The Highland Council
Comhairle na Gàidhealtachd

Roads and Transport Guidelines for New Developments
Stiùiridhean Rathaidean is Còmhdhalach airson Leasachaidhean Ùra

Section 2 – Standards and Guidelines
Earrann 2 – Inbhean is stiùiridhean

Chapter 5
Caibideil 5
Design objectives and requirements
Amasan is riatanasan dealbhaidh

Contents

Chapter 5 – Design objectives and requirements Caibideil 5 – Amasan is riatanasan dealbhaidh 7
5.1 Introduction / Ro-ràdh 7
Geometric requirements for roads and junctions/ Riatanasan geoimeatrach airson rathaidean is chinn-rathaid 8
5.2 Road elements / Eileamaidean rathaid 8
5.3 Road link types / Seòrsachan cheangalan rathaid 8
5.3.1 Strategic route roads and main distributor roads 8
5.3.2 Local distributor road 8
5.3.3 Industrial access road 10
5.3.4 Residential streets 10
5.3.5 Home zones and shared surfaces 11
5.3.6 Single track access road 12
5.4 Rural residential streets / Sràidean còmhnaidheach air an dùthaich 13
5.5 Link design geometric requirements / Riatanasan geoimeatrach dealbhadh ceangail 14
5.6 Road junctions / Cinn-rathaid 17
5.6.1 Introduction 17
5.6.2 Junction types 17
5.6.3 Junction spacing 17
5.6.4 Junction visibility 17
5.6.5 Junction design standards 18
5.6.6 Siting of junctions and accesses 18
5.6.7 Long vehicle requirements 18
5.7 Visibility / Faicsinneachd 21
5.7.1 Introduction 21
5.7.2 Forward visibility 21
5.7.3 Visibility splays at junctions 21
5.8 Carriageway widening for corners and bends / Leudachadh rathaidean airson oiseanan is lùban 26
5.9 Vehicle clearance / Rùm-gluasaid charbadan 28
5.9.1 Vertical clearance 28
5.9.2 Horizontal clearance 28
5.10 Gradients / Caiseadan 29
5.11 Turning areas / Àiteachan tionndaidh 29
5.11.1 Introduction 29
5.11.2 Residential turning areas 30
5.11.3 Industrial turning areas 32
5.11.4 Bus turning areas 33
5.12 Rural accesses / Slighean-inntrigidh dùthchail 33
5.13 Private accesses and driveways / Slighean-inntrigidh prìobhaideach 33
5.13.1 Introduction 33
5.13.2 Private accesses for non-residential developments 33
5.13.3 Access for timber extraction 34
5.13.4 Private accesses and driveways for residential dwellings 34
5.14 Designing roads for low speeds / A' dealbhadh rathaidean airson astaran ìosal 35

5.14.1 Introduction 35
5.14.2 Design 35
5.14.3 Speed limits 36
5.14.4 Standard traffic calming features 36
5.14.5 Consultation 38
Pedestrians, cyclists and equestrians / Coisichean, 38
luchd-baidhsagail is marcaichean 38
5.15 Pedestrians / Coisichean 38
5.15.1 Introduction 38
5.15.2 General design aspects 39
5.15.3 Pedestrian crossing facilities 40
5.15.4 Additional design considerations for pedestrians 46
5.15.5 Footway widths adjacent to carriageways 51
5.15.6 Footpath widths remote from roads 52
5.16 Cyclists / Luchd-baidhsagail 53
5.16.1 Introduction 53
5.16.2 Link design 54
5.16.3 Cycle facility road crossings and junctions 59
5.16.4 Additional design issues for cyclists 61
5.17 Provision for Equestrians / Ullachadh airson Mharcaichean 62
Public transport / Còmhdhail phoblach 63
5.18 Public transport facilities / Goireasan còmhdhalach poblaich 63
5.18.1 Introduction 63
5.18.2 Bus routes 64
5.18.3 Road widths for bus routes 65
5.18.4 Bus stops and shelters 66
5.18.5 Bus boarders 68
5.18.6 Bus bays 68
5.18.7 Lighting at bus stops 69
5.18.8 Bus turning facilities 69
5.18.9 Bus priority measures 70
5.18.10 Real time information 70
5.18.11 Taxis 71
5.18.12 Trains 71
5.19 Servicing arrangements / Ullachaidhean seirbheiseachaidh 71
5.19.1 Introduction 71
5.19.2 Commercial and industrial developments 71
5.19.3 Loading bays 72
5.19.4 Service roads and ramps 73
5.19.5 Parking 74
5.19.6 Fire fighting vehicles 75
5.19.7 Refuse collection requirements 75
5.19.8 Gully emptying 76
5.19.9 Winter maintenance 76
Traffic signs and road markings, road lighting, traffic signals and statutory undertakers / Soidhnichean trafaig is comharran rathaid, soillseachadh rathaid, siognailean trafaig agus gabhail os làimh reachdail 77

5.20 Traffic signs and road markings / Soidhnichean trafaig is comharran rathaid 77
5.21 Road lighting / Soillseachadh rathaid 78
5.21.1 Introduction 78
5.21.2 Design requirements 79
5.21.3 Location of equipment 79
5.21.4 Existing services 80
5.21.5 Defective equipment prior to adoption 80
5.22 Traffic signals / Siognailean trafaig 80
5.22.1 Introduction 80
5.22.2 Design requirements 81
5.22.3 Installation – General requirements 83
5.22.4 Maintenance costs 84
5.23 Statutory undertakers / Gabhail os làimh reachdail 85
5.23.1 Introduction 85
5.23.2 Locations 85
5.23.3 Service strips 86
5.23.4 Design requirements 87
5.23.5 Council and statutory undertakers' access rights 89
5.23.6 General construction requirements 90
5.24 Road drainage / Drèanadh rathaid 90
5.24.1 Introduction 90
5.24.2 Sustainable urban drainage systems 91
5.24.3 Design requirements 92
5.24.4 Drainage connection 95
5.24.5 Sub-grade drainage 96
5.24.6 Drainage impact assessment 97
5.24.7 Flooding issues 97
5.25 Other design requirements / Riatanasan dealbhaidh eile 97
5.25.1 Access to play areas 97
5.25.2 Traffic noise 98
5.25.3 Safety barriers and fences 98
5.25.4 General construction traffic 98
5.25.5 Special features 99

List of figures / Liosta fhigearan

Figure 5.1 Single Track Access Road Passing Place – Standard and Large
Figure 5.2 Visibility Splays at a Priority Junction
Figure 5.3 Minor Road Approach Visibility Splay
Figure 5.4 Cross Corner Visibility Radius
Figure 5.5 Driveway Visibility for Pedestrians
Figure 5.6 Carriageway Widening on Corners

Figure 5.7 Standard Turning Areas for Residential Streets
Figure 5.8 Standard Turning Areas for Industrial Areas
Figure 5.9 Controlled Pedestrian Crossing Arrangement
Figure 5.10a Flush Dropped Kerbs at a Controlled Pedestrian Crossing
Figure 5.10b Flush Dropped Kerbs at an Uncontrolled Pedestrian Crossing
Figure 5.11 Cycle Lane Priority Crossing
Figure 5.12 Standard Bus Bays – Rural and Urban
Figure 5.13 Side Loading Bay
Figure 5.14 End Loading Bays
Figure 5.15 Curve Widening on Service Ramps
Figure 5.16 Typical Layout of a Signal Controlled Priority Junction
Figure 5.17 Recommended Statutory Utility Locations within the Service Strip

List of tables / Liosta chlàran

Table 5.1 Geometric Requirements for Urban Road Links
Table 5.2 Geometric Requirements for Rural Road Links
Table 5.3 Junction Design Standards for Priority Junctions – Urban
Table 5.4 Junction Design Standards for Priority Junctions – Rural
Table 5.5 Indicative Y Dimensions for Rural Speed Values
Table 5.6 Cross Corner Visibility Requirements
Table 5.7 Carriageway Widening on Curves of Small Radii
Table 5.8 Minimum Footway Widths
Table 5.9 Minimum Footpath Widths
Table 5.10 With-flow Cycle Lane Widths
Table 5.11 Segregated Cycle Track Facility Effective Widths
Table 5.12 Clearance Distances to Fixed Objects
Table 5.13 Traffic Signal Design Reference Documents
Table 5.14 Gully Spacings for Carriageways

Section 2 – Standards and guidelines / Earrann 2 – Inbhean is stiùiridhean

Section 2 of the Roads and Transport Guidelines for New Development document sets out the Council's current standards and guidance to assist the design of new road layouts, together with their associated services and facilities, to the standards required by the Council, if the road is to be adopted as public.
The section starts with establishing an appropriate layout, in terms of the intended road type, then provides guidance and requirements on various aspects of detailed design, including parking levels. Guidance on construction details and material standards is also provided.

For lightly trafficked residential streets, reference must be made to the Scottish Government's Designing Streets document, providing design parameters and guidance, which must be taken into account in the design of new or improved streets that serve residential areas.

Section 2 includes the following:

Chapter 4 Road Network

Chapter 5 Design Objectives and Requirements

Chapter 6 Parking

Chapter 7 Construction Materials Standards

Chapter 5 – Design objectives and requirements
Caibideil 5 – Amasan is riatanasan dealbhaidh

5.1 Introduction / Ro-ràdh

5.1.1 This chapter provides details of the Council's current design requirements for new road layouts, explains why the design requirements are set and gives appropriate background and supporting information for various relevant aspects of the design. An understanding of the principals behind these guidelines is essential in their application to the geometric design of road layouts and the following paragraphs are included to brief developers in that respect.

5.1.2 Road safety is the environment and ease of maintenance the main objective and designers should seek to meet the standards wherever possible.

5.1.3 Specific design requirements are contained within highlighted text boxes or Tables. Additional design considerations may be necessary for individual developments and are described within the general text paragraphs or highlighted as figures. Users of Chapter 5 are, therefore, recommended to familiarise themselves with the complete Chapter.

5.1.4 The Chapter is sub-divided into the following grouped topics, for ease of reference:

- Geometric Requirements for Roads and Junctions
- Pedestrians, Cyclists and Equestrians
- Public Transport
- Servicing Arrangements
- Traffic Signs and Road Markings, Road Lighting, Traffic Signals and Statutory Undertakers
- Road Structures
- Road Drainage
- Other Design Requirements

5.1.5 It is a statutory requirement, in terms of Section 20 of the Equality Act, to take account of the needs of disabled persons when designing any building to which the public have access. Routes to buildings should be designed to accommodate disabled persons.

Geometric requirements for roads and junctions/ Riatanasan geoimeatrach airson rathaidean is chinn-rathaid

5.2 Road elements / Eileamaidean rathaid

5.2.1 Design is divided into two distinct parts – link design and junction design. Design requirements for both parts are related to vehicle speed and the desired capacity for volume and type of traffic.

5.3 Road link types / Seòrsachan cheangalan rathaid

5.3.1 Strategic route roads and main distributor roads

5.3.1.1 As stated in Chapter 4, Strategic Route Roads and Main Distributor Roads are major road types that would need to be designed in full consultation with the Council.

5.3.2 Local distributor road

5.3.2.1 The nature of a Local Distributor Road will be influenced by the anticipated mix and volume of all types of traffic using it, including pedestrians and cyclists.

Design Requirements
The standard width of carriageway for a Local Distributor Road shall be 6.0 metres, increasing to 7.3 metres if it is a bus route or gives access to an industrial development.

5.3.2.2 Prior agreement must be reached with the Council as to whether bus stops will require provision of lay-bys and this is likely to be influenced by the intended speed limit and traffic volume on the road. Generally, a 40mph speed limit is considered more appropriate for a semi-rural location, with the majority of urban locations expected to have a 30mph speed limit.

5.3.2.3 Where pedestrian movements are high, facilities for pedestrian crossings shall be provided, preferably in the form of controlled crossings. Where appropriate and there is sufficient demand, the crossing facilities may also be designed to cater for cyclists. However, in certain circumstances, it may be more appropriate to reduce vehicle speeds, so that uncontrolled crossings can be provided. The crossing points should be provided at locations that best serve vulnerable road users, seeking to meet natural pedestrian desire lines wherever possible.

5.3.2.4 Typical locations where there is likely to be major pedestrian (and cyclist) activity are:

- in proximity of a school (where an associated TRO may be required, to restrict parking);
- where there are a number of retail units;
- on a defined pedestrian route and/or cycle route;
- in the vicinity of bus stops;
- at developments of high trip generators, such as business, commercial, leisure or industrial developments.

5.3.2.5 In some instances, new development proposals may be required to enhance existing pedestrian and cycle facilities.

Design Requirements.
Where a footway is to run adjacent to the Local Distributor Road (other than when it is a High Street), a minimum 3.0-metre shared footway/cycle track shall be provided, preferably separated from the carriageway by a 2.0 metre verge, unless agreed otherwise with the Council.
If the verge is located to the rear of the footway/cycle track, then the first 0.6 metres of the 3.0m footway/cycle track shall form a segregation strip, by use of different materials, such as block paving.
Localised widening of the combined footway/cycle track shall also be provided in the vicinity of bus stops.

5.3.2.6 In some locations, wider footways should be provided where there are significant levels of pedestrian activity. In some circumstances, provision of cycle lanes on the carriageway may be permitted, as an alternative arrangement.

Design requirements
A 2.0 metre verge shall be provided on both sides of a Local Distributor Road (other than when it is a High Street), at all times, unless agreed otherwise by the Council, together with any additional width required for the provisions of SUDS measures, such as swales.
In rural locations, where the verge is adjacent to the carriageway, it shall be grassed, although a granular material may be acceptable at some specific locations, to act as an over-run area.
Where direct frontage access is permitted onto a Local Distributor Road, curtilage turning facilities are to be provided within the development, so that vehicles can enter and exit the site in forward gear, in the interests of road safety.

5.3.3 Industrial access road

5.3.3.1 The alignment of an Industrial Access Road will largely depend on its length but a formal design speed is still considered appropriate for assessing curve radii and visibility.

Design requirements
A design speed of 32kph is proposed as an appropriate figure, combined with a desirable minimum centreline radius of 127 metres (absolute minimum of 30 metres), together with localised carriageway widening or vehicle over-run areas at locations with small radius curves.
The Industrial Access Road should be designed as a loop road or with a number of vehicular entrances and exits, rather than as a cul-de-sac requiring turning head facilities.
The carriageway should be a minimum width of 7.3 metres, but it may be acceptable to reduce this to 6.0 metres where commercial vehicle activity is likely to be limited, such as for small units, or where there is one-way working.
A minimum 2.0 metre wide footway should be provided on both sides of the road, increased to at least 3.0 metres minimum if shared footway/cycle tracks are provided.

5.3.3.2 Depending on levels of movements and also any surrounding pedestrian/cycle network, there may be a requirement for pedestrian crossing facilities. Bus services (new or enhancement) and public transport infrastructure may also be required.

5.3.4 Residential streets

5.3.4.1 There are different types of residential streets, with varying design

requirements depending on their access arrangements and the number of units that they are serving.

5.3.4.2 Carriageway widths and alignment should promote low vehicular speeds together with a greater emphasis on facilities for walking and cycling.

5.3.4.3 Proposed speed limits for residential developments must be agreed with the Council. For the majority of these developments, the Council will require a formal 20mph speed limit or speed restriction zone to be introduced, with appropriate signage provided. The developer will be required to meet all costs associated with the introduction of such 20mph speed limits or zones, including signage and TRO costs.

Design requirements
Residential streets should have a maximum design speed of 32kph, although the design of any alignment should encourage lower speeds.
Where a residential street is also to be a bus route, an appropriate speed limit and carriageway width must be agreed with the Council, as this will influence the design of the street. Geometric requirements shall be assessed on a site-by-site basis, in consultation with the Council and taking account of the principles within Designing Streets. In certain cases, the Council may require geometric dimensions that differ from those recommended within Designing Streets.
Where a supporting mandatory 20mph speed limit is introduced, this will require associated signage and the promotion of an associated TRO, which the developer shall normally fund.
There is a requirement to ensure that service vehicles, especially refuse collection vehicles, can be accommodated and this shall be confirmed by the use of swept path analysis.

5.3.5 Home zones and shared surfaces

5.3.5.1 For many new residential developments, the Home Zone concept of shared surface streets would be acceptable and is encouraged by the Council. There is no standard Home Zone design but there is useful design information that can be referred to. Examples include:

- Home Zone Design Guidelines
  (Institute of Highway Engineers)
- Homes Zones: Challenging the future of our streets (www.nacto.org)
- Homes zones in Scotland: evaluation report
- Homes zones paving

(http://www.paving.org.uk) Rebirth of the Home Zone - Interpave

5.3.5.2 Shared surfaces can also be provided within other types of development to help enhance social interaction. However, any such proposal must be agreed early with the Council and needs to take full account of the needs of people with mobility difficulties, especially the visually impaired.

5.3.6 Single track access road

5.3.6.1 The single track access road is predominantly constructed within the rural environment, where low traffic flows permit a reduced carriageway width.

Design requirements
The carriageway should be 3.3 metres wide and shall be provided with inter-visible passing places, where possible, that are a maximum distance of 150 metres apart and sited to suit the vertical and horizontal geometry. Where there are a number of dwellings in close proximity to each other and directly fronting onto the road, a 5.5 metre wide carriageway must be provided along the frontages to accommodate a stopped vehicle

5.3.6.2 Figure 5.1 shows two options for the required layout of a standard passing place, with the larger size provided where significant numbers of HGVs may use the road.

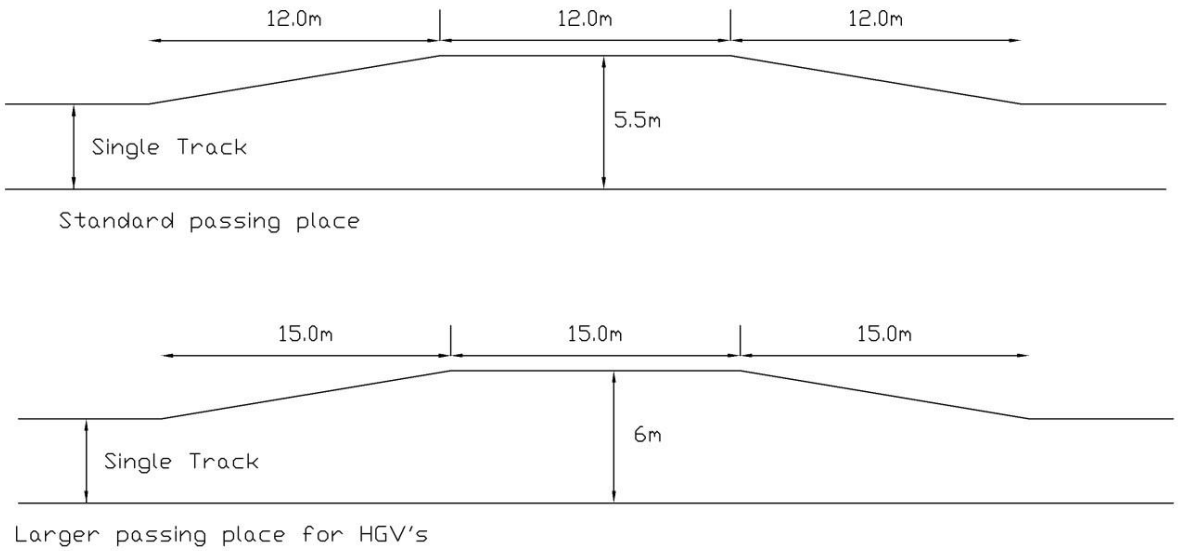


Figure 5.1 Single track access road passing place – standard and large

5.3.6.3 Where a development is proposed on an existing road which currently does not meet all of the above criteria, then the developer will still be required to

widen the road along the frontage of the development and may, where deemed necessary, need to widen the whole length of the access road to the development to an appropriate width. In such cases, the extent of improvements will have to agreed and approved by the Council prior to their construction.

5.4 Rural residential streets / Sràidean còmhnaidheach air an dùthaich

5.4.1 For residential streets, guidance and standards contained within both Designing Streets and this document tends to focus on residential developments within the urban context. In rural locations residential streets should still comply with general geometric standards, but their layout and construction materials should be more related to the rural context.

5.4.2 The proposed design of a rural residential scheme must be discussed at an early stage with the Council. The principles of Designing Streets do apply to rural residential streets, in that they should be designed to accommodate pedestrians, cyclists, service vehicles and private vehicles. However, the main difference is likely to be in the use of appropriate materials, with the objective of ensuring that a rural residential street fits well into its surroundings. Examples of good rural design include:

- Having horizontal alignments with more curves and bends. This results in shorter sections of straight roads, which will also reduce vehicle speeds;
- Not using standard precast concrete kerbing, but other materials, such as plastic kerbing, granite kerbs or setts. In some cases, kerbing may be omitted altogether;
- Lower kerb upstands may be more appropriate, but recognising drainage and future maintenance requirements; Footways could be segregated from the carriageway by grass verges or open spaces for SUDs measures such as swales;
- Provision of pedestrian access to bus stops/shelters on adjacent bus routes where appropriate;
- Driveways and accesses could be provided with gates that are set back;

- Use street furniture more appropriate to a rural setting;
- Street lighting may, in some cases, be omitted;
- Seeking to reduce the amount of road markings and signage required; and
- Enhanced landscaping could be provided, such as trees within the grass verges.

5.4.3 Whilst the use of appropriate materials can assist in softening the visual impact of a rural residential street, there is an issue with their future maintenance. It is important, therefore, that if a developer proposes any special materials, this is discussed and agreed with the Council. In some circumstances, a developer may be required to provide additional quantities of a particular material to the Council, for storage and future maintenance.

5.5 Link design geometric requirements / Riatanasan geoimeatrach dealbhadh ceangail

5.5.1 The link design geometric requirements to be used for different types of road are set out in Tables 5.1, for urban roads, and Table 5.2, for rural roads. The geometric requirements shall be discussed and agreed with the Council, in case there are any site-specific issues that may require a local variation to a particular criterion.

Table 5.1 Geometric requirements for urban road links

Road type		Strategic route 1	Main distributor 2	Local distributor 3a-60kpm	Local distributor 3b-50kpm	Industrial access road 4	Main residential street 5	Minor Residential street home zone and cul-de-sac 6a	Comment
Widths	Carriageway	7.3m	6.0–7.3m	6.0-7.3m	6.0-7.3m	6.0-7.3m	5.5-7.3m	C/way width to be suitable for refuse vehicle 2.9m wide and 8.6m long	a - refer to Designing streets
	Footway (minimum width)	3.0m b	3.0m b	3.0m b	3.0m b	2.0m	2.0m		b - shared footway/cycle track, with first 0.6m block paving where next to carriageway Either grass or combined 0.6m block paving & 1.4m grass for Road Type 6
	Verge	2.0m	2.0m	2.0m	2.0m	2.0m	2.0m where specified by the Council		
Design speed		DMRB	DMRB	60kph c	50kph c	32kph unless bus route	32kph unless bus route	32kph max	c - 50kph for 30mph speed limit and 60kph for 40mph speed limit
Sight distance	Overtaking	DMRB	DMRB	345m	290m	-	-	Refer to Designing streets	
	Stopping	DMRB	DMRB	90m	70m	70m	35m		
Horizontal radius	Desirable minimum	DMRB	DMRB	255m	180m 127m d	127m d	-	To be agreed with the Council	d - carriageway widening or overrun areas at corners
	Absolute minimum	DMRB	DMRB	180m		30m d	25m d		
Gradients	Maximum	DMRB	DMRB	8%	8%	8%	8%	10%	
	Minimum	DMRB	DMRB	0.80%	0.80%	0.80%	0.80%	0.80%	In exceptional cases, a lower minimum may be accepted
Vertical curves K values	Overtaking crest	DMRB	DMRB	142	100	-	-	-	
	Minimum crest	DMRB	DMRB	17	10	10	6	-	
	Minimum sag	DMRB	DMRB	13	9	9	6	-	
Access features	Frontage Access	No	No	No	Restricted e	Yes	Yes	Yes	e - Only acceptable where low traffic flows
	In-curtilage turning	n/a	n/a	n/a	Essential	Desirable	Desirable	No	
	On-street lay-by for parking/ loading	n/a	n/a	Yes f	Yes f	No	No	No	f - depends on type of frontage
	Bus bay	Yes	Yes	Yes	No	No	No	No	

Table 5.2 Geometric requirements for rural road links

Road type		Dual Carriageway	A - Class	B - Class	C - Class	Unclassified	Single track access road	Comment
Widths	Carriageway	2x7.3m	6.0m-7.3m	5.5m-6.0m	3.3m or 5.5m	3.3m or 5.5m a	3.3 m	a - if single track, then passing places are to be provided
	Footway (if provided)	2.0m	2.0m	1.5m	1.5m	1.5m	1.5m	Additional 0.5m separation strip to be provided, where verge is to rear of footway
	Verge	2.0m	2.0m	2.0m	2.0m	2.0m	2.0m	Width excludes ditches. normally grass
Design speed		DMRB	DMRB	85kph	60kph	60kph	60kph	
Sight distance	Overtaking	DMRB	DMRB	490m	345m	345m	n/a	
	Stopping	DMRB	DMRB	160m	120m	120m	120m	
Horizontal radius	Desirable minimum	DMRB	DMRB	510m	255m	255m	-	
	Absolute minimum	DMRB	DMRB	360m	180m	180m	Note	Note – value to be agreed
Gradients	Maximum	DMRB	DMRB	8%	10%	10%	10%	
	Minimum	DMRB	DMRB	0.80%	0.80%	0.80%	0.80%	In exceptional cases, a lower minimum may be accepted
Vertical curves K values	Overtaking crest	DMRB	DMRB	285	142	142	Note	Note – value to be agreed
	Minimum crest	DMRB	DMRB	55	17	17	Note	Note – value to be agreed
	Minimum sag	DMRB	DMRB	20	13	13	Note	Note – value to be agreed
Access features	Frontage access (see note 1)	No	Restricted b	Restricted [b]	Yes	Yes	Yes [c]	b – depends on road layout, visibility and traffic volumes/speeds **c** - - where development directly fronts the road, width to be increased to 5.5 m
	In-curtilage turning	Essential	Essential	Yes	Yes	Yes	Yes	To allow entry/exit in forward gear
	On-street lay-by	No	Yes	Yes	Yes	Yes	Yes	
	Bus bay	Yes	Yes	Desirable	No	No	No	

Note 1 – acceptance of the formation of a new rural private access will be influenced by traffic volumes, speeds, road layout and the proximity of existing accesses. For Class A and B roads, the Council must be consulted for guidance on spacing advice. On other minor rural roads, a new private access should not normally be constructed within 90 metres of a road junction or within 30 metres of an existing private access. The Council would encourage the use of shared accesses.

