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chapter 12 Facilities for Pedestrians, Cyclists and Motorcyclists

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12.1 Duties and responsibilities

The 1993 Roads Act¹ requires Road Authorities to consider the needs of all road users when constructing and maintaining public roads. For traffic engineers involved in the design, construction and maintenance of traffic management schemes there is a clear implication that due consideration should be given to all road users.

Vulnerable road users – pedestrians, cyclists, children, the elderly, and those with a mobility impairment may require special consideration within traffic management schemes and the provision of specific facilities on the road. The 1993 Roads Act also requires all road users to take reasonable care for their own safety and that of others when using public roads.

The 1997 Road Traffic (Traffic and Parking) Regulations,² requires that pedestrians exercise care and take all reasonable precautions in order to avoid causing danger or inconvenience to traffic and other pedestrians. Where pedestrian crossings are provided, pedestrians are required to use them. Pedal cyclists are required to ride no more than two abreast in the roadway (except when overtaking other cyclists).

The 1997 Road Traffic (Signs) Regulations³ and Traffic Signs Manual⁴ give details of the requirements for signs and road markings at pedestrian crossings.

"Provision of cycle facilities – National Manual for urban areas"⁵ gives comprehensive guidance on the provision of cycle facilities. The Cycle manual is currently being reviewed and it is expected that it will be updated by the end of 2003.

12.2 Promoting walking and cycling

In general, the minimum width of a new footway should be 1.8 metres. Wider footways should be provided where there are higher pedestrian flows. Where an existing street is being improved, consideration should be given to widening inadequate footways.

During the past two decades there has been a considerable decline in walking and cycling as modes of travel.

More recently cycling along some routes has increased with the provision of cycle facilities.

There are many possible reasons for the long term decline in walking and cycling including:

- increased car ownership
- economic growth and increased employment
- reduced reliability of public transport
- motor vehicle dominated road design
- concerns about personal security
- speed and volume of motor traffic leading to concerns about road safety
- closure of public rights of way
- poor planning resulting in longer distances to shops, schools, etc.

In order to reverse this downward trend it will be necessary for roads authorities to adopt policies that actively promote walking and cycling. These policies need to recognise the role that walking in particular plays in integrating other modes of transport. Surveys have revealed a substantial latent demand for more cycling and walking if better facilities are provided.

Safe networks of walking routes are required to key attractions, public transport access points, and urban centres. A local walking strategy can be developed in partnership with other public bodies, commercial organisations, voluntary groups and the wider community.

Walking and cycling can be promoted through steps taken within the planning process thereby reducing the need to travel by private motor car (see Section A, Chapters 1.5 and 1.7).

Businesses and schools can be encouraged to adopt Travel Management Plans (Chapter 1.5) setting out strategies for reducing car trips and increasing other more sustainable modes of travel. "Safer routes to schools" projects and local traffic calming schemes can help to increase walking and cycling trips in local residential areas.

In making infrastructure improvements to encourage walking and cycling, road authorities will need to address the following issues:

- the need to reduce the dominance of motor traffic
- the provision of pedestrian priority measures
- the provision of better walking and cycling facilities
- the provision of more and safer crossing facilities
- a reduction in the volume and speed of motor traffic
- a reduction in the obstruction of footways and cycle tracks caused by parked vehicles and street furniture
- improved maintenance of footways and cycle tracks
- improved lighting for footways and cycle tracks
- improved signing for pedestrians and cyclists
- the provision of specific facilities for people with a mobility impairment
- pedestrian, cycle and mobility audits (see Chapter 14)
- a reduction in the fear of street crime and concern about personal safety

This chapter concentrates on guidance for the provision and improvement of specific crossing facilities for pedestrians and cyclists.

Pedestrian/cycle bridges and subways are only suitable when the topography of the surrounding area provides pedestrians and cycles with a direct route with no significant gradients, and where personal security is not a perceived risk.

If pedestrian/cycle bridges and subways are provided at other locations they will not be attractive to use. There may be resultant safety problems because pedestrians and cyclists will continue to cross at ground level.



