6 PEDESTRIAN NETWORK COMPONENTS

CHOOSING THE BEST OPTIONS
Reduce and calm traffic
Better paths, ramps, steps, driveways, kerb crossings
Select the best crossing facility
Select the best crossing provision for schools
Select the best combination of components

6.1 Introduction

A variety of components and techniques can be used to improve our networks for pedestrians.

6.2 Traffic-reduction engineering techniques

Description

Road engineering techniques that reduce the amount of traffic include:

- changing the priority at intersections by using Stop and Give Way signs
- using a 'diverter' to prevent some through and/or turning movements at intersections
- partially closing the street by using a kerb extension to block one direction of motor vehicle travel into or out of an intersection
- closing the street to all vehicles by installing a physical barrier.

Advantages

Road engineering traffic reduction techniques can:

- improve the general neighbourhood and walking amenity
- make it easier for pedestrians to cross roads
- create the opportunity to reallocate road space to favour pedestrians
- reduce the likelihood of pedestrian injury
- be low cost compared with other road improvements
- be applied to existing roads.

[46, 118, 139]

Disadvantages

They may:

- require additional maintenance
- create problems for bus operators, emergency services and refuse collection
- require detailed consultation with all those affected
- require that vehicles and associated problems move to adjacent routes. [46, 118, 139]

Photo 6.1 – Traffic reduction by heavy vehicle ban and road narrowing, Christchurch (Photo: Susan Cambridge)


Photo 6.2 – Traffic reduction by one-way entry, Christchurch (Photo: Megan Fowler)

Recommendations

Engineering treatments that reduce traffic can be important in terms of the road user hierarchy by creating particular benefits for pedestrians. They work best in combination with traffic calming. To prevent vehicles and existing problems moving to adjacent routes, an area-wide approach that may incorporate a number of low-cost measures is required. As these changes may affect a number of parties, detailed consultation is required.

6.3 Traffic calming

Description

'Traffic calming' covers a range of self-enforcing measures that reduce vehicle speeds [118]. Although it is commonly associated with local roads, some measures can be used on roads higher in the road hierarchy that pose greater difficulties and dangers for pedestrians [33, 37]. The method is essentially a matter of limiting the length of unconstrained street sections so that speeds do not exceed target values.

Traffic calming generally involves measures that slow traffic by making higher speeds feel uncomfortable to drivers. This means physically diverting a moving vehicle either horizontally or vertically, sometimes accompanied by measures that have a psychological effect on drivers and encourage them to reduce their speed voluntarily [12, 146].

All traffic-calming schemes should be designed for local conditions, mixing various devices [46].
However, they generally consist of:

- the traffic-calming elements
- a warning on all approaches that drivers are entering a traffic-calmed area, which may include a lower speed limit
- information for drivers exiting the area that they are leaving the traffic-calmed area.

Possible design elements include:

- limiting total street length
- horizontal curvature that induces continuous slow speeds
- limiting the lengths of straights (by introducing low-speed bends)
- roundabouts
- pedestrian platforms
- mid-block kerb extensions
- intersection kerb extensions
- speed humps
- chicanes
- paving treatments
- gateway/entry treatments.

New developments can use integrated design elements that minimise the need for discrete devices.

Advantages

Traffic calming can:

- increase journey times which will deter drivers from using traffic-calmed streets unless they have business in the area
- decrease vehicle speeds which will result in an improved environment, especially in regard to neighbourhood severance
- give drivers more time to react to unexpected incidents and avoid them
- ensure that any collision between a pedestrian and a vehicle is less severe
- be low cost
- be applied to existing roads.

Disadvantages

Heavy vehicles are slowed more than cars, and may find some manoeuvres more difficult. This may create problems for bus operators, emergency services and refuse collection.

Noise levels and vehicle emissions may increase if traffic speeds up between devices. This is likely when devices are placed too far apart.

Some additional maintenance may be required.

Recommendations

Traffic calming is most appropriate in residential and retail areas.

Consider the effects area-wide and consult with all affected parties.

In new areas use a speed-based design of elements to continuously limit opportunities to speed up.

In existing areas ensure discrete speed-restricting elements are closely placed to ensure traffic does not continually speed up and slow down between them.

For comprehensive guidance on traffic calming for residential areas refer to *Guide to traffic engineering practice, part 10: Local area traffic management* [12].

For comprehensive guidance on traffic calming for main streets refer to *Sharing the main street* [170] and *Cities for tomorrow: better practice guide,* part C-5 [169].

Photo 6.3 – Traffic calming by road narrowing, Christchurch (Photo: Megan Fowler)

Photo 6.4 – Traffic-calmed retail street, central Nelson (Photo: Tim Hughes)

6.4 Network components outside the roadway

6.4.1 Footpaths

Description

A footpath is the part of road or other public place that is laid out or built for pedestrian use [168]. Footpaths may run alongside the road or through parks and other open spaces, and include overbridges and subways [110]. Chapter 14 discusses footpath design and provision in more detail.

Advantages

Well designed footpaths encourage walking and reduce the risk of crashes.

Well designed footpaths can play an important role in social interaction between pedestrians and those living, working or shopping along the route.

Footpaths in the road corridor create space for road user signs and can carry utility cables and pipes.

Footpaths in the road corridor also provide space for those waiting for other modes of travel or wishing to cross the roadway. [46, 63, 66]

Photo 6.5 – Footpath, Auckland (Photo: David Croft)

Disadvantages

In shared zone situations, providing footpaths in the road corridor can increase vehicle speeds. [46, 63, 66]

Recommendations

Footpaths should provide for all types of pedestrians. By designing for the needs of pedestrians with impaired mobility, a high standard will be provided for all.

Provide footpaths wherever pedestrians might be expected. See section 14.1

In urban areas, always provide footpaths. See section 14.1

In rural areas footpaths are preferred, but where pedestrians can reasonably be expected there should always be, as a minimum, an area reserved for walking that is outside the main traffic lanes, such as a paved shoulder [10]. This is the lowest standard of pedestrian facility and may not be accessible to young or mobility impaired pedestrians.

6.4.2 Ramps and steps

Description

Significant gradient changes over relatively short distances present difficulties for all pedestrians, because more energy is required when ascending, and control is more difficult when descending. In most circumstances, ramps and steps are the only practicable way to deal with elevation changes [10, 24].

Advantages

Ramps can overcome major barriers for the mobility impaired (including those encumbered by luggage, shopping or pushchairs) [10, 24].

Disadvantages

Steps are not easily accessible by the mobility impaired or those on small wheels.

Ramps can add additional distance to a route when compared with steps [10, 24].

Photo 6.6 – Steps and zig-zag ramp, Hamilton (Photo: Shane Turner)

Recommendations

Install ramps where possible as they provide greater accessibility and are favoured by all types of pedestrians [10].

Install steps where it is not technically feasible to provide a ramp, or where the additional distance a ramp imposes is so excessive it is unlikely to be used.

Provide both steps and a ramp where these will best suit different users [42].

On rare occasions, use mechanical methods to elevate pedestrians [42]. For example, escalators and elevators are used on a number of New Zealand footpaths, including in Wellington’s botanical gardens, between New Plymouth’s museum and foreshore, and at Durie Hill in Wanganui. However, they must be well sited and designed to avoid being subjected to considerable abuse and quickly becoming very expensive to maintain.

See section 14.10 for more advice on designing ramps and steps.

6.4.3 Driveways

Description

A driveway is a passageway for motor vehicles that enables them to access private property adjacent to the road [84].

Where they cross footpaths, driveways behave in many respects like intersections, as vehicles can cross pedestrian routes and effectively sever the walking network [66]. Unlike at intersections, however, drivers are required to give way to pedestrians.

