step Below Desirable Min (m)	Two Steps Below Desirable Min (m)
Type 2 and Type 3 Single Carriageway[1]	2.0	1.5	1.0
Type 2 and Type 3 Dual Carriageway[2]	6.0	3.0	1.5

[1] *Amended as per Amendment No. 1, Item 1*
[2] *Amended as per Amendment No. 1, Item 2*

4.18 No carriageway separation distances are required for on road cycle lanes.

4.19 Where a cycle track passes a direct access it is permissible to reduce the carriageway separation distance to 0.5 metres, however it is preferable that the separation distances presented in Table 4.3 are maintained in front of any direct access, where possible.

4.20 Figures 4.2 - 4.5 illustrate the cross section requirements of different types of cycle facilities.

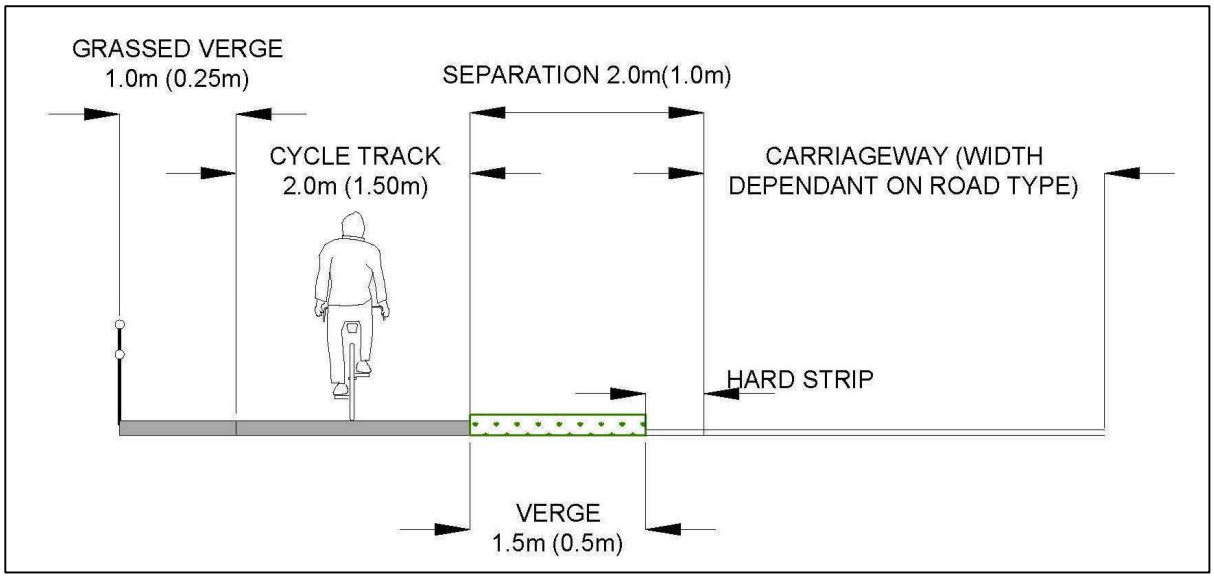


Figure 4.2: Off-Road One-Way Cycle Track (Low Volume)

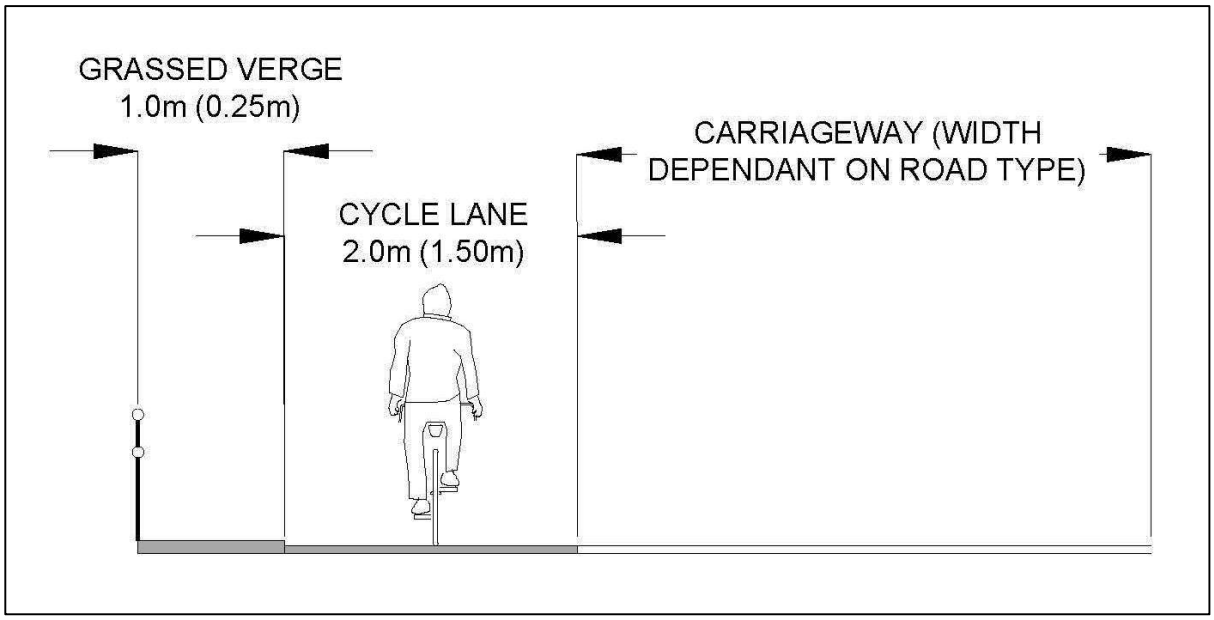


Figure 4.3: On-Road One-Way Cycle Lane (Low Volume)

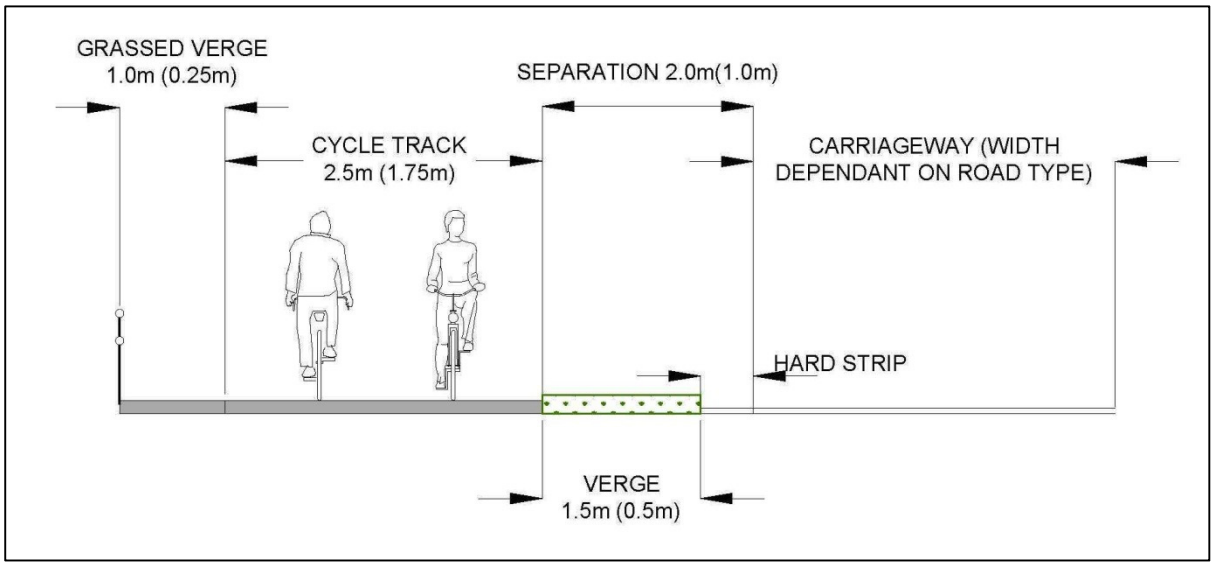


Figure 4.4: Off-Road Two-Way Cycle Track (Low Volume)

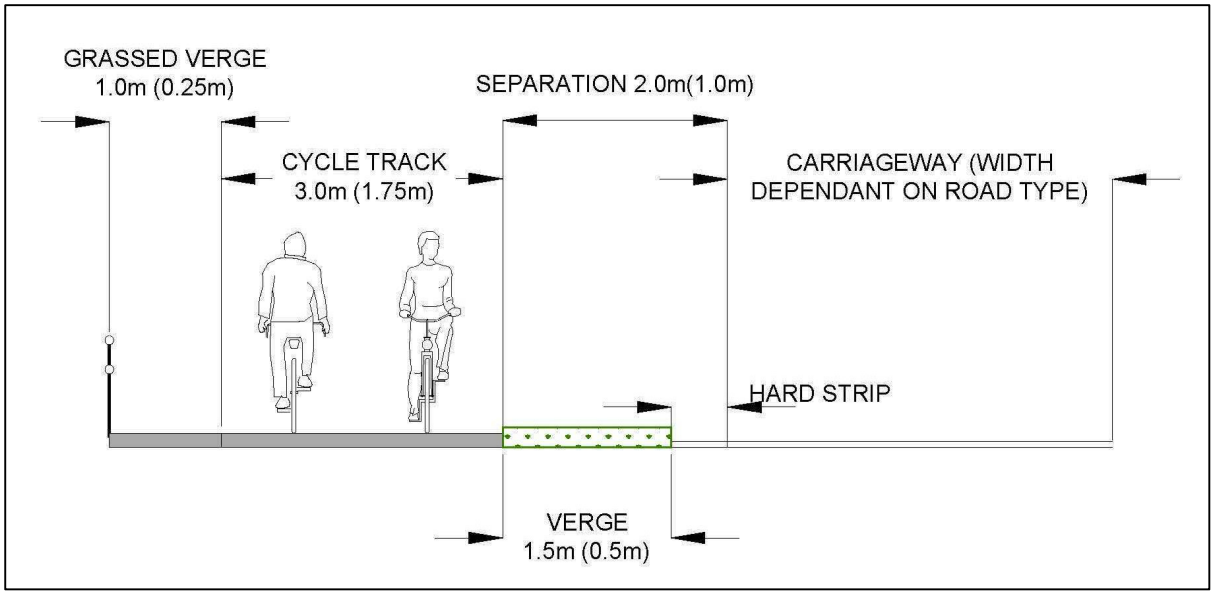


Figure 4.5: Off-Road Shared Cycle and Pedestrian Facility (Low Volume)

Safety Barriers

4.21 The provision of safety barriers shall be made in accordance with NRA TD 19 Safety Barriers.

4.22 Any safety barrier required shall be positioned between the carriageway and the cycle track. The minimum distance between the cycle track and the safety barrier shall be equal to the working width of the safety barrier and comply with the edge constraint distances shown in Table 4.2. In addition, any exposed safety barrier posts facing the cycle track require protection to prevent injury to any passing cyclists.