On road cycle track

Footway widths and bollards

In urban areas, the normal minimum width of a footway should be 1.8m. It is important that the effective width of the footpath is preserved for pedestrians. The presence of street furniture (poles, bollards, seats etc.) reduces the effective width considerably, and can create significant obstacles for vision-impaired persons.

In particular, bollards should be used sparingly, and only in situations where they do not create obstacles for pedestrians. On high-flow pedestrian routes, inappropriately placed bollards can result in pedestrians walking out onto the carriageway, encroaching on the path of moving vehicles. Other methods of defining the limit of the road or precluding car parking on footways (such as high kerbs, enforcement, etc) may be more appropriate, as these retain the pedestrian capacity of the footway.

12.3 Controlled crossings

In order to achieve broad aims of sustainable transport, it is important that walking and cycling are encouraged. Roads, particularly those with high traffic volumes, are seen by many people as barriers to walking and cycling and there are increasing demands for the provision of good crossing facilities.

Guidance on the justification for a controlled pedestrian crossing and the most appropriate type of crossing facility is given in Local Transport Note 1/95⁷. The old system of warrants is now 30 years old and has been superseded. In the climate of encouraging walking as part of sustainable transport, justification for pedestrian facilities tends to be made more in terms of the needs of pedestrians (in particular the delays and difficulties experienced in crossing a road).

It can sometimes be difficult to provide adequate signalled facilities for pedestrians without having adverse effects on peak hour traffic queues and delays.

Factors to consider in assessing the need for a pedestrian crossing

There are a number of factors that should be considered before introducing a pedestrian/cycle crossing facility. These factors include:

- volume and speed of traffic
- volume and age profile of pedestrians and cyclists
- road, cycle track and footway widths
- difficulty in crossing the road
- delay in crossing the road
- road accident records
- requests for crossing facilities

Advice on the provision of crossings for cyclists is also given in the "Provision of cycling facilities – National Manual for Urban Areas"⁸.

Types of controlled crossings

There are a number of options for introducing controlled crossings. These are zebra, pelican, puffin, toucan crossings and pedestrian stages at traffic signals. Puffin crossings respond better to the needs of both pedestrians and drivers and consideration should be given to using them at locations where pelican crossings would traditionally be considered appropriate. Pedestrian stages are dealt with in Chapter 10.7. Crossings can be introduced either in isolation or as part of other schemes such as traffic calming schemes or environmental cells. The crossings themselves can be placed on top of raised tables if required. This can help to reduce approach speeds and reduce pedestrians concerns about crossing the road.

Zebra crossings⁴ rely on drivers giving way to pedestrians who step out onto the crossing. They cause little delay to pedestrians and are generally used in the following cases:

- where traffic speeds are low (85% speeds less than 35mph)
- where traffic volumes are moderate
- as part of traffic calming schemes
- where the carriageway width does not exceed 7 metres

At sites with high traffic volumes or high approach speeds it may be difficult for less able (such as the elderly or mobility/sensory impaired) or less confident (such as younger children) pedestrians to gain precedence.

Details of the road markings for a Zebra Crossing Complex are shown in Diagram 12.1 (figure 7.30 of the Traffic Signs Manual[®]). High-friction surfaces should be considered for each approach (see Chapter 12.6). Zebra crossings can assist with transport policy objectives such as traffic reduction or speed reduction on local roads.

The minimum width of a zebra crossing is 2.4m, although greater widths (up to 5m) should be used when there are high pedestrian flows or the footways are narrow.

Zebra crossings can be sited close to junctions, at a minimum recommended distance of 5m away. Zebra crossings are useful on low speed approaches to urban roundabouts and avoid any potential confusion for drivers that can occur with signalled crossings close to the yield line.