Advantages

If traffic volumes using the driveway are very low, pedestrians can use the driveway to access the adjacent property [13, 15, 66].

Disadvantages

Vehicles crossing footpaths conflict with pedestrians using the footpath and are hazardous where visibility is restricted or vehicles are reversing.

Driveways are a common cause of adverse cross gradients on the footpath.

Young children (under four years old) are particularly at risk of serious injury and even death on driveways, especially at their own home. In many cases, the driver of the vehicle involved is a parent or relative who is reversing [13, 15, 66].

Recommendations

Busy driveways should preferably be located to avoid crossing main pedestrian routes.

Driveways should be narrow to minimise the area of conflict with pedestrians.

Driveways should be designed to reflect the law that drivers are required to give way to all other users when entering or leaving the roadway. The footpath should clearly continue across the driveway at-grade.

The driveway should only resemble a roadway where it is so busy it needs to operate as an intersection.

The internal layout of developments should encourage forward entry and exit, and minimise reversing.

Residential driveways where vehicles reverse, should be separated from play areas by internal fencing or similar.

See section 14.11 for design details.

Photo 6.7 – Footpath continues to a high standard across driveway, Tauranga (Photo: Mike Calvert)

6.4.4 Shared-use paths

Description

In a few respects, the characteristics of pedestrians (see section 3) are similar to those of cyclists – so sometimes path-sharing is an appropriate solution for both groups. This can be achieved commonly by creating a widened, purpose-built footpath to accommodate both. This path can be either [11]:

- unsegregated: both pedestrians and cyclists share the same space, or
- segregated: the path is divided into two with one side of the path for pedestrians and the other for cyclists.

Advantages

The advantages of shared-use paths accrue mostly to cyclists unless inclusion of cycling enables a new facility that could not be funded solely for walking.

Shared-use paths:

- provide a motor traffic-free facility
- are generally safer for cyclists between junctions with roads and driveways
- are particularly suitable for novice cyclists and children, and recreational routes
- can provide convenient and attractive links away from roadways.

Disadvantages

The different speeds of pedestrians and cyclists lead to inevitable conflicts.

Some pedestrians, for example older pedestrians, feel insecure walking among faster cyclists.

More space is required than for a footpath due to the need for cyclists to pass pedestrians travelling in the same direction.

The behaviour of children and pets being overtaken by cyclists is unpredictable.

As the volumes of all users increase, conflicts between their needs can significantly affect the quality of provision for both pedestrians and cyclists.

Most cyclists will not divert from a roadway that provides a faster route, so paths rarely completely replace the need for on-road provision.

While segregation by markings or surface treatments reduces these conflicts, users are poor at keeping to their part of the path.

Segregated shared paths require considerably more space.

Recommendations

Shared paths may be considered where the combined flow of pedestrian and cyclists is light. Until further research has been undertaken, British guidance suggests an upper limit of 200 total users per hour. Where the demand for walking or cycling is higher than this, greater width and degree of segregation should be considered.

As shared paths are generally proposed with cyclists in mind, refer to the *Cycle network and route planning guide* [73]. Comprehensive guidance on all the issues for shared paths is found in the toolbox developed for the Australian Bicycle Council: *Pedestrian-cyclist conflict minimisation on shared paths and footpaths* [69].

Section 14.12 has advice on designing shared use and segregated paths.

Photo 6.8 – Unsegregated share path behind beach, Perth (Photo: Tim Hughes)

Photo 6.9 – Segregated path, Auckland (but substandard width)

6.4.5 Kerb crossings

Description

Kerb crossings provide a smooth transition between the footpath and roadway that can be conveniently used by mobility impaired pedestrians. Kerb ramps, also known as 'kerb cut-downs', 'pram crossings' and 'drop kerbs', are a type of kerb crossing where part of the footpath is lowered to the same level as the adjacent roadway. This enables pedestrians to access the roadway without an abrupt change in path level.

Advantages

Kerb crossings are:

- essential for mobility impaired pedestrians, and those with prams
- a natural focus for crossings.

Disadvantages

They can:

- cause difficulties for the mobility impaired if not properly designed
- make it so difficult for blind and vision impaired users to detect when they are leaving the footpath to enter the roadway, that tactile warning indicators are required
- create ponding if drainage is not addressed.

Photo 6.10 – Kerb ramp, Christchurch (Photo: Megan Fowler) (note: missing tactile paving)

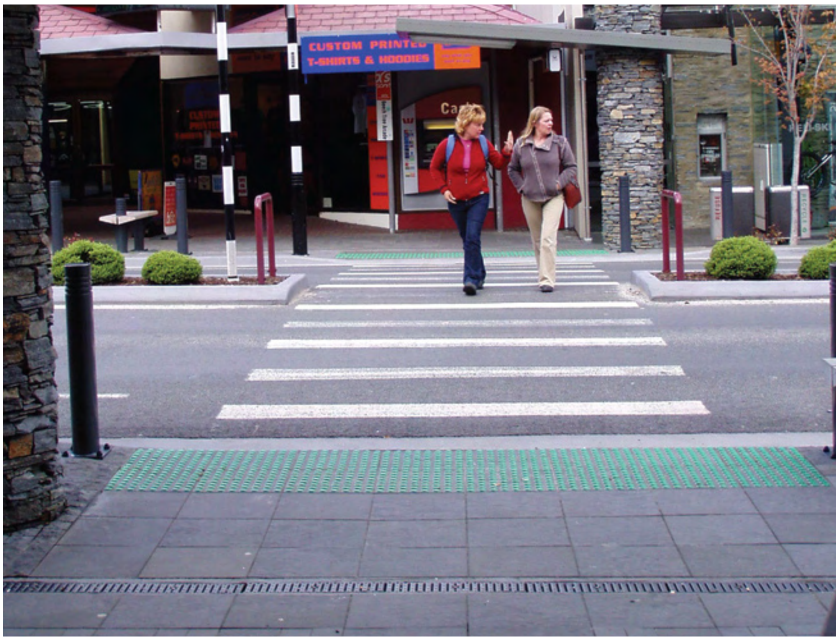

Photo 6.11 – Same level kerb crossing, Queenstown (Photo: Tim Hughes)

Recommendations

Kerb crossings should be installed wherever a footpath crosses an intersection and at every pedestrian crossing point. Kerb ramps should be installed at every kerb crossing where the grade changes as pedestrians step onto the roadway [46]. They should guide pedestrians to the safest place to cross.

When retrofitting, priority should be given to areas with the highest pedestrian use, particularly the CBD and near bus stops, schools, parks, shopping areas and medical facilities [13]. The NZ Local Government Act requires them to be installed at every new development or footpath improvement, to a standard suitable for wheelchair use [134].

Tactile paving should be used at kerb crossings so that visually impaired pedestrians are aware of the change from footpath to roadway.

Section 15.6 has design advice on kerb crossings and ramps.

6.4.6 Public transport interface

Recommendations

For effective implementation, the following broad principles for pedestrian access to public transport need to be established [151].

- The location of public transport stops/stations and of pedestrian networks should be developed in relation to each other at both network wide and local levels. Preferably this should be through the medium of a local transport plan.
- The location of the stops/stations should be carefully chosen, preferably at a safe focal point in the area. This requires assessment at a local level with the aim to make the walking element as short, safe and convenient as possible. There may be particular value in locating stops by main pedestrian routes, where these exist. Where they are not obvious, this may point to the need for reviewing pedestrian provision.
- The location and form of pedestrian crossing points should be matched to maximise the convenience of catching a bus (tram, etc). They should be sited in relation to stops and station entrances and designed to ensure that vehicle/pedestrian conflict in such areas is minimised. The passenger should always cross behind the vehicle and, therefore, stops should in principle be located just beyond crossing points. If crossings are not well sited in relation to stops, or pedestrian level of service is poor, there is an incentive, especially to pedestrians in a hurry or impatient, to take risks.
- For local public transport especially, it is important to have adequate comfortable waiting space and facilities, as waiting is linked in the passenger's perception to the walk access. This is particularly so for the local bus stop. Where shelters are provided they should be lit wherever possible. In all cases stops should be lit or sited to take advantage of local street lights.
- New residential estates, shopping and business centres should be designed for the most convenient pedestrian movement and also for effective service by public transport. This approach should also apply to the redevelopment of older areas.
- In town centres and other commercial locations, buses and trams should be able to set down and pick up passengers as close as possible to main destinations.