Headroom

4.23 It is important that clear headroom is available throughout the cycle facility, as headroom restrictions may result in cyclists banging their heads therefore impacting on safety and comfort along the cycle facility. The designer needs to take into account headroom issues associated with gateway entrances, sign heights, overhanging trees, lighting and car/van/truck restriction devices and underpasses. The desirable minimum headroom along cycle facilities is 2.7 metres, however over short distances a reduced head height of 2.4 metres is acceptable. Where minimum headroom is unavailable (e.g. exiting bridges/ tunnels) cyclists should be advised to dismount.

4.24 The designer should refer to NRA Addendum TD 36/93 Subways for Pedestrians and Pedal Cyclists Layout and Dimensions with respect to headroom requirements along cycle facilities.

5 DESIGN SPEED

5.1 It is recommended that all cycle facilities have a design speed of 30 km/h. However, on approach to obstacles a reduced design speed of 10 km/h is acceptable (over short distances). It is important to note that for cycle facilities located on long downward slope sections (steeper than 5% and longer than 150 m), a design speed of 50 km/h should be implemented.

5.2 The distance at which a cyclist has visibility of potential hazards is an important design parameter. The greater the visibility a cyclist has, the greater their comfort and safety on the cycle facility. Table 5.1 gives visibility parameters of Dynamic Sight Distance (DSD) and Stopping Sight Distance (SSD) for off-road cycle facilities. Along on-road cycle facilities the visibility parameters will be determined by existing road standards which relate to motorised vehicles which exceed those of cyclists.

Dynamic Sight Distance

5.3 DSD is the advance distance a cyclist requires to see ahead, to make the task of riding feel safe and comfortable and to pass slower cyclists and pedestrians. The distances specified in Table 5.1 are the distances covered by the cyclist travelling at 30 km/h in approximately eight seconds.

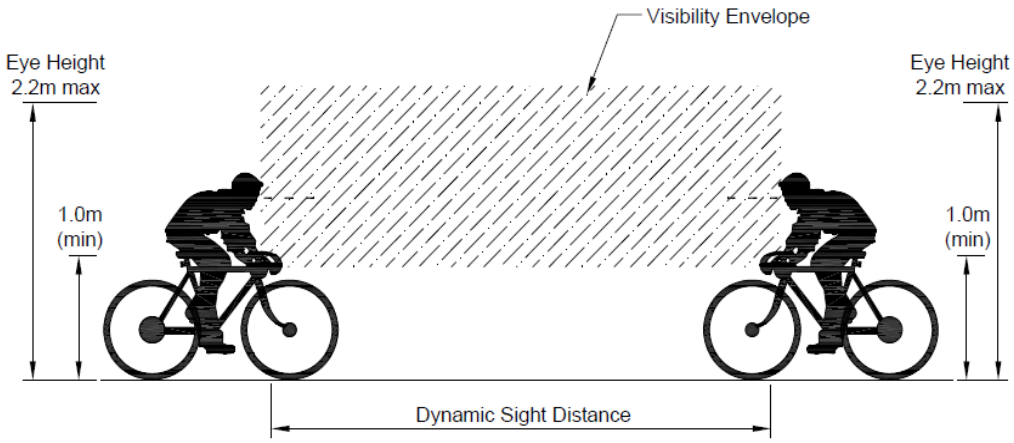


Figure 5.1: Dynamic Sight Distance Envelope

Stopping Sight Distance

5.4 SSD is the distance required to perceive, react and stop safely in adverse conditions (i.e. the distance covered in the perception/ reaction time (two seconds) plus the actual braking distance (deceleration rate of 0.15g)). Minimum SSDs should be increased by 50% on loose surface tracks. Designers should ensure that an object at the minimum SSD is visible from a range of cyclist eye heights. SSD should be measured from a point 0.6m inside the edge of the cycle facility.

5.5 Designers should ensure that an object at the minimum SSD is visible from the following range of eye heights, 1.0 m to 2.2 m. The object height should be taken as a range from ground level to 2.2 m, as

cyclists need to be able to observe deformations, holes and objects which could interfere with safe progress.

5.6 Street furniture, trees and shrubs should be located outside of the envelope of the SSD where practical. In particular trees can obscure pedestrians from approaching cyclists. Isolated objects with widths of less than 300 mm are unlikely to have a significant effect on visibility and may be ignored if removal is not practicable.

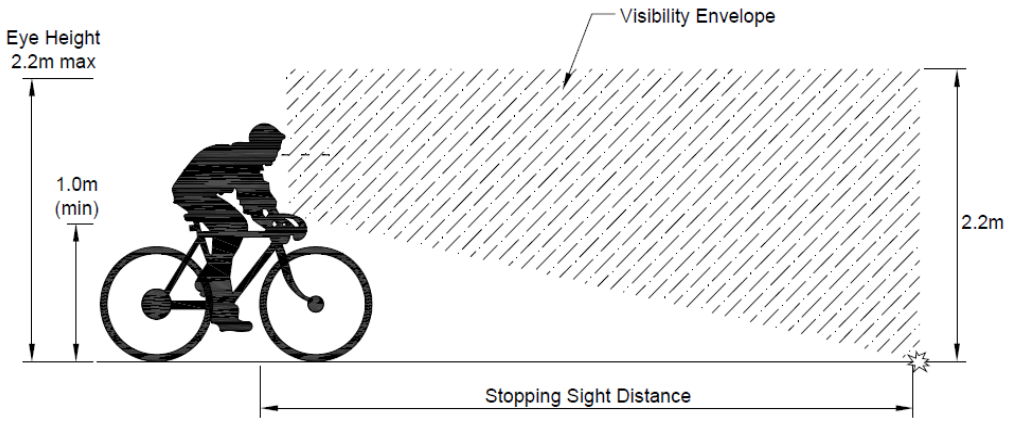


Figure 5.2: Stopping Sight Distance Envelope

5.7 The required Minimum Desirable Dynamic Sight Distance and Stopping Sight Distance are presented in Table 5.1

Table 5.1 Dynamic Sight Distances & Stopping Distances

Design Speed (km/h)	**50 km/h**	**30 km/h**	**10 km/h**
Minimum Dynamic Sight Distance (m)	110	65	15
Minimum Stopping Sight Distance (m)	60	35	15

6 GEOMETRIC ALIGNMENT

Horizontal Alignment

6.1 In order for a cyclist to achieve a safe and comfortable level of cycling sufficient horizontal radii are required. Horizontal radii below the values recommended may create difficulties for cyclists to keep their balance or lose momentum having to apply their brakes on approach to the bend. The provision of tight horizontal radii can compromise safety and the attractiveness of the cycle facility.

6.2 On approach to obstacles and/or major junctions the introduction of tight horizontal alignments can be used as a speed inhibitor. The introduction of tight horizontal alignments needs to be accompanied by appropriate warning signage.

6.3 Table 6.1 presents the recommended horizontal radii that shall apply for the different design speeds.

Table 6.1: Recommended Horizontal Radii (m) for different Design Speeds

Design Speed (km/h)	Minimum Horizontal Radius (m)
10 km/h	4
30 km/h	25
50 km/h	94

Superelevation

6.4 Superelevation is not required as part of the design of cycle facilities and excessive superelevation (greater than 5%) associated with on-road cycle facilities is to be avoided due to the potential dangers associated with using such facilities in icy weather.

Gradient

6.5 The overall gradient along a cycle route is an important design consideration. Comfort and attractiveness of a cycle facility will be greatly increased if the route follows a shallow gradient.

6.6 The gradient of a cycle facility impacts on two issues; the physical limitations of a cyclist to climb steep inclines and maintain speed, and their ability to stop when descending steep inclines. Steep gradients are not welcomed by cyclists and have the potential to put off users. Steep inclines generate high downhill speeds increasing the potential to conflict with other users who may be struggling to climb the steep gradient in the opposite direction.

6.7 Table 6.2 presents the maximum vertical gradients permissible on a cycle facility.

Table 6.2: Gradient Requirements

	Gradients
Desirable Maximum	3%
One Step Below Desirable Maximum	5%
Two Steps Below Desirable Maximum	10%

6.8 The provision of gradients greater than 5% should be confined to short sections of the cycle route and should be preferably less than 100 metres in length.

7 JUNCTIONS AND CROSSINGS

7.1 The interactions between cycle facilities and the public road is an important component of the overall design of such facilities. Drivers need to understand where to expect interactions with cyclists on the public road and cyclists need to understand the control measures in place when interacting with the public road.

7.2 Layouts that place a cyclist outside the driver's normal field of view are not recommended as they can lead to hazardous situations and layouts which are simple to understand for both cyclists and motorists are preferred.