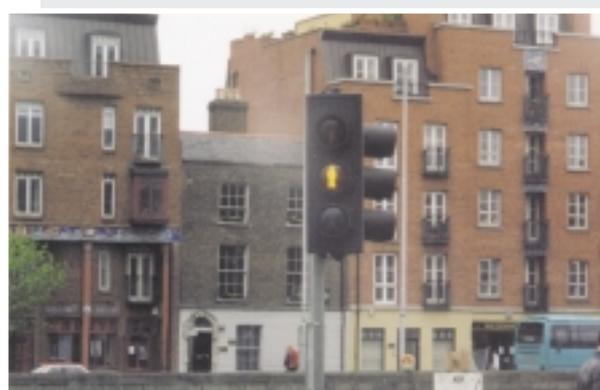
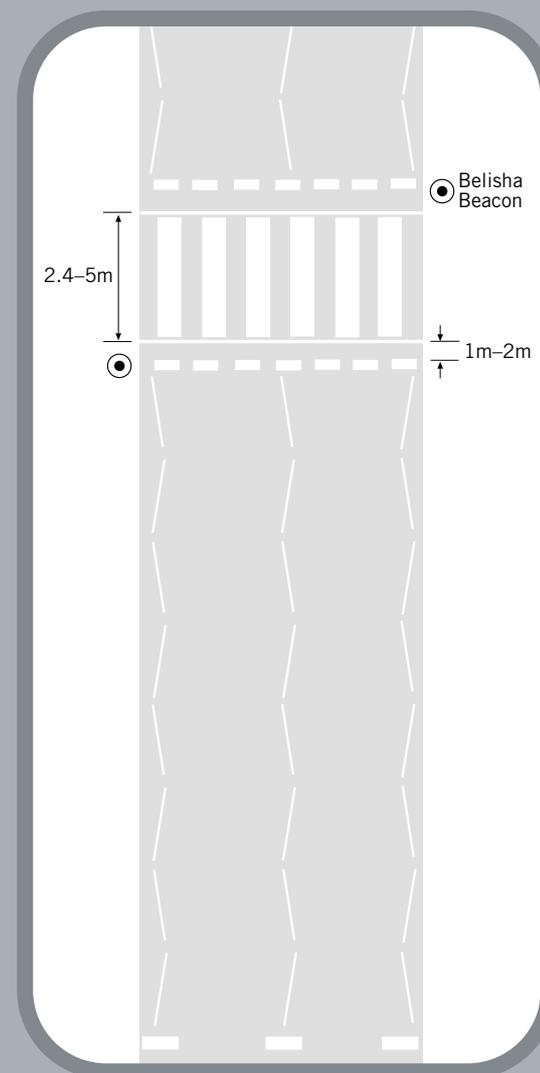
Parking is prohibited within 15m on the approach side or 5m on the side other than the approach side of a section of road where any of the following have been provided:

- Pedestrian Crossing (no zig-zag markings)
- Pedestrian Crossing Complex (has zig-zag markings)
- Traffic/Pedestrian Signals

The standard marking for a pedestrian crossing complex is 8 x 2m zig-zag marks. There may be situations where it may not be possible to install all of these marks because of site constraints. Similarly if there are problems with approach visibility or speed then the number of markings can be extended up to a maximum of 18 markings. On carriageways less than 6m wide, two zig-zag lines (one at each side of the road) with a solid line down the centre should be used. On roads wider than 6m a third zig-zag line should replace the central hazard line.

Belisha beacons must be provided at all zebra crossings They increase the conspicuity of the crossing. Belisha beacons should be located on the nearside footway of each approach adjacent to the crossing. The beacons should flash at regular intervals at a rate of between 35 and 45 flashes per minute.

Diagram 12.1 Zebra Crossing complex



Pedestrian aspects

Pelican crossings⁴ give positive signal control to both pedestrians and drivers.

They use far-side pedestrian signal heads (which should incorporate an amber pedestrian aspect in all new installations) and near-side push button units (see Diagram 12.2).