Description

Walking is involved in all public transport journeys, therefore, providing good pedestrian access is an essential requirement for public transport to become a realistic alternative to car travel [151]. This involves providing good quality pedestrian links to, and good pedestrian facilities at stops, stations and interchanges. Although catering for pedestrians within large stations and interchanges can be considered outside the scope of this guide, smaller stops such as bus shelters are often incorporated into the pedestrian network.

Advantages

By providing attractive and convenient links with public transport, a journey comprising walking and public transport becomes more attractive.

Disadvantages

An interface with a good quality and popular public transport service situated within a sub-standard pedestrian environment may lead to safety issues for pedestrian access, and under-utilisation of the service. To prevent this, particular attention must be paid to the pedestrian network at and around public transport stops.

Photo 6.12 – Bus stop with shelter, Perth, Western Australia (Photo: Tim Hughes)

6.5 Selecting the appropriate crossing facility

In the past, decisions on pedestrian facilities used formal warrants to select a control type based solely on information about traffic and pedestrian flow. Practitioners using these warrants recognised that a more comprehensive and context sensitive approach was required. This would consider a wider range of options and help them choose the best one for the circumstances based on a better understanding of the likely effects on safety and delay to all users.

Research was commissioned to search the literature and develop a better approach. The results [148] were reported in an appendix to the consultation draft of this guide and practitioners were encouraged to trial it. The recommended approach included some complex decision trees and calculations, so Land Transport NZ produced the *Pedestrian crossing facilities calculation spreadsheet* [149] to calculate and compare the level of service and safety improvements likely to be achieved for the options appropriate to the situation. The guidance below on selecting appropriate road crossing facilities follows this approach. Use of the spreadsheet is recommended for all but the most straightforward situations.

There are four main reasons for choosing to improve facilities for pedestrians to cross roads:

1. Level of service: the crossing opportunities available to pedestrians are below the desired level of service.
2. Safety: crash records show that specific pedestrian crashes may be reduced by providing crossing assistance, or that perceptions of poor safety are discouraging walking.
3. Specific access provisions: a particular group (eg young children, vision and mobility impaired people) needs the improvements.
4. Integration: it is part of integrating and reinforcing a wider traffic management plan for the area.

When considering how to best provide for pedestrians, consider the following questions (in this order):

- What is the road environment and the land use context, and who uses it?
- What are the appropriate physical aids to crossing?
- Is the control of the crossing point appropriate?
- How do we design the facility to fit into the environment?

This approach should be followed in all cases when providing crossing assistance for children. Section 6.6 should also be referred to.

6.5.1 Environment and land use context

When considering crossing facilities, refer to the hierarchy for considering solutions in section 5.4 and consider whether it may be appropriate to reduce traffic volumes, calm traffic speeds, or reduce the number of traffic lanes as outlined in Table 6.1.

The issues in Table 6.1 are all relevant when considering the road environment, land use context and the type of user.

Table 6.1 – Environment and land use context considerations

Feature	What to consider
Traffic volume and composition	Traffic volume affects the delays experienced by pedestrians, but with facilities that give priority to pedestrians, there are delays to other road users. Should the volume be reduced? The composition of traffic affects how many heavy vehicles and cyclists use the road. This affects the desirable width of the road at the crossing facility.
Speed of traffic	Speed is critical to pedestrian safety. Higher speeds increase injury severity and make it more difficult for pedestrians to judge safe gaps. Should traffic calming and speed management be used along the route/area?
Road layout	How many traffic lanes are there in each direction? Can road space be reallocated to reduce the number of lanes? Is there room to provide certain types of crossing facility? What other provision is there for pedestrians in the vicinity?
Land use	What is the surrounding land use and how might it affect the types, times and volumes of user? What would users expect in this area? What effect would loss of parking have? How would access to driveways be affected by possible measures?
Pedestrians	Who wants to cross, how many? What are the users' ages and walking purposes? Are some of them school children, elderly, or visually or mobility impaired? Is there suppressed demand for crossing facilities?
Where to cross	Where do pedestrians cross now and where do they want to go or come from? Do they cross in one place or are they spread out along a link, at an intersection? Are they in a hurry?
Road user hierarchy	How does this location fit with the road-user hierarchy? What type of user should be considered the most important?

6.5.2 Types of crossing facility

Often a single facility will address multiple reasons for providing crossing assistance. Facilities (or combinations of facility) are also often implemented at low cost. Crossing facilities generally fall into three categories [10, 126] (see Table 6.2), although it is possible to combine two or more facilities at the same location [58].

Table 6.2 – General types of pedestrian crossing aid

Category of treatment	Objective	Possible treatment
Physical aids	To simplify decisions for drivers and pedestrians by shortening the crossing distance or dividing the crossing movement into two easier crossings.	Kerb extensions Pedestrian islands Splitter islands Medians
Priority/time separated	To give pedestrians priority, or to allot pedestrian-only periods for use of an on-road section, alternating with periods for vehicles.	Zebra crossings School patrols/kea crossings Mid-block signalised crossings Signalised intersections
Spatially separated	To eliminate conflict by putting pedestrians and vehicles in physically different areas.	Underpasses Overpasses

Physical aids

For most urban roads, improvements in safety and level of service for crossing pedestrians can most easily be achieved by physical aids. These reduce the crossing distance and the amount of traffic the pedestrian has to negotiate at each stage. The crossing distance can be reduced through kerb extensions, medians and pedestrian islands. The amount of traffic the pedestrian has to negotiate at each stage can be halved by separating the crossing into two separate crossing manoeuvres (medians and pedestrian islands).

Figures 6.1 and 6.2 are from the *Pedestrian crossing facilities calculation spreadsheet*. They illustrate improvements in the level of service for pedestrians at various traffic volumes, by providing physical aids on a typical two-way, two-lane road with a 50 km/h speed limit. The crossing distance without physical aids assumes a 14 m kerb-to-kerb crossing distance; kerb extensions assume a 9m crossing distance; a median island (for example, pedestrian islands) assumes two 6m crossings; and kerb extensions and a median island assume two 4.5 m crossings.

Mean queuing delay to pedestrians
Note: Chart varies according to inputs entered for flow type, number of lanes, lane widths, pedestrian profile and walk speeds.