7.3 Junction and crossing facilities should include clear rules with respect to which user has priority and due to the high speed nature of the rural environment cyclists will generally be required to give way to motor vehicles at conflict points.

7.4 Approaches to crossings should be at right angles to the carriageway to ensure adequate visibility for cyclists. Where cycle routes are located adjacent to the carriageway and lead to crossing points then 'jug handle' layouts should be used to place cyclists at right angles to the traffic flow.

7.5 At junctions and crossings it is important that there is adequate visibility between cyclists and drivers, and between cyclists and pedestrians. On-road cycle facilities should be clearly marked both to guide cyclists and to inform drivers of the route cyclists take through the junction.

7.6 It is recommended that the surface of the cycle facility has a colour contrast treatment on approach to junctions/ crossings as a warning to cyclists of upcoming conflicts with vehicular traffic. In addition, the introduction of a chicane or an approach stagger should be considered to regulate the speed of cyclists on approach to intersections with the public road.

Road Carriageway Visibility

7.7 The following table and diagram sets out the required set back (X- Distance) value that should be provided for on the cycle facility on approach to a road. The appropriate Visibility Envelope (Y-Distance) is as set out in NRA TD 41-42 and depends on the design speed of the road which the cycle facility is intersecting with.

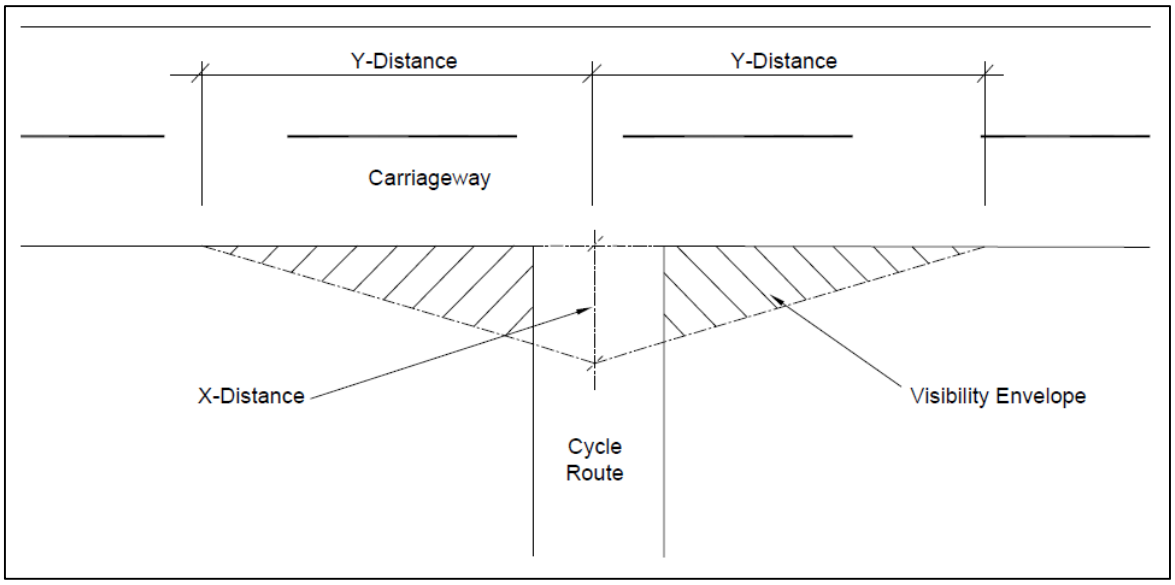


Figure 7.1: Visibility splays for junctions with roads and crossings of roads

Table 7.1: Values used as set back distances (X) from edge of carriageway

X – distance (m)	Description of Use
4.0	Cycle route approach to a road – Desirable Minimum
2.0	Cycle route approach to a road – Absolute Minimum

Cycleway Visibility

7.8 Where a cycleway or track intersects with another cycle facilities the required visibility splay is dependent on the design speed of the cycle facility and the 'Y' distance is that presented under Table 5.1 for Stopping Sight Distance.

Crossings

7.9 The type of crossing will depend primarily on the AADT on the road which needs to be crossed. On a road carrying less than 12,000 AADT a give-way crossing is acceptable while on roads with greater than 12,000 AADT the provision of a grade separated crossing should be considered, taking into account the projected number of users, the available land and the availability of suitable gaps in traffic to cross the road. The design of any grade separated cycle facility should be in accordance with NRA

BD 29 - Design Criteria for Footbridges and NRA TD 36 - Subways for Pedestrians and Pedal Cyclists. Layout and Dimensions.

7.10 Figure 7.2 demonstrates the required design details where a cycleway crosses a rural road.

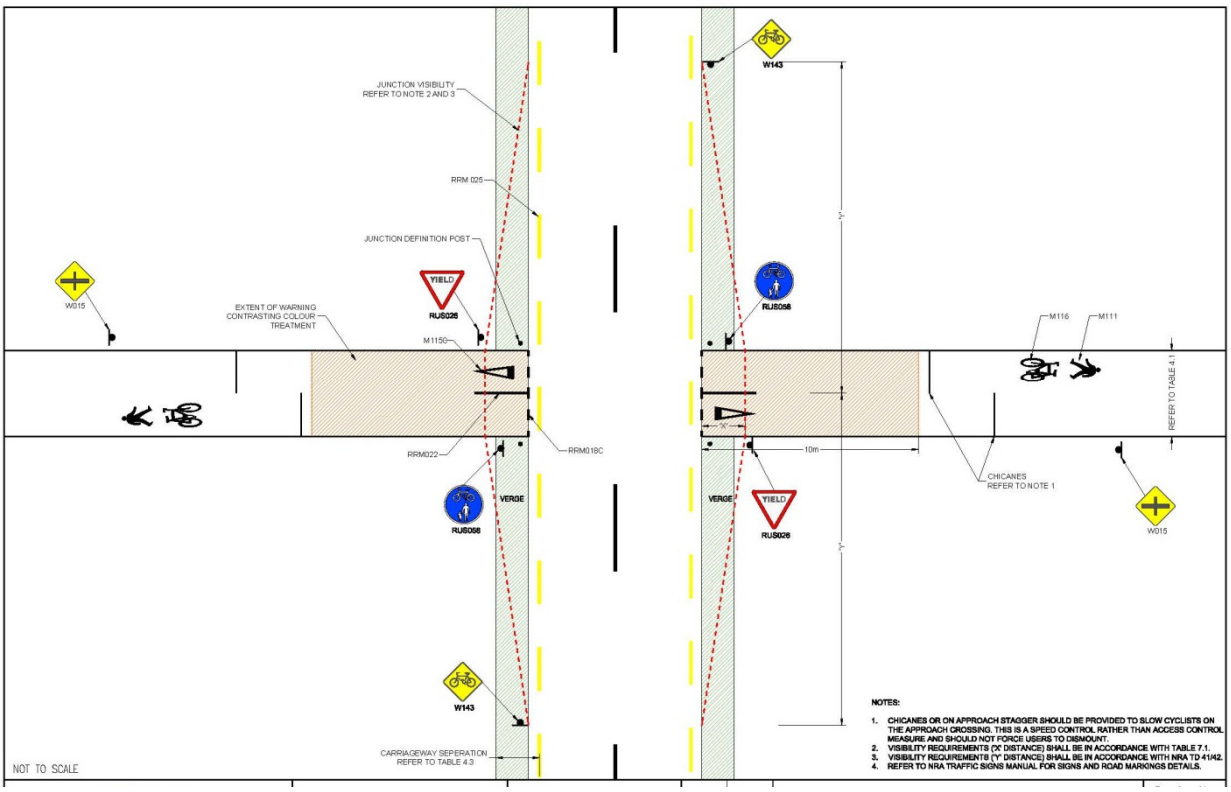


Figure 7.2: Road Crossing Detail

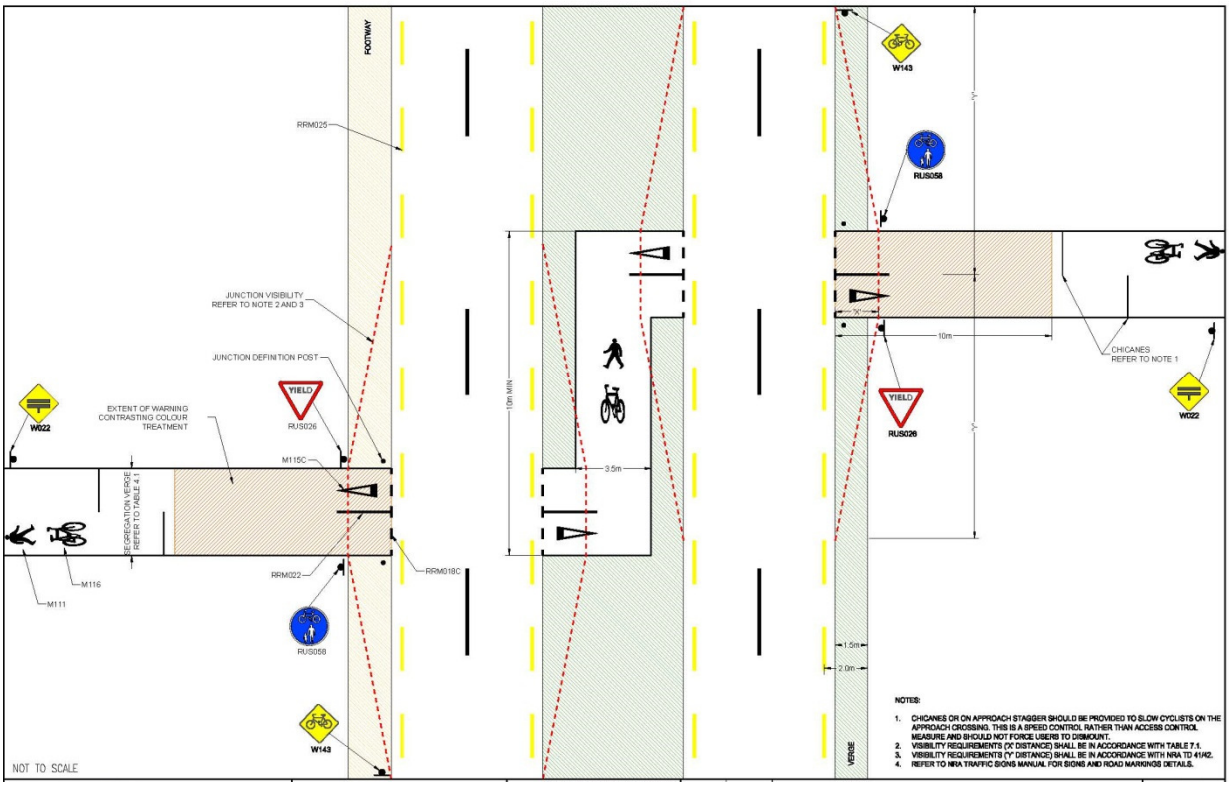
Dual Carriageway Crossing

7.11 Where a crossing traverses a dual carriageway with traffic flows carrying less than 12,000 AADT, a central island of ≥ 3.50 metres should be provided within the central median and the crossing should