The sequence of pedestrian lights is red, green, amber then red again. The green pedestrian aspect time is usually fixed at 6 seconds and is an invitation for pedestrians to start to cross the road. The amber pedestrian aspect varies with the width of the road, allowing a second for each 1.2m of road width that pedestrians cross. The amber aspect indicates that pedestrians can complete their crossing manoeuvre but should not start to cross. All red periods of 2 seconds should be allowed at the beginning and end of the pedestrian signal sequence.

The majority of pelican crossings are situated on roads with a speed limit of 40mph or less. Speed discrimination or assessment detection may be necessary for 85 percentile approach speeds in excess of 35mph.⁹ Pelican crossings can be used on roads with high traffic volumes and where pedestrian flows are high. Pelican crossings tend to be more popular with the public and are better for less able or less confident pedestrians. The minimum width of a pelican crossing is 2.4m, although greater widths (up to 5m) should be used when there are high pedestrian flows or the footways are narrow.

Pelican crossings work more efficiently (from a vehicle point of view) by collecting groups of pedestrians together and crossing them at the same time. This does however result in delays to pedestrians and unless measures are taken to ensure that delays are minimised, pedestrians will be more likely to cross against the red man. Pedestrians should not have to wait longer than 30 to 40 seconds at a pelican crossing and opportunities should be sought to introduce the green pedestrian sequence earlier if traffic conditions allow. This can be achieved in two ways:

- A facility for a **pre-timed maximum** for vehicles can be introduced. If the maximum vehicle green time for vehicles (usually 30 to 40 seconds) has elapsed since a pedestrian demand was last made, then the green man crossing will come in straight away on demand

Diagram 12.2 Pelican Crossing

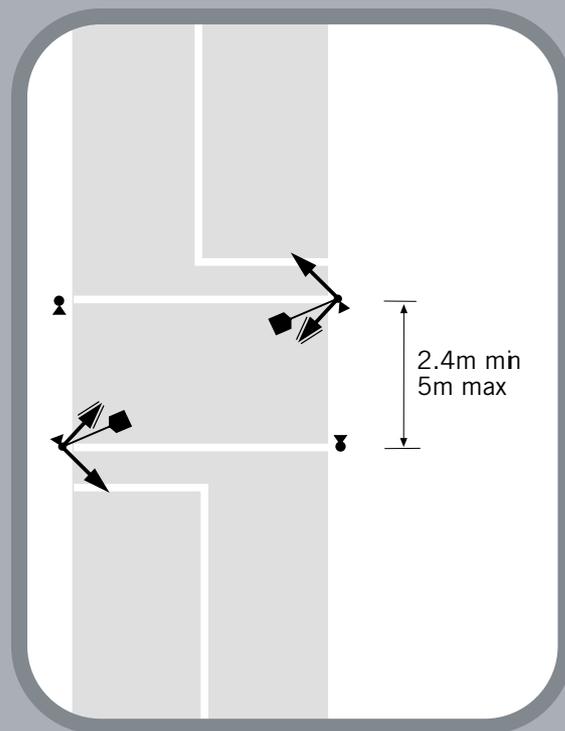
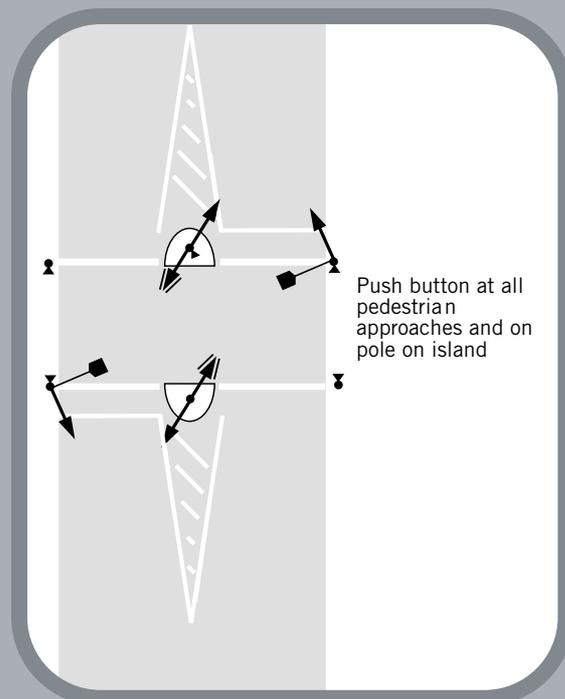