5.6 Road junctions / Cinn-rathaid

5.6.1 Introduction

5.6.1.1 There will be a requirement to provide vehicular access for nearly all new developments to some extent by means of a road junction. Depending on the size of a development, internal junctions may also be required. It is important that junctions are designed so they are safe for all road users. Junction design is influenced by traffic capacity, vehicle speed and also by type and size of development block, where relevant.

5.6.2 Junction types

5.6.2.1 Where two roads intersect or where a new access joins an existing road, the standard requirement is that a right angled priority T-junction should be formed with the major road, which is defined as carrying the higher volume of traffic through the junction.

5.6.2.2 In certain circumstances, other types of junctions, such as a roundabout or the provision of traffic signals may be required, with the appropriate junction layout and type agreed in advance with the Council. Crossroads are more convenient for pedestrians and can help create more permeable street networks, so are appropriate for residential areas. For larger developments or complex junction layouts, the design of junctions shall be checked for the anticipated traffic flows, using standard junction design computer programs or by use of microsimulation modelling.

5.6.2.3 The geometric layout of the junction should clearly establish the priority of the major road to approaching drivers and other road users. Signs and/or road markings will usually be required to emphasize this priority, provided at the developer's expense, and agreed with the Council.

5.6.3 Junction spacing

5.6.3.1 In the interest of road safety, the number of new connections onto the existing main road network should be minimised and, where feasible, new vehicular accesses should connect with existing side roads in the first instance. However, within new residential developments, particularly medium/large ones, it is recommended that a number of access routes are provided, in order to spread traffic flows by giving drivers route choice.

5.6.4 Junction visibility

5.6.4.1 It is important that vehicles exiting a side road can see and be seen by approaching vehicles on the main road, especially where the main road has high traffic speeds. A junction visibility splay must be provided and kept clear of obstructions. These requirements can significantly impact the design of any frontage. Guidance on visibility is given in Section 5.7.

5.6.5 Junction design standards

5.6.5.1 Road junctions should be designed to meet the minimum standards set out in Table 5.3 (Urban) and Table 5.4 (Rural).

5.6.6 Siting of junctions and accesses

5.6.6.1 It is preferable to provide new junctions and accesses on level ground or where the gradient is less than 6%. In addition, they should be sited in sags rather than at or near crests. Where a T junction or access is positioned on a curve, it should be sited so the minor road/access is on the outside of the curve. Junctions or accesses on the inside of sharp curves will generally be unacceptable.

5.6.6.2 Outwith residential areas or industrial estates, where two opposite minor roads approach a major road that carries high volumes of traffic or fast-moving vehicles, a staggered junction, comprising two T-junctions, should normally be used, instead of a crossroads layout. Right/left staggers (where a vehicle crossing the main road first turns right out of the minor road, travels along the major road and then turns left into the other minor road) are preferred to left/right staggers, in the interests of road safety.

Design requirements
For a staggered junction layout outwith a residential area or industrial estate, the stagger distance between the centrelines of the two minor roads should be a minimum of 50 metres and, no more than 100 metres.

5.6.6.3 Junction spacing, as set out in Tables 5.3 and 5.4, is related to the likely volumes and speed of traffic, as well as the distance required for a moving vehicle to comfortably take up an appropriate position for any movement.

5.6.7 Long vehicle requirements

5.6.7.1 At those junctions where it is expected that significant numbers of long vehicles will emerge from the minor road, such as an Industrial Access Road, it is good practice that the nearside kerb incorporates a taper, to assist the vehicles turning left out off the access. A 1 in 5 taper over a minimum length of 30m, measured from the minor road centreline is deemed appropriate.

Table 5.3 Junction Design Standards for Priority Junctions – Urban

Urban roads					
Major road type	**Minor road type**	**Minimum spacing on main road**	**Visibility splay**		**Corner Radii**
		(metres)	**X (metres)**	**Y (metres)**	**R (metres)**
60mph speed limit	Any	210	9	215	Compound curve
Main distributor	Local distributor	210	9	160	Compound curve
Local distributor (40mph speed Limit)	Local distributor	100	9	120	10
Local distributor (30mph speed Limit)	Local distributor	100	9	90	10
Local distributor	Industrial access road street	100 for same side 50 for opposite side	4.5	90	15
Local distributor	Main residential	100 for same side 50 for opposite side	4.5	90	6
Industrial access road	Industrial access road	50 for same side 25 for opposite side	4.5	90	15
Main residential street	Main residential street	50	4.5	30 If 20mph speed limit	6
Main residential street	Minor residential street	25	Refer to standards and guidance in Designing Streets with dimensions to be agreed		
Main residential street	Loop road, home zone or cul-de-sac	25	Streets to have maximum design speed of 32kph		
Minor residential street	Loop road, home zone or cul-de-sac	25	Streets to have maximum design speed of 32kph		
Speed limit 30mph or more	Individual driveway	25 from a major junction 15 from a minor junction	2.4	70/45 *	-
Speed limit 20mph or less	Individual driveway	25 from a major junction 15 from a minor junction	2.4	25	-

Note – in terms of Table 5.3, a junction is deemed to be major when the minor road is Type 1, 2, 3a, 3b, 4 or 5 as defined in Table 5.1. A minor junction is one where the major road is restricted to Type 4, 5 or 6 and the minor road is Type 6 only.

* Main residential street/minor residential street

Table 5.4 Junction design standards for priority junctions - rural

Rural roads					
Major road type	**Minor road type**	**Minimum spacing on major road**	**Visibility splay**		**Corner radii**
	See note 1	**(metres)**	**X (meters)**	**Y (meters)**	**R (metres)**
Dual carriageway 120kph design speed	Any	295	9	295	Compound curve
A class road 100kph design speed	Any	270	9 2.4 for a driveway	215	15 6 driveway
B class road 85kph design speed	Any	160	9 2.4 for a driveway	160	15 6 driveway
C class road 60kph design speed	Any	120	4.5 2.4 for a driveway	120	10 6 driveway
Unclassified road	Any	120	4.5 2.4 for a driveway	Note 2	10 6 driveway
Single track	Any	120	4.5	Note 2	10
Access road			2.4 for a driveway		6 driveway

Note 1 – guidance on the formation of a new rural private access, including geometric dimensions, can be obtained from the Access to Single Houses and Small Developments Booklet.

Note 2 - for unclassified rural roads, the Council will advise what Y value of the visibility splay and what corner radii are considered appropriate for any proposed junction, as they are dependent on the likely vehicle speeds at the specific location. This may require a speed survey to be undertaken, at the developer's expense. As an indication, likely Y values are given in Table 5.5.

Table 5.5 Indicative Y dimensions for rural speed values

85% percentile speed survey – mph/kph	60/100	50/85	40/60	30/50	20/30
Y distance – metres	215	160	120	90	60

5.7 Visibility / Faicsinneachd

5.7.1 Introduction

5.7.1.1 To enable a driver to see a potential hazard in the road ahead in time to slow down or stop comfortably, the driver's line of vision, in both horizontal and vertical planes, must be considered, together with the stopping distance of the vehicle. The most obvious obstructions to visibility are likely to be road summits, parked vehicles, dense planting, walls/fences and adjacent buildings.

5.7.2 Forward visibility

5.7.2.1 The requirements for minimum forward visibility, commonly referred to as the Stopping Sight Distance (SSD), for different types of road are set out in Tables 5.1 and 5.2. For residential streets or other locations where lower traffic speeds are to be encouraged, Designing Streets recommends reduced distances. However, proposed values for such prospectively public roads must be agreed with the Council during the planning application stage, as these values affect the scheme layout and subsequent RCC application.

5.7.2.2 A design check of the SSD should be undertaken, especially at curves and crests in the road, in order to establish to what extent forward visibility cuts across a corner that could require an area to the rear of the footway and/or verge being included in the forward visibility splay.

Design requirements
The eye level of a driver can vary from 1.05m above the road surface, when in a typical car, to approximately 2.0m for a commercial vehicle. To allow drivers to see each other across summits, across bends and at junctions, it is essential that unobstructed forward visibility is at least provided within these heights above the road surface, in terms of Full Overtaking Sight Distance.
In terms of Stopping Sight Distance, for a driver to see an obstacle lying on the carriageway, unobstructed forward visibility should be provided to a point closer to the ground and this lower limit is set at 0.26m. Eye level shall be taken between 1.05m and 2.0m.
It is important that the designer checks visibility can be provided in both the horizontal and vertical plane.

5.7.3 Visibility splays at junctions

5.7.3.1 Visibility requirements for a junction or access are dictated by the nature and volume of traffic on the minor road, together with the speed of the traffic on the major road.

Design requirements
Road users approaching a major/minor priority junction along the major road must be able to see the minor road access from a distance equivalent to the SSD set out in Tables 5.1 and 5.2.
A new junction or access must provide visibility splays, as shown in Figures 5.2/5.3/5.4. These must be constructed and maintained free of any obstruction over the whole visibility splay. The driver's eye height shall be taken as 1.05 metres and the target height as 0.6 metres.
Values for X and Y, together with Radius R, are as set out in Tables 5.3 and 5.4,

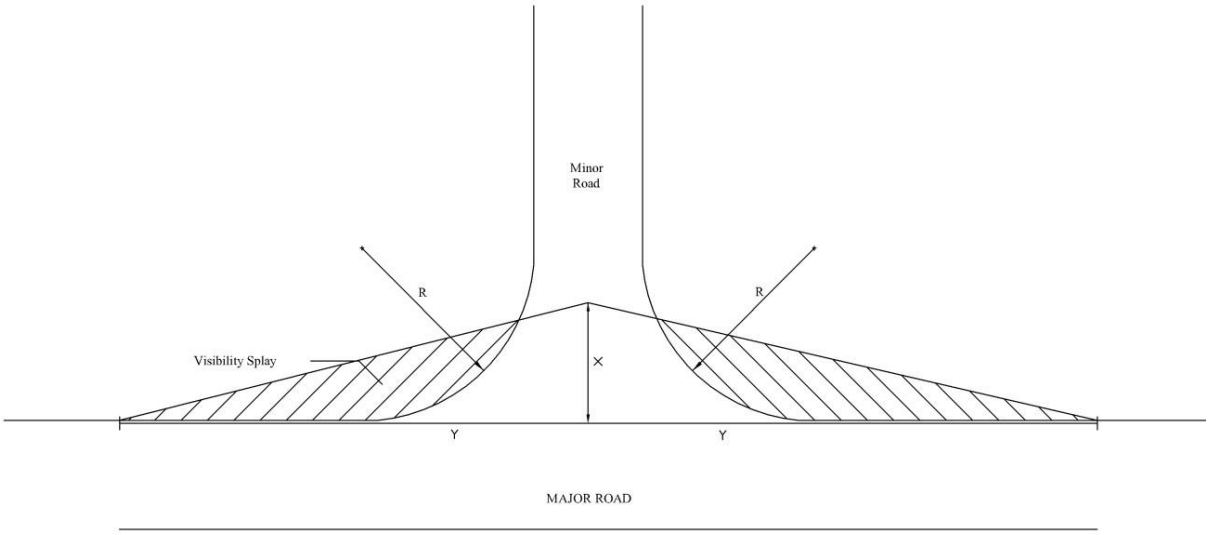


Figure 5.2 Visibility splays at a priority junction

5.7.3.2 As shown in Figure 5.2, visibility splays are determined on plan by two basic dimensions. The X distance is measured from the nearside edge of the main road carriageway back along the centreline of the minor road. The Y distances are measured along the same nearside edge of the main road carriageway and extend in both directions from the minor road. The splays are formed by connecting the ends of the Y distances with the X dimension.

5.7.3.3 In assessing the visibility splays, it is important to check them in both the horizontal and vertical planes. Account should be taken of any planting regime within the splays and their future maintenance requirements. Special consideration also needs to be taken when the minor road is located on a curve.

5.7.3.4 In addition, a driver approaching a Give Way junction from the minor road must be able to see the layout of the junction clearly and a forward visibility splay must be provided. This minor road approach visibility splay is measured from a point 15 metres back from the nearside edge on the main road carriageway, along the centreline of the minor road and should give a clear view of the junction, especially its vertical alignment, using an object height of 1.05 metres, as shown in Figure 5.3.

5.7.3.5 The use of mirrors to aid visibility at a junction is not acceptable.

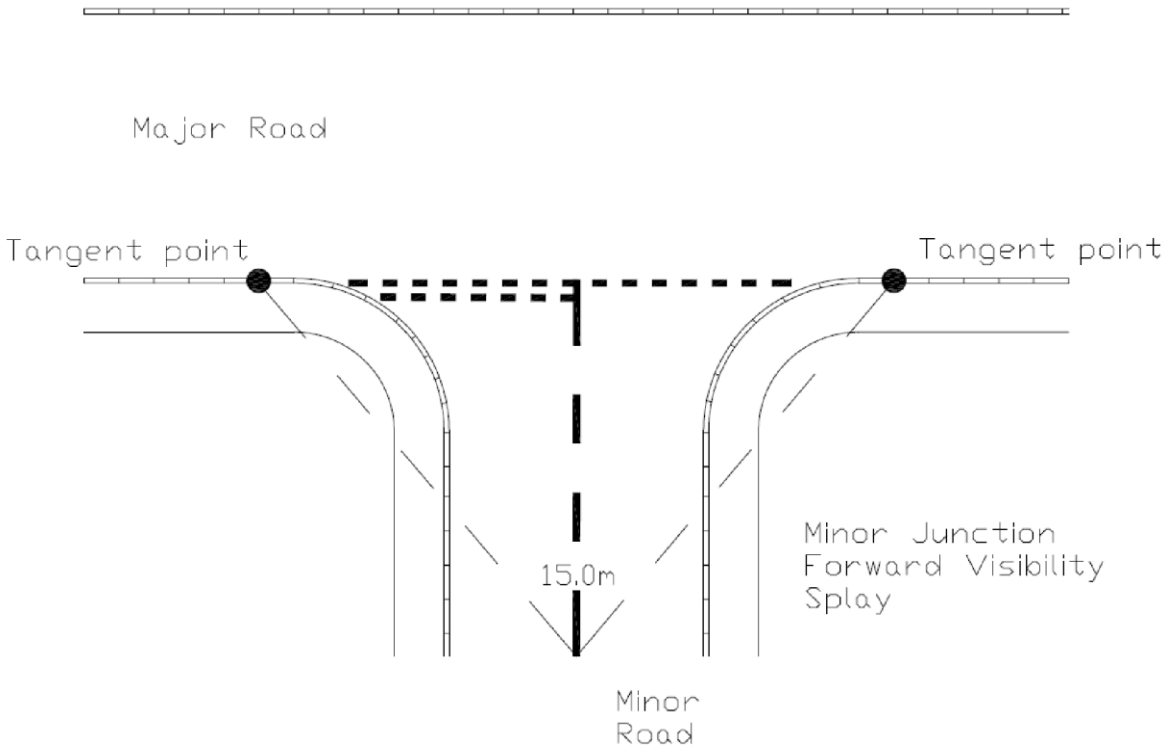


Figure 5.3 Minor road approach visibility splay

Design requirements
On roads with speed limits greater than 30mph, cross corner visibility must also be provided for those vehicles turning left into the minor road from the main road, as shown in Figure 5.4.

5.7.3.6 Cross corner visibility is achieved by the provision of a visibility radius tangential to the kerb line, using an object height of 1.05 metres. Figures of typical cross corner visibility radii are set out in Table 5.6. This can result in an additional area, over and above the junction visibility splays shown in Figures 5.2 and 5.3, respectively, being required to be kept free of obstructions. Junction visibility design should, therefore, consider all three aspects and compare them on one drawing for checking purposes.

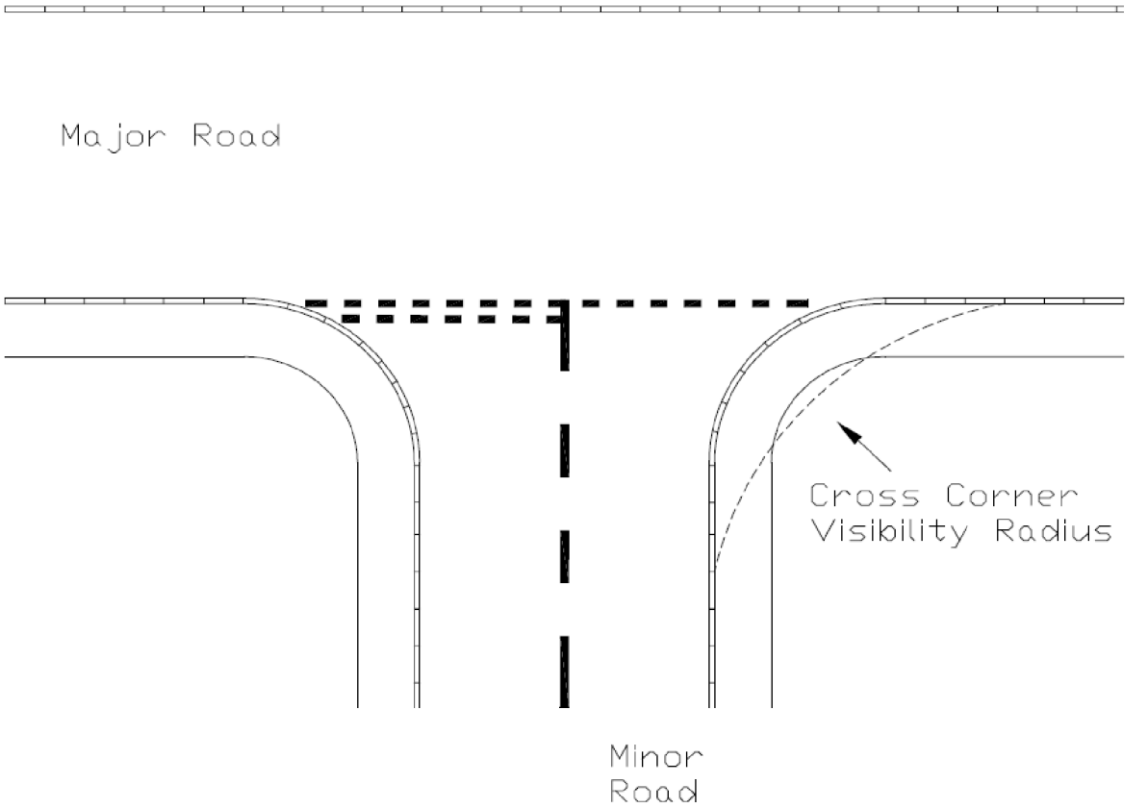


Figure 5.4 Cross corner visibility radius

Kerb radius – metres	Visibility radius - metres
5.5	9
6	10
7.5	12
9	15.5
10	20

5.7.3.7 Where a driveway is formed as shown in Figure 5.5 and has either high walls, hedges or buildings (being higher than 0.85 metres) set at the back of the footway and they cannot be reduced in height, then 45° visibility splays, with 2.4 metres x 2.4 metres minimum dimensions, are to be provided for intervisibility between vehicles and pedestrians.

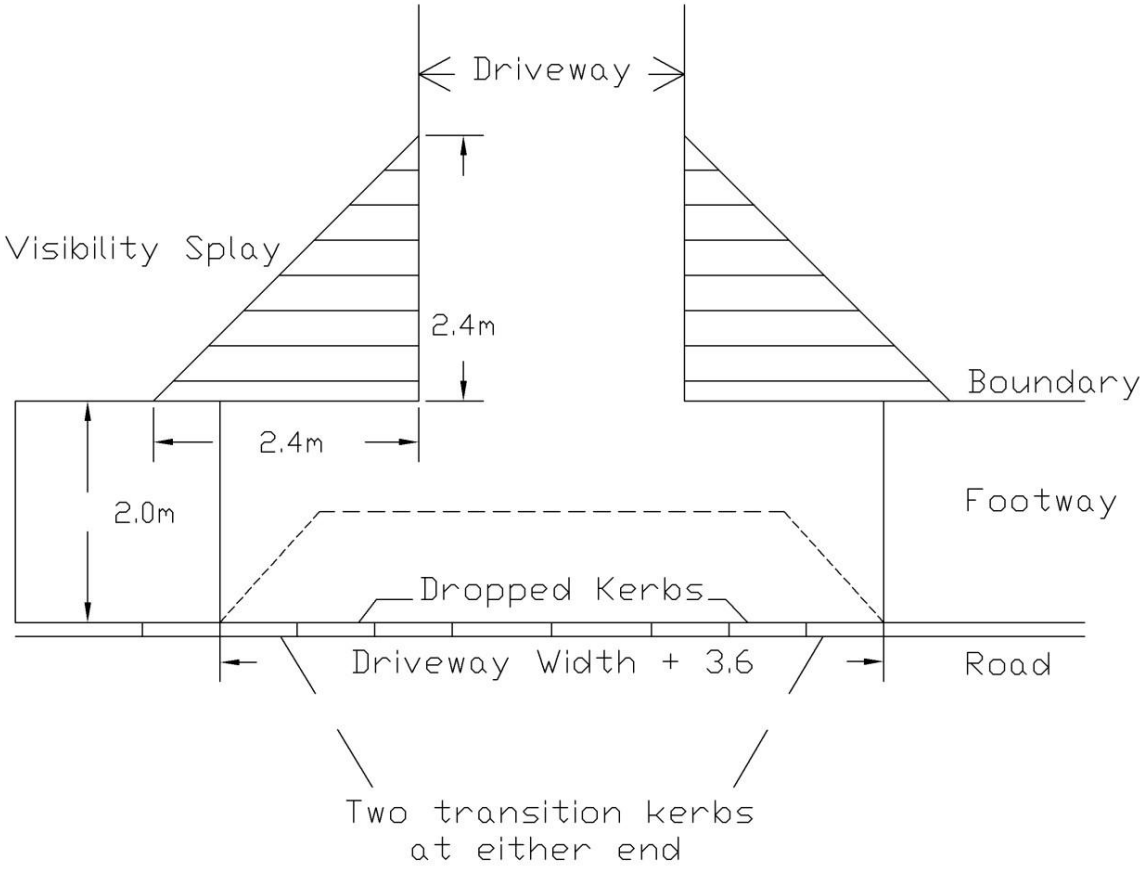


Figure 5.5 Driveway visibility for pedestrians

Design requirements
No frontage access or parking will normally be permitted within close proximity of a road junction, with a minimum distance of 25m for major junctions and 15m for minor junctions allowable, subject to visibility requirements.