be staggered right to left to ensure crossing pedestrians and cyclists face on-coming traffic. The staggered distance between crossings should be a minimum of 10 metres.

7.12 Figure 7.3 demonstrates the required design details where a cycleway crosses a rural dual carriageway.

Figure 7.3: Dual Carriageway Road Crossing



Jug Handle Crossing

7.13 Where cyclists travelling on a cycle track wish to turn and join a cycleway or cycle track on the other side of a road, it may be appropriate to provide a jug handle crossing. A jug handle crossing may be included in places where the cycle track cannot continue on that side of the carriageway or where a

cycle facility needs to terminate. A key objective of the jug handle design is to ensure cyclists approach the road at right angles to maximise visibility.

7.14 Figure 7.4 demonstrates the required design details where a cycle track crosses a rural road to connect with a cycleway on the opposite side of the road.

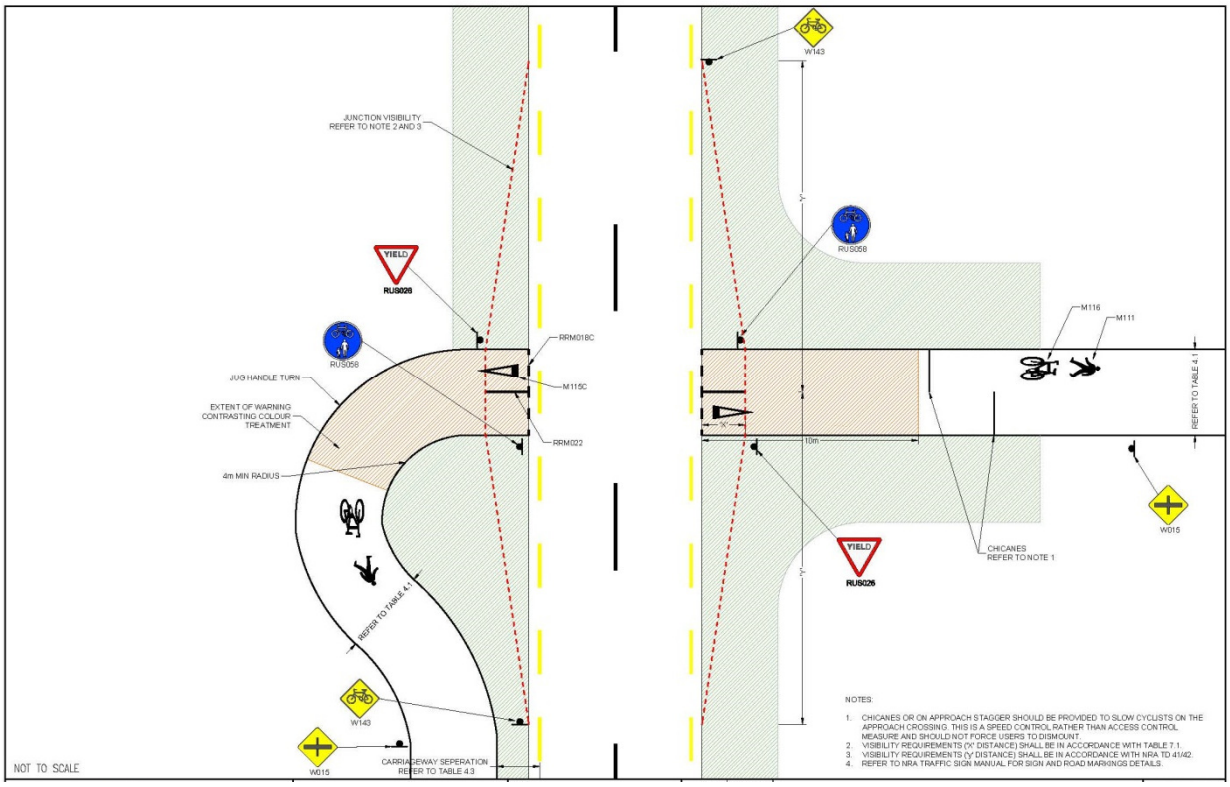


Figure 7.4: Jug Handle Crossing

Direct Entrances

7.15 In rural situations a cycle facility will need to cross direct entrances such as farm and house entrances. As a general objective the priority at these crossings should lie with the cyclists and it is preferrable that the alignment of the cycle facility is retained past the entrance.

7.16 Visibility requirements for motorised vehicles at direct entrances shall be in accordance with NRA TD 41-42. The 'x' distance shall be measured from the nearside edge of the carriageway without the need to accommodate the cycle facility.

7.17 Additionally at direct entrances, the access will require a visibility splay setback of 2.0 m ('x' distance) from the cycle facility with a stopping sight distance based on the design speed of the cycle facility (Table 5.1).

7.18 There will be situations where the cycle facility may need to bend in or bend out to accommodate the private entrance. The provision of a bend in cycle facility at a private entrance is best suited to one-way cycle tracks, however it can be applied to a two-way cycle tracks subject to the provision of an absolute minimum 0.5 m carriageway separation distance.

7.19 Figure 7.5 demonstrates a bend in crossing associated with a direct entrance on the public road.

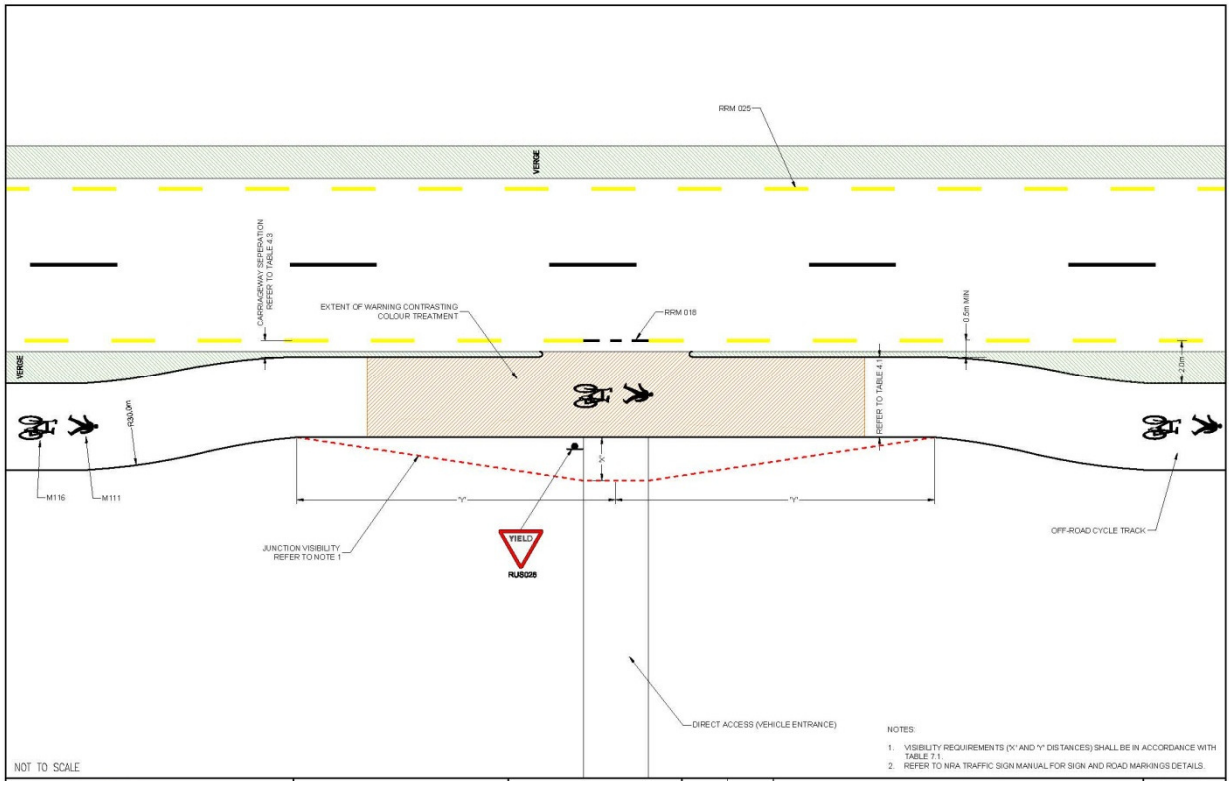


Figure 7.5: Direct Entrance Bend In Crossing

7.20 The provision of a bend out cycle facility requires sufficent set back to allow a single vehicle to wait between the main carriageway and the cycle crossing point. This distance will be based on the maximum size of the vehicle using the direct entrance and will generally be 5.0 metres if the direct entrance serves a private house and 15.0 metres if serving a farm entrance.