Diagram 12.3 Splitter island at Pelican



■ **Detectors** can be mounted on the traffic signal heads. These detect gaps in traffic and allow an earlier introduction of the green man crossing if there is a gap in traffic

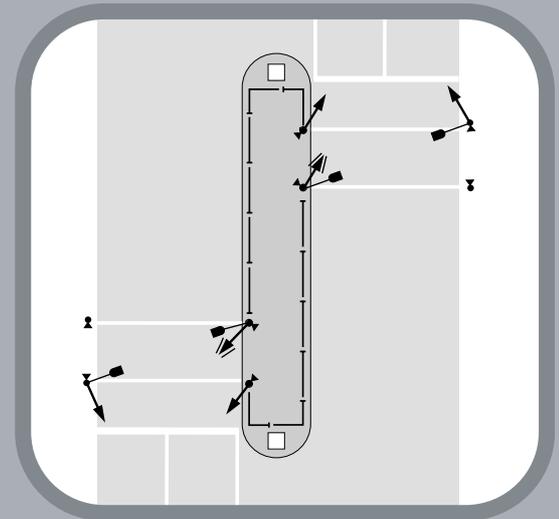
Where roads are wide enough (around 8m or more), traffic islands can be introduced to increase the conspicuity of the crossing by allowing additional primary signal heads to be installed. If traffic islands are used then an additional push button unit should be installed on the signal poles on the island, for use by any slower moving or late crossing pedestrians who did not complete their crossing movements during the first green man phase (See Diagram 12.3).

On wide distributor roads (10m or more) or dual carriageways, consideration should be given to splitting the crossing into two parts and staggering the crossing points (see Diagram 12.4). Where possible, the staggerer should be arranged so that pedestrians are walking towards traffic when they are in the central island. This allows pedestrians to see approaching vehicles more easily. The central island needs to be at least 3m wide to ensure that there is sufficient width for pedestrians to pass within the pedestrian guardrails (with the required clearance of 450mm from traffic). These staggered crossings can be more efficient for traffic and safer for pedestrians.

For higher risk sites, a high-friction surface should be considered for each approach to a pelican crossing (see Chapter 12.8).

Puffin crossings¹⁰ have recently been introduced in the UK. Puffin (Pedestrian user friendly intelligent) crossings are similar to pelican crossings but are designed to be more responsive to the needs of both pedestrians and drivers. Detectors fitted to the top of the traffic signal poles are directed at pedestrians on the crossing and can extend the pedestrian crossing time to allow slow moving or large groups of pedestrians (such as school children) sufficient time to cross the road. Pole mounted detectors can also be used to supplement pedestrian push button units. They detect the presence of a pedestrian at the kerbside but will cancel the pedestrian demand if the pedestrian moves away from the crossing point (for example, crosses through a gap in traffic). This helps to prevent unnecessary delays for drivers and the resulting frustration. Puffin crossings

Diagram 12.4 Staggered Pelican Crossing



Puffin crossing



Toucan Crossing

are gradually replacing pelican crossings in the UK. Puffin crossings use near-side pedestrian signal aspects incorporated into the push button units rather than far-side signal heads.

Toucan crossings^{11&12} (Two-can-cross) enable pedestrians and cyclists to cross together. Cyclists are not required to dismount and cross on foot unlike the other forms of controlled crossing. They should be used where cycle and pedestrian routes cross main roads. The crossing itself should be a minimum of 4m wide to give adequate room for pedestrians and cyclists. It is important to design the approaches to the crossing to minimise the conflict between cyclists and pedestrians. Separate detection for cyclists may reduce delay time to vehicles, as cyclists will negotiate a junction more quickly than pedestrians. Advice on the provision of crossing facilities for cyclists is given in the Provision of Cycle Facilities, National Manual for Urban Areas⁸. Whenever feasible, dished crossings, tactile paving and audible and tactile indicators should be provided as part of all new signal controlled crossings (See chapter 13). Consultation with organisations representing people with disabilities is advisable prior to the construction of new crossings or the alteration of existing crossings.