5.7.3.8 It is essential that any planting regime provided as part of the development proposals takes account of future growth and potential impact on junction visibility, without the need for excessive maintenance. Where the visibility splay includes a widened verge, the Council will expect to be provided with the right to control the affected land so it can undertake future maintenance requirements. Where such land is retained in private ownership, that owner will be responsible for ensuring that visibility is maintained, even if that includes land in separate ownership. There is also a requirement for property owners to ensure that any private planting behind a road visibility splay does not encroach and is adequately maintained, otherwise the Council has the powers to cut back any such invasive vegetation and charge the owners for the work.

5.8 Carriageway widening for corners and bends / Leudachadh rathaidean airson oiseanan is lùban

5.8.1 Specified road widths refer to links with straight sections or having large radii curves. Whilst this is desirable for major traffic routes, such as Strategic Route Roads, Main Distributor Roads and Regional Route Roads, for other types of road or street, lower speeds are often a key objective and bends are designed in. Whilst most vehicles can negotiate such bends within the same carriageway width, larger vehicles, especially HGVs, refuse vehicles and buses, may require a greater width. As a result, there may be a need to widen the carriageway at the location of bends, depending on the type of vehicles using the road and its curve radius and length.

5.8.2 Table 5.7 shows the increased widths required on bends of small radii to allow two vehicles to pass, while maintaining appropriate clearances. Widening may also be required in more open situations, being influenced by the type and volume of vehicles, particularly HGVs and buses, as illustrated in Figure 5.6.

5.8.3 Widening is most simply achieved by maintaining the outer kerb line as a circular arc with the radius equal to the centreline radius plus half the standard carriageway width and increasing the road width on the inside of the bend. Alternatively, it can be achieved using transition curves, with full widening being maintained over the length of the circular arc.

Table 5.7 Carriageway widening on curves of small radii

Centre line radius (metres)	**Road widths required at apex of 90º bend (m) curve**				
	Local distributor		**Industrial access road**	**Main residential street**	**6.0 metre width**
	6.0m basic	7.3m basic	7.3m basic	5.5m basic	6.0m basic
25	-	-	11.2	7.3	7.8
30	-	-	10.7	7.2	7.7
75	-	-	9.4	6.8	7.3
150	150.0	6.4	7.9	5.9	6.4
180	180.0	6.0	7.3	5.5	6.0

Note – increased widths may be applied to rural roads, subject to agreement with the Council.

5.8.4 For minor residential streets, where the centre line curve radius is less than 30 metres, careful consideration needs to be given as to how carriageway widening or a vehicle over-run area is provided. Any requirement is likely to be dictated by the types of vehicles using the street. In developments where low volumes of traffic are expected, the occasional HGV or service vehicle could straddle the whole carriageway, as long as passing places are provided. Swept path analysis should be taken to confirm that any proposal is suitable. The use of over-run areas may be acceptable, but such a proposal must be discussed and agreed with the Council, as such areas can create potential conflict between pedestrians with mobility difficulties and turning vehicles.

5.8.5 Further guidance on the details of inside kerb lines for industrial roads can be found in Designing for Deliveries, published by Logistics UK (formerly Freight Transport Association).

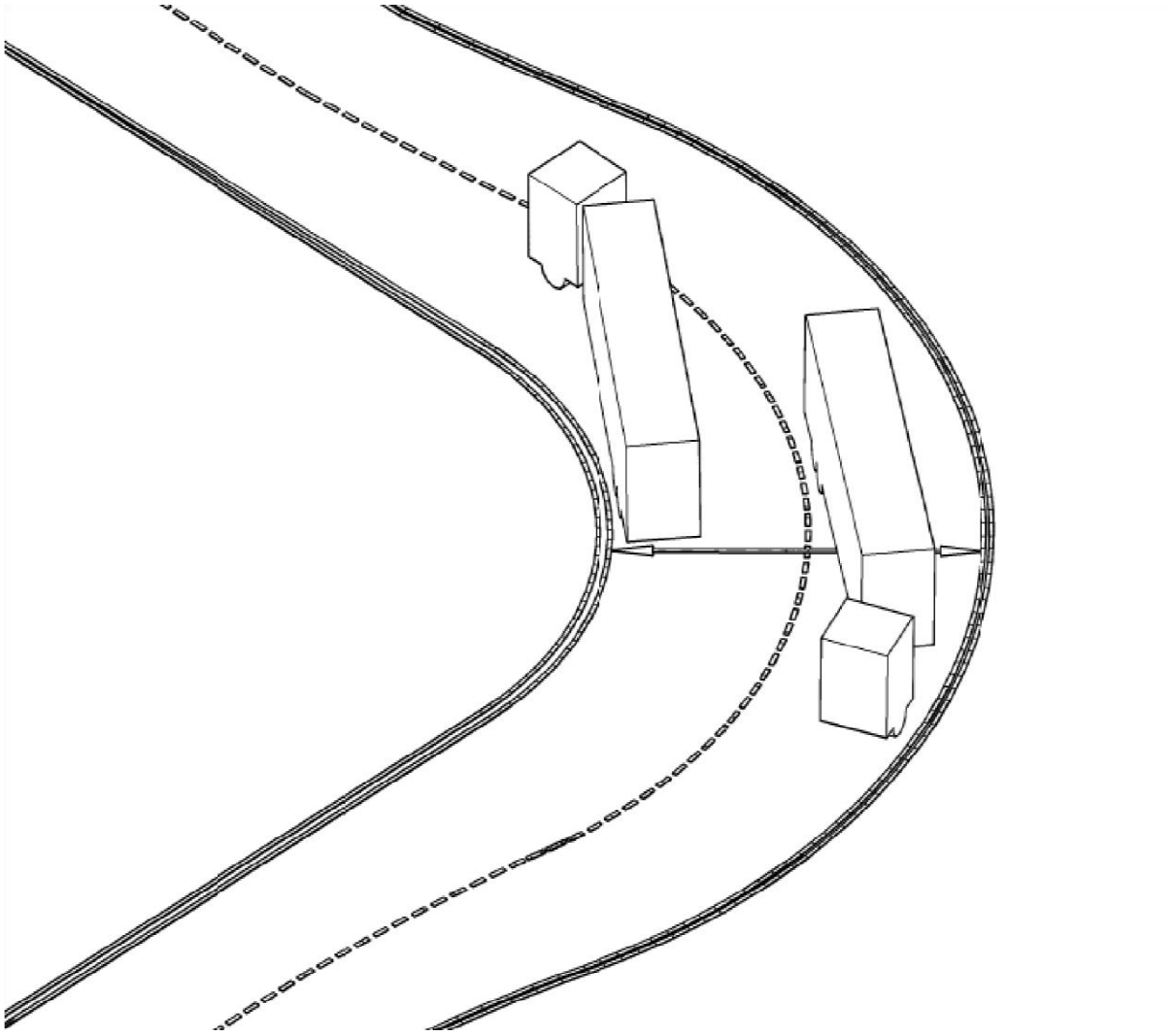


Figure 5.6 Carriageway widening on corners

5.9 Vehicle clearance / Rùm-gluasaid charbadan

5.9.1 Vertical clearance

5.9.1.1 There are currently no regulations governing the maximum height of vehicles, apart from the 4.2 metres height restriction for a 38 tonne lorry loaded in excess of 32.5 tonnes. However, most vehicles are less than 4.5 metres high.

Design requirements
The minimum headroom for any new structure shall be 5.3 metres, including pends, even when private, where servicing is required. The exception to this requirement is for a footbridge, where a 5.7-metre clearance below it is required for vehicles.

5.9.1.2 For any pend access or covered parking area that will only be used by private cars, a reduced clearance height of 2.1 metres would be generally acceptable, being increased to 2.7 metres if also used by cyclists. However, the layout should ensure service vehicles, including a refuse vehicle, can service the development without causing an obstruction on the adjacent road.

5.9.1.3 The design and location of any proposed pend access shall take account of the need for motorists to be able to see passing pedestrians.

5.9.2 Horizontal clearance

Design requirements
A horizontal clearance of at least 0.45 metres must always be provided between the edge of carriageway and any vertical objects, such as traffic signs and street furniture. Where the vertical object is protected by a safety barrier, the road face of the barrier is to have the 0.45 metre clearance. Where the crossfall of the carriageway exceeds 4%, the clearance shall be increased to a minimum of 0.60 metres, to take account of high-sided vehicles.

5.10 Gradients / Caiseadan

Design requirements

Channel gradients should not be flatter than 0.8%. If the carriageway changes from camber to crossfall, this must not coincide with a sag point in the longitudinal gradient or where a length of road has a channel gradient of less than 1%.

Lay-bys should usually be provided with a 2.5% crossfall away from the road channel, especially where SUDS is provided within the adjacent verge.

Road gradients of more than 10% should be avoided, wherever possible, as this can lead to problems with associated footways, particularly for those persons with mobility difficulties and during periods of winter weather.

Where the minor road is a Local Distributor Road, Industrial Access Road, Main Residential Street or Rural Classified Road, then the approach gradient over the final 9 metres should not exceed 2.5%. For all other lower categories of road and also private accesses, the approach gradient should not exceed 5% over the final five metres.

Should the minor road slope up from the major road, then it must be designed to ensure that minor road surface water does not flow onto the major road.

For private driveways that slope down from the public road towards a property, a small section of raised gradient or bullnose and transition kerbing should be installed, where reasonably practicable, in order to ensure that road surface water does not flow down the driveway, towards any property.

5.11 Turning areas / Àiteachan tionndaidh

5.11.1 Introduction

5.11.1.1 Road layouts shall be designed so that vehicles, especially HGVs and service vehicles, do not need to reverse on to the public road. This can be achieved by the provision of access roads that form a well connected internal network, thus avoiding the need for turning areas. This would reduce un-necessary dead mileage for vehicles and also facilitate and encourage public transport provision.

5.11.1.2 Cul-de-sac are no longer recommended as standard road layouts but where provided, these should preferably terminate in turning circles that can be used by all vehicles, in forward gear. Where a lack of space precludes the creation of a turning circle or as a temporary solution as part of a phased development, a turning head may be substituted. However, the developer

must recognise the inherent dangers of reversing vehicles, especially service vehicles, and seek to minimise the associated risks. If the road is likely to be used by public transport, turning circles must always be provided, unless specifically agreed otherwise with the Council.

5.11.1.3 The dimensions of turning facilities should suit the characteristics of the largest vehicles likely to use the facility on a regular basis. For residential streets, these will normally be refuse collection vehicles, while in industrial/commercial developments, it may be necessary to cater for 15.5-metre-long articulated vehicles or 18-metre-long draw-bar trailers. A swept path analysis should be undertaken to demonstrate manoeuvrability of the intended design vehicle within the road layout.

5.11.1.4 The turning areas detailed in the following paragraphs are based on the turning circles between kerbs for these vehicles. Where there is no adjacent footway, a 2-metre-wide verge or margin shall be provided, to allow for any overhang of vehicle body or possible over-riding of the kerb.

5.11.1.5 Casual parking within turning areas should be discouraged, either by locating them well clear of frontage development or by ensuring that premises or any designated parking bays are accessed via the turning area. In some circumstances, such as where buses use the turning circle, there may be a requirement for formal parking restrictions to be implemented, which would need a Traffic Regulation Order to be implemented.

5.11.2 Residential turning areas

5.11.2.6 Layouts for residential areas should seek to avoid the need for turning areas. If this is not possible, the standard turning area for a residential area will suit most service vehicles. Various layout options are shown in Figure 5.7. Where the road approaching the turning area is single track, it shall be widened to 5.5 metres for at least 10 metres before the turning area.

5.11.2.7 In residential areas, the use of less formal shapes may be acceptable, although the shape must still contain the basic standard turning area dimensions. Turning areas must be able to accommodate refuse collection vehicles, with the Council currently using vehicles that are 2.5 metres wide (excluding wing mirrors) and 8.6 metres long. As an alternative a swept path analysis may be used to demonstrate that the specified service vehicle can be accommodated.

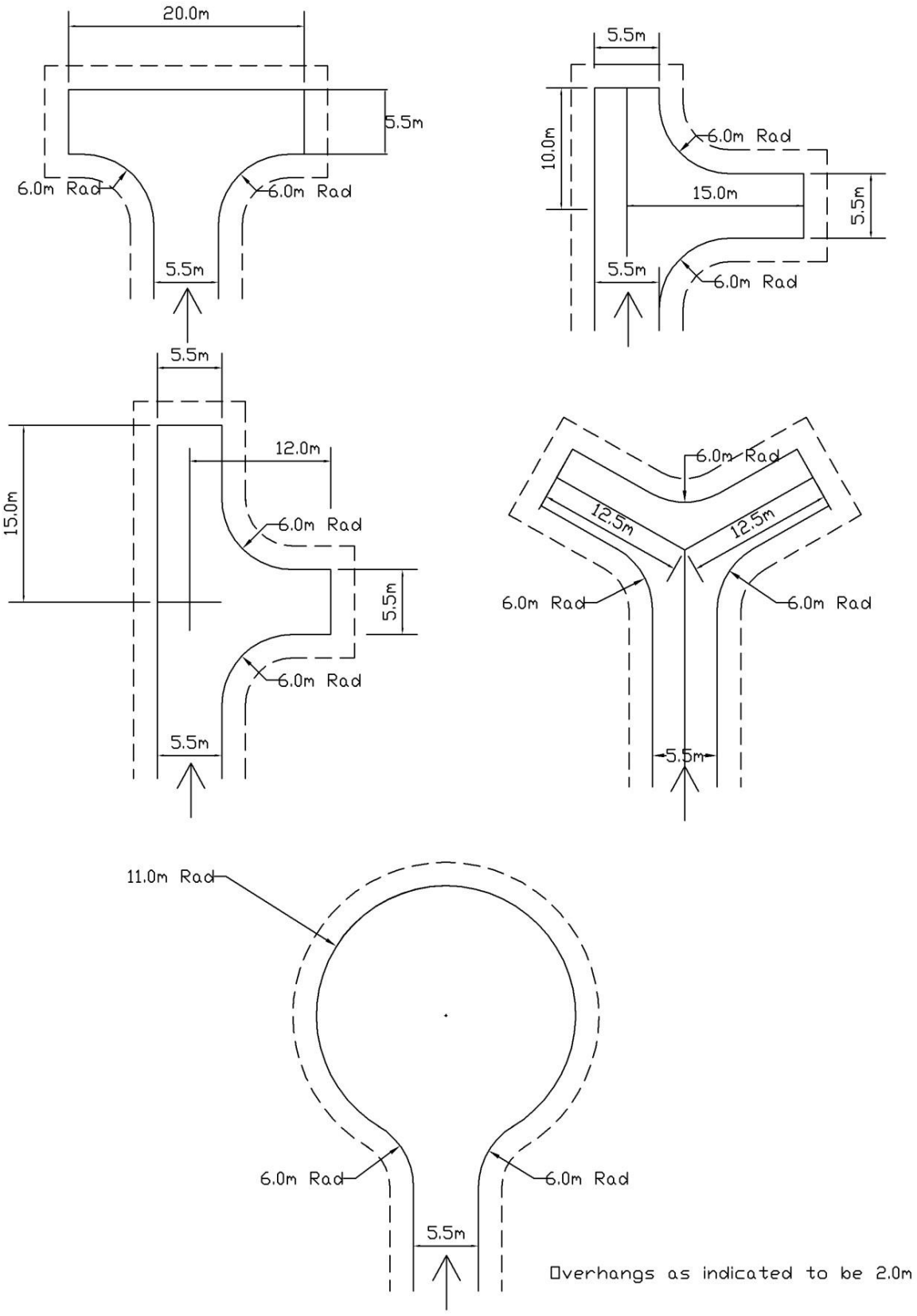


Figure 5.7 Standard turning areas for residential streets

5.11.3 Industrial turning areas

5.11.3.1 The industrial turning area is for use within both industrial and commercial areas. Various layout options are shown in Figure 5.8. It should be noted that due to the large size of turning area required and associated difficulty in turning large vehicles, it is recommended that service/access roads in commercial and industrial areas are formed as loops, where possible.

5.11.3.2 A separate turning area may not always be necessary where an industrial access road is flanked by service areas that will accommodate the turning manoeuvres of the largest vehicles anticipated.

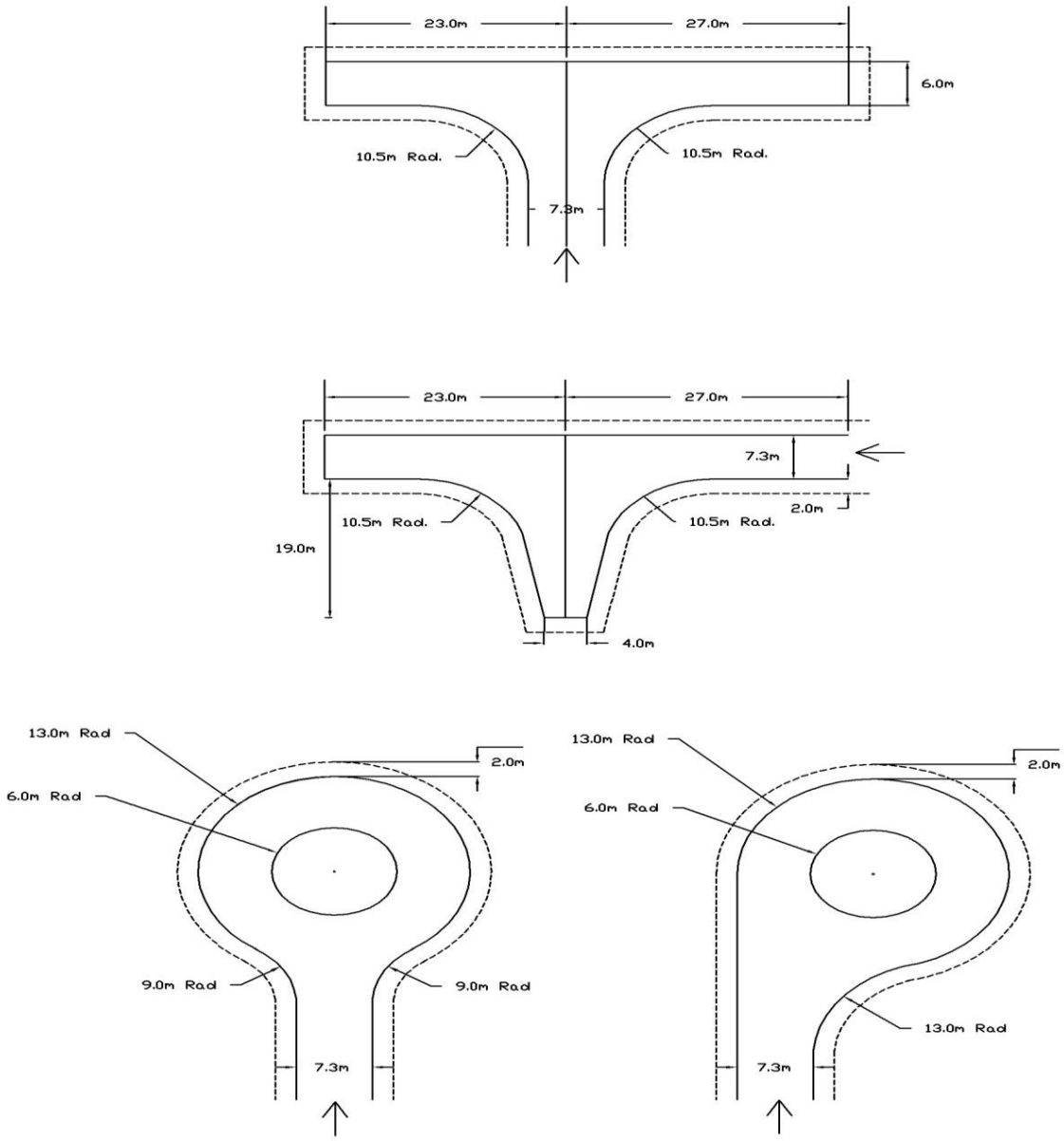


Figure 5.8 Standard turning areas for industrial areas

5.11.4 Bus turning areas

5.11.4.1 The turning requirements for buses shall be based on the standards for industrial turning areas. On a public road, the presumption shall be that a turning circle shall be provided where there is no through route.

5.11.4.2 If a bus stop is proposed within the turning circle, a section of straight kerb and footway shall be provided. If it is intended that the turning circle is to serve as a bus terminus, then the carriageway area should be enlarged, to allow one bus to pass a stationary one and turn.

5.12 Rural accesses / Slighean-inntrigidh dùthchail

5.12.1 For a rural access, a service bay is to be provided. On a narrow road, the service bay could also serve as a passing place. Details of dimensions, construction standards and materials are given in the Access to Single Houses and Small Housing Developments Guidance.

5.13 Private accesses and driveways / Slighean-inntrigidh prìobhaideach

5.13.1 Introduction

5.13.1.1 Private accesses and driveways should be able to accommodate the numbers and types of vehicles using them. They may also need to be enhanced for pedestrians and cyclists.

5.13.2 Private accesses for non-residential developments

5.13.2.1 For non-residential developments, including commercial, industrial, leisure and agricultural, the volume of traffic and/or the number of service vehicles entering and exiting the site may result in the need for the private access to be constructed to Industrial Access Road standards, with a carriageway junction formed with the public road. Where required, the access should be kerbed with the public footway having dropped kerbs to help pedestrians cross the access. Gates, if provided, shall be set back a minimum of 15 metres from the nearside carriageway edge and open away from the carriageway only.

5.13.2.2 Where the traffic flow is sufficiently high, the vehicular access should be treated in a similar manner to an uncontrolled crossing at a side road and tactile paving should be provided. A traffic calming measure in the form of a

ramped table should also be provided within the entrance highlighting to vehicles that this is a footway crossing. Where the existing crossover surface is being replaced with another surface, it is helpful if the replacement surface provides a contrast in colour and tone with the footway.

5.13.2.3 Pedestrians and cyclists should be provided with a separate access, in order to reduce potential conflict. In addition, segregation of service and customer vehicles should also be provided, especially where a development generates high numbers of each type of trip.

5.13.2.4 For a rural access, a service bay is to be provided. On a narrow road, the service bay could also serve as a passing place. Details of dimensions, construction standards and materials are given in the Access to Single Houses and Small Housing Developments Guidance.

5.13.3 Access for timber extraction

5.13.3.1 Planning consent may be required for any new or improved access to a public road. Developers should contact the Planning and Development Service to confirm planning requirements; however, for any works connecting to a public road, a Road Opening Permit must be obtained from the appropriate Area Roads and Community Works Manager. For timber extraction purposes, specific measures will be necessary in order to maintain road safety and protect the structure of the public road. Full details are available in the Technical Advice Note, Timber Extraction, which is reproduced in Appendix 11 of these guidelines.

5.13.4 Private accesses and driveways for residential dwellings

5.13.4.1 Where a number of dwellings or private residential parking areas are served by a private access, their design will be influenced by servicing arrangements and number of parking spaces. If the number of vehicles using the access is likely to be low and no service vehicle will enter, then a dropped kerb footway crossing should be sufficient. However, if service vehicles will use the access or there are significant numbers of vehicles, then a kerbed carriageway access should be provided, with its construction appropriate to the level of traffic and its type. Access arrangements should be discussed and agreed with the Council.

Design requirements
Access to individual dwellings over kerbed footways shall be by means of dropped kerbs and transitions. At least the first 6 metres of the driveway shall be surfaced with non-loose material, in order to prevent stones and chippings being dragged onto the

public road and if gates are provided, these must open inwards and not cross the footway.
For rural areas and also those urban roads with high traffic flows having direct frontage, turning space must be provided within the curtilage of the dwelling, to enable a vehicle to enter and exit in forward gear.
Private access gradients should not exceed 5% for the first five metres of the access and gradients exceeding 10%.

5.13.4.2 For developments with direct frontage onto lightly trafficked urban roads, it is desirable, but not essential, that curtilage turning space be provided, in the interest of road safety.

5.13.4.3 Drainage of surface water needs to be considered, together with the access requirements for disabled persons.

5.13.4.4 Residents of dwellings served by a shared private access will be responsible for all aspects of its upkeep and maintenance. The developer must ensure that prospective residents are made aware of this obligation.