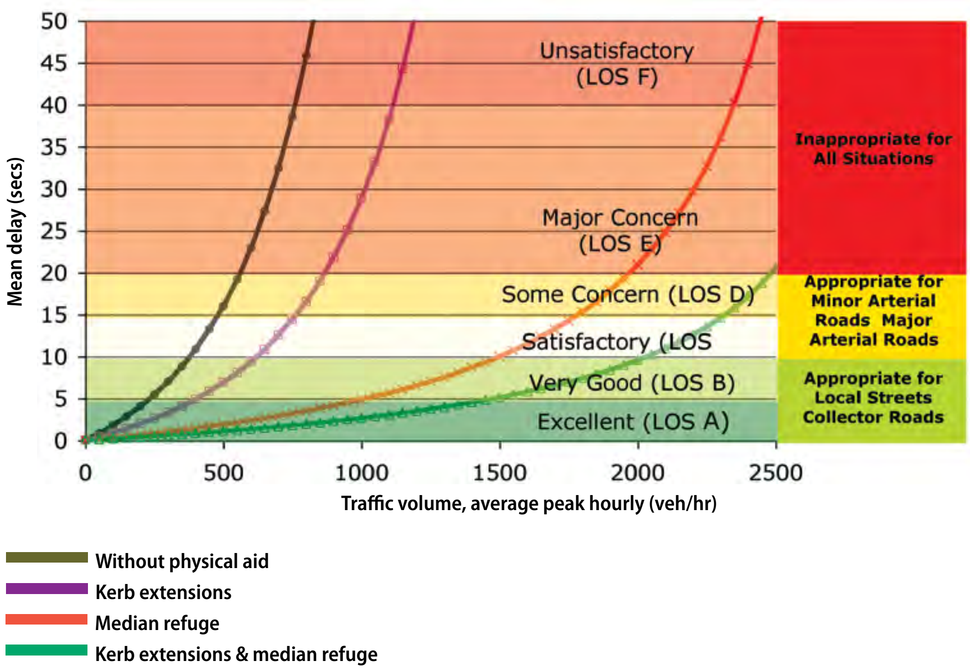

Figure 6.1 – Mean delay for various facilities on a two-lane, two-way urban road (uninterrupted flow)

Mean queuing delay to pedestrians

Note: Chart varies according to inputs entered for flow type, number of lanes, lane widths, pedestrian profile and walk speeds.

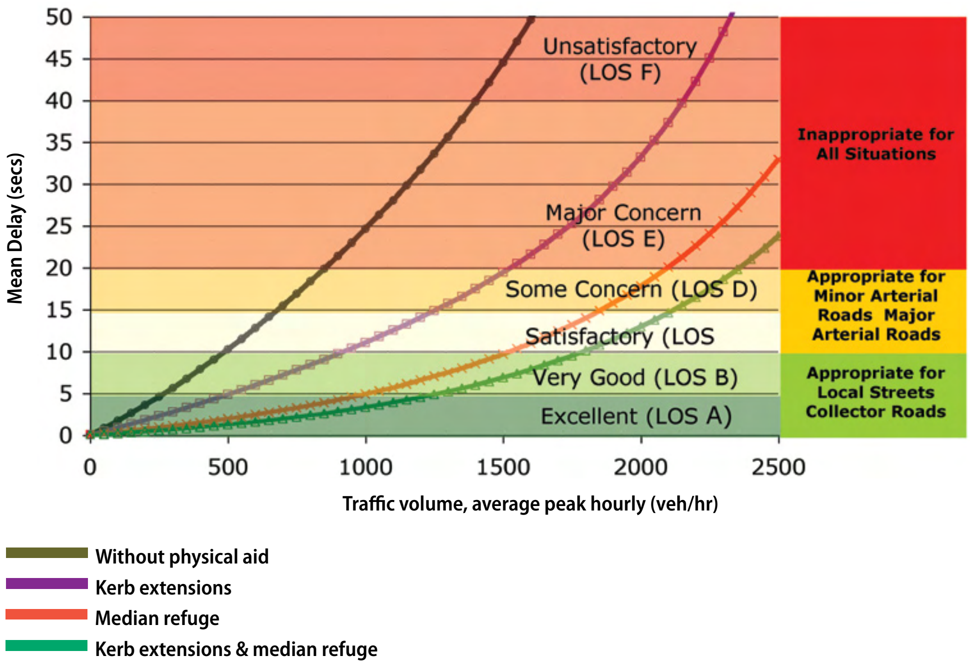

Figure 6.2 – Mean delay for various facilities on a two-lane, two-way urban road (interrupted flow)

Physical aids also improve safety as shown in Table 6.3.

Kerb extensions have superior safety performance so are likely to be preferred on roads carrying up to about 500 vehicles per hour during peak two-way flow.

On busier roads, kerb extensions and a raised median or pedestrian island can provide excellent safety benefits and a satisfactory level of service at flows above 1500 vehicles per hour.

Some of the measures shown in Table 6.3 may not normally provided specifically to address pedestrian safety. They do however provide particular benefits to pedestrians which may exceed the benefits to other road users. An example is cycle lanes. International studies show they provide a modest 10% safety improvement for cyclists, but 30% for pedestrians. This appears to be due to the buffer space provided outside parked cars.

Table 6.3 Physical aids and their typical crash reductions

Measure	Pedestrian crash reduction
Kerb extensions only [79]	36%
Raised median or pedestrian refuge islands [79]	18%
Kerb extensions with raised median islands [79]	32%
Adding kerb extension to existing zebra crossing [145]	44%
Cycle lanes [53]	30%
Roundabouts [79]	48%
Flush medians [79]	30%

Time separated/priority control

Pedestrian priority and signal control should only be considered after providing the best combination of physical aids for the site. Adding the control will provide benefits to pedestrians, but will typically result in a greater total delay to motor vehicle occupants than the total time saved by pedestrians. The road user hierarchy will be most relevant in balancing the needs of the various users. Table 6.4 shows crash reductions for the various time-separated and priority control treatments and enforces the needs for using these treatments in conjunction with physical aids.

Careful thought should be given to using pedestrian zebra crossings, as they do not on their own improve safety, and typically cause greater delays for motor traffic than the delays they reduce for pedestrians. They are not a safe option on roads that cross more than one lane of traffic travelling in the same direction.

Table 6.4 – Time separated and priority control measures and their typical crash reductions

Measure	Pedestrian crash reduction
Zebra crossing on a pedestrian platform [145]	80%
Mid-block traffic signals [145]	45%
Zebra crossings with no physical aids [53]	-28%
School patrol crossing [53]	35%
Intersection traffic signals – parallel pedestrian phase [53]	-8%
Intersection traffic signals – exclusive pedestrian phase [53]	29%

Signals are the only full time at-grade control option for multi-lane roads. They are also appropriate for busy two-lane roads where continuous pedestrian streams create excessive vehicle delays. Where there is a need for special provision for the vision impaired and where a signalised mid-block crossing would get insufficient use, consider signalising a nearby intersection.

Section 6.6 covers crossing assistance for school children.

Spatially separated facilities

Although spatially separated facilities can eliminate conflict with vehicles for pedestrians who use the facility, and minimise crossing delay, they can increase pedestrians' travel time due to the requirement to change level or other detours. This can be overcome depending on the pedestrian's position in the road user hierarchy and could involve keeping pedestrians at-grade, and raising or lowering the road. Section 6.7.7 further describes benefits and potential problems with overpasses and underpasses.

6.6 Crossing assistance for school children

Walking is the most often-used mode of transport to education facilities [76]. However, with their limited abilities and lack of experience, children are among the most vulnerable of pedestrians [91]. Their abilities will also vary according to their age, with children less than eight years old being the most vulnerable.

Crossing assistance for school children may be considered as part of school travel plans and safe routes to school. Near each school the concentration of children walking increases to the extent that formal crossing points are typically provided near school gates. Crossing facilities near schools experience short periods of high pedestrian flows, but may have little use outside these times. Crossing facilities that give full-time priority to pedestrians instead of vehicles may not be the best solution [58]. Even where crossing facilities that give priority to pedestrians are the best solution, they generally require additional devices and help [10, 90].

When considering providing crossing assistance for school children the general process in section 6.5 should be followed. However, crossings mainly used by school children have three major differences from other pedestrian crossings:

Photo 6.13 – Walking to school, Christchurch

1 Flows will be tidal at any one time, towards the school in the morning and away from the school in the afternoon.
2 The average height of those crossing (children) will be lower than that of other users, affecting sight lines and visibility [10].
3 As children will cross in groups, the consequences of a vehicle intruding into the crossing will be more severe.