Traffic Island



Build-out and speed table

12.4 Uncontrolled crossings

Traffic islands (refuges) are the simplest form of crossing facility. Such facilities provide some protection for pedestrians and enable them to cross one stream of traffic at a time.

A series of traffic islands can be particularly useful where pedestrian crossing movements are not concentrated at one point but are spread along a length of road. In addition they can contribute to reducing traffic speeds and preventing overtaking. Where a traffic island is provided it is important that it is of sufficient width to accommodate pedestrians. Ideally, a 2m-wide island should be provided to accommodate bicycles, prams, pushchairs and wheelchairs. A width of 1.5m is regarded as the minimum for pedestrians, but is not wide enough to accommodate a bicycle. Traffic islands are dealt with in detail in Chapter 6.8.

Build-outs and speed tables can also improve the opportunity for pedestrians to cross the road. They can be provided at locations where parking is being sheltered or as a traffic calming feature in

its own right (see Chapter 6.12 and 6.13). Pedestrians may have a shorter distance to cross and may have the benefit of reduced vehicle speeds. Build-outs and speed tables can also be incorporated into controlled crossing facilities.

12.5 Issues for motorcyclists

Motorcyclists (including moped and scooter riders) are vulnerable road users because they have little protection if they are involved in an accident with another vehicle. They travel at higher speeds than other vulnerable road users and consequently they are more likely to be seriously injured or killed in an accident. They are involved in a far higher percentage of accidents per trip than other motor vehicles and are particularly vulnerable at junctions where drivers often fail to see them. Although road design cannot address all the problems that motorcyclists face, there are a number of issues that designers, traffic engineers and planners can influence. Some of the main problems are:

- the joints between road surfaces, use of concrete blocks or clay pavements on the carriageway and metal inspection chamber covers on the road can present slip hazards. Jointing materials and blocks should provide an adequate skidding resistance. The siting of inspection covers where riders are likely to be leaning over to turn at a junction
- surface problems such as pot holes, raised "lips" on overrun areas can cause loss of control accidents. Pot holes should be attended to promptly and any changes in surface level should be made conspicuous by use of appropriate markings
- other maintenance problems include leaves and diesel spillages on the carriageway. These should be identified and be treated promptly
- weaving traffic on links and at approaches to junctions may be unaware of the presence of motorcyclists and cyclists and could collide with them or cause them to lose control. Clear and easy to understand signs and road markings in advance of the junction can help to reduce the risk of last minute lane changing

Motorcyclists can also help themselves by ensuring that they display dipped headlights when riding in day time to make themselves more conspicuous to other road users. Road authorities should consider the needs of motorcyclists as part of their transport strategy.



Motorcyclist on roundabout

12.6 Design and safety issues

The design of controlled crossing facilities is dealt with in a number of documents. Chapter 7 of the Traffic Signs Manual⁴ gives basic advice on the provision of zebra and pelican crossings. Although some of the signal sequences, aspects and timings in the UK are different from Ireland, Local Transport Note 2/95 (UK) – The Design of Pedestrian Crossings⁹, gives useful detailed design advice on the provision of controlled and uncontrolled crossings for pedestrians and cyclists.

Desire lines and proximity of crossings to junctions

Pedestrians and cyclists want to travel as directly as possible. They do not want to walk or cycle out of their way to use crossings. Significant proportions of pedestrians and cyclists will not inconvenience themselves by travelling the extra distance to formal facilities and may be prepared to take the risk of crossing away from the formal crossing point if they are not guided to them.