5.14 Designing roads for low speeds / A' dealbhadh rathaidean airson astaran ìosal

5.14.1 Introduction

5.14.1.1 The layout of a development will be influenced by a range of factors, including the desire to restrict traffic speeds and improve road safety for all road users. Reduction in vehicle speed is in line with the Council's objective of improving road safety. Lower speeds tend to result in a reduction in the number of traffic accidents occurring and their severity. Lower speeds can also make areas generally more pedestrian friendly and reduce traffic noise, which is of benefit in residential areas.

5.14.1.2 As reduced vehicular speeds tend to result in more attractive conditions for pedestrians and cyclists, people can be encouraged to walk or cycle within a particular area, sometimes instead of using the car. More pleasant places and environments that do not focus on the private car are also provided.

5.14.2 Design

5.14.2.1 New developments should be designed such that the layouts of new roads, especially within residential areas, physically restrict vehicular speeds but without the need for standard traffic calming features that look as if they are

additional to the general road layout and tend to emphasise the street as mainly being for vehicular traffic. The exception to this is the use of raised carriageways at junctions within residential areas, as they can assist pedestrians when crossing a road. Generally, horizontal geometry changes, shared surfaces and use of particular materials would be more effective in delivering a more natural looking traffic calmed area as an integral part of the streetscape. The Council should be consulted about such proposals early during the planning stage. The needs of pedestrians and cyclists must be taken into account and incorporated into the road design.

5.14.3 Speed limits

5.14.3.1 In the interests of road safety and also to create more attractive places, the Council will require all new residential streets, especially those roads that have significant levels of direct residential frontages, to be designed in such a manner that they are suitable for implementation of a 20mph speed limit or zone. Where a Local Distributor Road also has direct frontage access, the appropriate speed limit shall be agreed with the Council during the design stage.

5.14.3.2 Where possible, the speed limit shall be self enforcing and this is likely to require design features to be incorporated in the layout, which seek to ensure the majority of vehicles travel within the speed limit. Reductions in forward visibility and carriageway width are the most effective methods in reducing driving speeds. To meet the statutory requirements for a mandatory 20mph limit or zone, careful design will be required. Where considered necessary, traffic calming features, as discussed in the following sections, may be deemed appropriate. All traffic calming proposals must comply with the relevant legislation and the developer shall be responsible for ensuring such compliance.

Design requirements
A gateway feature shall be provided at the beginning of an individual road that has a 20mph speed limit or at the entrance(s) to a 20mph speed restriction zone, in order to highlight the change in speed limit and encourage motorists to adjust their driving accordingly.

5.14.4 Standard traffic calming features

5.14.4.1 There may be occasions where it is appropriate to enhance existing or provide new traffic management or traffic calming measures, mainly in circumstances when such measures need to be provided retrospectively. Where the Council agrees or decides that any traffic management or traffic calming measure should be

implemented in order to mitigate the impact of a particular development, the developer will be required to fund the costs for the promotion and construction of these measures. Costs shall include those associated with the processing of any associated Traffic Regulation Order.

5.14.4.2 If distinct traffic calming features are provided, the most common types of traffic calming are horizontal displacements, vertical displacements, road narrowing and surface treatments. In selecting different types, it is important to assess the overall effect of the features selected on the whole development. Features should be selected that restrict vehicle speeds whilst also seeking to protect vulnerable road users, such as pedestrians and cyclists. There may also be a requirement to adopt features that can accommodate buses, preferably without vertical displacement. As a guide, traffic calming features will, on average, require 70-metre spacing to achieve average vehicle speeds of 20mph.

5.14.4.3 There are different types of traffic calming features that can be used. Horizontal displacements should change the direction of the travelling vehicle by a minimum of 45° and should preferably re-align the carriageway by a lane width or more. Whilst the displacement can incorporate parking, it shall not rely on the presence of parked vehicles. Long distance forward visibility can be reduced but not the required stopping sight distance. Features include:

- road bends
- chicanes
- road humps
- speed tables and cushions
- raised junctions
- side entry treatment
- rumble strips
- carriageway narrowing
- road narrowing pinch points
- traffic islands
- surface treatments and road markings
- changes in junction priority

5.14.4.4 Where the Council agrees to the use of traffic calming features with vertical displacements, it is recommended that bypass cycle lanes or tracks are provided, so cyclists can avoid the need to negotiate level changes. In addition, where horizontal displacements are introduced, the default situation should be that the layout incorporates a cycle bypass or some other

alternative arrangement so cyclists can avoid the change

5.14.4.5 Traffic calming features must be designed, signed and illuminated in accordance with the following current legislation:

- The Roads (Traffic Calming) (Scotland) Regulations 1994
- Road Humps (Scotland) Regulations 1998
- The Road Humps and Traffic Calming (Scotland) Amendment Regulations 1999 and 2002
- ETLLD Circular 1/2006 – Setting Local Speed Limits.

5.14.4.6 Further guidance on traffic calming design can be found in other documents, such as the IHT publication Traffic Calming Techniques, Transport Scotland's Cycling by Design, the DfT publication Local Transport Note 12/2008 – Cycling Infrastructure Design and various relevant Traffic Advisory Leaflets.

5.14.4.7 In certain circumstances, it may also be necessary for additional traffic management and/or calming measures to be provided on roads outside the development site. This could apply to commercial and industrial developments as well as residential ones. Such measures must be agreed with the Council.

5.14.5 Consultation

5.14.5.1 It is essential that early consultation and discussions take place with the Council, during the planning application stage, to agree which traffic calming features are the most appropriate. In addition, if traffic calming is to be introduced on an existing public road, there may be a need to consult with the local community and any such requirements shall be clarified with the Council.

Pedestrians, cyclists and equestrians / Coisichean, luchd-baidhsagail is marcaichean

5.15 Pedestrians / Coisichean

5.15.1 Introduction

5.15.1.1 Section 4.4 has already highlighted the Council considers walking as an important sustainable mode of travel that shall be encouraged and designed for in any new development. A key aspect of the layout will, therefore, be

the provision of a network of high quality pedestrian routes that encourage walking as the preferred mode of travel for most short trips.

5.15.1.2 External and internal features that will generate or attract pedestrian movements should be identified at an early stage in the planning application process and, for larger developments, must be considered in the Transport Assessment and this may include improvements to the existing pedestrian network. These features will establish the main pedestrian routes, which should then be designed to be as direct as possible. Levels of use will influence widths and segregation desirability. Provision for cyclists should be considered at the same time, as often facilities for both modes can be combined and shared.

5.15.2 General design aspects

5.15.2.1 Pedestrian routes should:

- be as direct as possible, whilst having regard for personal safety;
- provide good levels of visibility, ensuring natural surveillance from adjacent buildings as far as practicable;
- avoid the creation of "blind" spots that would need enhanced surveillance measures;
- avoid having main pedestrian routes adjacent to those Distributor Roads that do not have direct frontage access.

5.15.2.2 Where a Local Distributor Road has the dual role of a mixed-use "High Street", the provision of adjacent pedestrian routes is important, in terms of enhancing the vitality and atmosphere of the area.

5.15.2.3 Special consideration should be given to potential locations of developments likely to be generators of significant levels of pedestrian movement, such as shops, schools, health clinics and leisure facilities, with thought given to what pedestrian routes and crossing facilities may be needed and their appropriate siting.

5.15.2.4 In non-residential developments, it is highly desirable that pedestrian routeings should avoid the need to cross car parks to reach the main entrance of any building. For all types of developments, direct and safe routes and crossings to bus stops and nearby facilities, such as schools and healthcare centres, should also be provided.

5.15.2.5 Whilst footways are contiguous with a carriageway and their standards

normally included as part of the appropriate road description, footpaths are remote from the carriageway. Whilst footpaths have a role to play, they will only be considered for adoption where they form part of the general pedestrian network connecting public roads with each other or providing access to public destinations or areas. Footpaths should be as direct as possible and wide enough to accommodate the anticipated levels of pedestrian activity, including future phases of a development. The width should allow people to stop and talk to each other without causing an obstruction. In addition, it is likely that many footpaths will also be used by cyclists and, therefore, their widths should be increased to accommodate shared use, with a minimum width of 3.0 metres required, in order to provide access for maintenance vehicles. A footpath shall be designed so that its entire length is accessible by wheeled maintenance vehicles and plant.

5.15.2.6 Routes of footpaths should be designed in conjunction with public transport provision in order to facilitate convenient access to public transport services.

5.15.2.7 Urban footpaths should normally be provided with street lighting. In some circumstances, it may be desirable for a rural footpath to have some lighting, but this must be agreed with the Council.

5.15.2.8 Where a footpath is not adopted by the Council, its future maintenance regime must be clarified and agreed with the Council during the planning process, taking account of its Open Space Policy requirements.

5.15.2.9 Where footways and footpaths link to cycle tracks, special attention shall be given to those areas where pedestrians and cyclists converge.

5.15.2.10 The design of pedestrian facilities shall take account of the requirements for accessibility, as set out in the Equalities Act. In addition, recommendations contained within Inclusive mobility and Roads for all - Good practice guide for Roads should be taken into account.

5.15.3 Pedestrian crossing facilities

5.15.3.1 Where possible, pedestrian routes, especially main ones, should seek to have the minimum number of road crossings but it is unlikely that the design can eliminate all such crossings. Particular attention should be given to the locations at which pedestrians will cross a carriageway, so their exposure to risk is reduced. Whilst the aim is to provide crossing points as close as possible to the pedestrian desire line, this is not always appropriate. In such cases, the use of hard and soft landscaping, as well as

street furniture, can guide pedestrians to more suitable locations and help prevent children walking or running directly onto the road.

5.15.3.2 **Major/Minor priority junctions** - it is important to take account of the specific requirements of road users. The high speed nature of rural roads is such that specific facilities may be required at some locations in order to ensure the safe passage of specific road users through the junction. This can be equally true at some urban sites where junctions may be used intensively by all types of road user and where the main roads are carrying high volumes of fast-moving traffic.

5.15.3.3 DMRB CD 123 highlights that defined at-grade pedestrian crossing points on the minor road should be a minimum of 15 metres back from the "Give Way" line, and should be sited so as to reduce to a minimum the width to be crossed by pedestrians provided they do not involve excessive detours from their desired paths. Central refuges should be used wherever possible, but not on major roads in a rural situation. Refuges should be at least 1.5m wide to protect wheelchair users and parents with push-chairs when crossing the road. Where pedestrians are expected to cross the minor arm of a junction, tactile surfaces and dropped kerbs should be provided. Such a layout is appropriate for the primary categories of road, such as Strategic Routes, Main Distributors, Regional Routes, Local Distributors (excluding High Streets) and Subregional Routes.

5.15.3.4 For secondary category roads, especially residential streets, setting the pedestrian crossing back from the main road is rarely practical or necessary. Where traffic volumes are not high or where vehicle speeds are low, the pedestrian crossing can be positioned closer to the mouth of the junction, which is likely to reflect the natural pedestrian desire line. Guidance on acceptable layouts for such crossings is set out in Designing Streets. Alternatively, a speed table can be designed in accordance with current legislation.

5.15.3.5 The requirements of pedestrians should be carefully considered in the design and choice of major/minor priority junctions. It is recommended that the proposed general principles to be applied are agreed with the Council at an early stage.

5.15.3.6 Where an uncontrolled crossing is provided on the minor arm of a junction, it must include the appropriate use of tactile blister paving, dropped kerbs and a central refuge where carriageway widths allow.

5.15.3.7 **Alternative crossing facilities at major/minor junctions** - the following alternative facilities should also be considered for higher trafficked situations, but must be discussed with the Council:

- Displaced controlled pedestrian crossing
- Subway or footbridge

5.15.3.8 **Roundabouts** - separate pedestrian routes with crossings away from the flared entries to roundabouts are preferable where road widths are reduced and traffic movements are more predictable. Roundabouts by their nature cater for higher traffic volumes and can be particularly difficult to negotiate by pedestrians, particularly those with mobility impairments. For this reason, uncontrolled crossings at roundabouts are not recommended and an alternative crossing facility should be considered.

5.15.3.9 **Alternative crossing facilities at roundabouts** - the following facilities should be considered at roundabouts but must be discussed with the Council:

- Displaced controlled pedestrian crossing;
- Signalisation of the roundabout, with pedestrian facilities;
- Subway or footbridge

5.15.3.10 **Controlled pedestrian crossings –** where grade separation cannot be justified or provided, it may be necessary to consider balancing the needs of pedestrians and vehicles by providing a controlled pedestrian crossing, such as a puffin crossing or a pedestrian stage within a set of traffic signals. The design of controlled crossings is subject to various Pedestrian Crossing Regulations, depending on the type of facility.

5.15.3.11 The design of pedestrian crossings should take account of guidance and recommendations set out in DMRB CD 143 and Chapter 6 of the Traffic Signs Manual. Signal controlled pedestrian crossings are the safest places for vulnerable pedestrians to cross the road, especially for visually impaired people. In addition, illumination levels on pedestrian crossings should be carefully considered, which will impact on the street lighting design.

5.15.3.12 When providing new or replacing existing controlled pedestrian crossings, audible signals and tactile rotating cones should be provided, in addition to visual signals. These features should also be provided on the controls for the pedestrian phase at junctions. Where it is not practical to provide audible signals, such as where two crossings are close together, tactile rotating cones

should always be provided. The pole the crossing controls are fixed to should ideally be located on the right of the crossing in the direction of travel, since guide dog users are generally trained to use a guide dog in their left hand. Puffin crossings have a number of advantages for pedestrians over the older pelican type crossing including an infrared detector which senses when pedestrians are using the crossing and holds the signals for drivers at red. Ideally all new installations should be puffin crossings. Inclusive Mobility contains detailed advice on the design of crossings.

5.15.3.13 A tactile surface must be provided on the footway approaches to all controlled crossings, as shown in Figure 5.9. Tactile paving is used by visually impaired pedestrians to align themselves on the crossing and the paving laid correctly to guide users to the dropped kerbs on the opposite side of the road. Detailed guidance is provided in the Department for Transport document Guidance on the Use of Tactile Paving Surfaces. In addition, there may be a requirement for a high skid resistant surfacing material to be used on the carriageway approaches to a controlled crossing and advice should be sought from the Council.

Design requirements
Dropped kerbs are required at all pedestrian crossings (whether controlled or not) to assist wheelchair users and parents with prams, as shown in Figures 5.10a and 5.10b.

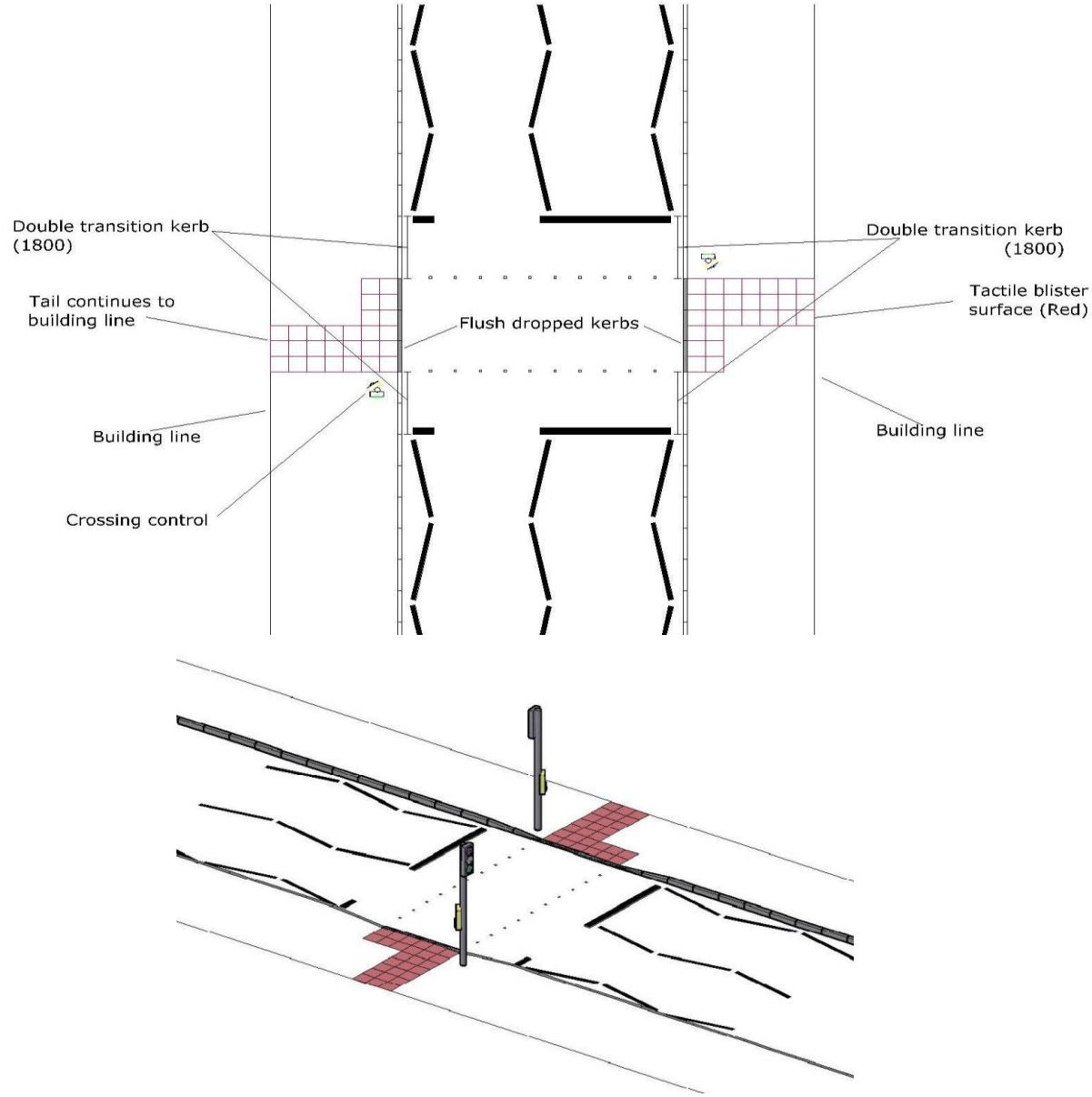


Figure 5.9 Controlled pedestrian crossing arrangement

5.15.3.14 At pedestrian crossing points, dropped kerbs should be installed to allow disabled people to cross the road, laid to the tolerances recommended in Inclusive mobility, ideally using rounded bullnose kerb. Generally, all new crossing installations should be flush with the carriageway, however for maintenance purposes the dropped kerbs should not be greater than a 6-millimetre maximum upstand tolerance.

5.15.3.15 The following dropped kerb issues are common problems on many existing roads:

- The upstand at most dropped kerbs is higher than the 6 millimetres tolerance, thus creating a significant barrier for mobility impaired users.

- Road drainage at locations of dropped kerbs can be a significant issue that may require special attention.
- It is apparent that the use of single transition kerbs at crossings is common practice and thus the localised longitudinal fall of a footway at the crossing could be in excess of the maximum gradient recommended in Inclusive mobility of 9 per cent (1 in 11) in extreme circumstances.

Design requirements
All new dropped kerbs at crossing installations should be dropped over two transition kerb lengths at either end, wherever practical, to achieve the required gradients.

5.15.3.16 **At grade crossings** - at pedestrian crossing points, other than those at which a suitable grade separated facility is provided, sections of kerbs must be lowered to permit easy access. In some circumstances, such as within residential areas, the use of raised carriageways would be a suitable alternative method. Tactile paving should be used at all crossing points.

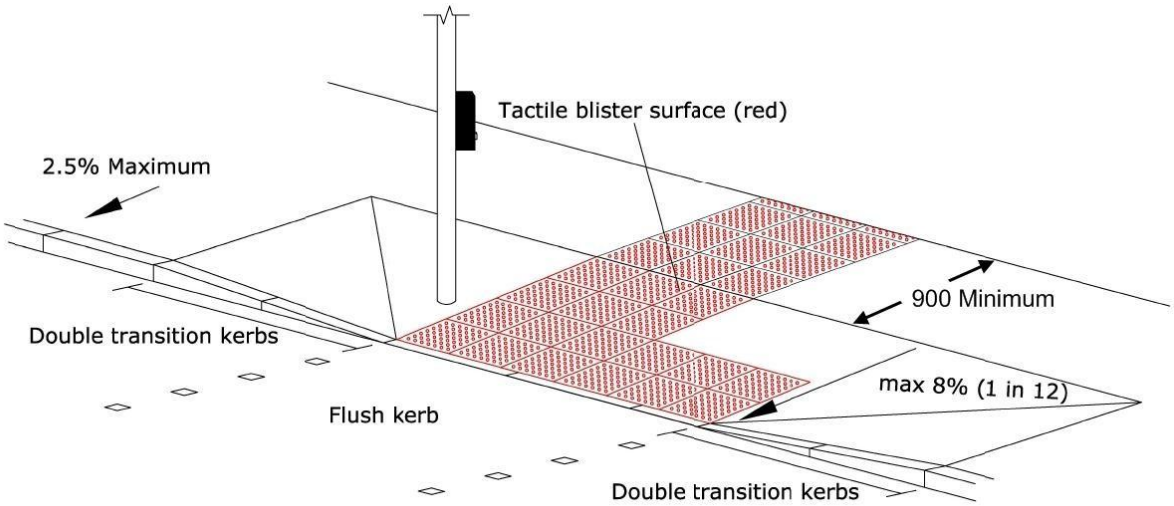


Figure 5.10a Flush dropped kerbs at a controlled pedestrian crossing

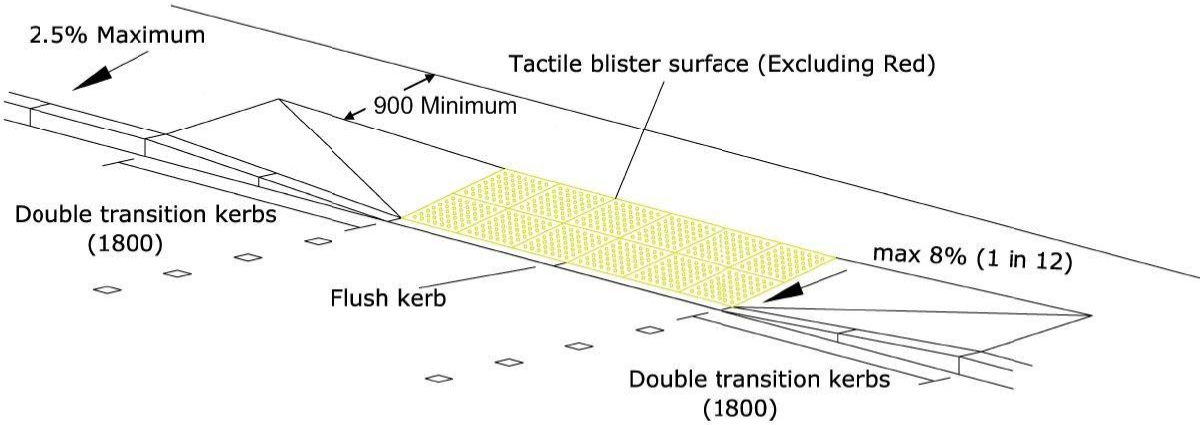


Figure 5.10b Flush dropped kerbs at an uncontrolled pedestrian crossing

5.15.3.17 **Grade separated crossings** – where both pedestrian and vehicular traffic levels are very high or where they offer the only practicable means of providing a desirable link across a highly trafficked road, it may be appropriate to consider the provision of footbridges and underpasses, as the form of carriageway crossing. Where deemed suitable, the facility should be designed to be convenient, pleasant and safe to use, with the route being more appealing than any alternative. This may involve lifting or lowering the carriageway level in order to ensure that the pedestrian route has minimal change in level. Underpasses have particular problems, with regard to perceived personal safety, and, therefore, should be avoided where possible.

5.15.4 Additional design considerations for pedestrians

5.15.4.1 **Routes for prams and wheelchairs** - the design of the layout must ensure that all pedestrian routes are suitable for persons using prams and wheelchairs, particularly those routes from residential areas to shops and community facilities. Steps, steep crossfalls/gradients, gratings likely to trap wheels and walking sticks, and street furniture obstructions should be avoided.

5.15.4.2 **Pedestrian guardrails** – there is a general presumption against controlling pedestrians by use of guardrails. However, some exceptions to this

presumption will be accepted, where justified, such as at schools or other locations where there are significant numbers of children. Where guardrails are used, they must be of a high-visibility type, which permits drivers to clearly see pedestrians, such as wheelchair users, children and people of short stature who can be obscured by the railings.