Although schools often ask for formal crossing facilities [86], they should only be provided where analysis demonstrates they are appropriate, not solely on the basis of the risks perceived by parents and teachers [139]. This ensures that schools with similar issues are treated consistently, and promotes a uniform environment for both pedestrians and drivers [139]. Crossing facilities should be assessed whenever safe routes to school schemes or school travel plans are developed [46].

6.6.1 Types of crossing assistance for school children

Four types of additional crossing assistance can be offered for places where school children are particularly concentrated, and can be supplemented where appropriate by school speed zones. Table 6.5 describes this hierarchy of solutions.

Engineering devices

Engineering devices such as traffic calming and physical crossing aids should be considered first as they provide benefits for all pedestrians. The structured process in section 5.4 should be followed to improve the walking environment. This may lead to considering traffic calming or traffic reduction techniques. Physical crossing aids are discussed in more detail in section 6.5.

Table 6.5 – Types of crossing assistance for school children

Assistance	Descriptions
Engineering devices (not affecting priority)	These are devices that do not change who gives way at crossing points but offer crossing benefits. They include pedestrian islands, raised medians, kerb extensions, pedestrian platforms and traffic calming.
School traffic warden crossing	This involves adults or older children who guide school children on when to cross at: • mid-block crossing points, such as pedestrian islands and mid-block pedestrian signals • crossing points at intersections, including those with give way or stop controls, traffic signals and roundabouts • zebra crossings.
School patrolled zebra crossing or kea crossing	'School Patrol – Stop' signs stop vehicles and allow pedestrians to cross only when it is safe. School patrols operate on zebra crossings and on kea crossings (school crossing points without zebra markings).
Signalised intersections/signalised mid-block crossings	Traffic signals stop vehicles and permit pedestrians to cross when conflicting straight through traffic is stopped. At intersections they either stop any turning traffic or require it to give way to pedestrians.

For all types of school crossings, kerb extensions are generally preferred over central islands because of their safety benefits and because one crossing is easier for wardens and patrols to control than two. Central islands would, however, provide a better level of service for pedestrians at times when the crossing is not patrolled.

Pedestrian platforms should also be considered for school crossings in appropriate environments such as those where approach speeds are no greater than 50 km/h.

School traffic wardens

School traffic wardens are usually older children or adults, typically two per crossing site, who wear the same uniform as school patrols [151]. They have no power to control vehicular traffic other than by calling a pedestrian phase at traffic signals [58]. Wardens decide when it is safe for the assembled children to cross, and tell them to 'cross now', or to 'wait' [58]. Their use should be considered after engineering devices. Traffic wardens are mostly used at places with no traffic control and at traffic signals, but may also be used at zebra crossings where a school patrol is not operating, to guide children when it is safe to cross.

Photo 6.14 – Traffic island installed for safe routes to school, Christchurch (Photo: Tim Hughes)

Traffic wardens are the most appropriate solution at traffic signals, and for straightforward situations where light traffic flows provide ample crossing opportunities, with no need to stop traffic.

Figures 6.1 and 6.2 indicate that when there are kerb extensions that narrow a crossing point to nine metres, wardens can easily find suitable gaps where traffic flows at the rate of 500 vehicles per hour. Because traffic is not expected to stop, wardens provide the safest option for lightly trafficked roads.

School patrolled zebra crossings and kea crossings

School patrols are normally operated by two or three appointed children under adult supervision [79]. On rare occasions adults operate them alone. These patrols must be trained by the New Zealand Police. The appointed patrol members hold or swing out 'School patrol – Stop' signs (RG-28) when they see a safe gap in the traffic. Drivers are obliged to stop. When it is safe to cross, one patrol member calls 'cross now', and releases the children to cross. Thus school patrols, as opposed to school traffic wardens, have the power to control traffic.

When school patrols operate on zebra crossings they are called school patrolled zebra crossings. They can also operate at school crossing points without zebra markings, usually referred to as kea crossings. It is important that both of these incorporate engineering devices to improve their safety. The roadway should be narrowed by kerb extensions. Kea crossings have stricter legal requirements on their layout. Both require permanent signs and markings. Kea crossings also have temporary signs that are only present when the crossing is operational. They are removed when the patrol finishes operation and the site reverts to normal roadway where pedestrians give way to traffic [58, 90]. Kea crossings can be used for crossing two lanes of traffic in one direction, such as on a divided road or one way street – provided a separate 'School patrol – Stop' swing sign can be provided for each lane.

Photo 6.15 – Kea crossing patrol, Christchurch (Photo: Megan Fowler)

School patrols should be considered whenever traffic flows would make it difficult for school traffic wardens to find safe gaps in the traffic. Figures 6.1 and 6.2 give initial guidance, suggesting that with appropriate road widths, school patrols are not needed below 500 vehicles per hour. There is no clear rule about how many children are needed before a school patrol is justified, but as the patrols require a significant commitment of effort, alternative ways of assisting pupils across the road may be considered when there are fewer than 20 pupils.

The provision of a zebra crossing for a school patrol should be made on the basis of the use of the crossing away from school times. If there is little pedestrian use outside school times then a zebra crossing is likely to be dangerous at those times and is not appropriate. A kea crossing should be considered [58, 88, 90].

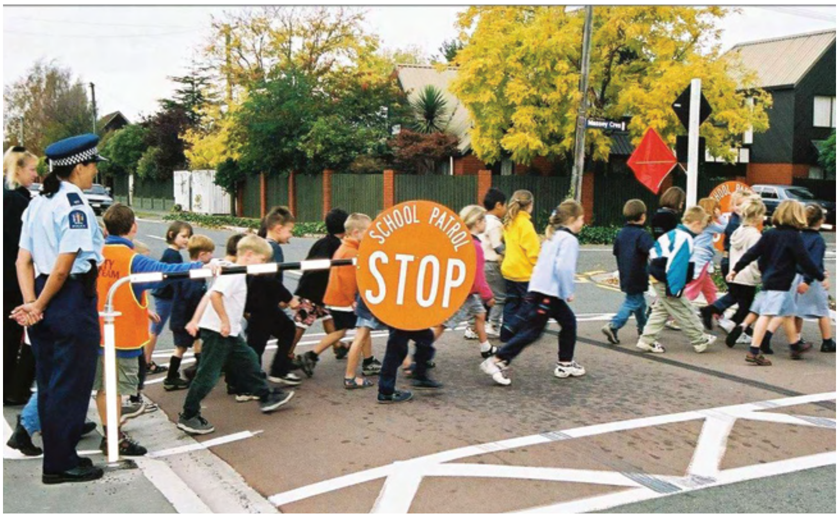

Photo 6.16 – Kea crossing on pedestrian platform, Christchurch (photo: Paul Cottam)

Sections 15.18.1 and 15.18.2 have design details of school patrols and kea crossings.

Signalised crossings

Signalising an intersection or installing a signalised mid-block crossing may be an appropriate solution in some cases to provide crossing assistance. If the crossing is not likely to be well used outside school hours, signalising an intersection would be the preferred option. Sections 6.7.6 and 6.7.9 further discuss these options.

Traffic signals are the only full time at-grade crossing control option where there are more than two lanes of traffic to be crossed, and the number of lanes cannot be reduced. They should also be considered where traffic flows are very high, making school patrol operation difficult, and where pedestrians need to cross outside school crossing times.

School speed zones

The area of road near a school entrance, where school children are most concentrated, usually has significant activity that results in reduced traffic speeds for the period before and after school. The crossing of children outside a school usually occurs in a supervised environment. Crash statistics show that crossing outside school is the safest part of a walking trip to school. The so-called 'chaos at the school gate' helps to tame traffic speeds and though user behaviour may need some management, care should be taken to ensure it is not managed so well that caution diminishes and traffic speeds increase. Where traffic calming, traffic management and parking management measures are not sufficient to achieve sufficiently slow vehicle speeds outside a school, school speed zones may also be appropriate.