7.21 Figure 7.6 demonstrates a bend out crossing associated with a direct entrance on the public road.

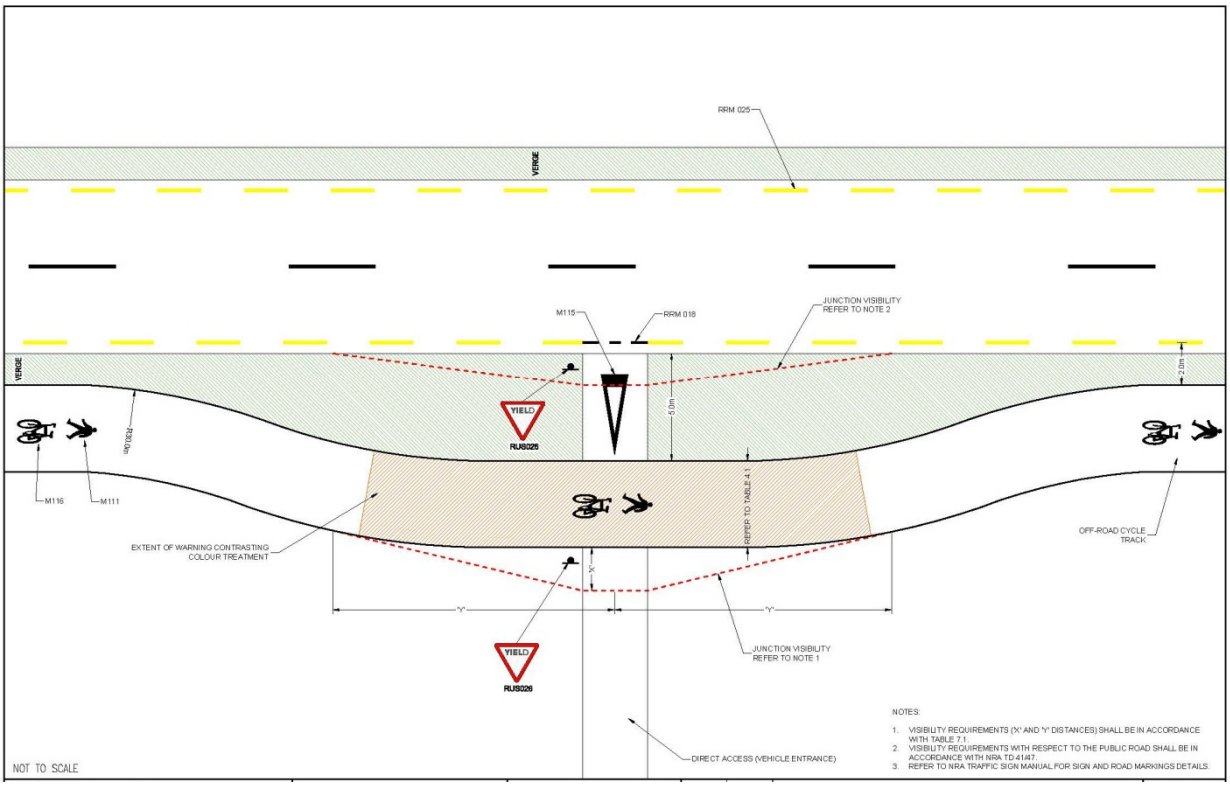


Figure 7.6: Direct Access Bend Out Crossing

7.22 The "dwell" area, in accordance with NRA TD 41-42, shall be provided immediately adjacent to the carriageway as defined by the nearside edge of the carriageway and can incorporate the cycle facility. However, a dwell area is better provided between the carriagway and the cycle track with sufficient space to store one motorised vehicle.

7.23 The cycle track pavement construction must be carried across the private entrance to clearly indicate priority to cycle traffic and the road entrance should be at the same level as the cycle facility. Cycle symbol road markings should be provided at the crossing to reinforce the arrangement and a colour contrast treatment should be provided along the cycle route warning cyclists of the upcoming conflict with motorised traffic.

Minor Give Way Junctions

7.24 At minor give-way junctions, where the AADT of the side road is less than 4,000 vehs, the most appropiate treatment for crossing facilities is the introduction of a bend out crossing. This type of facility can be used for both one-way and two-way off-road cycle tracks. As a general objective the priority at minor give way junctions should lie with vehicular traffic, due to the high speed of traffic in rural areas and the unexpected nature of cyclists in a rural area. Signs should be provided on the road warning motorists of the upcoming crossing facility.

7.25 At junctions where the cycle facilties are provided on road, they should be continued through the junction with the same priority as the mainline traffic.

7.26 With one-way off road cycle tracks crossing minor roads it is possible to provide a bend in junction treatment where the off-road cycle facility is directed on road at a minimum distance of 30 metres or greater before the junction. The cycle facility should be continued through the junction with the same prioirty as the mainline traffic. A bend-in junction treatment is not acceptable for two-way cycle facilities as exiting vehicular traffic would not expect cyclists arriving from the opposite side of the road.

7.27 Figure 7.7 demonstrates a bend in crossing associated with a minor junction.

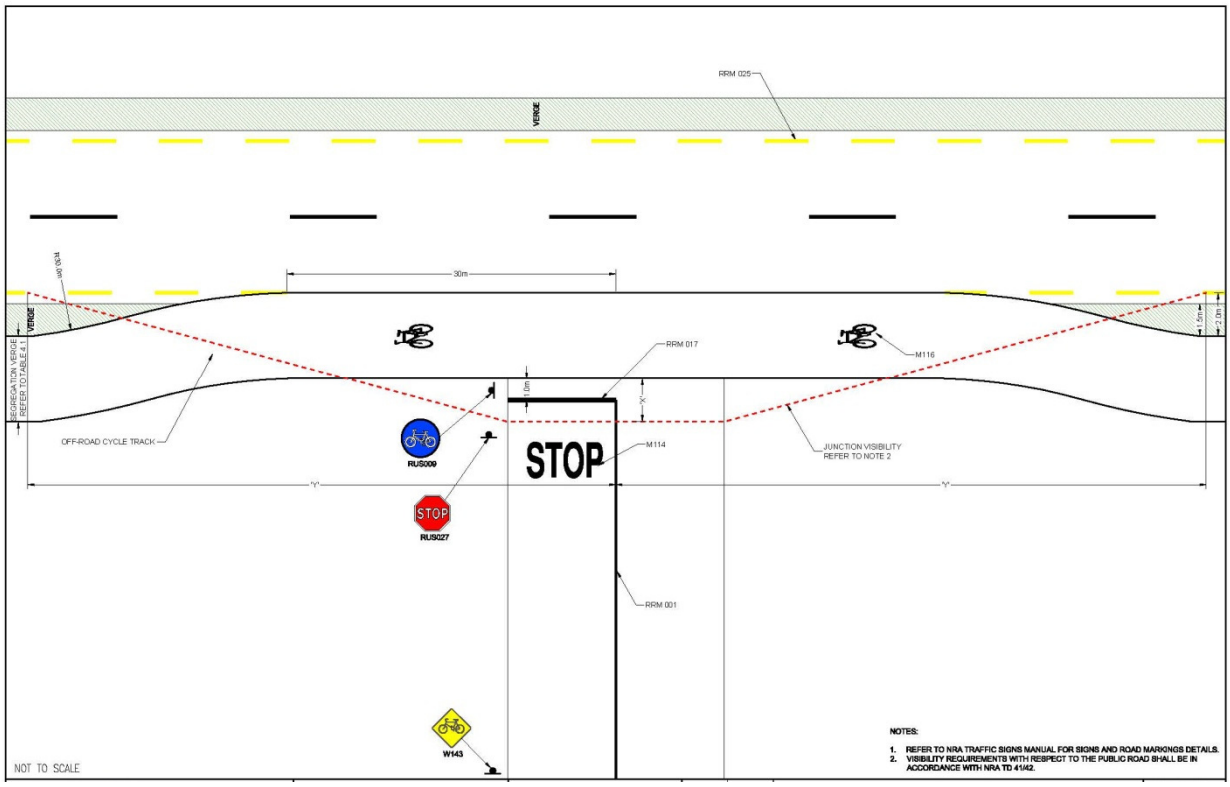


Figure 7.7: Bend In Minor Road Junction (One Way Cycle Track)

7.28 The bend out junction treatment is based on increasing the space between the cycle track crossing point and the main carriageway. This gives space for motorised vehicles turning off the major road before they encounter the cycle crossing thereby improving safety by ensuring waiting motorised vehicles do not encroach onto the main carriageway. The distance between the edge of the main carriageway and the crossing facility should be between 10 and 15 metres.

7.29 The bend out junction treatment should include a straight approach for cyclists to ensure that cyclists are provided with full visibility on entry to the junction treatment. The horizontal radii of 10 metres on the cycle facility can be introduced to encourage lower cycle speeds on approach to the junction.