5.15.4.3 In most circumstances, guardrails are not specifically an accessibility feature and railings can be a hindrance to disabled people. The rails can narrow the pedestrian route and can present a hazard to mobility impaired people. For these reasons:

- there should be at least 1200 millimetres between parallel guardrails;
- guardrails should be at least 1000 millimetres and ideally 1200 millimetres above ground level;
- guardrails should extend to within at least 200 millimetres of the ground or have a kick board provided, to assist visually impaired people to detect this feature; and
- there should be a minimum 450 millimetres offset from the carriageway.

5.15.4.4 It is recommended that guardrails should contrast in tone with their surroundings but provided guardrails are sited appropriately only the ends of the guardrailing need be highlighted where they project into the pedestrian flow, by provision of two 150 millimetre deep bands that contrast tonally with the colour of the railing.

5.15.4.5 Further advice on the use of pedestrian guardrail is provided in the DfT publication Local Transport Note 2/09 – Pedestrian Guard railing.

5.15.4.6 **Routes on local distributor roads** – where pedestrian routes run adjacent to Local Distributor Roads with high traffic flows, it is desirable that they should be separated from the carriageway by a verge, in the interests of road safety, unless agreed otherwise with the Council. Verges need not necessarily be required to have a grass surface. The requirement for a verge would not normally apply where the road has the role of a traditional High Street.

5.15.4.7 **Vehicular footway crossings** – where vehicular access is to be taken across a footway, the ramped part shall be restricted to the front section of the footway, adjacent to the carriageway, in order to enforce the priority of pedestrians over vehicles. Having a short section of ramp will also encourage lower speeds for those vehicles crossing the footway. There is a

general presumption against the use of kerbed service roads in those areas of high pedestrian flows and within urban centres.

5.15.4.8 **Gradients** – it is desirable that the gradients on footways and footpaths do not exceed 5%, on average, with a normal local maximum of 8% acceptable, although it is recognised that a footway gradient will relate to the adjacent carriageway gradient. In certain circumstances, a steeper footpath gradient may be permitted, except on those routes delineated for pedestrians with prams and wheelchairs, subject to the requirement that a handrail is provided on at least one side, together with rest platforms, at appropriate spacings. If a steep footway is unavoidable, a handrail may be required and should be provided preferably at the back of the footway.

5.15.4.9 **Ramps and steps** – pedestrian ramps and steps should be avoided, if possible. However, where provided, they shall comply with the geometric standards and recommendations set out in Inclusive mobility.

5.15.4.10 The developer should be aware that steps will not normally be adopted by the Council. As a result, steps should never be the only pedestrian route provided. However, some people find ramps difficult to negotiate and steps should be provided in addition to ramps.

Pedestrian barriers – situations where a main public footpath meets a road at right angles should be avoided, because of the inherent danger of children going onto the road. Where such an arrangement cannot be avoided, the provision of pedestrian guardrail or a staggered pedestrian barrier should be considered, as part of the layout design.

Design requirements
The design of a pedestrian barrier and its materials shall be approved by the Council and must take account of the need to permit access for maintenance vehicles.

5.15.4.11 **Disabled access to buildings** – if disabled access to a building includes the provision of a ramp, this should normally be outwith the public footway. Where this cannot be achieved, the layout must be agreed with the Council. The design shall take account of requirements set out in the Technical handbooks related to Building (Scotland) regulations.

5.15.4.12 **Street furniture/Ancillary equipment** – there is a wide range of different types of street furniture, from lighting columns and litterbins to bollards and sign poles. Badly sited furniture can be an obstruction to people with

mobility difficulties.

5.15.4.13 Badly designed street furniture can also pose a hazard to visually impaired people. Furniture lower than 1.0 metre in height, such as benches without backrests and low bollards, are not in most ambulant adults' normal line of sight. In addition, all street furniture should be detectable at ground level with a long cane. Projecting litterbins fixed to lighting columns and the glazed side walls of cantilevered bus shelters are examples of street furniture which create potential hazards.

5.15.4.14 Visually impaired people who receive mobility training, including guide dog and long cane users are trained to walk in the middle of a footway, since there are normally less obstructions in this zone. Visually impaired people move towards the kerb edge or the back of the footway when looking for a crossing or building entrance respectively.

5.15.4.15 It is recommended that items of street furniture should be grouped together where possible to assist visually impaired people to identify the potential hazard. Colour, including the use of coloured banding, can be used to help avoid collisions with street furniture.

5.15.4.16 The design of places should, therefore, ensure that all necessary street furniture be at least 1.0 metre high and be grouped together at the back of the footway where possible and out of the main pedestrian flow. Street furniture that is in or close to the pedestrian flow, particularly freestanding furniture, should contrast tonally with its surroundings.

5.15.4.17 **Visual colour** - for visually impaired pedestrians relying on residual vision, it is essential to ensure that the colours of street furniture contrast with their surroundings. Colours which appear to be different from one another in colour (chroma) can be very similar tonally (e.g. green and brown) and, therefore, do not give sufficient contrast. Contrast is the visual perception of one element when viewed against another and is indicated by the difference in light reflectance between two surfaces. It is generally recognised that 30 points of difference in light reflectance between surfaces should give adequate contrast to be noticeable to a large proportion of partially sighted people.

5.15.4.18 **Seating** - many disabled people cannot walk for more than 50 metres before taking a rest and suitable seating at regular intervals is a particularly important feature in a high quality pedestrian environment. The design of seating should consider the following:

- Seats with backrests should be provided at regular intervals along well used pedestrian routes;
- Seating should generally be 450 – 480mm high, a height most people can rise from;
- At bus stops and other locations where people wait for a short period of time 'perch' seats can be provided. A height of 580mm is recommended for this type of seating;
- At least a proportion of seating in a group should be fitted with armrests to assist in rising from the seat;
- To allow wheelchair users to transfer on to fixed seating, not all seats should have armrests, i.e. there should be no armrest on the end of a row of seats; and
- A space should be kept clear next to fixed seating to accommodate wheelchair users.

5.15.4.19 **Signage -** the specification of traffic signs for road users is explained within the Traffic signs manual (TSM) and the Traffic Signs Regulations and General Directions 2016 (TSRGD). Inclusive mobility contains more information on the design of signage for pedestrians.

5.15.4.20 Only around 5% of visually impaired people have no sight at all and the vast majority have some residual vision and may be able to distinguish colours, or shades of light and dark. By making a sign clear and easy to read for a visually impaired person it will make the sign clear and easy to read for everybody.

5.15.4.21 Sign poles and cantilevered signs can present a barrier and a hazard to mobility impaired people and application of minimum footway widths should be included in the design process. The lack of the minimum distance between poles on double pole signs and the lack of colour contrast to highlight sign poles can create problems.

5.15.4.22 Where signage aimed at pedestrians is not covered by Traffic signs manual/Traffic Signs Regulations and General Directions 2016, signage should follow the guidance in Inclusive mobility. Authorisation will be required for non-prescribed signs and this must be discussed with the Council.

5.15.4.23 Lighting - BS5489 is the Code of Practice for Road Lighting. The illumination of the pedestrian environment is often neglected and Inclusive mobility describes the recommendations of the British Standard and includes a table of light levels for different types of area. All new and replacement lighting

schemes for pedestrian areas should meet the criteria described in Inclusive mobility in addition to BS 5489.

5.15.4.24 Lighting columns can obstruct the footway and present a hazard to visually impaired people. Therefore, the columns should be located at the back of the footway where possible. In existing locations, columns should be sited consistently either at the back or front of the footway.

5.15.4.25 **Grit bins** – in those developments where pedestrian routes have gradients steeper than 8% and/or there is an extensive network of footpaths, the Council may require grit bins to be provided, with small areas of hard standing formed for the siting of the bins, adjacent to the footways/footpaths.

5.15.5 Footway widths adjacent to carriageways

5.15.5.1 Table 5.8 specifies the required minimum widths of footways, ie, those pedestrian routes adjacent to carriageways. These widths may require to be increased at those locations where high levels of pedestrian flow are expected. Relaxations in footway widths are at the Council's discretion.

Design requirements
Where vehicles park at right angles to a footway, an additional 0.8 metres shall be required to accommodate any vehicle overhang.

Table 5.8 Minimum footway widths

Frontage development	Width (metres) [1]
None	2.0 [2]
Industrial	2.0 [2]
Residential	2.0 [2]
Schools and local shops	4.0
Major shops	5.0
Rural roads	2.0 [3]

Note 1 - additional 0.8 metres required if adjacent right angled parking provided.
Note 2 - minimum 3.0 metre shared footway/cycle track for main and local distributor roads, excluding High Streets.
Note 3 - 1.0 metre separation strip, preferably grassed, to be provided between footway and carriageway.

5.15.5.2 Where a shared footway/cycle track runs adjacent to a Main or Local Distributor Road (excluding High Streets), it is desirable to separate it from the carriageway by a verge, which would normally be 2.0 metres wide.

Design requirements
If a Distributor Road verge is not provided or is located to the rear of the shared footway/cycle track, then the first 0.6 metres of the shared facility, adjacent to the carriageway, shall be constructed in block paving, to encourage segregation.

5.15.6 Footpath widths remote from roads

5.15.6.1 Table 5.9 specifies the required minimum widths of footpaths and pedestrian areas, which are remote from the road network and are intended for adoption. The widths may require to be increased to allow for maintenance of the footpath and/or underlying services. In most cases, the footpath will be a shared footpath/cycle track facility. Relaxations in widths are at the Council's discretion.

Table 5.9 Minimum footpath widths

Type of footpath	Width (metres)
Pedestrian and shared routes	3.0 [1]
Shopping precinct	6.0
Footbridge	2.5 [2 3]
Underpass (2.4m headroom)	2.5 [2 3]
Rural locations	To be agreed

Note 1 – wherever possible, all paths are to be designed to shared footpath/cycle track standards.
Note 2 - may be inadequate for maintenance purposes.
Note 3 - widen to 4.0 metres if shared with cyclists, with height of underpass increased to desirable minimum of 2.7 metres to accommodate for cyclists.

5.15.6.2 Where possible, the footpath should be located within a wider area of open space, having adjacent verges. Where landscaping is provided, consideration must be given to future maintenance requirements, with the objective of limiting the need to have to regularly trim back any over-hanging vegetation.

5.16 Cyclists / Luchd-baidhsagail

5.16.1 Introduction

5.16.1.1 In order to maximise the opportunities for cycling, it is important that a high quality cycle route network is provided. This is consistent with the Street User Design Hierarchy described in Chapter 4 - Section 4.3.4.4, the Council's transport policies and also with national policy.

5.16.1.2 All new developments must consider the access needs of the people using the development and should provide facilities that will allow them to make trips by bicycle. This should include routes both within and adjacent to new developments. This may include the enhancement or extension of existing nearby cycle facilities, which should be linked to new developments, as well as new routes.

5.16.1.3 A cycle network accommodating all forms of daily trips made by people accessing the development should be provided. The network should link residential areas to key locations, such as shops, schools, bus routes, health clinics, major employment and parks, etc. Early consultation with the Council is essential, in terms of agreeing the cycle network, any new facilities and their requirements or alterations to the existing network.

5.16.1.4 It is important that residential schemes and other developments are highly accessible for cyclists, with links being visually attractive. The cycle network is likely to consist of different forms of links, such as roads with low traffic speeds and volumes, on-road cycle lanes and segregated pedestrian/cycle tracks. In residential areas, where 20mph speed limits are likely to be in place, cyclists and vehicles can usually safely share the same carriageway, although key cycle routes should be as direct as possible. Where culs-de-sac, one-way streets or other movement restrictions are proposed, full permeability of the development should be retained for cyclists and pedestrians.

5.16.1.5 Developers should be aware that when an existing footway or footpath is upgraded to accommodate cyclists a TRO has to be processed for this change of use, with the shared facility marked and signed in accordance with current legislation. The developer would be liable for the costs associated with these requirements. A new shared pedestrian/cycle facility does not require a TRO but must be signed and marked appropriately.

5.16.1.6 Design requirements for cyclists are provided in this Section. Reference should be made to Cycling by Design. In addition, further useful guidance is provided in Local Transport Note 1/20 – Cycling Infrastructure Design.

5.16.2 Link design

5.16.2.1 The design of new cycle facilities should meet the following objectives:

- Adopt the following cycle design hierarchy - Preference 1 has cyclists sharing with low speed/flows of vehicles on the carriageway; Preference 2 has cyclists using carriageway cycle lanes and Preference 3 has segregation of cyclists;
- New cycle facilities should link key local destinations and existing networks;
- Cyclists should be segregated from high volumes of vehicular traffic, particularly where vehicle speeds are 40mph or higher; and
- Signal-controlled crossing points should be provided for cyclists on those roads with high traffic flows.

5.16.2.2 Cyclists sharing with vehicles on a road will generally only be acceptable when vehicle speeds (ideally, 20mph or lower) and traffic volumes are low.

5.16.2.3 Cycle lanes on the carriageway can be acceptable where the width of carriageway is wide enough to accommodate the cycle lanes, without vehicles having to over-run them. In addition, the cycle lanes should be kept free of parked vehicles wherever possible, either through design or enforcement.

5.16.2.4 Cycle lane provision for cyclists on the carriageway is provided in two ways:

- **Mandatory cycle lane** – defines an area of the carriageway that is reserved for cyclists and requires a TRO to prohibit all vehicles, except pedal cycles, to enter or travel within the cycle lane.
- **Advisory cycle lane** – primarily used to warn drivers of the presence of cyclists and encourage them to adopt a line of travel away from the cyclists. It does not require a TRO, therefore has no legal status and, as a result, is often subject to obstruction by parked vehicles. Vehicles are also permitted to drive along the cycle lane, which can cause conflict when overtaking cyclists.

5.16.2.5 In urban areas, it is preferable to highlight the cycle lane or sections of it by use of coloured surfacing. In addition, it is common practice for the Council

to permit cyclists to use mandatory bus lanes and this needs to be stated within the associated TRO.

5.16.2.6 The absolute minimum width of a cycle lane should be 1.5 metres. Desirable minimum cycle lane widths are set out in Table 5.10.

Table 5.10 With-flow cycle lane widths

Standard	Width (metres)	Comment
Maximum width	2.5 [1]	Lanes of this width should be used where cycle flows are expected to be >150 cycles/peak hour and overtaking cycles within the lane can be expected.
Desirable minimum Width	2.0 [1]	The minimum width that should be considered for a cycle lane where cycles overtaking each other is not anticipated to be frequent.
Absolute minimum Width	1.5 [2]	The running width of the lane should be free from obstructions such as debris, gullies and yellow line road markings.

Note 1 - cycle lanes over 2.0m wide in areas of car parking may attract drivers to park in them. Physical barriers, mandatory lane markings or parking and loading restrictions can prevent this.
Note 2 - lane widths narrower than 1.5m can present a hazard to cyclists and motor vehicle drivers. Only in exceptional circumstances where it is safe to do so and over short distances – for example where stationary traffic blocks the route to an advance stop line and the proposed lane is completely free from obstructions such as gullies - should widths down to 1.2m be considered. Lanes narrower than this should not be provided on a live carriageway.

5.16.2.7 Where car parking is located adjacent to a cycle lane, it is preferable that a buffer strip with a desirable minimum of 1.0 metres (absolute minimum of 0.5 metres) is provided adjacent to the cycle lane to avoid conflict between car occupants opening doors and cyclists using the cycle lane.

5.16.2.8 Where road space permits, it is desirable to provide a contra-flow cycle lane along a one-way street. In such circumstances, the absolute minimum width should be 1.5 metres (2.0 metres for a two-way cycle lane), if there is sufficient carriageway space. (Table 5.10)

5.16.2.9 **Cycle tracks** – a cycle track is a route provided for cyclists that can be either part of a road, adjacent to the carriageway, or a separate facility some

distance from a road. A cycle track should be located to be free from conflict with parked motor vehicles.

5.16.2.10 Where pedestrians are permitted to use a cycle track, consideration should be given to delineating the facility to separate pedestrians and cyclists or to permit shared use. This decision should be based on site-specific factors such as:

- bicycle and pedestrian volumes;
- the function of the area;
- use by disabled people; and
- available width.

5.16.2.11 Reference should be made to the advice in Cycling by Design in considering whether shared use or delineated facilities are the most appropriate.

5.16.2.12 The widths of cycle tracks should comply with the guidance provided in Table 5.11. However, widths are influenced by the level of cyclist and pedestrian activity and the function of the area, hence widths greater than the minimum specified should be provided wherever possible. Additional clearance from fixed objects should be provided, either in the form of a buffer strip or additional track width, as shown in Table 5.12. Reference should be made to Cycling by Design for further guidance.

Table 5.11 Segregated cycle track facility effective widths

Facility	Standard	Width (m)	Comments
One way cycle track	Desirable minimum	2.0	Operates satisfactorily for flows of up to 150 cycles/ hour with minimal overtaking anticipated
	Absolute minimum	1.5	The running width required that is free from obstructions such as debris, gullies, road markings and street furniture
Two way cycle track	Desirable minimum	3.0	For high cycle flows of up to 2,500 cycles per hour
	Absolute minimum	2.0 [1]	Operates satisfactorily for two-way flows of up to 200 cycles per hour free from obstructions such as debris, gullies, road markings and street furniture
Shared use path/ footway	Desirable minimum	3.0	Typically regarded as the minimum acceptable for combined flows of up to 300 per hour
	Absolute minimum	2.0 [2]	Can operate for combined flows of up to 200 per hour but will require cycles and pedestrians to frequently take evasive action to pass each other
Pedestrian only path/ footway	Desirable minimum	2.0	The minimum width in normal circumstances to permit passage of two wheelchair users.
	Absolute minimum	1.5	Acceptable over short distances in specifically constrained environments, such as at bus stops or where obstacles are unavoidable.

Note 1 - track widths narrower than 2.0m can present a hazard to cyclists, however widths as low as 1.5m may be acceptable over short distances where there is no alternative. Cycle tracks of this width should only be considered where two-way flows of less than 150 cycles per hour are likely.

Note 2 - in particularly constrained situations or for combined flows of less than 100 users per hour, a width of 1.5m may be considered. However this will create conflict between users and should only be used over short distances where no alternative is available.

Table 5.12 Clearance distances to fixed objects

Object	Absolute minimum clearance (m)	Comments
Low upstand ≤ 50 mm	Nil	
Kerb height 50 mm to 150mm	0.20	Added to the effective facility width or a separate buffer strip
Isolated feature (eg sign post, lamp column) or continuous feature of height <1.2m	0.25	Added to the effective facility width or a separate buffer strip
Continuous feature of height >1.2m	0.50	Added to the effective facility width or a separate buffer strip
Carriageway	0.50 [1]	Margin (grass verge or buffer strip) between effective cycle track width and a live carriageway

Note 1 - the desirable minimum separation between a footway or cycle track on roads with a speed limit in excess of 40mph should be 1.5m. A hardstrip can be considered to be part of the separation.

5.16.2.13 It is important a smooth and even riding surface is provided, including those sections of cycle track that cross vehicular access crossing points. Where possible, cycle tracks should meet side roads without a sudden change in level. Raised tables are the preferred method, but where dropped kerbs are used instead, they should be flush with the carriageway yet designed to avoid drainage problems.

5.16.2.14 A cycle track should not feed cyclists back onto the main carriageway in proximity to a junction, as this can introduce a point of conflict. In addition, careful design will be needed where a cycle track converges onto a footway or footpath.

Design requirements
Gradients – cycle track gradients should not normally exceed 3%, but with a normal local maximum of 7% acceptable over short lengths. Reference should be made to Cycling by Design for full guidance on gradients. The gradient shall be reduced on the approach to a connection with a road.
Crossfall/ Superelevation – for all routes, the maximum crossfall should be 2.5%.
Visibility – a desirable minimum forward visibility distance of 45 metres should be provided, for cyclist comfort, with an absolute minimum stopping distance of 20 metres.
Horizontal curve radius – a desirable minimum horizontal curve radius of 15 metres, with an absolute minimum of 4.0 metres, should be provided.
Vertical clearance – a desirable minimum headroom height of 2.7 metres should be provided, with an absolute minimum of 2.4 metres acceptable over a very short distance.
Surfacing – surfacing for a shared use may be of a standard footway construction, but standard or small element concrete slab paving is not generally suitable for cyclists.

5.16.3 Cycle facility road crossings and junctions

5.16.3.1 All proposed cycle facility road crossings are to be discussed and agreed with the Council prior to submission of the RCC Application.

5.16.3.2 Whilst cycle routes are likely to require road crossings, their number should be kept to a minimum, wherever possible. The type of crossing facility provided will depend on the volumes of traffic on the road. For example, where a major cycle route crosses a minor access or cul-de-sac, a raised carriageway crossing may be considered. Where a main road cycle lane crosses a minor road junction, the cycle lane should be continued across the mouth of the minor road, as shown in Figure 5.11.

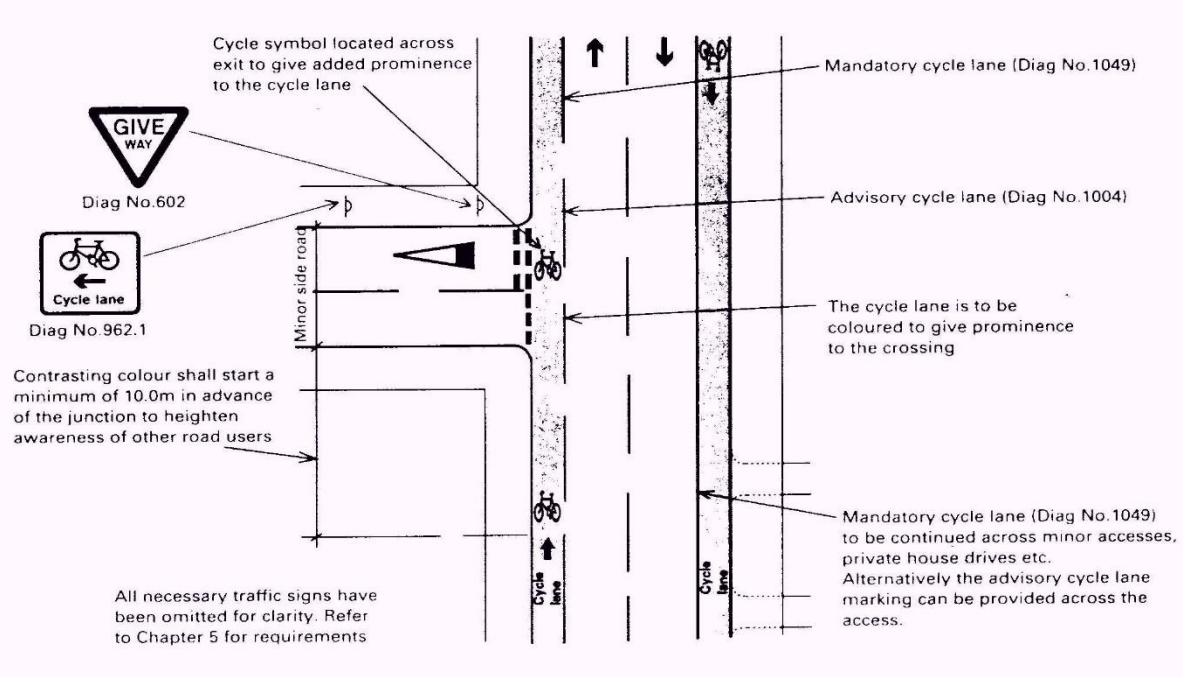


Figure 5.11 Cycle Lane Priority Crossing

5.16.3.3 Where a cycle track crosses a minor road, reference should be made to Cycling by Design with regard to advice on suitable crossing arrangements.

Design requirements
For cycle facility crossing points, the preference is to provide a raised carriageway. Where this is not possible, dropped kerbs must be installed instead.

5.16.3.4 Where a signal-controlled facility is deemed necessary, a Toucan crossing shall be provided. This is a shared road crossing for both pedestrians and cyclists. Design details for a Toucan crossing are provided in Chapter 6 of the DfT's Traffic signs manual.

5.16.3.5 Grade separated crossings designed to accommodate pedestrians with mobility difficulties are likely to be suitable for use by cyclists, although there may be a requirement to check that adequate width and headroom is provided. On new bridges, parapets must have a minimum height of 1.4 metres to accommodate cyclists. For existing bridges with lower parapets, cycle access should be permitted, with the parapet treated as an effective width restriction of up to 0.5m. Further guidance is provided in Cycling by Design.

5.16.3.6 **Junctions** – as a significant percentage of injury accidents involving cyclists

occur at junctions, it is very important that junctions are carefully designed to take account of the safety of all road users. Detailed guidance on the design of cycle facilities at junctions is contained in Cycling by Design and this should be referred to.