School speed zones are relatively new to New Zealand, but widely used in various forms overseas. Most overseas schemes using fixed signs have proved ineffective. In New Zealand, electronic signs showing a speed limit reduction are programmed to light up only at times when children are coming to and going from school. They are only beneficial where analysis shows they would achieve a real reduction in traffic speeds. *Traffic note 37* [89] has guidelines for introducing school speed zones.

Photo 6.17 – School speed zone, Christchurch (Photo: Megan Fowler)

6.7 Network components on the roadway

This section is based on a comprehensive set of references. To avoid frequent repetition, the references numbers in common are all shown here [6, 10, 12, 13, 46, 53, 58, 66, 72, 118, 126, 139].

6.7.1 Pedestrian islands

Description

Pedestrian islands are elongated, raised portions of pavement within the roadway that provide a place for pedestrians to wait before crossing the next part of the road [56, 70]. Crossing pedestrians only need to find a gap in one stream of traffic, meaning larger and more frequent gaps and significantly reduced crossing times. Pedestrian islands are shorter than raised medians, which continue along sections of road.

Advantages

Pedestrian islands:

- reduce the crossing area where pedestrians are in conflict with traffic
- can considerably reduce delays for pedestrians (by up to 90 percent)
- can be retrofitted to existing roads
- are particularly helpful to pedestrians unable to judge distances accurately or who have slower walking speeds
- can improve safety with an estimated pedestrian crash reduction of 18 percent (or 32 percent when combined with kerb extensions).

Pedestrians on the island are more visible to oncoming drivers, and pedestrians can see oncoming traffic better.

The localised roadway narrowing encourages lower vehicle speeds.

Larger islands may be landscaped.

Disadvantages

They:

- restrict vehicle access to adjacent driveways
- can force cyclists closer to motorised traffic on narrower roads
- can disrupt drainage causing water to pond within the island or adjacent kerb ramps
- need a wide roadway to ensure adequate space after installation
- can be an obstacle which may be struck by motorised traffic if not particularly conspicuous.

The island size is related to the type and number of anticipated pedestrians that will wait on them. This space may not be readily available.

Recommendations

Because the main effect of pedestrian islands is reduction in pedestrian delay, they are most useful where traffic flows exceed 500 vehicles per hour.

Pedestrian islands are nearly always highly cost effective in improving pedestrian safety and reducing delay. They can be incorporated whenever a raised island is created as part of a roading scheme, for example deflection and splitter islands. It is important to ensure they meet at least the minimum criteria and are designed to accommodate the anticipated number of pedestrians for the facility.

Do not install where the lack of remaining road space will create an unsafe pinch point for cyclists.

Pedestrian islands can be combined with kerb extensions and platforms. When used at mid-block traffic signals and zebra crossings the island permits a staggered layout. Flush medians should include regular pedestrian islands to reduce inappropriate motor vehicle use of the medians and to improve pedestrian feelings of security on them. Although they can be retrofitted, they should be considered as a matter of course in all new/improved roading schemes.

See section 15.8 for design advice on pedestrian islands.

Photo 6.18 – Pedestrian island, Christchurch (Photo: Susan Cambridge)

6.7.2 Medians

Description

Medians are areas at, or close to, the centre of the road and provide a place for pedestrians to wait before crossing the next part of the road. They are longer than pedestrian islands and may be raised or flush, continuous or intermittent.

Advantages

Medians:

- have the same advantages as pedestrian islands
- are continuously effective along a road
- improve safety for motor vehicles.

Flush medians:

- allow vehicular access to adjacent driveways
- are very cheap to install.

Raised medians:

- have the same advantages as pedestrian islands
- may be landscaped.

Disadvantages

Medians:

- force cyclists closer to motorised traffic on narrower roads
- require a wide roadway to ensure adequate space after installation.

Flush medians:

- can cause pedestrians to feel vulnerable while waiting on long lengths of flush median.

Raised medians:

- provide an obstacle for mobility impaired pedestrians so the medians can require frequent cut-through treatments
- restrict vehicular access to adjacent driveways, leading to more u-turns at intersections.

Photo 6.19 – Raised median with pedestrian cut-through, Palmerston North (Photo: Shane Turner) (note: tactile paving is missing)

Photo 6.20 – Flush median, Christchurch (Photo: Aaron Roozenburg)

Recommendations

Medians are particularly appropriate where pedestrian demand is not concentrated at defined locations.

Medians are suited to all classes of road and can be retrofitted as necessary where there is sufficient roadway width.

Do not install where there is insufficient remaining road space for safe cycling.

Raised medians can be combined with kerb extensions, zebra crossings and traffic signals.

Flush medians require pedestrian islands at traffic signals and zebra crossings and should incorporate regular pedestrian islands at other points [85].

Section 15.9 covers design advice on medians.

6.7.3 Kerb extensions

Description

Kerb extensions are created by widening the footpath at intersections or mid-blocks, and extending it into and across parking lanes to the edge of the traffic lane. This improves visibility of pedestrians by traffic and reduces the distance to cross the road.

Advantages

Pedestrian safety is improved by kerb extensions – with an estimated pedestrian crash reduction of 36 percent (twice that of pedestrian islands alone) [78]. This is because pedestrians are more visible to oncoming drivers and pedestrians get a better view of approaching traffic.

Pedestrian delay is reduced due to the shorter crossing distance and, therefore, crossing time which permits pedestrians to select a smaller gap (but to a much lesser extent than pedestrian islands, refer figures 6.1 and 6.2).

They also:

- can be retrofitted to existing roads
- create space for pedestrians to wait without blocking others walking past
- create space for installing kerb ramps
- physically prevent drivers from parking (and blocking) the crossing point
- gain additional space which can be used for landscaping, cycle racks and street furniture (as long as visibility is maintained)
- can help slow vehicle speeds
- ensure that car parking does not obscure visibility for vehicles at intersections.

Signs and traffic signal displays can be located where they are easily seen by approaching traffic.

Disadvantages

They:

- reduce on-street parking
- can force cyclists closer to motorised traffic on narrow roads
- can create drainage problems and rubbish can accumulate
- can create an obstruction that may be struck by cyclists and motorised vehicles.

Recommendations

Kerb extensions have particular safety benefits and also result in less delay for pedestrians. Figures 6.1 and 6.2 suggest they will be most beneficial on roads with flows less than 500 vehicles per hour.

They can be used on any class of road and can be retrofitted as necessary. They are particularly useful when combined with pedestrian platforms, zebra crossings, traffic signals and, where there is sufficient room, pedestrian islands.

Do not use where any part of the extension would protrude into a lane used by moving traffic or leave insufficient room for safe cycling.

See section 15.10 for design advice on kerb extensions.

Photo 6.21 – Kerb extensions, Christchurch
(Photo: Tim Hughes)

6.7.4 Pedestrian platforms

Description

Pedestrian platforms are raised and sometimes specially textured areas of roadway that act as a focus for crossings [151]. However, they are part of the roadway and pedestrians have to give way to vehicles unless the platform is also marked as a zebra crossing. (In Australian literature, zebra crossings on platforms are called wombat crossings).

Advantages

Pedestrian platforms:

- emphasise pedestrian movements at the expense of vehicular traffic
- help to focus traffic on pedestrians crossing
- can be aesthetically pleasing
- reinforce the slow speed message to drivers
- are highly effective at reducing vehicle speeds
- eliminate grade changes from the pedestrian route and, therefore, the need for kerb ramps
- lead to more drivers yielding to pedestrians.