7.30 Figure 7.8 demonstrates a bend out crossing associated with a minor junction.

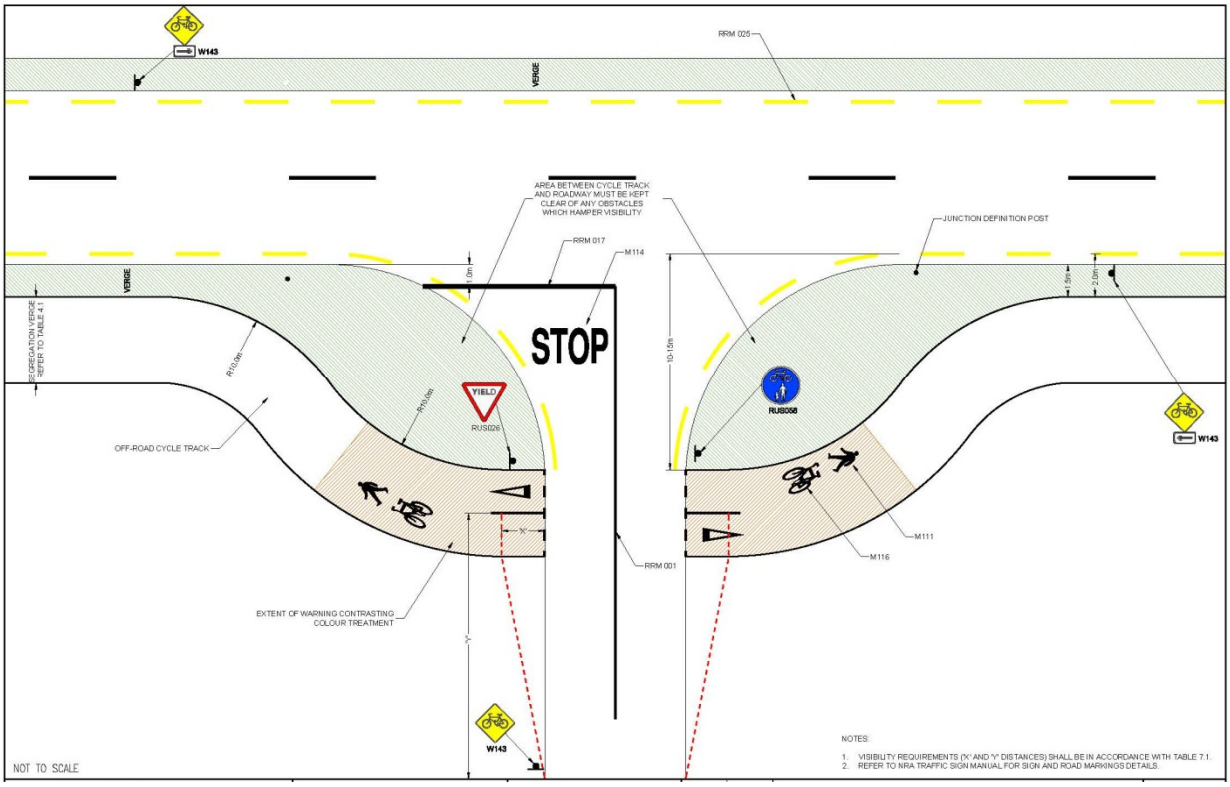


Figure 7.8: Bend Out Minor Road Junction

Major Junctions

7.31 At major give-way junctions, where the AADT of the side road is greater than 4,000 vehs, the most appropiate treatment for crossing facilities is the introduction of a bend out crossing with a central island. This type of facility can be used for both one-way and two way off road cycle facilities. The priority at major give-way junctions should lie with vehicular traffic. The provision of a central island will allow cyclists to cross the side road in two stages improving safety and convenience for cyclists. The central island should be a minimum of 3.5 metres in width to accommodate a waiting cyclist safely. Signs should be provided on the road warning motorists of the upcoming crossing facility.

7.32 The distance between the edge of the main carriageway and the crossing facility for a bend out junction should be the same as that noted for minor junctions, between 10 and 15 metres.

7.33 The bend out junction treatment should include a straight approach to cyclists to ensure that cyclists are provided with full visibility on entry to the junction treatment. The horizontal radii of 10 metres on the cycle facility can be introduced to encourage lower cycle traffic speeds on approach to the junction treatment.

7.34 Figure 7.9 demonstrates a bend out crossing associated with a major junction.

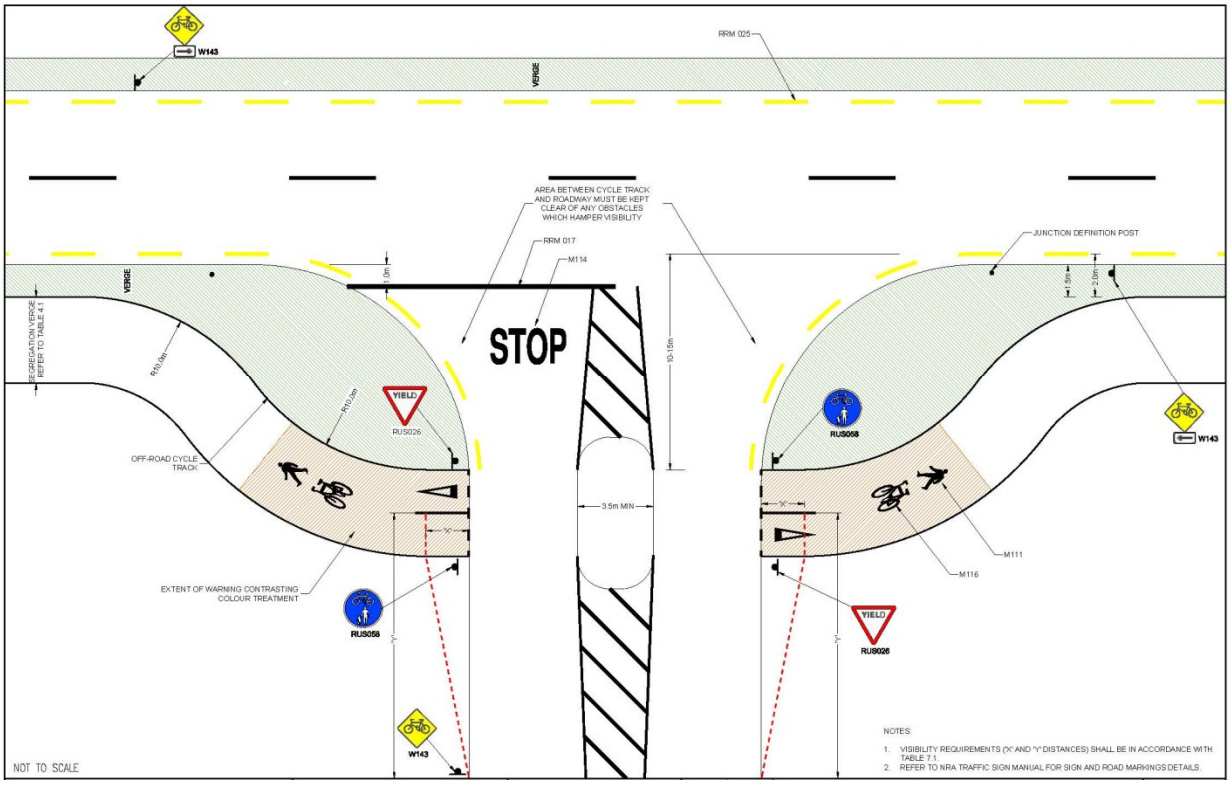


Figure 7.9: Bend Out Major Road Junction

7.35 On approach to junctions, cycle lanes should be continued through the junction with the same priority as the mainline traffic.

7.36 With one-way off road cycle tracks crossing major roads it is possible to provide a bend in junction treatment where the off-road cycle facility is directed on road at a minimum distance of 30 metres or greater before the junction. The cycle facility should be continued through the junction with the same prioirty as the mainline traffic. A bend-in junction treatment is not acceptable for two-way cycle facilities as exiting vehicular traffic would not expect cyclists arriving from the opposite side of the road.

7.37 Where the AADT of the side road exceeds 12,000 AADT, the provision of a grade separated crossing should be considered. The design of any grade separated crossing should be carried out in accordance with NRA BD 29 - Design Criteria for Footbridges and NRA TD 36 - Subways for Pedestrians and Pedal Cyclists. Layout and Dimensions.

Roundabouts

7.38 Roundabouts are one of the safest forms of at grade junctions for general motorised traffic, however they pose safety concerns for cyclists due to high vehicular speeds, particularly leaving the roundabout.

7.39 The preferred crossing facility at a roundabout is a bend out crossing located between 10 and 15 metres from the circulating carriageway of the roundbout. Where the cycle facility crosses roads with flows of greater than 4,000 AADT, the crossing should include for a central island.

7.40 The provision of cycle lanes on roundabouts is not recommended and any cycle lanes should terminate at the roundabout approach. On high speed roundabouts, with two lane approaches and circulating carriageways, it is recommended that cyclists approaching the junction via cycle lanes are provided with a bend out crossing facility.

7.41 Figure 7.10 demonstrates the design requirement associated with the provision of off –road cycle facilities at a roundabout.