5.16.3.7 **Advanced stop lines** – advanced stop line boxes shall be implemented, to allow cyclists to move to the front of waiting vehicles at a signal–controlled junction. This arrangement allows cyclists to move forward in advance of vehicles and be more noticeable to drivers. Advance Stop Lines must be preceded by mandatory or advisory cycle lanes or, in restricted circumstances, by a short 'stub' to indicate a point of entry to cyclists.

5.16.3.8 **Roundabouts** – special care should be taken when considering the provision of a roundabout where cyclists are permitted, as they can often experience difficulty when trying to negotiate the roundabout. If the roundabout is deemed necessary, then it is recommended that cyclists should be routed away from the roundabout, where possible. Hence, the location of a roundabout needs to be carefully considered to ensure that cycle routes are as direct and continuous as possible. The exception would be where there are very low traffic volumes or traffic speeds, as might be expected within minor residential streets.

5.16.4 Additional design issues for cyclists

5.16.4.1 **Signage** – the cycle network will require signage to be erected. Early contact with the Council should be made, to discuss and agree the detailed requirements. Signage must be in accordance with the current Traffic Signs Regulations and General Directions 2016 and Traffic signs manual..

5.16.4.2 **Traffic calming** – where traffic calming features are proposed in locations that permit cycling, the design of the features should seek to minimise impact on cyclists and reduce potential conflicts with vehicles. General advice on traffic calming is given in Section 5.13.

5.16.4.3 **Lighting** – during the design stage, agreement must be reached with the Council, with regard to the appropriate level of lighting that should be provided for a cycle track. For some facilities, such as in rural locations or leisure routes, lighting may not be required.

5.16.4.4 **Access barriers** – it is generally desirable that cycle routes do not have access controls, which can delay cyclists. However, experience suggests there may be a need for some form of access barrier to be provided at

certain locations, in order to prevent use of the route by unauthorised vehicles, especially motorcycles. The design of any barrier needs to take account of access requirements for all users and for maintenance vehicles and should comply with the guidance in Cycling by Design.

5.16.4.5 **Personal safety and security** – it should be noted that remote cycle tracks have the potential to be less secure than those facilities on or adjacent to the road network. It is important that the development layout is designed so cycle routes that form part of the core cycle network are overlooked by dwellings, shops and other buildings. Where possible, the routes should be lit and landscaping should avoid obscuring visibility. Measures to provide shelter from wind, which can be a problem for cyclists, should not interfere with natural surveillance.

5.16.4.6 **Cycle parking** – guidance on cycle parking standards and facilities is provided in Chapter 6.

5.17 Provision for Equestrians / Ullachadh airson Mharcaichean

5.17.1 Where a development provides facilities for equestrians, horse riders should generally be segregated from vehicular traffic, in the interests of road safety, as accidents involving horses can be very serious. In addition, surfacing materials suitable for horses tend to be different from those provided for other road users. Where there is a requirement to provide facilities for horse riders, these shall be designed appropriately and agreed with the Council.

5.17.2 Where an equestrian route crosses a road, consideration should be given to the provision of a controlled equestrian crossing. In such a case, any layout should be in accordance with Chapter 6 of the TSM, and also DMRB CD 127 Cross-sections and headrooms.

5.17.3 There is no standard specification for surfaces used by horses and any design will depend on the number of horses likely to use a route and whether it will be shared with other users, such as pedestrians or cyclists. However, useful guidance can be found in the following documents:

- A Guide to the Surfacing of Bridleways and Horse Tracks / Advice on Surfaces for Horses – available from the British Horse Society
- Traffic Signs Manual – Chapter 6 (DfT)
- Equestrian Access Factsheets

Public transport / Còmhdhail phoblach

5.18 Public transport facilities / Goireasan còmhdhalach poblaich

5.18.1 Introduction

5.18.1.1 The Council considers improved public transport provision to be one of the key objectives in its transport strategy as good levels of public transport can both help ensure access for non-motorists and assist in reducing private vehicular trips.

5.18.1.2 In terms of public transport provision, it is essential that developers discuss this matter with the Council as early as possible, especially the Council's Public Transport Unit. Discussions may also need to be held with relevant bus operators to agree routes and levels of services. It should not be assumed that provision of suitable infrastructure will in itself ensure operation of a bus route, as commercial and wider network operational factors will influence operator decisions.

5.18.1.3 In planning new developments, the need to provide or enhance local bus services will have a significant impact on road layout design. In order to be as attractive as possible, bus routes must be reasonably fast and direct, connecting the centres of the residential, business and shopping areas that they serve. Public transport requirements will affect the design of a development in terms of road types, layouts, widths and pedestrian access requirements and should be provided in accordance with the guidance in Inclusive mobility and Roads for All - Good Practice Guide for Roads.

5.18.1.4 For new developments, especially large ones and those which will generate significant numbers of trips, there may be a requirement to provide new services or enhance existing ones. Developers need to acknowledge they are likely to be required to provide financial contributions towards public transport services and associated facilities, such as real time information or bus priority measures. In phased developments, public transport provision will be required from an early phase in order to enable a pattern of use to become established and to reduce car dependence.

5.18.1.5 Larger developments may increase the stress on the existing road network with congestion levels and journey times likely to increase. In these cases, a

contribution towards off-site bus priority measures will be expected.

5.18.2 Bus routes

5.18.2.1 Potential bus routes must be discussed with the Council at an early stage and early input from likely bus operators is also desirable. Bus routes should generally be direct and provide easy access for public transport vehicles.

5.18.2.2 Generally, bus services will be based on Main Distributor/Regional Route and Local Distributor/Sub-regional Route Roads if standard size vehicles are used. In some instances, a demand responsive service will be more appropriate and this arrangement is actively encouraged where relevant within The Highland Council area and where the provision of community transport schemes is becoming a more common alternative to timetabled bus services.

5.18.2.3 Small public transport vehicles may be considered, to allow enhanced penetration into development sites but the feasibility of this will depend on wider operational requirements in the surrounding area. Where culs-de-sac are proposed, particularly within residential areas, suitable access and turning arrangements for Dial-a-Ride and Dial-a-Bus type vehicles, i.e. mini and midi buses for use by persons with reduced mobility shall be provided.

Design requirements
Ideally bus provision or penetration for a development should be such that no dwelling or workplace is more than a 400-metre walk from the nearest bus stop. For other types of development, such as sheltered/retirement homes, schools, healthcare facilities and shops, bus stops should be located as close as possible to the front door of the facility.
Any roundabouts or turning circles likely to be used by buses must be of sufficient size to accommodate the vehicles, without the need to over-run footways.

5.18.2.4 The size of the expected catchment area will also affect bus route requirements and any need for financial contributions to enhance services and to help mitigate the impact of the development.

5.18.2.5 **Residential developments** – as part of the "400 metre" rule, the scheme layout should consider bus stop locations and how people can walk to and from them as directly as possible. This will influence the layout design. For many new housing schemes, especially those within rural areas, there is likely to be a demand for school buses and provision for these should also be

considered. This should be agreed with the Council during the planning stage.

5.18.2.6 **Commercial developments** – shops will generate demand for travel by public transport, but the extent of demand will relate to the scale of development. For large schemes, such as retail parks or where a large food outlet is incorporated, public transport travel can be very significant. Where possible, bus services should be able to enter sites, especially larger ones, and facilities should be included that maximise the attractiveness of public transport. This will include taxis and community transport vehicles.

5.18.2.7 **Business and industrial developments** – individual employment or industrial premises are unlikely to warrant provision of their own public transport service, unless of a large scale. However, business parks or industrial estates will generate public transport demand, which should be addressed in a Travel Plan, and the appropriate level of public transport provision should be discussed with the Council. This could include modification of routes and services and/or involvement in some form of demand responsive provision.

5.18.2.8 **Recreation/leisure developments** – facilities such as sports centres and cinemas will generate public transport demand, especially by those persons without access to a car, such as children, who are often dependent on public transport. Consideration should be given, therefore, as to what associated public transport facilities are appropriate.

Design requirements
A development likely to generate significant levels of public transport use is to have a layout that ensures the main entrance is close to bus stops and that buses can access the stops by reasonably direct routes.
Conflict between pedestrians and car traffic should be avoided through appropriate design.

5.18.3 Road widths for bus routes

5.18.3.1 Those roads that are or may be used as bus routes shall be suitable in width, alignment and construction, to accommodate public transport vehicles. Corner radii should take account of the fact that buses have a large swept turning circle in the order of 20-25 metres diameter, depending on length of vehicle.

Design requirements
The minimum carriageway width for operation of buses in new developments shall be 6.0 metres. This should be increased to 7.3 metres, in discussion with the Council, where buses, travelling in opposite directions, are likely to pass each other on a regular basis.

5.18.4 Bus stops and shelters

5.18.4.1 For many developments it will be necessary for a developer to provide bus stop facilities, either new ones, upgraded existing ones or a combination of both, within a site and/or on surrounding roads. The actual requirements will be influenced by distance from existing stops, passenger demand, site layout and the road network. Bus stop layouts, including bus bays and boarders, together with turning arrangements should be provided, as appropriate, in agreement with the Council, especially its Public Transport Unit.

5.18.4.2 Appendix 7 sets out a Bus Stop Specification, which the developer will be required to comply with. In some instances, a bus bay may be appropriate whilst in others, a widened footway to provide a bus boarder might be more suitable and raised kerbs might also be required. Particularly busy bus stops may require widened footways. Nearby dropped kerbs should be provided to assist persons with mobility difficulties to cross the road and access the bus stops. A bus stop pole will be required, together with a plate showing the stop name and route numbers (the latter using replaceable tiles). Bus stop markings will also be required for most locations, including, in some cases, a Clearway marking in the carriageway channel and an associated time-plate, setting out times of restrictions for other vehicles.

5.18.4.3 A bus shelter will normally be required, in order to provide a more attractive waiting environment for passengers, sited so as not to interfere with visibility or footway widths. Bus shelters should include an information panel and provision of a real time information display may be required. All these facilities need to be provided, at the developer's expense, to a standard agreed with the Council's Public Transport Unit. Where a bus stop is located on a public road or prospectively public road, its facilities will subsequently be maintained by the Council.

5.18.4.4 When determining bus stop locations, consideration should be given to the following:

- Adequate unobstructed footway width

- Suitable space for a bus shelter
- On-street parking arrangements
- Close proximity to pedestrian crossings (and preferably on the exit side)
- Close proximity to the point where main pedestrian routes intersect the bus route
- Close proximity to local facilities e.g. shops, offices, pubs, residential areas
- Safety e.g. avoiding bends and crests in the road
- Visibility for road users (in both directions) when buses are stopped
- Potential impact on junction visibility splays
- Measures to ensure bus driver and intending passengers are clearly visible to each other
- Adequate frequency of stops along the route
- Location to minimise walking distance between linked interchange stops
- Close proximity to main junctions without affecting road safety or junction operation
- Close proximity to the heart of high density development
- Location to minimise likely objections from nearby residents

5.18.4.5 In addition, the designer should be aware that the need for a bus stop will have a direct influence on the design of a number of the above items (particularly the first six) within the overall layout design.

5.18.4.6 The location of a bus stop needs to be considered in relation to the pedestrian network, in order to minimise walking distances, as well as taking account of road crossing requirements and facilities. It is good practice to provide opposing bus stops near to each other, so that passengers can get on or off a bus in close proximity. However, they should not normally be directly opposite each other to avoid the risk of two buses stopping simultaneously and blocking the road. The spacing of bus stops will be influenced by density of development, but as a general guide, a spacing of some 250 metres is deemed appropriate in fully built-up areas. Rural areas are likely to have significantly greater spacings.

5.18.4.7 The siting of a bus stop can also raise environmental issues, particularly in relation to possible impacts on the occupiers of those premises that a bus stop will front. Where possible, a new bus stop should not be sited directly in front of a door or window, especially that of a residential dwelling. It is critical, therefore, that potential bus stop locations be designed into the overall development layout wherever possible and are agreed in advance

with the Council prior to installation.

5.18.4.8 Designers should provide for current bus sizes and manoeuvrability. However, it is recognised that bus dimensions and manoeuvrability may change and, therefore, some extra space should be allowed for. This is particularly relevant where the bus stop is located within marked parking or loading bays and a swept path analysis should be undertaken to ensure adequate space for a bus to manoeuvre has been provided.

Design requirements
The bus stop stance length should be 15 metres in order to accommodate all bus types. At particularly busy bus stops, two stance lengths may be required.

5.18.4.9 Where an in-line bus stop already exists or is unavoidable, careful consideration will be required with regard to the provision of any raised kerb and footway, in the vicinity of the bus stop, to assist passengers boarding and alighting the bus. This is because raising a section of existing footway may impact on adjacent frontages, in terms of changing levels and possibly affecting surface water drainage.

5.18.5 Bus boarders

5.18.5.1 Within areas restricted to speed limits of 30mph or less and where on-street parking or loading is permitted and space permits, bus stops should be built out from the front edge of the footway to allow buses to pull up parallel with the widened section of footway. The build-out, commonly called a bus boarder, should be sited so waiting passengers (and bus shelters):

- do not obstruct passing pedestrian flows;
- bus passengers and bus drivers have an unobstructed view of one another;
- the bus can pull up parallel with the kerb in line; and
- can resume travel without requiring to wait for a gap in passing traffic.

A raised bus boarder should be provided with facilities as recommended in Inclusive mobility. A bus boarder should not be provided on the outside of a bend where it could create a specific hazard to any vehicle that might accidently leave the road and could hit the bus stop.

5.18.6 Bus bays

5.18.6.1 Bus bays are introduced to maintain the free flow of traffic by eliminating standing vehicles on certain carriageways. In general, they are required on those roads where the speed limit is 40mph or higher. Standard bus bay layouts are shown in Figure 5.12.

5.18.6.2 The footway around any bus bay should be sufficiently wide to allow for the erection of a bus shelter. Unless the use is likely to be mainly used by alighting passengers, a bus shelter approved by the Council's Public Transport Unit should be provided.

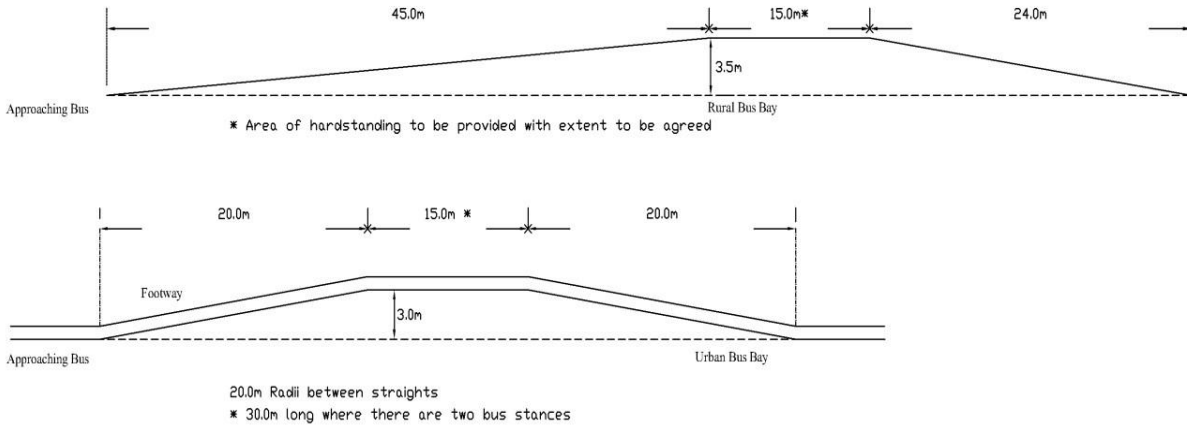


Figure 5.12 Standard Bus Bays – Rural and Urban

5.18.7 Lighting at bus stops

5.18.7.1 The provision of lighting at bus stops improves their environment and provides comfort to waiting passengers, in terms of personal safety. Lighting can be achieved by the provision of a street lighting column within the direct vicinity of a bus stop location. It is also possible to provide lighting as part of a bus stop pole but the appropriate type of lighting provision must be agreed with both the Council's Public Transport Unit and Area Lighting Engineer. The lighting design should seek to ensure that the timetable notice can be read during the hours of darkness. Lighting may also be required within bus shelters, particularly at busy stops or at locations where there is less than a normal urban standard of street lighting.

5.18.8 Bus turning facilities

5.18.8.1 For a development requiring a public transport service, it is preferable that

the road layout enables local bus services to divert easily through the development rather than needing to enter in, turn and then exit out of the site via the same access point. This can often be a significant influencing factor when a bus operator is considering whether to directly serve a development or not, or is calculating operation costs and any required subsidy.

5.18.8.2 It is likely that there will be instances where a turning facility or terminus is required. In residential developments, this should be located away from dwellings but for other developments should be sited as close as possible to the main building entrances. The design of the turning area or terminus, together with proposed construction materials, must be approved by the Council.

5.18.8.3 When a phased development is being constructed, it is important to provide suitable turning facilities, even if only on a temporary basis, for buses even though the bus route may only be partially established. This will permit a bus service to be provided initially, which can then be extended as the development grows

5.18.9 Bus priority measures

5.18.9.1 Where potential conflict arises between the desire for bus routes to be reasonably fast and direct and the general objective of ensuring that residential and industrial roads are designed to encourage low vehicle speeds, some form of traffic management should be designed. This could be in the form of incorporating traffic calming measures that slow general traffic but not buses or by providing bus priority measures, such as bus-only links and bus gates. The provision of any such measure must be discussed and agreed with the Council.

5.18.10 Real time information

5.18.10.1 It is the Council's policy to install real time information (RTI) on the bus network. The requirements for the installation of associated display boards and infrastructure at bus stops should be discussed with the Council and is also likely to be required at significant travel generating locations. This may include provision of RTI infrastructure within certain types of buildings. RTI equipment will have an impact on design layouts.

5.18.11 Taxis

Design requirements
For new developments of over 2,000 m^2 gross floor area in size, taxi pick up and drop off bays are to be provided, with locations that provide easy access to the facilities.
In certain circumstances, the Council may request such facilities be provided for smaller developments, depending on their nature.

5.18.12 Trains

5.18.12.1 Where a large development is located close to a railway station, consideration as to how users of the development can be encouraged to access rail services is needed. This could involve improved access routes to the station and/or contributing to improvements at the station itself, e.g. increased cycle parking facilities and/or car parking.

5.19 Servicing arrangements / Ullachaidhean seirbheiseachaidh

5.19.1 Introduction

5.19.1.1 Servicing of individual residential properties will generally be directly from the public road. For larger residential and small commercial developments, servicing will generally be undertaken via the private access serving the site; however, for major commercial and industrial developments, separate servicing access arrangements should be provided, in the interests of road safety.

5.19.1.2 If it is intended that any servicing shall be undertaken by parking vehicles on the public road this must be discussed with the Council, to agree suitable arrangements.

5.19.2 Commercial and industrial developments

5.19.2.3 The service areas in large commercial and industrial developments should be off-street and located to the rear or side of a building. The layout design should seek to provide servicing arrangements that are well segregated from pedestrian areas and the public road, in the interests of road safety.

5.19.2.4 Sufficient space shall be provided to accommodate the maximum number

and size of vehicles likely to serve the development at any one time and to let them manoeuvre with ease and stand for loading and unloading without inconvenience to other site users. Service areas must be large enough and so arranged that all vehicles enter and leave the service area in forward direction, unless specifically agreed otherwise with the Council. Turning and reversing movements should be confined to areas off the public road and away from pedestrian activity. A swept path analysis should be undertaken to demonstrate manoeuvrability of the intended design vehicle within the road layout. Steps should also be taken to avoid the problems of indiscriminate car parking in servicing areas.

5.19.3 Loading bays

5.19.3.1 Loads on platforms may overhang by 0.3 metres on each side and so, allowing for doors opening, the basic design module for loading bays is 3.3 metres wide. The length of loading bays is variable depending on the types of vehicle expected. Most vehicles do not have a greater overall height than 4.5 metres and, therefore, headroom of 5.3 metres is recommended in private areas and is necessary for adopted roads.

5.19.3.2 Where any loading/unloading activity is proposed to take place on a public road, there will be a requirement for a related Risk Assessment to be undertaken and submitted to the Council for prior approval, before such an activity would be deemed acceptable, as part of the design.

5.19.3.3 **Side loading bays** – Figure 5.13 shows a typical side loading bay arrangement.



Figure 5.13 Side loading bay

Design requirements
Where vehicles are to be loaded or unloaded whilst parked parallel to the kerb of a service road, side loading bays 3.0 metres wide and at least 3 metres longer than the vehicles intended to use them, shall be provided.

The width of the service road shall be increased to allow a forklift to load or unload a vehicle, with a minimum width of 9.0 metres where the road has two-way flow, reducing to 6.5 metres if there is only one-way flow.

5.19.3.4 **End loading bays** - typical minimum dimensions for end-on loading bays, suitable for most service vehicles in the range up to 8 - 10 metres long are shown in Figure 5.14. These are based on the recommendations of Logistics UK and allow room to manoeuvre and shunt. The total depth required can be reduced where vehicles are parked at an angle with a saw-tooth loading deck but this arrangement is only usually appropriate when used with one-way circulatory service roads. The depth of the bays should be increased to accommodate articulated vehicles up to 15 metres long. Where bays are interrupted by columns supporting overhead structures, the spacing should be a multiple of the 3.3-metre module plus the thickness of the column.

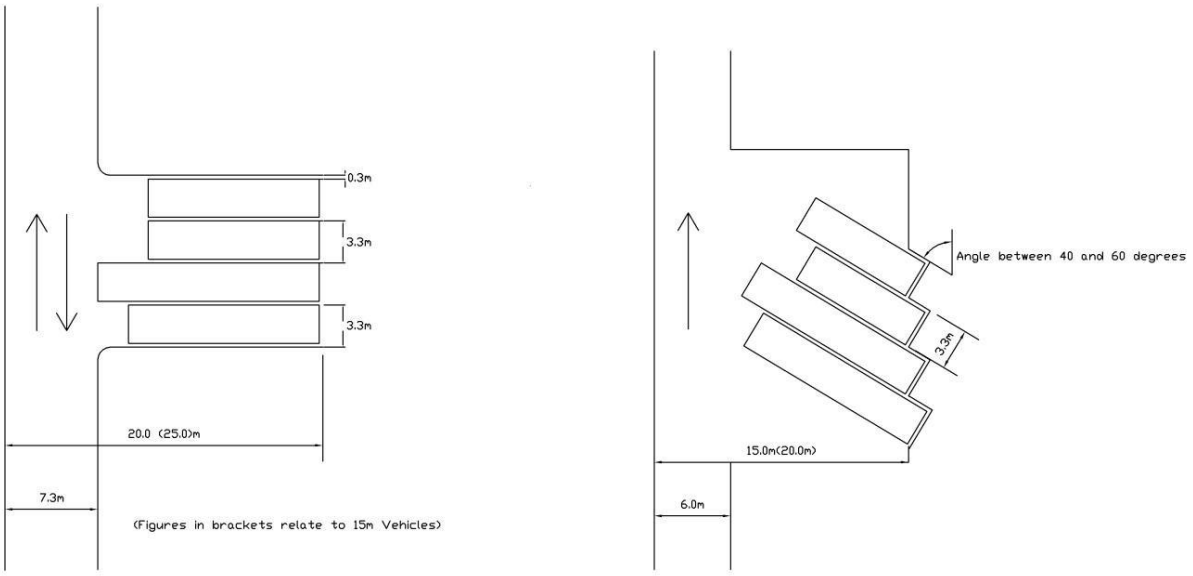


Figure 5.14 End loading bays

5.19.4 Service roads and ramps

5.19.4.1 Service roads shall be designed to at least Industrial Road Access standards, with particular emphasis given to widening of small radius bends and turning areas. Service roads may require a Road Construction Consent if they are to serve premises with more than one ownership and there is unrestricted

access to the public. Figure 5.15 shows recommended curve widening for a service ramp.

Design requirements
The gradient of straight ramps should not exceed 10% with a transitional grade of 5% at the break of slope.

Care should be taken with headroom, where ramps are involved, to allow for the bridging effect of long high vehicles. The height clearance at breaks of slopes may require to be considerably greater than the nominal 5.3 metres.

Curved service roads/ramps, particularly where two-way operation is involved, should be widened to allow for the swing of the inner rear wheel and the gradient of such ramps should be eased to 7% on the inner kerb line.