Photo 6.22 – Pedestrian platform, Nelson (Photo: Tim Hughes)

(Note: the ramp is well marked – because the design implies pedestrian right of way across the platform, it should be marked as a zebra crossing.)

Photo 6.23 – Pedestrian platform, Palmerston North (Photo: Glenn Connolly)

Disadvantages

They:

- only work effectively when vehicle speeds can be reduced to where drivers are able and prepared to slow or stop
- although still part of the roadway, may cause confusion as to who has the right of way
- can create discomfort for vehicle occupants, especially those in heavy vehicles (while platforms are less suited to bus routes, they can be designed to accommodate buses)
- should preferably not be used in isolation; but form part of a larger (area-wide) scheme
- may increase noise as vehicles brake, slow, pass over them and accelerate (see section 6.3).

Vision impaired pedestrians and children may not be aware they are entering the roadway on a raised platform, so there needs to be clear discrimination between the road and footpath.

Recommendations

Platforms are generally installed on local roads and sometimes on collector roads. They are not installed on arterial roads except in major shopping areas where the need for traffic calming and pedestrian assistance exceeds the arterial function. They can be retrofitted at both intersections and mid-block and are particularly useful in traffic-calmed areas (where they serve the same purpose as road humps). Where motorists need to stop and give way, the platforms should be marked as zebra crossings. In areas where heavy vehicles are part of the traffic, careful design and liaison will be necessary (see section 6.3).

Do not use where traffic approach speeds exceed 50 km/h.

Section 15.11 has design advice on pedestrian platforms.

6.7.5 Pedestrian zebra crossings

Description

A pedestrian zebra crossing is a section of roadway running from kerb to kerb and marked with longitudinal markings. Drivers are required to give way to pedestrians on both sides of all zebra crossings unless the crossing is divided by a raised traffic island.

Advantages

Zebra crossings:

- provide the least delay for pedestrians
- can be retrofitted to existing roads
- create a clear focus for crossings
- if raised (as a platform), slow vehicle speeds and can improve safety.

Recommendations

Zebra crossings are generally unsuitable for roads with higher speeds.

Do not use zebra crossings on roads with speed limits over 50 km/h unless approval is obtained from Land Transport NZ as required by the Traffic Control Devices Rule.

Do not use zebra crossings where there is more than one lane in any direction, as traffic may overtake a vehicle slowing for a pedestrian.

Zebra crossings should be combined with kerb extensions, platforms or islands to reduce the crossing distance and potentially improve safety. Other crossing assistance facilities should be considered before installing zebra crossings (see section 6.5). Flush medians must not be used to interrupt zebra crossings, but should be terminated either side of the crossing, with a pedestrian island installed in the centre [56].

Do not use zebra crossings for locations with fewer than 50 pedestrians per hour.

See section 15.12 for design advice on installing zebra crossings.

Disadvantages

They:

- on their own, do not improve pedestrian safety and may even decrease it
- can lead to an increase in 'nose-to-tail' vehicle accidents.

Pedestrians may feel threatened by vehicles travelling over the part of the crossing they have just used.

Drivers may not stop when pedestrians expect them to.

High pedestrian flows can dominate the crossing and cause severe traffic disruptions.

Wide markings can be slippery when wet for cyclists and motorcyclists.

Pedestrians may step out without checking properly whether approaching vehicles are too close to stop.

Zebra crossings need to be combined with other measures to enhance their safety.

Photo 6.24 – Pedestrian zebra crossing, Hamilton (Photo: Tim Hughes)

Photo 6.25 – Zebra crossing on platform across slip lane, Christchurch (Photo: Tim Hughes)

6.7.6 Mid-block pedestrian signals

Description

Mid-block pedestrian signals are installations that stop traffic so pedestrians can cross unimpeded. The signals are activated by pedestrians, vehicles are stopped, pedestrians cross and then vehicles are allowed to proceed.

Mid-block pedestrian signals can include intelligent features, such as extending the pedestrian phase for slow pedestrians and detecting that pedestrians have already crossed prior to the pedestrian phase being displayed.

Advantages

Mid-block pedestrian signals:

- clearly show when to cross
- balance the delays to pedestrians and traffic
- can reduce community severance
- are very safe for pedestrians when used properly.

Signals take the decision on when it is safe to cross away from the pedestrian.

Pedestrians group together, rather than crossing intermittently.

Photo 6.26 Mid-block pedestrian signals, Palmerston North (Photo: Shane Turner)

Recommendations

Use a traffic signals analysis package to model the expected delays to pedestrians and other users under signal operation. Compare the delay and safety performance with other options calculated using the *Pedestrian crossing facilities calculation spreadsheet*.

Mid-block pedestrian signals are the only option for multi-lane roads and on busy two-lane roads where continuous pedestrian streams can cause problems. They can be combined with kerb extensions, raised medians and islands.

If the number of pedestrians justifies them, consider using mid-block signals for sites with high traffic flows where the environment prevents installation of pedestrian islands or zebra crossings with appropriate physical aids.

Because safe use of pedestrian signals depends on good compliance, ensure signal timings provide a satisfactory pedestrian level of service.

Where there is a need for special provision for the vision impaired and where a signalised mid-block crossing would get insufficient use, signalising a nearby junction and incorporating pedestrian facilities can provide a better safety and traffic management solution.

Section 15.13 has design advice on installing mid-block signalised crossings.

Disadvantages

They:

- delay pedestrians more than zebra crossings
- are more costly to install, operate and maintain than other crossing types
- can be more disruptive to traffic flows than other crossing types apart from zebra crossings
- are more dangerous when crossing near the signals or against the signals.

Slower pedestrians may find it difficult to cross within the allotted time. Intelligent features can assist this.

Signal timings are frequently based on minimising vehicle delays which results in a poor level of service to pedestrians. Pedestrians having to wait for what seems to them an excessive time will take risks and cross against the signals. If all pedestrians have crossed before receiving a green signal, vehicles are required to stop anyway. Intelligent features can reduce this.

6.7.7 Grade separation

Description

Grade separation refers to infrastructure that puts pedestrians and motor vehicles at different heights. This typically means underpasses (tunnels and subways) and overpasses (bridges and elevated walkways).

Disadvantages

Grade separation:

- is costly to construct. It needs to be planned at the earliest possible stage to ensure maximum cost-effectiveness
- may need long ramps or flights of steps, resulting in longer travel times and more effort
- is only effective where pedestrians perceive it is easier and faster to use than crossing at-grade
- can be visually intrusive
- may be subject to vandalism
- may create an increase in the speed of traffic
- may increase the risk for those pedestrians who continue to cross at-grade
- may require the relocation of utilities
- may cause pedestrians to have personal security concerns because of reduced natural surveillance from traffic.

Places where it easiest to construct grade separation are often not on pedestrians' desire lines.

Overpasses:

- are more likely to be open to the weather and the risk of objects falling onto the roadway
- require greater vertical separation than underpasses and, therefore, longer approach ramps and greater travel distance.

Underpasses:

- are perceived as providing less personal security than overpasses due to lower natural surveillance
- can have drainage problems
- can encourage high cycling speeds.

Advantages

Grade separation:

- allows pedestrians to cross the road unhindered by traffic
- can reduce walking travel time
- significantly reduces potential conflicts with motorised vehicles
- minimises severance in communities with heavily used roads
- reduces vehicle delays and increases highway capacity
- can be integrated with existing development (such as air bridges linking buildings).

Overpasses:

- are usually cheaper than an underpass in an existing environment
- can be covered to protect against the weather and to prevent objects falling to the roadway below.

Underpasses:

- can be cost effective when part of a new development.