Whilst it is impossible to provide crossings to accommodate the needs of every pedestrian and cyclist it is important that crossings are sited where the maximum number of people are likely to use them. Surveys of crossing movements over a 12-hour period (7am–7pm) are carried out to establish the numbers of people crossing. These are normally recorded in 15-minute intervals for each 50m section of road, so that the busiest lengths of road and the main "desire lines" for pedestrians and cyclists can be identified. This survey should be supplemented by the observations of an experienced engineer at the site to determine the best location for the crossing.

People generally want to cross roads at or near junctions. If the junction is signal controlled then a pedestrian/cycle phase can be introduced to accommodate this desire line. However, at a priority junction (controlled by a yield or stop sign) a zebra or pelican crossing may be required. In this case there is a balance to be struck between convenience for pedestrians and safety. In general, pelican crossings should not be closer than 20m to junctions (particular care is needed at roundabout approaches where drivers may mistakenly think the junction is signal controlled and not yield at the roundabout) while zebra crossings should not be closer than 5m.



Guard Rail blocks visibility



High visibility guardrail

Visibility

Drivers approaching crossings need adequate visibility of the crossing so that they can stop if required. The required visibility distances for drivers to be able to see the near-side primary signal of the crossing or a pedestrian stepping onto a crossing are outlined in Chapter 10, Table 10.2. Pedestrians should be able to see approaching drivers and be seen by them. Visibility should not be obscured or restricted by trees, parked vehicles, signs lamp columns etc. If this is difficult to achieve consideration should be given to the following:

- building out the footway and moving the primary signal pole to improve visibility
- providing high mounted signal heads
- providing signs warning of the crossing and "SLOW" markings
- relocation of the crossing to a point where visibility is adequate
- preventing parking on the approaches

A reasonable balance between visibility and placing the crossing in the desire line will often need to be struck.

Guardrail (Primary Distributor roads only)

Guardrail is provided to guide people to cross at the correct position and discourage people from crossing on the approaches where they are at greater risk of being injured. The type of guardrail specified should provide good visibility of (and for) pedestrians and cyclists. Some traditional forms of guardrail can block a driver's visibility of small children, because the acute angle of approach causes the vertical bars to line up and block visibility. High visibility guardrail should be specified to avoid this problem. This type of guardrail has a bar pattern, which allows drivers and pedestrians good visibility. A minimum clearance of 450mm between the guardrail and the kerb edge should be maintained as the guardrail could interfere with cyclists on the road.

High-friction surface

Many of the accidents that occur on crossings involve vehicles failing to stop and running into the rear of a vehicle in front of people on the crossing. The risk of such accidents increases significantly if the road surface is wet. Consideration should be given to the provision of high-friction surfaces on the approaches



High-friction surface (UK)



Uncontrolled crossing point

to a crossing. Where provided, in a 30mph speed limit a length of 50m should be provided on each approach and should be applied through the stop line to the nearer limit of the crossing walkway. On higher speed limit roads a greater length should be applied.

Facilities for the mobility/sensory impaired

People with a mobility/sensory impairment require the provision of specific facilities to assist them in crossing the road. This is dealt with in more detail in Chapter 13.

Dished crossings

Dished crossings should be provided at all crossing points whether controlled or not. They will assist cyclists, people in wheelchairs and people with prams and pushchairs. A ramp slope of 1 in 20 is desirable, where possible but it should not be steeper than 1 in 12. The kerb face at the crossing should be flush with the carriageway or a maximum of 6mm high, so as not to form a barrier to wheelchair users or a trip hazard for less able pedestrians. Whilst this may cause some concerns over the ponding of water, it should be possible to alleviate such problems by careful design and construction. The crossing points and approaches should be kept clear of gullies, chambers and inspection covers. Appropriate tactile paving should be provided at all crossing points (see Chapter 13).

Lighting of crossings

It is important that all crossings are well lit. The lighting should highlight pedestrians and cyclists both approaching the crossing and on the crossing. The best way to achieve this is to provide specific lighting for this purpose at both sides of the crossing to ensure that people can be seen.



Lighting of crossing points

12.7 References

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12. TA 4/98 Toucan Crossing Development – DETR (UK), Available from DETR Tel +44 20 7271 5169