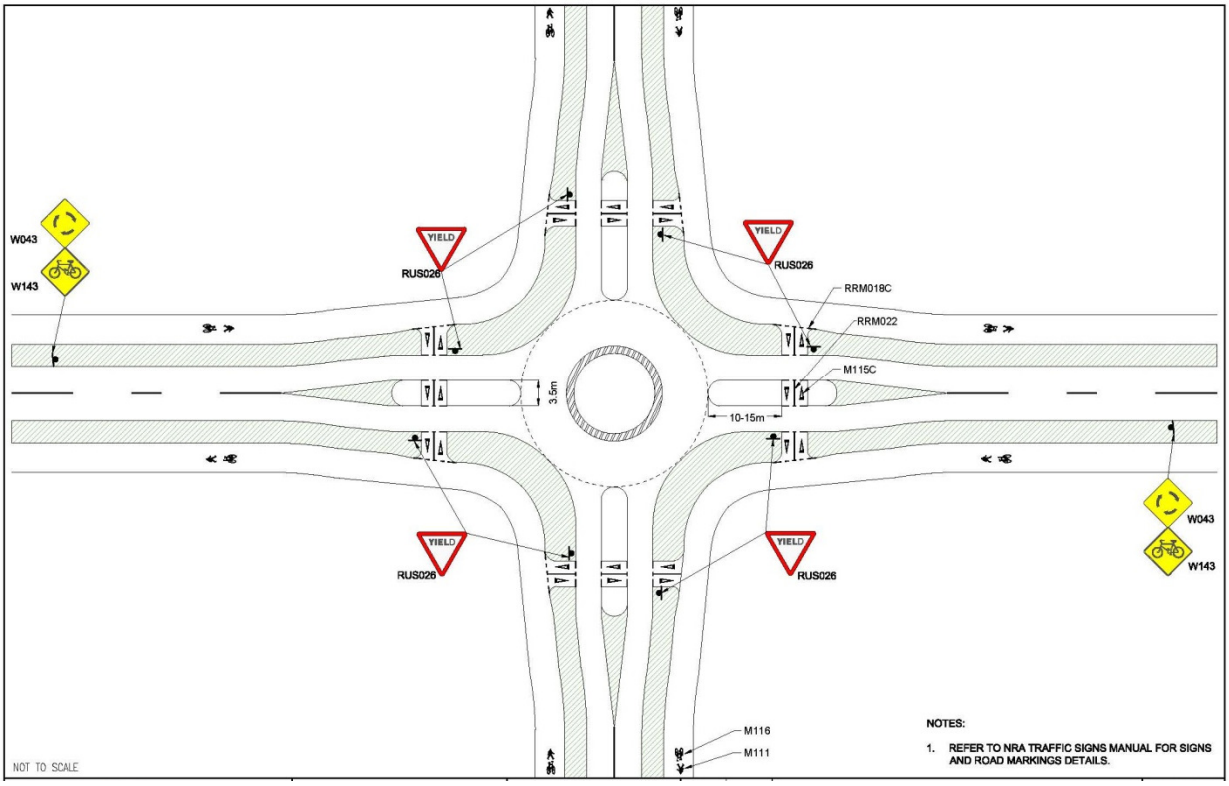


Figure 7.10: Roundabout Junction

Access Control

7.42 It is preferable that access control measures are kept to minimum as this will enhance the comfort and attractiveness of the cycle facility, however, it is recognised that there will be circumstances where access control measures will be required, in order to restrict access to the cycle facility for motorised vehicles, farm animals, etc.

7.43 The key objective of any access control requirement is to ensure that cyclists do not have to dismount to negotiate the access control, and it would be preferable to keep gates to a minimum. If gates need to be introduced, the self-closing type would be preferable, as this type of facility is less likely to result in cyclists having to dismount.

7.44 The design of access control gates or barriers must take into account the variety of cycle types who are likely to use the facility to include bicycles with panniers and trailers and trikes/ recumbents. Figure 7.11 and Figure 7.12 demonstrates the design requirements associated with the provision of approach barriers/ gates for both cycleways and cycle tracks.

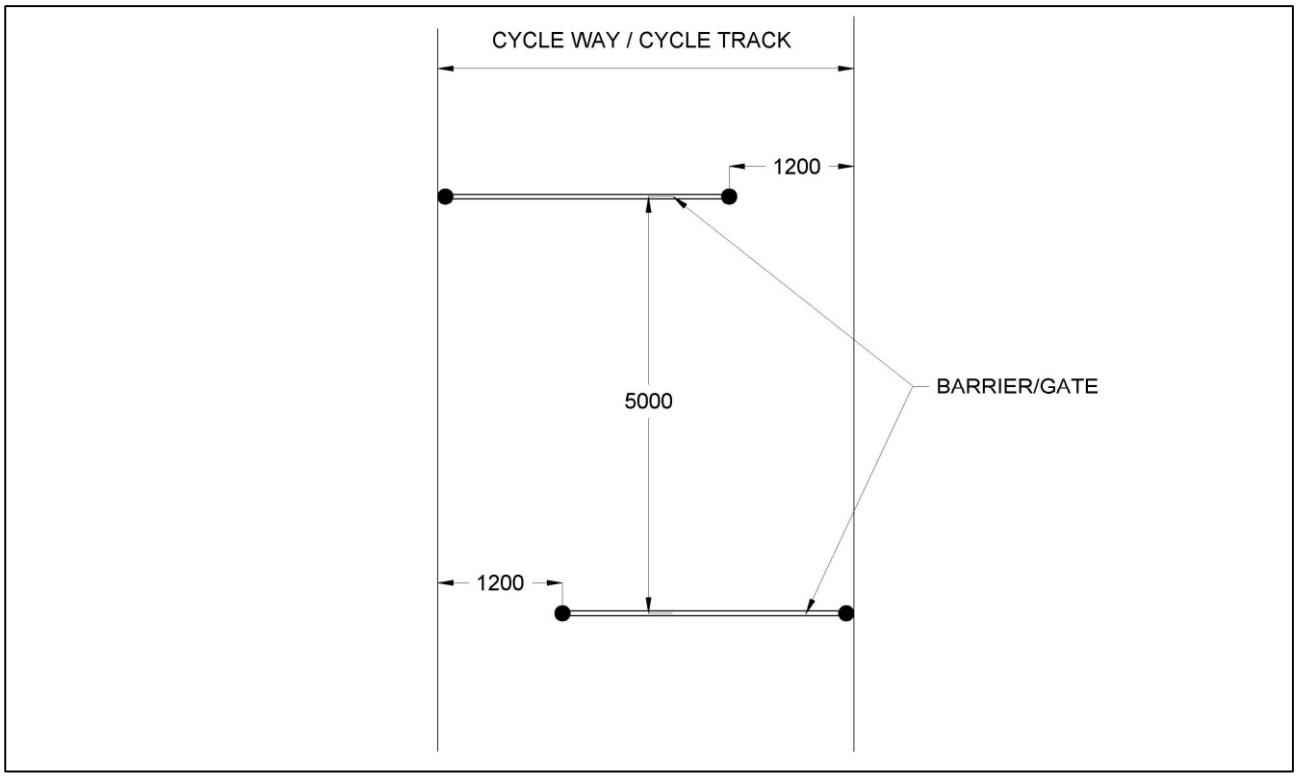


Figure 7.11 Staggered Approach Barrier

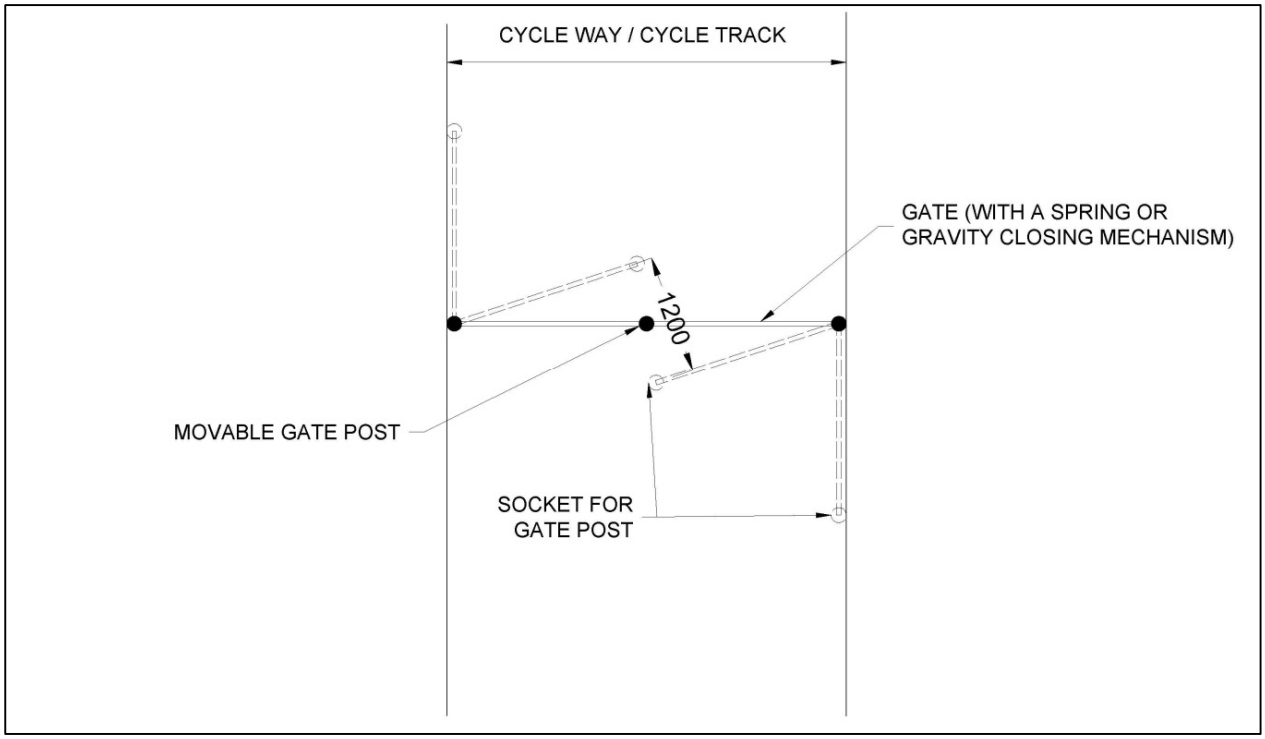


Figure 7.12 Cycle Gate

8 CONSTRUCTION DETAILS

General

8.1 The type and quality of the cycleway/cycle track surface and its construction detailing will affect the attractiveness of the facility. Cycle facilities do not experience the same degree of wear compared to road pavement for motor vehicles and a much lighter construction is acceptable.

8.2 The material specifications and construction techniques are to be consistent with the relevant requirements of the NRA DMRB and the Manual of Contract Documents for Road Works (NRA MCDRW).