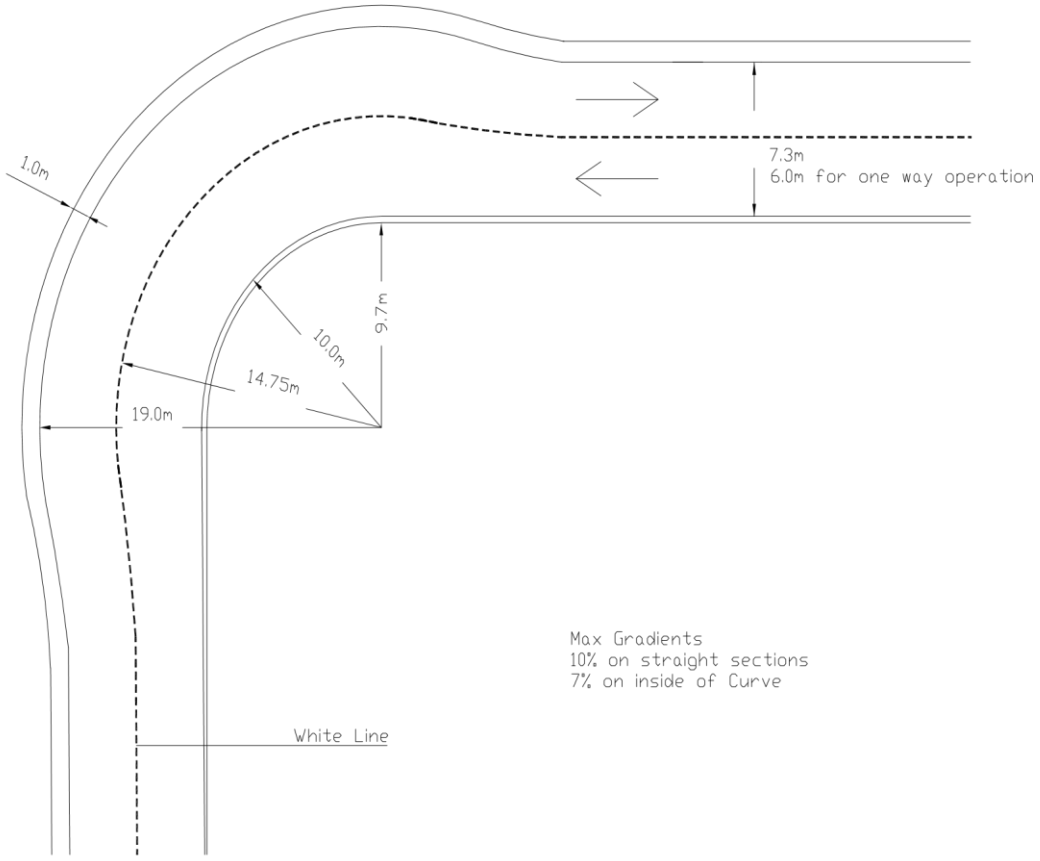


Figure 5.15 Curve Widening on Service Ramps

5.19.5 Parking

5.19.5.1 Provision must be made in commercial and industrial developments for the overnight parking of all associated vehicles off the public road. Where large

numbers of servicing movements are anticipated, consideration should be given to the provision of parking bays for vehicles awaiting access to loading bays. Such parking bays should be located to ensure that vehicles using them do not interfere with the safe manoeuvring of any other vehicle. The dimensions of the parking bays should be similar to loading bays, but it is recommended that advice contained with the Logistics UK Designing for Deliveries publication be considered.

5.19.6 Fire fighting vehicles

5.19.6.1 The width of roads and reinforced emergency vehicle paths and requirements for their proximity to buildings is detailed in Section 2.12 of the Building (Scotland) Regulations. The regulations specify a minimum clear width of 3.7 metres adjacent to low-rise dwellings, to facilitate the use of pumping appliances. The width of development roads, especially minor residential streets must be determined, taking account of these requirements, although it is assumed that emergency vehicles can use the full carriageway. Where buildings are 9 metres or more in height, the clearance width is to be increased to 4.5 metres, in order to allow the use of heavy rescue and fire fighting equipment. It should be noted that a 3.3 - 4.0-metre carriageway width may be appropriate for access but is not sufficient for the actual operation of a fire tender in this case.

5.19.7 Refuse collection requirements

5.19.7.1 The Building (Scotland) Regulations currently permit a maximum carry distance for individual dustbins of 46 metres. Where communal refuse storage accommodation is provided, the Regulations require that this be located no more than 15 metres from an access road suitable for use by refuse and recycling vehicles. Where such accommodation forms part of a chute system or is used for bulk refuse containers, the vehicular access should extend to the doors of the refuse accommodation area. However, BS 5906 Waste Management in Buildings suggests a maximum carry distance of 25 metres for individual waste containers, 10 metres for communal waste storage and direct access for bulk containers. It is recommended that these latter standards be adopted as far as possible.

5.19.7.2 Refuse vehicles currently used by Highland Council are 2.5 metres wide (excluding wing mirrors) and 10.5m long. They have 3-axle units with front-only steering and require a 22-metre diameter turning circle, as set out in Section 5.11.

5.19.7.3 Provision must be made for the standing of refuse bins off carriageways and footways where these are not collected from individual properties.

5.19.7.4 Developers are required to consult with the Council's Waste Management Services to discuss and agree requirements for refuse storage and collections. This can have a significant impact on the development layout and should, therefore, be undertaken early in the design process.

Appendix 8 sets out the Council's current Refuse and Recycling Collection Requirements Policy.

5.19.7.5 For phased developments, there may be a requirement for temporary refuse collection measures to be implemented and these must be agreed with the Council. The developer should be aware that Council refuse vehicles will generally only travel on new development roads that have been adopted as public and for substantially complete un-adopted roads, interim measures must be agreed with the Council.

5.19.8 Gully emptying

5.19.8.1 Road gullies need to be regularly cleaned and emptied. Occasionally, a gully may also require emergency attention, due to flooding or for some other maintenance reason. It is important, therefore, gullies are located in appropriate positions, as is reasonably practicable, so that gully emptying vehicles can stop without blocking the carriageway.

5.19.9 Winter maintenance

5.19.9.1 The operation of winter maintenance vehicles needs to be considered in the planning and design of road and pedestrian networks, particularly in relation to gradients and turning requirements.

5.19.9.2 In addition, for some developments, depending on their size, layout and gradients, the Council may specify the provision of grit bins. Grit bins shall normally be sited on areas of hard standing located to the rear of the footway and be positioned so they are outwith any visibility splay.

5.19.9.3 For phased developments, there may be a requirement for temporary winter maintenance measures to be implemented and these must be agreed with the Council. Refer to Chapter 3 - Section 3.4.1.

Traffic signs and road markings, road lighting, traffic signals and statutory undertakers / Soidhnichean trafaig is comharran rathaid, soillseachadh rathaid, siognailean trafaig agus gabhail os làimh reachdail

5.20 Traffic signs and road markings / Soidhnichean trafaig is comharran rathaid

5.20.1 Only Scottish Ministers or the relevant Roads Authority may cause or permit traffic signs to be placed on or near any public road. Accordingly, proposals for the erection of any traffic sign or laying of any road marking must have prior approval from the Council, who may give advice as to type, colour and text height required.

5.20.2 Designing Streets encourages a relaxation in the provision of signage and road markings in certain circumstances. Whilst the Council acknowledges these aims and objectives, the developer must seek agreement with the Council with regard to what signs and markings are to be provided and where relaxations can be granted.

5.20.3 The developer shall be required to install, at his own expense, all necessary traffic signs and associated road markings, deemed necessary for the development. This could include alterations to existing signs and markings on the adjacent road network.

Design requirements
Signs and markings need to be designed to comply with the current version of the TSRGD, the TSM and BS EN12899-1:2007 – Fixed Vertical Road Traffic Signs and also the relevant current parts of BS 8442 – Road Traffic Signs and Internally Illuminated Bollards.
Materials used for the manufacture of sign faces and associated poles must meet the relevant standards required by the Council.
Traffic sign poles, with their plates, need to be designed to withstand a wind pressure of 15 millibars, equating to 156kg/m^2.
Some poles may need to be protected by safety barriers and any such requirement must be agreed with Council. Alternatively, passive poles may be used.

5.20.4 When considering sign poles and columns, the provision of passive safety shall be the normal standard unless agreed otherwise with the Council.

Guidance on passive safety can be obtained from BS EN 12767 – Passive Safety of Support Structures for Road Equipment.

5.20.5 **Road markings** – junction markings should be provided at most junctions, unless agreed otherwise. Road marking materials shall comply with BS EN 1436.

5.20.6 **Street nameplates** – in urban areas, particularly for residential developments, street nameplates should be provided as an integral part of the road network. Attention should be given to their location, so that whilst serving their purpose, they do not create a hazard, by obscuring visibility or creating a physical obstruction. In addition, future maintenance requirements need to be considered, such as landscaping that can, itself, obscure a street nameplate.

5.20.7 As per Chapter 3 - Section 3.3.7, the Council will provide advice, with regard to appropriate style, wording, lettering and the consultation/approval procedures, which comply with relevant Council policies. Some rural locations may require a street nameplate.

5.21 Road lighting / Soillseachadh rathaid

5.21.1 Introduction

5.21.1.1 Road lighting is an important aspect of the road design process. It is likely that the majority of the road lighting will be located on prospectively adoptable roads and the Council will adopt and maintain the road lighting. It is essential, therefore, that its design and materials used are acceptable. As a result, the developer should consult the Council, especially the Area Lighting Engineer (or his representative), to agree the lighting design, as early as possible. As mentioned in Chapter 3 - Section 3.3.6, it is recommended that the developer obtains a copy of the Council's Lighting Section document The Specification for the Lighting of Roads in Housing and Developments, as this gives relevant advice and guidance.

5.21.1.2 The Council will give advice on the type of lantern and lamp that may be appropriate for the development. The developer should remember the Road Construction Consent application needs to include drawings and detail that give information in relation to location and type of lighting columns; lanterns; feeder pillars; wall-mounted units, if proposed; paint colour and underground ducts, with their intended cabling material.

5.21.1.3 Provision and installation of prospectively adoptable road lighting shall comply with the current version of the Specification for Highway Works.

5.21.2 Design requirements

5.21.2.1 Road, footpath and cycle track lighting shall be designed to comply with the requirements of BS EN 13201 and BS 5489. The developer should seek advice from the Council with regard to the selection of lighting class to be applied to the design.

5.21.2.2 Where a cycle track provides shared facilities for pedestrians and cyclists, road lighting is to be provided that complies with BS 5489: Part 9, Section 3, Clause 14, with lighting levels as specified in its Table 6.

5.21.2.3 Where a developer proposes to use non-standard equipment, such as decorative or heritage columns and lanterns, this must be agreed with the Council. This is because decorative lighting equipment can have high future maintenance cost implications, so its use tends to be limited.

5.21.3 Location of equipment

5.21.3.1 Whilst Road Construction Consent application drawings may indicate the proposed positions of all lighting equipment, there will be a requirement to determine the exact locations on site and agree them with the Council.

Design requirements
Lighting columns shall be sited at the rear of a footway, unless agreed otherwise.
Where there is a 2.0-metre wide grass verge adjacent to a carriageway, the column should be sited at the rear of the verge, next to the footway edge.
Where a wider verge is provided, the column should be sited 2.0 metres from the edge of carriageway.
If a lighting column requires to be sited more than 2.0 metres from the edge of carriageway, the appropriate column height and lamp wattage must be agreed with the Council.
If no footway is provided, the lighting column shall be positioned within the verge so that it has a minimum clearance of 1.0 metre from the edge of the carriageway.
Underground lighting cables should be run within 0.3 metres of the rear of the footway or verge.
If a surface lighting cable needs to be installed, its route must be agreed with the Council.

5.21.4 Existing services

5.21.4.1 It will be the responsibility of the developer or his contractor to contact Statutory Undertakers for the purpose of establishing the position of any existing underground service.

5.21.4.2 The developer will need to obtain an electricity supply for the road lighting from an electricity supplier having cables in the area. The developer should be aware that he will be required to make arrangements with the relevant power supplier, with regard to paying for any electricity consumed by the road lighting installation prior to it being adopted by the Council. The developer will need to provide written confirmation of such an agreement.

5.21.5 Defective equipment prior to adoption

5.21.5.1 In the event of the developer failing to provide operational road lighting installation adjacent to any occupied dwelling, prior to the lighting being adopted, then the developer will be served with a Notice instructing such provision to be made within 28 days. Failure to comply with such a Notice in the specified time period will result in the Council commencing procedures to call in the Road Bond to fund the completion of the road lighting installation.

5.21.5.2 In addition, if the developer or his contractor fails to rectify a fault in the road lighting, within a period of 5 days from the date of notification, the Council will arrange for a repair to be carried out, with all costs being subsequently invoiced to the developer.

5.22 Traffic signals / Siognailean trafaig

5.22.1 Introduction

5.22.1.1 There may be instances where vehicular access to a new development requires to be controlled by traffic signals. In such situations, the design of traffic signals and proposed equipment specifications that are associated with new development and which the Council will subsequently be requested to adopt must be submitted to the Council for verification and approval by the Council's Traffic Signal Engineer. For complex arrangements, submission should be during the Planning stage, so the Council can be satisfied that traffic flows can be accommodated on the road network. More basic layouts can be submitted as part of the Road Construction Consent application.

5.22.2 Design requirements

5.22.2.1 DMRB, Volume 6, Section 2, Part 3 TD50 covers the geometric design requirements for new signal controlled junctions and signal controlled roundabouts. Where possible, existing junctions being converted to signal control should also comply with these requirements.

5.22.2.2 DMRB, Volume 8, Section 1, Part 1 covers the main elements of signal assessment, equipment and the principles of traffic signal design as listed in Table 5.13 below. Table 5.13 Traffic Signal Design Reference Documents

SH 6/73	Criteria for traffic light signals at junctions (Scotland)
TA 16/07	General principles of control by traffic signals, as set out in TAL 1/06*****
TA 82/99	The installation of traffic signals and associated equipment, as set out in LTN 1/98*****
TD 7/07	Statutory approval of traffic control equipment
TA 15/07	Pedestrian facilities at traffic signal installations, as set out in TAL 5/05*****
TA 12/07	Traffic signals on high speed roads, as set out in TAL 2/03*****

***** DMRB still refers to these documents within the new reference documents.

5.22.2.3 Part 2 contains TA84 Code of Practice for traffic control and information systems for all purpose roads. This CoP details best practice for signal controlled schemes, from inception to implementation of projects.

5.22.2.4 Details of signing and lining requirements at traffic signals are contained within the Traffic Signs Manual Chapter 4 and Chapter 5.

5.22.2.5 There are also a number of Traffic Advisory Leaflets that give guidance on aspects of traffic signal design and implementation. Some of these have been adopted into the DMRB, as noted above, but others remain as independent guidance documents. These include:

- TAL 03/03 Equestrian crossings
- TAL 01/02 The Installation of puffin pedestrian crossings
- TAL 06/01 Bus priority

5.22.2.6 Two other documents should also be referred to as part of the design

exercise, namely 'Guidance on the use of tactile paving' and 'Cycling by Design'.

5.22.2.7 Configuration of the signal controller involves the specification of a number of different elements. At the simplest level these are:

- Phases and stages
- Intergreens
- Green times
- Mode of control

5.22.2.8 Phases and stages are the basic elements of signal control. A Phase is defined as a number of green lamp signals on the same circuit and a Stage is a collection of Phases. At a simple 'T' junction there would be two Phases for the main road traffic, one for each direction, and a Phase for the side road. Since both main road phases appear together, they would be grouped into a single stage called Stage 1 and the side road phase placed in Stage 2. Phases are denoted by letters and stages by numbers.

5.22.2.9 Intergreens are the safety times taken to move from green on one Phase to green on another conflicting Phase. The minimum intergreen between traffic phases is five seconds.

5.22.2.10 Green times are the duration of green on a Phase. The minimum traffic green is generally seven seconds but can be lower in certain circumstances. Timings are usually obtained from a related traffic modelling exercise with the exception of pedestrian timings which are calculated according to the method given in TAL 5/05 Pedestrian Facilities at Signal-Controlled Junctions or the TAL 01/02 - The Installation of Puffin Pedestrian Crossings.

5.22.2.11 The mode of control is generally either Fixed Time (FT), Vehicle Actuation (VA) or Urban Traffic Management Control (UTMC) but the actual mode to be used for a new set of signals must be agreed with the Council, together with proposed time periods and phase timings. However, all new signalised equipment will normally need to be UTMC compliant and also include Remote Monitoring Facilities (RMF) complying with the Council's required specification.

5.22.2.12 The particulars of the controller operation are detailed in the TR 2500 Specification. This involves the completion of some 10 to 20 standard forms covering all aspects of the controller's operation. The designer is required to fill in the forms setting out the basic method of operation such as defining

the Phases, Stages and intergreens. It is then possible to specify additional facilities, such as UTC control and bus priority, and their operation with a selection of optional forms.

5.22.3 Installation – General requirements

5.22.3.1 In terms of the installation of traffic signals, the Council will normally expect the following to be provided, unless agreed otherwise:

- Proposed traffic signal equipment suppliers must be approved by the Council;
- Each approach to have a minimum of two signal heads, a Primary located on the left at the Stop line and a Secondary usually located on the far side of the junction;
- Stop lines to be set a minimum of 2.5 metres from the Primary signal head;
- Pedestrian crossings to be indicated by two lines of aluminium road studs, usually set 3 metres apart;
- Tactile paving and dropped kerbs to be provided at either end of the crossing area;
- The tactile paving to be 'L' shaped with the corner of the 'L' next to the pedestrian push button;
- The pole carrying the pedestrian push button should be on the right of the crossing and set a minimum of 750mm back from the kerb face and no more than 450mm from the edge of the tactile paving along the kerb line;
- Erection of poles must comply with the standard construction technique as specified by the Council for all such installations;
- To assist the visually impaired identify the start of the crossing period the appearance of the green man should be accompanied by a rotating tactile cone underneath the pedestrian demand unit and/or an audible tone; and
- Vehicle detection shall be by a combination of inductive loops buried

in the carriageway surface or Microwave Vehicle Detectors (MVDs) and/or Passive Infrared Detectors (PIDs) on the pole tops.

5.22.3.2 Figure 5.16 shows a typical layout of a signal controlled priority junction and illustrates the above installation requirements.

5.22.3.3 Any additional costs associated with the integration of new traffic signals equipment with the Council's current management and control systems will be payable by the developer.

5.22.4 Maintenance costs

5.22.4.1 Where a new development involves prospectively adoptable traffic signals, the developer should be aware that the Council will normally require the developer to pay for any adjustments to the signals, including timing alterations, during the 12-month maintenance period. In addition, the Council will usually require the developer to provide a commuted payment to finance maintenance of the signals for a period of up to 15 years, commencing from the date of adoption of the signals (being currently some £500 per year and £7,500 in total).

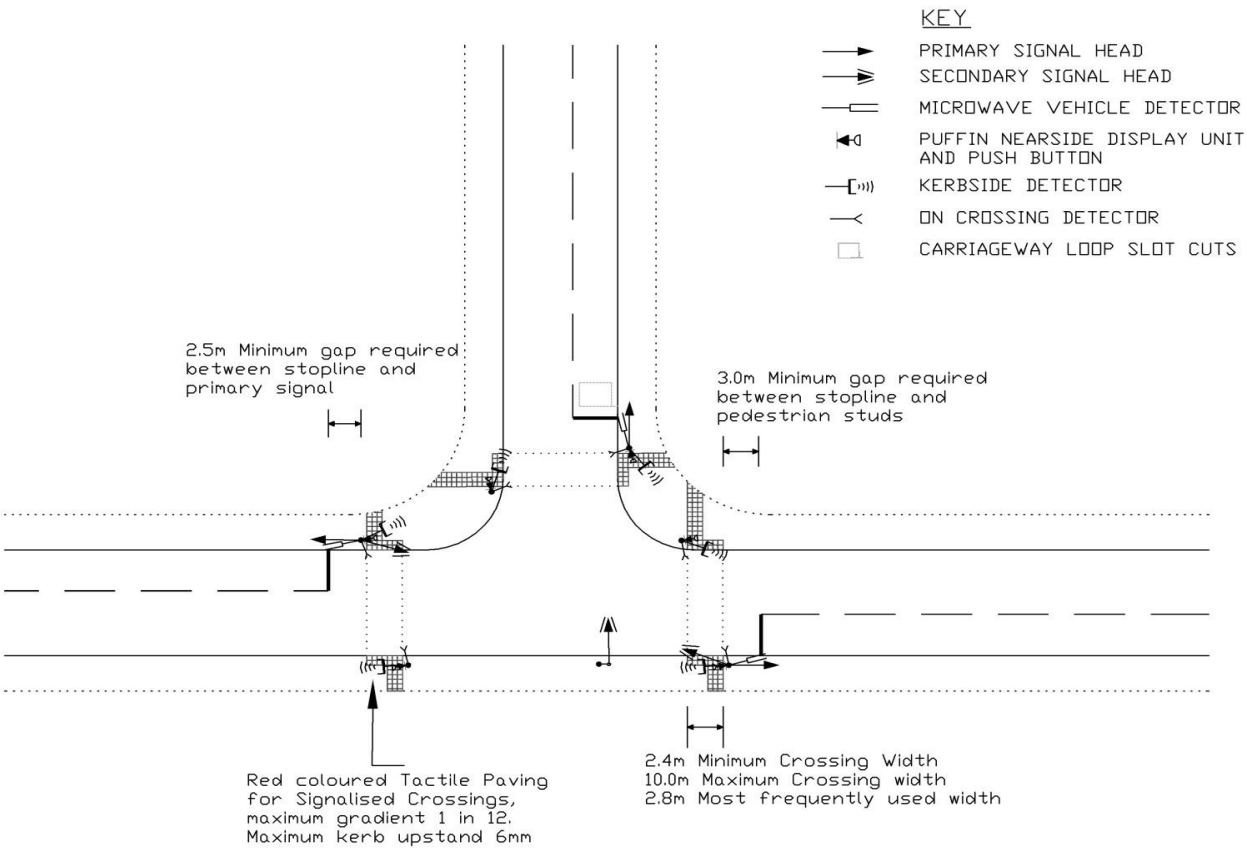


Figure 5.16 Typical layout of a signal controlled priority junction

5.23 Statutory undertakers / Gabhail os làimh reachdail

5.23.1 Introduction

5.23.1.1 The provision of statutory or other services laid underground is a basic element of development design. The Statutory Undertakers, who provide such services, must, therefore, be consulted during the preparation of design briefs, so that their requirements can be co-ordinated into the design and agreement reached between their needs and other development objectives.

5.23.1.2 The Statutory Undertakers will wish to deal with one road manager, so that they are assured of protection, in terms of the New Roads and Street Works Act 1991. For new developments, the Council will only become the road manager once a relevant section of road has been added to the List of Public Roads. Until that time, the developer or his representative must act as road manager.

5.23.2 Locations

5.23.2.1 In the interests of both the Statutory Undertakers and their customers, all main supplies and services serving more than one proprietor should be located in land that is both publicly maintained and easily accessible. It is generally accepted, therefore, that these criteria are best met by public roads and, as well as making provision for all modes of transport, it is usually a function of most roads to provide routes for underground services.

5.23.2.2 Due to their size, sewers will normally be placed under the carriageway. Early consultation should be held with Scottish Water, with regard to its requirements, in accordance with the Sewerage (Scotland) Act 1968, for surface water sewers, the drainage of roofs and paved areas within the curtilage of premises and the foul water drainage system. For most systems, the developer will need to prepare a schedule of drainage so the system can ultimately be included in a Section 7 Sewerage (Scotland) Act Agreement between the Council and Scottish Water, to establish future maintenance obligations.

5.23.2.3 In addition, developers need to comply with SEPA's Best Management Practice, when designing surface water systems, in order to take account of its requirements for sustainable urban drainage systems (SUDS) to be provided.

5.23.3 Service strips

5.23.3.1 All services, other than sewers and occasionally water mains, shall be grouped in "service strips" located within the limits of footways, verges, adoptable footpaths, with a minimum number of service connections running across the carriageway.