Recommendations

Grade separation can include under- and overpasses for motor vehicles with the pedestrian route remaining at-grade. This overcomes issues regarding greater travel distances for pedestrians using such facilities. Where the road user hierarchy favours pedestrians this may be the preferred approach.

Where deemed necessary, the grade-separated route must appear more desirable to pedestrians than any other option. This may require restricting other options, for example by installing fencing around dangerous potential at-grade crossing areas, or by improving the convenience and aesthetics of the grade-separated option.

Section 15.14 has design advice on installing grade-separated crossings.

Photo 6.27 – Pedestrian overpass, Auckland (Photo: David Croft)

6.7.8 Give Way, Stop and uncontrolled intersections

Description

Give Way and Stop controlled crossroads and uncontrolled 'T' intersections are most common where there are moderate or low volumes on one or more approaches. They give no priority to pedestrians crossing the intersection. As pedestrians often cross at intersections, they present important opportunities to improve pedestrian safety and convenience.

Advantages

Less busy intersections provide the best opportunities for traffic calming measures and crossing aids.

Photo 6.28 – Priority intersection, Christchurch (Photo: Andy Carr)

Photo 6.29 – Intersection on platform, Auckland (Photo: Brenda Bendall)

Disadvantages

The presence of conflicting and turning traffic movements makes crossing decisions more complex for pedestrians.

The uncontrolled approaches will have faster traffic speeds and be more dangerous to cross. It can be difficult to provide physical crossing aids while maintaining traffic efficiency.

Providing the space necessary for large turning vehicles increases crossing distances and turning speeds of smaller vehicles.

Recommendations

Consider opportunities for traffic calming and physical crossing aids.

Balance the space needs of turning traffic with pedestrian needs.

Consider safer alternatives such as roundabouts.

Combine intersections with kerb extensions, raised medians, pedestrian islands and platforms.

Section 15.15 has general design advice on intersections.

6.7.9 Signalised intersections

Description

In many respects, signal-controlled intersections and mid-block signals have very similar design considerations. At mid-block signals the pedestrian phase is always segregated from vehicles, while at intersections pedestrians may have to share their phase with turning traffic, which must give way to pedestrians [70].

Advantages

Signalised intersections:

- clearly indicate when to cross
- largely take away from the pedestrian the decision on when it is safe to cross
- allow pedestrians to group together, rather than crossing intermittently
- provide clear crossing opportunities where vehicle movements may be very complex
- reduce vehicle conflicts
- can reduce pedestrian crashes if the conflict with turning vehicles is well managed.

An exclusive 'scramble crossing' or 'barnes dance' phase can allow pedestrians to cross safely on the diagonal, minimising their overall travel distance while eliminating vehicle conflicts, but at the expense of extra pedestrian and vehicle delay. The safety benefits will diminish to the extent that extra delays result in non-compliance.

The pedestrian phase can be advanced to give pedestrians an early start (and hence position them where drivers are more likely to notice and give way).

The turning needs of large vehicles can be catered for in a pedestrian friendly way by providing appropriate slip lanes.

Disadvantages

They are:

- more costly to install, operate and maintain than other crossing types
- rarely installed to provide for pedestrian needs but for where vehicular flows warrant signalisation.

Some pedestrians may find it difficult to cross within the allotted time.

The pedestrian phases may require a high proportion of the total cycle time (delaying vehicles), or pedestrians may be delayed to accommodate the vehicles.

If pedestrians have crossed illegally before receiving a green signal, signals will still provide a pedestrian phase, delaying traffic for no apparent reason.

Recommendations

At busy junctions requiring multiple approach lanes, signals are generally preferred over roundabouts.

Consider exclusive phases that permit diagonal crossing where pedestrian needs predominate in the hierarchy of users (such as CBD streets), or where turning conflicts cannot be sufficiently well managed by other means.

Consider providing slip lanes for high volume multi-lane junctions especially where heavy vehicles are present. If not initially provided, reserve the land needed to do so in the future.

Signalised intersections can be combined with kerb extensions, raised medians, pedestrian islands, slip lanes and platforms. If slip lanes are installed, pedestrian platforms should be considered.

Section 15.16 has design advice on installing signalised intersections.

Photo 6.30 – Signals with exclusive pedestrian (scramble) phase, Auckland (Photo: Judith Goodwin)

6.7.10 Roundabouts

Description

Roundabouts give no priority to pedestrians waiting to cross the intersection. However, roundabouts can be designed to benefit pedestrians.

Advantages

Roundabouts can be designed to ensure low vehicle speeds and should have a major role in traffic calming schemes. They generally reduce crashes for pedestrians.

Pedestrian islands can be incorporated into splitter islands dividing the crossing into two movements which will reduce pedestrian delay.

Disadvantages

They:

- can cause problems for the vision impaired due to confusing auditory signals from approaching and circulating vehicles
- can be more difficult to cross when higher volumes of traffic are present

Pedestrians find it particularly difficult to cross the exits of fast multi-lane roundabouts, and drivers exiting these roundabouts may not notice pedestrians crossing if there is not a large pedestrian presence in the area.

Photo 6.31 – Roundabout with zebra crossings on the approaches, Palmerston North CBD (Photo: Shane Turner)

Photo 6.32 – Crossing point near roundabout, Queenstown (Photo: Tim Hughes)

Recommendations

Roundabouts should be designed to ensure low entry and exit speeds.

The splitter islands of roundabouts, should incorporate pedestrian island crossing facilities.

When considering installing multi-lane roundabouts, walking and cycling requirements need to be given full consideration. Consider the use of grade separation of paths, adding signals to the roundabout, or using conventional intersections with traffic signals instead.

Roundabout approaches and departures can be combined with kerb extensions. Pedestrian platforms may be used where approach speeds do not exceed 50 km/h. Zebra crossings can be marked on such platforms where the general requirements for zebra crossings are met, and queues from the crossing will not block the roundabout.

Section 15.17 has design advice on pedestrian aspects of roundabouts.

6.8 Railway crossings

Recommendations

Rail corridor operators seek to minimise the number of level crossings so the need for any additional crossings will have to be discussed with them from the outset to gain their consent.

Level crossings and grade separated crossings should be as convenient as possible for pedestrians and, where possible, follow the natural desire line. There have been cases in New Zealand where pedestrians have found it more convenient to cross the tracks as trespassers, at-grade, putting themselves at risk of being hit by trains. In New Zealand, five to 15 pedestrians are killed each year by trains at places other than level crossings, ie crossing illegally or walking along the tracks [113].

It is important to take into account railway tracks that are close to new developments.

During planning for new areas, locate developments so that pedestrian and other desire lines can utilise natural features such as railway cuttings and embankments to facilitate grade separation.

For significant new developments near existing railway lines, consider how pedestrians will gain access across the railway lines. New railway crossings may be necessary so it is important to involve the rail corridor operator from the outset.

Section 15.19 has design advice on installing at-grade railway crossings.

Photo 6.33 – Pedestrian railway level crossing beside road, Christchurch (Photo: Susan Cambridge)

Note: good separation - but tactile paving needed and ashphalt surface requires regular maintenance.

Photo 6.34 – Automatic pedestrian gates control double track crossing, Fremantle, Western Australia (Photo: Tim Hughes)

Description

Although railway crossings are rare compared with road crossings, pedestrians can feel extremely apprehensive when using them. Trains can travel quickly, are very intimidating and are unable to stop suddenly or swerve to avoid a collision.

There are three types of crossing:

1. Grade separated, with pedestrians travelling under or over the railway
2. Pedestrian level crossings adjacent to vehicular crossings
3. Pedestrian level crossings in isolation from vehicular crossings.

In New Zealand in 2004, four pedestrians died and one was seriously injured after being hit by trains at level crossings [113].

The advantages and disadvantages of grade separated and level crossing facilities are similar to those across roads. See section 6.7.7.