Pavement

8.3 A key objective for any cycle facility is a smooth even surface. A smooth riding surface improves the enjoyment of the facility and prevents cyclists having to avoid potential hazards along the road surface. Cyclists can ride at speeds up to 50 km/h on downhill sections, and a rough surface or pothole can cause a cyclist to fall, leave the track or cycleway and crash or come into conflict with other users of the facility. Poor surfacing along an on-road cycle facility can lead to cyclists veering onto the main carriageway significantly impacting on cycle safety.

8.4 A cycle facility with a good quality pavement will provide a safe, attractive and comfortable environment for potential users. In addition, early investment in paving along the cycle facility will cut down on expensive future maintenance and repairs, cutting down on lifecycle costs and limiting times at which the facility will be out of service because of maintenance.

8.5 The pavement design should also consider the need of other potential users of the facility including cleaning equipment, maintenance vehicles and or local traffic access. Machine laid closed pavement construction (i.e. asphalt) is the preferred surface treatment for cycle facilities.

8.6 Bicycles are more sensitive to ride quality than motor vehicles and it is desirable to provide a finished surface quality for a cycleway that meets the minimum requirements of Series 700 of the Specification for Roadworks.

8.7 The design of cycle facilities should include foundations and geotextiles underneath the paving to avoid the risk of subsidence and edge damage. Foundations will need to be wider than the paving in order to eliminate the risk of edge damage. The cycle facility pavement foundations should be designed to the road design standards in Volume 4 of the NRA DMRB. Where necessary, due to soft ground conditions, capping should be placed in accordance with Series 600 of the Specification for Roadworks.

8.8 Asphalt surfacing is the most popular among cyclists because of its evenness and high skid resistance. It is recommended that an aggregate grading of 0/6 to 0/11 is provided. It is recommended that a closed surface pavement construction should be made up of the following:

a) 20 mm thin surface course macadam

b) 40 mm to 55 mm base course

c) 150 Clause 804 sub base (machine laid to achieve correct ride quality)

d) Geotexile layer (where necessary)

e) Capping (where necessary)

8.9 Like asphalt paving, cement concrete offers a closed surface with a high level of evenness and is an acceptable surface for a cycle facility. However, shrinkage joints, thermal joints and construction joints need to be installed correctly to achieve a high level of comfort for cyclists. The preferred surface finish is fine brooming, which will provide a high level of skid resistance. Concrete will offer excellent drainage and it is a material that possesses high durability. The occurrence of potholes and rutting will be minimal.

8.10 Although a closed pavement construction is preferred by cyclists in terms of comfort and safety, there are occasions where a surface is required to give a sense of the environment. In rural cycleway and greenway situations, where the cycle facilities attractiveness is just as important as comfort, dust path construction or other loose material construction maybe the preferred option in order to blend with the environment and to avoid unnecessary impacts in forests, along protected heritage trails, tow paths and along river banks. The application of loose surfaces can enhance the cycle facilities' appeal to its users due to its more natural aesthetics.

8.11 As an alternative to unbound surfaces in environmentally sensitive locations the provision of surface dressed base course is an acceptable alternative.

Surface Crossfall

8.12 Cycle facility surfaces need to be adequately drained to avoid the difficulties that standing water and ice can create for cyclists. A cycle facility should be constructed with a crossfall generally between 1.0% and 3.0%, with a maximum of 5.0% permitted over short sections.

8.13 Where a cycle facility forms part of the contiguous road surface, the road crossfall should be continued across its extent. However, within superelevated curves the crossfall can be reduced across the width of the cycle facility so as not to exceed 5%.

Surface Water Collection

8.14 Surface water runoff from cycleways is preferably collected from over-the-edge drainage ditches or by direct runoff into combined surface water and ground water filter drains. In some limited areas runoff may be collected by a kerb and gully system, but this should be avoided if possible as it is not really suitable in a rural area.

8.15 Where a cycle track facility is proposed, as either a new construction or an improvement to an existing road, a surface water collection system should be provided in accordance with NRA Addendum to HD 33 Surface and Sub surface Drainage System for Highways.

8.16 Where an off-road cycle facility is proposed running parallel to the road, surface water runoff can be collected either within the segregation Grassed verge or may be allowed to flow across the cycle facility and into a drainage ditch.

Over-the-Edge Drainage

8.17 Over-the-edge drainage is the preferred arrangement for a rural road with a cycle track adjoining. Where over-the-edge drainage is used it is important to ensure that the surface water runoff flows off the cycle track towards the drainage ditch and does not pond. Suitable crossfall of between 1% and 3% should be provided on the cycle track pavement.

8.18 The grassed verge between the carriageway and the cycle track must be constructed with a crossfall of no more than 10% so as not to destabilise an errant cyclist. No minimum crossfall is specified for the

grassed verge as water infiltration is desirable to limit and attenuate the overall runoff to the receiving watercourse.

8.19 The outside pavement edge detail of both the carriageway and cycleway should be higher than the proposed ground level by the depth of the pavement wearing course to stop back flow of the surface water runoff from a flat grassed verge.

Signage and Road Markings

8.20 Proper signage and lining is an integral and important part of any cycle facility and furthermore provides a good level of coherence, safety and attractiveness. Good signage gives clarity to the user as to where the cycle track starts/ends and provides warnings to potential risks that may be present. Signs and lines used on the public road network shall comply with the Traffic Signs Manual 2010.

8.21 At the start and end of a cycle facility and where the cycle facility connects with a public road, Sign RUS 009 should be erected for facilities solely used by cyclists and Sign RUS 058 for facilities shared between pedestrians and cyclists.

8.22 Cycle facilities which form part of the National Cycle Network should include the relevant signage requirements as identified in the Traffic Signs Manual.

8.23 The cycle facility should include clear directional signage along the route to ensure cyclists along the route understand that they are proceeding in the correct direction. The erection of directional signage is particularly important where the cycle facility interacts with the public road or where the cycle facility temporarily follows the public road.

8.24 Road markings should be kept to a minimum along the cycle facility. The provision of cycle symbols (M116) and pedestrian symbols (M111) need only be applied when the cycle facility intersects with the public road, or other public rights of way.

8.25 Delineation between pedestrians and cyclists is not recommended on low volume shared facilities, however the segregation of pedestrians and cyclists is recommended on high volume shared facilities. It is possible to segregate pedestrians and cyclists using road markings however the provision of a vertical (i.e. kerb) or a horizontal (i.e. grassed verge) separation along with contrasting surfacing is the preferred method of segregation.

Lighting

8.26 Generally rural cycle tracks will not be illuminated. Lighting should only be considered at junctions and close to and in built-up areas. The design and implementation of lighting should be carried out in accordance with BS EN 13201- 2:2003, Table 3.

9 REFERENCES

[1] **National Cycle Policy Framework 2009 – 2020** (Department of Transport)

[2] **National Cycle Network Scoping Study** (National Roads Authority, 2010)

[3] **National Cycle Manual** (National Transport Authority, 2011)

[4] **NRA TD 9 (NRA DMRB 6.1.1)** – Road Link Design

[5] **NRA IAN 03/12 –** Provisions for Cyclists and Pedestrians on Type 2 and Type 3 Single Carriageway National Roads in Rural Areas

[6] **NRA HD 33 (NRA DMRB 4.2.3)** – Surface and Sub-surface Drainage systems for Highways

[7] **NRA BD 29 (NRA DMRB 2.2.8)** - Design Criteria for Footbridges

[8] **NRA TD 36 (NRA DMRB 6.3.1)** - Subways for Pedestrians and Pedal Cyclists. Layout and Dimensions (NRA DMRB - Volume 6: Road Geometry)

[9] **NRA TD 19 (NRA DMRB 2.2.8A) –** Safety Barriers

[10] **NRA TD 27 (NRA DMRB 6.1.2)** – Cross Sections and Headroom

[11] **NRA TD 41/42 (NRA DMRB 6.2.6)** – Geometric Design of Major/ Minor Priority Junctions and Vehicle Access to National Roads

[12] **Cycle by Design 2010** (Transport Scotland, 2011)

[13] **Design Manual for Bicycle Traffic** (CROW, Netherlands, 2006)

[14] **Traffic Signs Manual** (Department of Transport Tourism and Sport, Dublin 2010)

[15] **Design Manual for Urban Roads and Streets** (Department of Transport Tourism and Sport and Department of Environment, Community and Local Government, Dublin 2013)

10 ENQUIRIES

10.1 All technical enquiries or comments on this document, or any of the documents listed as forming part of the NRA DMRB, should be sent by e-mail to infoDMRB@nra.ie, addressed to the following:

Head of Network Management, Engineering Standards & Research
National Roads Authority
St Martin's House
Waterloo Road
Dublin 4

……...
Pat Maher
Head of Network Management,
Engineering Standards & Research

National Roads Authority

Design Manual for Roads and Bridges
(NRA DMRB)

AMENDMENT No. 1 (December 2014) to
NRA TD 300 Rural Cycle Scheme Design Dated April 2014

NRA TD 300 Rural Cycle Scheme Design Dated April 2014 is amended as follows:-

1. Page 13, Paragraph 4.17, Table 4.3
   Delete the text 'Carriageway ≤ 80 km/h' and insert the text 'Type 2 and Type 3 Single Carriageway' from the 'Road Type' column on the first row.

2. Page 13, Paragraph 4.17, Table 4.3
   Delete the text 'Carriageway > 80 km/h' and insert the text 'Type 2 and Type 3 Dual Carriageway' from the 'Road Type' column on the second row.

Bonneagar Iompair Éireann
Transport Infrastructure Ireland

Ionad Ghnó Gheata na Páirce,
Stráid Gheata na Páirce,
Baile Átha Cliath 8, Éire

Parkgate Business Centre,
Parkgate Street,
Dublin 8, Ireland

www.tii.ie

info@tii.ie

+353 (01) 646 3600

+353 (01) 646 3601