5.23.3.2 The width of a service strip will depend on the number and type of premises to be served. Normally, all domestic services (gas electricity, lighting, water and telephone) will be accommodated in a 2-metre wide reservation and Figure 5.17 shows typical positions for each service, which are generally accepted as standard. However, Figure 5.17 is only a guide and does not absolve the designer from having to negotiate with each Statutory Undertaker, in turn, at the earliest possible stage. This is because, for each development, the depth, clearance and relative position of each service will require to be decided by the relevant Statutory Undertaker, with the method of cable and pipe laying left to their discretion. The majority of services are normally located within footways and special arrangements will be required where a footway is less than 2 metres wide. In addition, local widening in excess of 2 metres may be necessary to accommodate access chambers or where roads have tight bends.

5.23.3.3 The layout of service strips should be designed to accommodate phased developments and service plots. Hence, advance ducts, with draw strings, should always be installed to avoid any future un-necessary need to dig up roads and footways in order to subsequently lay services or provide connections, where possible.

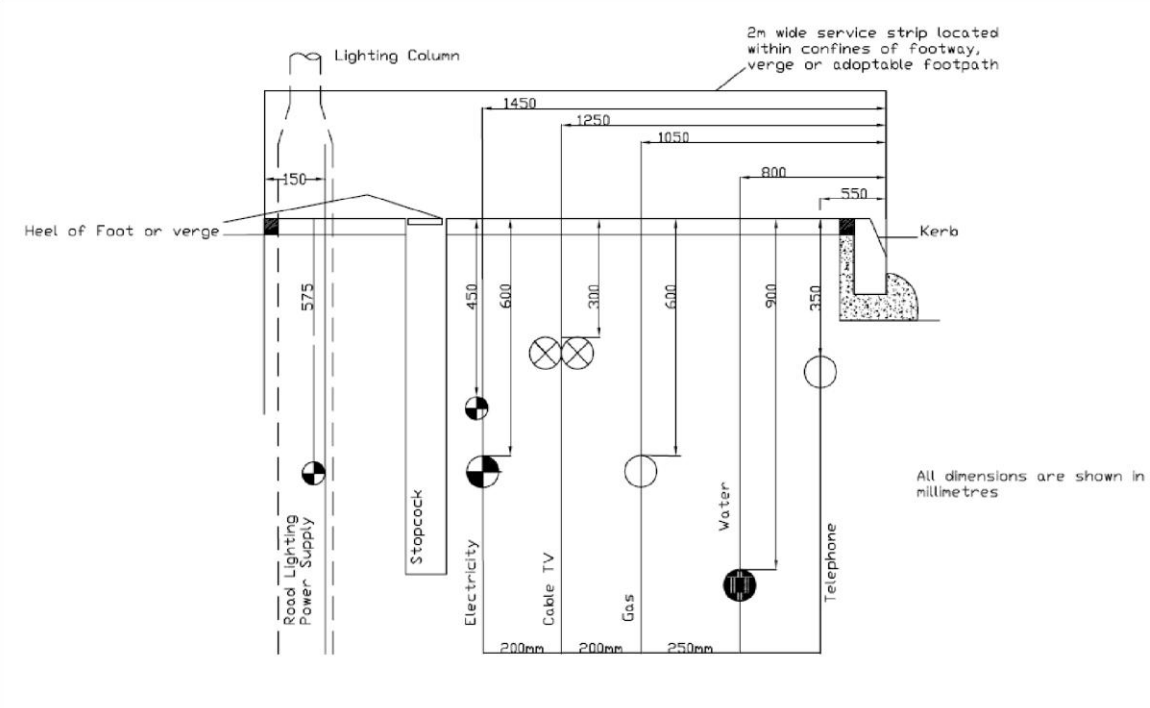


Figure 5.17 Recommended statutory utility locations within the service strip

5.23.3.4 Where service strips are not located adjacent to carriageways, their width must allow for access by mechanical vehicles and/or plant for maintenance or repair purposes. In all cases, there must be a permanent and continuous demarcation of the boundary between the service strip and any adjacent private property. This can be achieved by methods such as a fence, wall or concrete edging.

5.23.4 Design requirements

5.23.4.1 **Street furniture and road lighting** - all street furniture, including road lighting columns, should normally be located at the rear of footways/footpaths or recessed behind them, with no item of street furniture or structure obstructing any road junction sight line, unless agreed otherwise with the Council. Conversely, no services, other than road lighting cables, should be located within 0.5 metres of the rear of the footway, in order to allow for lighting columns, joint pillars or other street furniture. Guidance regarding road lighting is contained within Section 5.20, with further advice available from the Council's Area Lighting Manager.

5.23.4.2 **Maintenance access** – ready access must always be available to all parts of service routes, for both routine and emergency maintenance. Lorry access will be needed to some locations, such as manholes, electricity sub-stations, telecommunication junction boxes and gas governor house installations, with Statutory Undertakers' requirements for such facilities being ascertained at

an early stage. Facilities should be positioned so as to minimise disruptions to vehicle and pedestrian access when service maintenance is being carried out, whilst seeking to ensure that necessary access to the facilities will not itself be obstructed by parked vehicles. Special consideration will be needed, in this respect, where services run underneath or adjacent to single lane carriageways and parking bays.

5.23.4.3 **Fire hydrants** – the position of all fire hydrants should be agreed with the Fire Master and Scottish Water and be positioned so that vehicles are unlikely to park on top of them.

5.23.4.4 **Carriageway crossings** – where service strips or branch corridors cross a carriageway, cabled services shall be individually ducted at increased depths, in accordance with the requirements of the Statutory Undertakers or as directed by the Council.

5.23.4.5 **Shared surfaces** – in shared surface layouts, all services shall continue to be located within land eligible for adoption by the Council. In certain cases, this may require a service strip to be located underneath a shared surface, but in no circumstances will this be permitted at the entrance into a shared surface that has a narrow width, unless an alternative emergency access route can be provided. Where courtyards have informal turning head shapes, a service strip shall still be provided.

5.23.4.6 For shared surfaces, especially Home Zones, service strip requirements will form an integral part of the design process. Early consultation with all Statutory Undertakers will be essential, in terms of delivering successful shared surface developments.

5.23.4.7 **Special surfaces** – where a road has special engineering properties, such as porous surfacing, there may be a need to provide dedicated crossing areas for services. Early consultation with the Council and Statutory Undertakers will be required, to agree locations and specifications.

5.23.4.8 **Manholes** – where manholes are located within the carriageway, careful consideration should be given to their positioning, to ensure that the carriageway is not closed when maintenance work is being carried out, especially for culs-de-sac. For a two lane road, manholes should be located at the quarter point of the road, rather than on the centre line, but always with the general objective of avoiding the vehicle wheel tracks. In addition, manhole positions should seek to avoid awkward locations, such as at junctions, dropped crossings, stopping areas or tight bends, as well as

avoiding likely wheel paths of cyclists and motorcyclists.

5.23.4.9 **Surface finish** – the surface finish of all service strips must form an integral part of its surrounding environment and be acceptable for general maintenance requirements by the Council and, in some cases, the adjacent frontage. Service strips should be appropriately protected when there are risks of damage from occasional overriding by vehicles.

5.23.4.10 **Landscape planting** – it is essential any adjacent landscape planting, especially trees, are clear of visibility splays and are located so their roots do not damage underground services or are themselves damaged as a result of maintenance of the services.

5.23.4.11 **Location plans** – the proposed locations of all services within road boundaries are to be indicated on the plans submitted with the Road Construction Consent application.

5.23.5 Council and statutory undertakers' access rights

5.23.5.1 Where verges, visibility splays and service strips are contiguous with private gardens, special attention will be required to ensure that the access rights of the Council and Statutory Undertakers are clearly understood by householders and tenants. At the same time, the developer must remember that one of the objectives of having some quiet streets, such as Minor Residential Streets, Culs-de-sac and Home Zones, is the closer integration of public and private landscaped areas, by encouraging householders and tenants to maintain verges right up to the edge of paved areas.

5.23.5.2 Boundaries between public road verge/service strip areas and private gardens must be indicated. This can be achieved by the careful attention to landscaping details, such as using setted or cobbled areas to highlight the locations of stop cocks, hydrants, manhole covers, etc. In addition, householders and tenants must be made fully aware that the building of walls and fences or the planting of deep rooted trees, shrubs and hedges within the delineated service area within a verge is prohibited and Statutory Undertakers have the legal right to excavate these underground services at any time. These requirements can be achieved by means of a condition being included in the missives of the affected property. In addition, Statutory Undertakers may wish to attach warning notices to metre boards at such properties.

5.23.5.3 Conversely, adjoining property owners should be given assurances that

Statutory Undertakers are legally obliged to reinstate service strips to a required standard, following any maintenance works.

5.23.6 General construction requirements

5.23.6.1 Any person wishing to install services or apparatus in a public road must apply to the Council for a Road Opening Permit, in terms of Section 56 of the Roads (Scotland) Act 1984 or obtain permission in writing, in terms of Section 109 of the New Roads and Street Works Act, before any excavation is undertaken within the public road.

5.23.6.2 The developer or his agent is responsible for contacting the relevant Statutory Undertakers regarding the position of any existing underground plant and seeking permission to connect to such plant.

5.23.6.3 Under the terms of Section 139 of the New Roads and Street Works Act, it is the duty of a developer to inform the Council of any unidentified apparatus that is found.

5.24 Road drainage / Drèanadh rathaid

5.24.1 Introduction

5.24.1.1 Developments require to be drained, in order to remove excess surface water, and providing adequate drainage is another basic element of the development design. In general, a road surface water drainage system shall not accept roof water and surface water drainage from adjacent properties, which shall be treated separately, preferably on site. If a combined surface water system is proposed, this must be discussed beforehand with the Council and Scottish Water, who will normally require the developer to prepare a schedule of drainage so that the system can ultimately be included in a Section 7 Sewerage (Scotland) Act Agreement between the Council and Scottish Water, to establish future maintenance obligations.

5.24.1.2 The Highland Council will adopt drainage systems that exclusively contain road surface water from adopted roads but will only adopt drainage systems containing curtilage water under a Section 7 Agreement between Scottish Water and the Council.

5.24.1.3 Road drainage has traditionally involved the provision of underground pipe systems that are designed to accommodate the envisaged quantity of runoff water, in order to prevent local flooding. However, as these piped systems

remove the runoff more quickly than if it were left to flow naturally, they have the potential to cause problems in other areas.

5.24.1.4 In recent years, water quality has become a more important issue, as a result of the problems associated with pollutants from developments and roads being carried into watercourses and groundwater. The traditional piped systems tend not to be able to address this problem and may, in fact, contribute to it.

5.24.1.5 Dealing with surface water drainage from new developments in an effective manner that results in no flooding or pollution, whilst also enhancing the local environment, requires schemes to be designed in a manner that goes beyond the conventional approach to drainage. Road drainage schemes are now usually required to employ sustainable urban drainage systems, commonly referred to as SuDS. Where a drainage system discharges into an existing watercourse or public sewer, the system will also need to meet additional requirements, as deemed necessary by the following bodies:

- Foul or Surface Water Sewers – Scottish Water
- Water Quality and Quantity – SEPA
- Flood Prevention – The Highland Council

5.24.2 Sustainable urban drainage systems

5.24.2.1 Sustainable urban drainage systems (SUDS) seek to act like natural systems, in terms of treating polluted surface water, whilst also providing attenuation of the water, in order to reduce its detrimental impact on watercourses. In addition, well designed SUDS measures, such as ponds, which are not underground can provide a positive contribution to the amenity of a site, in terms of landscaping and wildlife.

5.24.2.2 SUDS comprise a number of features that manage surface water runoff and control pollution. There are four general types of features:

- Filter drains and permeable surfaces
- Filter strips and swales
- Infiltration devices
- Basins and ponds

5.24.2.3 The features are most effective, in terms of water attenuation, when they are placed as close as possible to where rainwater falls, so that the runoff can be captured early. The features can also provide treatment for carried pollution

particles, within the surface water, using the natural processes of sedimentation, filtration, adsorption and biological degradation.

5.24.2.4 To aid drainage designers, reference should be made to the SuDS Manual (C753), published by CIRIA and also the SuDS for Roads guidance manual produced by SCOTS. Further SUDS guidance and good practice advice can be obtained from SEPA. Reference should also be made to Sewers for Scotland 4.0, published by Scottish Water, as this sets out technical requirements, which must be met.

5.24.2.5 Each development will be considered on a site-by-site basis, in order to determine the most effective combination of SUDS features, together with the required level of treatment. The developer must allow sufficient landtake for these features, when designing the site layout, as some, such as basins and ponds, can require significant areas of land.

5.24.2.6 Where SUDS features are proposed, an agreement between the developer and Council and/or Scottish Water, in respect of future maintenance requirements and responsibilities will be required. The developer should discuss the limits of maintenance with the Council as early as possible.

5.24.2.7 The developer should be aware that maintenance of new watercourses, basins and cut-off drains will rest with the respective owner, unless agreed otherwise with the Council and/or Scottish Water. The developer must make prospective owners aware of their future potential maintenance responsibilities. It will be important that on-going maintenance of such drainage features is carried out. To aid this, open space adjacent to the features needs to be provided and reserved in order to ensure access. For example, it is recommended that a 6 metre wide access strip be provided adjacent to any watercourse, extending to a nearby public road and reserved for access. Such spaces should exclude private garden areas and there will need to be agreement on extent, ownership and maintenance of these associated open areas.

5.24.3 Design requirements

5.24.3.1 Where the drainage design is undertaken by the developer, it must comply, in all respects, with the requirements of Scottish Water and SEPA, and be approved by the Council and is likely to require SUDS features. Foul drainage shall be designed to the standards required by Scottish Water. Drainage design should be considered as early as possible and discussed with relevant bodies during the pre-application and outline planning stages.

5.24.3.2 Where a piped road drainage system is permitted, it shall be designed in accordance with the current editions of the DMRB and SuDS for Roads, subject to the qualification that the minimum permitted pipe diameter shall be 150mm. Unless agreed otherwise with the Council, measures must be incorporated to prevent surface water flowing on to a public road from adjacent private properties.

5.24.3.3 The spacing of road gullies shall be designed in accordance with Transport Research Laboratory **LR277 "The Hydraulic Efficiency and Spacing of BS Road Gullies"**. Standard road layout gully spacings, derived from LR277, are shown in Table 5.14. The spacing may require to be adjusted, according to the road layout, e.g. at junctions, sags, crests, etc and advice should be obtained from the Council.

Table 5.14 Gully spacings for carriageways

Road Type		**Gradient**							
Cross Section	**Carriageway Width (m)**	**Flatter than 1/150 0.66%**	**1/150 0.66%**	**1/100 1.00%**	**1/80 1.25%**	**1/60 1.66%**	**1/40 2.50%**	**1/30 3.33%**	**1/20 500%**
Camber	5.5m	20	30	35	40	45	55	60	75
1 in 40 (2.5%)	6.0m	20	25	30	35	40	50	60	70
	7.3m	15	20	25	30	35	40	45	55
Crossfal 1 in 40 (2.5%)	5.5m	10	15	17	20	22	27	30	37
	6.0m	10	12	15	17	20	25	30	35
	7.3m	7	10	12	15	17	20	22	27

Notes:
1. The desirable minimum permitted channel gradient is 1/125 (0.8%) but with an absolute minimum of 1/200 (0.5%) considered in exceptional circumstances.
2. Spacings are based on assumption of 2.0-metre wide footways on both sides of carriageway. There may be a need to amend spacings where wider footways are provided.

Design requirements
Irrespective of design spacings, a gully shall be positioned as follows:

- just upstream of the tangent point at road junctions;
- short of the point where adverse camber is removed when applying superelevation;
- at any localised low point, where two gullies shall be installed;
- just up-stream of traffic calming features, where necessary; and
- to avoid pedestrian crossing points or driveways, but located just upstream of them, where possible

5.24.3.4 For irregularly shaped areas, the empirically-derived formula of one gully for each 200m^2 of catchment area may be used. Additional gullies will be required where gradients are steeper than 1/20 (5%), flatter than 1/150 (0.66%) or where surface water draining from adjacent areas may be anticipated.

5.24.3.5 Generally, channel gradients shall not be flatter than 1/125 (0.8%). Where this is not possible, special drainage measures may be necessary and agreement should be sought from the Council.

5.24.3.6 Remote footpaths/cycle tracks shall be constructed with flush edging and adjacent land drainage, so that surface water can drain naturally. Only in exceptional circumstances should direct drainage into gullies be considered, with approval required from the Council. If such footpaths are prospectively adoptable, the adjacent drainage system will also be adopted, if constructed to appropriate standards.

5.24.3.7 Lay-bys shall be drained by means of either having road gullies located in the rear of the lay-by, thereby seeking to avoid wheel tracking wherever possible, or by use of a filter drain where there is a verge but no kerb. Where the lay-by crossfall is towards the main carriageway, drainage requirements must be agreed with the Council.

5.24.3.8 Where soakaways are incorporated into a drainage system, they shall be designed in accordance with the requirements and recommendations of BRE Digest 365 Soakaways and CIRIA R156 "Infiltration drainage – manual of good practice", to suit the drainage characteristics of surrounding ground material. Soakaways should be sited so that the integrity of nearby structures and roads are not impaired by a potential change in water table levels. Adequate vehicular access is to be provided to allow for occasional

maintenance. Where privately owned soakaways are to be used, being either existing or new facilities, approval of their use and future maintenance regime must be agreed between the developer, Scottish Water and the Council.

5.24.3.9 The drainage design must consider the whole of the site. Whilst drainage of the road network and building roofs are likely to be the main sources, runoff from open spaces and any other drainage must also be taken into account. As a result, detailed proposals for dealing with runoff from the whole site must be submitted for approval.

5.24.3.10 In addition, existing land drainage may be present on a site and is likely to be affected by the development proposals, probably having an impact on drainage requirements. The drainage design needs to take account of such land drainage and proposed measures for accommodating it must be submitted for approval. Proposed measures can include cut off drains, constructed above and below a development, if appropriate.

5.24.3.11 The drainage designer should be aware that land drainage or other appropriate measures must be taken to prevent water flowing onto a public road from adjacent properties. Conversely, the layout of a development, in terms of gradients and routes, needs to be checked to prevent excess road surface water or any overflowing watercourse that comes onto a road being directed towards properties, thereby exposing them to the risk of flooding. Such a check should include an assessment of low points, in terms of the risk of overflow due to gully blockages and extreme events and any likely impact on nearby buildings. The check must consider flood routes and potential depths.

5.24.4 Drainage connection

5.24.4.1 Connection of a road drainage system to an existing sewer can only be undertaken with the authority of Scottish Water, whilst discharge into a watercourse needs the approval of SEPA and also the Council, as the local Flood Prevention Authority.

5.24.4.2 Use of an existing sewer could significantly affect its capacity and have a detrimental effect on combined sewer overflows, such that changes to the foul sewer network may be necessary. The developer must consider this aspect and submit proposals for alterations, with capacity calculations, for approval by both the Council and Scottish Water.

5.24.5 Sub-grade drainage

5.24.5.1 As well as providing a surface water drainage system, it is also important that effective drainage of the sub-grade is provided, together with drainage of any other permeable layers of a road.

5.24.5.2 Where a road has no direct frontage development, the sub-grade drainage is likely to require the following features:

- Filter drains should be installed at the foot of cuttings and slopes, where it is deemed necessary to prevent the flow of water across footways and also to protect carriageway foundations and earthworks slopes. Drainage should be positioned deep enough to ensure that the water table does not rise to within 0.6 metres of the formation level.
- Where an embankment is formed, the capping layer and/or sub-base layer shall be extended to the face of the embankment slope to aid drainage of these layers.

5.24.5.3 The surface of any filter drain should have a dished concave shape to help catch water. In addition, a catch pit could sometimes be provided with a grating cover rather than a manhole cover, especially within rural areas.

5.24.5.4 In rural locations, it will usually be acceptable for a ditch to be provided instead of a filter drain.

5.24.5.5 Where a road does have direct frontage development and there are no adjacent slopes, then there is unlikely to be a need for any specific sub-grade drainage features, unless a ground investigation suggests the water table is within 0.6 metres of formation level or that material below formation level is significantly impermeable. In such cases, some form of positive subgrade drainage should be installed.

5.24.5.6 Permeable block paving - in some locations, such as parking areas and courtyards, consideration should be given to installing permeable block paving, with an appropriate drainage system within the sub-base and/or sub-grade. Such block paving does require regular maintenance, in terms of inspection, cleaning and vacuum sweeping of the surface. The Council may adopt suitable areas of permeable block paving and this matter should be discussed at an early stage in the design process. There would be a need to check the sub-grade to ensure that it was suitable and can retain its strength when saturated, otherwise an impermeable membrane would be required.

Guidance on permeable paving is set out in SuDS for Roads.

5.24.6 Drainage impact assessment

5.24.6.1 The detailed drainage layout for a development will need to be submitted, as part of the Road Construction Consent application, together with design calculations. In addition, the developer should be aware that for many applications, a Drainage Impact Assessment must be provided, as part of the supporting information for a "Planning in Principle" application, with full drainage details and calculations provided as part of the detailed planning application.

5.24.6.2 The Drainage Impact Assessment is to be site-specific and highlight all drainage issues that relate to the site, together with impacts of the development. Information of proposed outfalls and/or connections, together with an indication of likely SUDS measures, should also be provided. In association with the Assessment, it is also important that a plan, showing existing and proposed ground level contours, including road, floor and garden levels, is provided by the developer, as development in a valley or depression is more likely to be prone to flooding.

5.24.7 Flooding issues

5.24.7.1 Before considering the development of a site, commencing a layout design and assessing road and drainage requirements, a developer needs to be aware of any potential flooding issue that could affect the site and prevent its development. This includes the site being prone to existing flooding or the development creating or exacerbating flooding either on the site or for nearby locations. More detailed advice with regard to flooding is provided in Chapter 8.

5.25 Other design requirements / Riatanasan dealbhaidh eile

The following items may be additional design requirements for certain developments that the developer should take into account.

5.25.1 Access to play areas

5.25.1.1 For those developments where a play area is required or provided, this should usually be within areas of open space but which are overlooked. The

play area should be sited in appropriate locations so that most children can safely walk or cycle to and from them, without the need for adult escort.

5.25.2 Traffic noise

5.25.2.1 The developer should be aware that the Council shall usually require new residential developments to be designed to take external noise into account, which will include noise generated by traffic. Hence, the designer should consider the following sources of traffic noise:

- new roads, constructed as part of the development;
- existing roads, adjacent or near to the development;
- changes to the existing road network to accommodate the development;
- changes to the existing road network, as listed in the Council's Local Transport Strategy for implementation within five years, adjacent to or near the development.

5.25.3 Safety barriers and fences

5.25.3.1 A new road layout, provided as part of a proposed development, must be designed to promote road safety. There may be circumstances where vehicle restraint systems, usually in the form of safety barriers or fences, need to be provided, with their main objective being to prevent vehicles leaving the carriageway (and entering areas where they could create a hazard or increasing risk of serious injury to the vehicle occupants). There may also be situations where provision is required to prevent pedestrians or cyclists entering onto the carriageway or protect them from falls. For example, a culvert headwall with a drop exceeding 1.5 metres requires some form of pedestrian restraint, as a minimum.

5.25.3.2 In relation to the provision and design of safety barriers and fences, the developer shall take account of the requirements of DMRB CD 377 Requirements for Road Restraint Systems, in terms of when barriers and fences are needed and their specification. There is also a requirement to comply with the associated Road Restraint Risk Assessment Process (RRRAP) that is used to assess if some form of barrier is required or not. Any requirement must be agreed with the Council.

5.25.4 General construction traffic

5.25.4.1 All developments will generate construction traffic to some extent. For large developments, the level of construction

traffic may be significant and should, therefore, be considered as part of the general design process. Awkward sites, including small developments, may present access problems, requiring solutions to be agreed with the Council, such as the use of haul roads or Temporary TROs. Appropriate and careful design can help to minimise the impact of construction traffic and the developer should seek to mitigate any detrimental impact.

5.25.4.2 In some circumstances, the Council will require the developer to enter into a suitable legal agreement, usually in terms of either Section 56 or Section 96 of the Roads (Scotland) Act 1984 to undertake any necessary improvements to the surrounding local road network, in order to accommodate construction traffic or to fund any remedial work to repair any damage caused by such traffic. Further information on this aspect is provided in Chapter 9, which also considers abnormal loads.

5.25.5 Special features

5.25.5.1 In some exceptional cases, a new development will either incorporate or impact on special features not covered within this document. Examples might be:

- a railway line or level crossing (where Network Rail would need to be consulted);
- need for a cattle grid; or
- a development near Inverness Airport and its flight path.

5.25.5.2 Where a special feature has implications on the design of a development or its access arrangements, the developer must discuss the matter with the Council.