3. Design – 3.4. Crossings

Pedestrian Network Guidance

NZ Transport Agency Waka Kotahi

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NZ TRANSPORT AGENCY WAKA KOTAHI

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More information

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Contents

This document constitutes a section of the Design chapter within the NZ Transport Agency Waka Kotahi Pedestrian Network Guidance (PNG). For access to the complete Design chapter and the other chapters of the guidance, please visit nzta.govt.nz/png.

The PNG is published in a hybrid format comprising both HTML (ie webpages) and PDF components, marking a departure from the previous version, which was available solely in HTML. The PDF documents, each addressing discrete sections or thematic areas, are designed to complement the overarching HTML structure, which presents the guidance in a cohesive and navigable format. Together, these formats are designed to function as an integrated whole, ensuring that users can access and engage with the content in a manner that is both flexible and coherent, while preserving the integrity and consistency of the guidance.

3. Design

The Design chapter is divided into the following sections:

3.4. Crossings

3.4.1. Introduction

Every walking trip involves crossing streets and may also include the need to cross railways, waterways and other natural features. Safe, convenient and appropriate crossings are therefore key elements in providing a connected network for pedestrians.

Planning and designing safe, appropriate, and convenient pedestrian crossings requires an understanding of the diverse characteristics and behaviour of people walking; of the Safe System principles; and the legal obligations of all road users.

The focus of this section is on the mid-block crossings. For information on provision of pedestrian crossings at intersections, refer to PNG: Intersections.

3.4.1a Safe System and safety benefits

Places where pedestrians cross should align with Safe System principles. In general, safe system aligned measures for pedestrians either:

- separate pedestrians from motor vehicles, or
- ensure impact speeds are at or below 30k m/h.

For further information, refer to section 3.1.1. Safe System design in PNG: Pedestrian design principles.

Austroads research[1] published in 2020 identified pedestrian facilities that are Safe System aligned, and those that are not fully aligned with Safe System principles but can support or make incremental improvements to safety and/or mobility for pedestrians.

Installing a crossing treatment can have safety benefits. For more information on pedestrian crash reduction factors (CRFs) and crash modification factors (CMF) for various treatments, refer to the Crash estimation compendium: New Zealand crash risk factors guideline.

3.4.1b General legal considerations

The Land Transport (Road User) Rule 2004 includes a number of clauses regarding how pedestrians should cross roads. This includes:

- A pedestrian must use a pedestrian crossing, school crossing point, underpass or footbridge if it is within a 20 m distance of where they want to cross (clause 11.3).

[1] Corben, B (2020). Integrating Safe System with movement and place for vulnerable road users, AP-R611-20, p14.

- A pedestrian crossing a roadway without a pedestrian crossing or a school crossing point should, wherever possible, cross at right angles to the kerb or side of the roadway (clause 11.4).
- A pedestrian must not loiter on a crossing or roadway longer than is necessary to cross the roadway (clause 11.6).

The Road User Rule 2004 also includes clauses regarding driver's responsibilities in the vicinity of crossings, as follows:

- Passing at school crossing point or pedestrian crossings (clause 2.10) – a driver must not pass or attempt to pass a vehicle that has stopped or slowed down at a school crossing point or pedestrian crossing
- A driver approaching a pedestrian crossing or a school crossing point at which a school patrol sign is extended must (clause 3.9) –

    (a) stop before reaching the pedestrian crossing or school crossing point; and

    (b) remain stopped while the sign is extended.
- A driver approaching a pedestrian crossing must (clause 10.1.1) –

    (a) give way to pedestrians, and to riders of wheeled recreational devices or mobility devices,—

        (i) on the pedestrian crossing; or

        (ii) obviously waiting to cross it and who are not behind a school patrol sign; and

    (b) if necessary, slow down and stop the driver's vehicle for that purpose.
- A driver approaching a pedestrian crossing must not enter the crossing if the driver's intended passage is blocked by stationary traffic (clause 10.1.2).

There are other legal obligations particular to specific crossing types and aids and these are outlined in the relevant sections.

3.4.2. Crossing selection

Crashes involving pedestrians and drivers occur most commonly when pedestrians need to cross the street. Streets that are difficult to cross act as a barrier to undertaking a walking journey. Choosing a safe, convenient and appropriate crossing type is therefore critical to support people walking.

3.4.2a Types of crossing facility

Crossing facilities generally fall into four categories as shown in Table 1. Often two or more crossing aids are combined at the same location. For example, kerb extensions can support many of the other crossing treatments by reducing the crossing distance. Crossings for pedestrians can also be shared with other users such as people cycling. Further guidance on dual crossings is available in the Cycling Network Guidance (CNG).

Table 1: Types of crossings for pedestrians

Category of treatment	Objective	Possible treatment
Non-priority crossings aids (section 3.4.4)	Assists pedestrians to cross by shortening the crossing distance, simplifying the crossing task, increasing visibility, reducing vehicle speeds or encouraging courtesy between drivers and pedestrians. On their own, these crossing aids do not give pedestrians priority over vehicles.	• Kerb crossings • Kerb extensions • Pedestrian/median refuges • Pedestrian platforms • Courtesy crossings
Priority crossings (section 3.4.5)	Gives pedestrians priority, or allots pedestrian-only periods for use of an on-road section, alternating with periods for vehicles.	• Zebra crossings • Raised zebra crossings • Signalised crossings • School crossings
Grade separation (section 3.4.7)	Eliminates conflict by putting pedestrians and vehicles in physically distinct areas. It also provides crossing opportunities over waterways.	• Underpasses and overpasses
Rail crossings (section 3.4.8)	Provides crossing opportunities of rail lines for pedestrians.	• Grade separated • Pedestrian level crossings with/without vehicular crossings

3.4.2b Crossing selection process

Selecting the appropriate pedestrian crossing facility is critical to ensuring people can cross streets safely and easily. Selecting the type of pedestrian crossing facility including the supporting aids requires a comprehensive and context sensitive approach.

For further guidance on crossing selection process, refer to Appendix A.

3.4.2c Location and spacing of crossings

Crossing points focus pedestrian movements to specific locations, therefore the location of crossings is important. Crossings that meet the seven pedestrian network characteristics will help to support walkable places. They are: safe, inclusive, comfortable, direct, legible, connected and attractive.

The spacing and frequency of crossings along a street depends on the street type, land use and built environment, pedestrian desire lines, and both existing and supressed crossing demand.

Further guidance

PNG Planning:

- Section 2.3.3. Pedestrian network characteristics
- Section 2.1.3. Measuring pedestrian activity

Research suggests that at grade crossings should be provided every 80 m to 100 m in urban environments.[2]

Another rule of thumb is that if it takes a person more than three minutes to walk to a crossing, wait to cross a street, then resume their journey, they may decide to cross along a more direct route, which may be unsafe or unprotected route.

[2] Global Designing Cities Initiative. Designing Streets for People from Global Street Design Guide.

The type of crossings along a street and whether they provide priority to pedestrians or not is also an important consideration. It may be appropriate to provide priority crossings at key locations along with non-priority crossings or aids (for example pedestrian refuges) to provide convenient choices for all pedestrians. This arrangement provides for people who may prefer or require crossings where they have priority, but also provides more frequent crossing opportunities for people who are comfortable finding a gap in traffic to cross.

An example of frequent crossings of different types through a town centre main street is shown below.

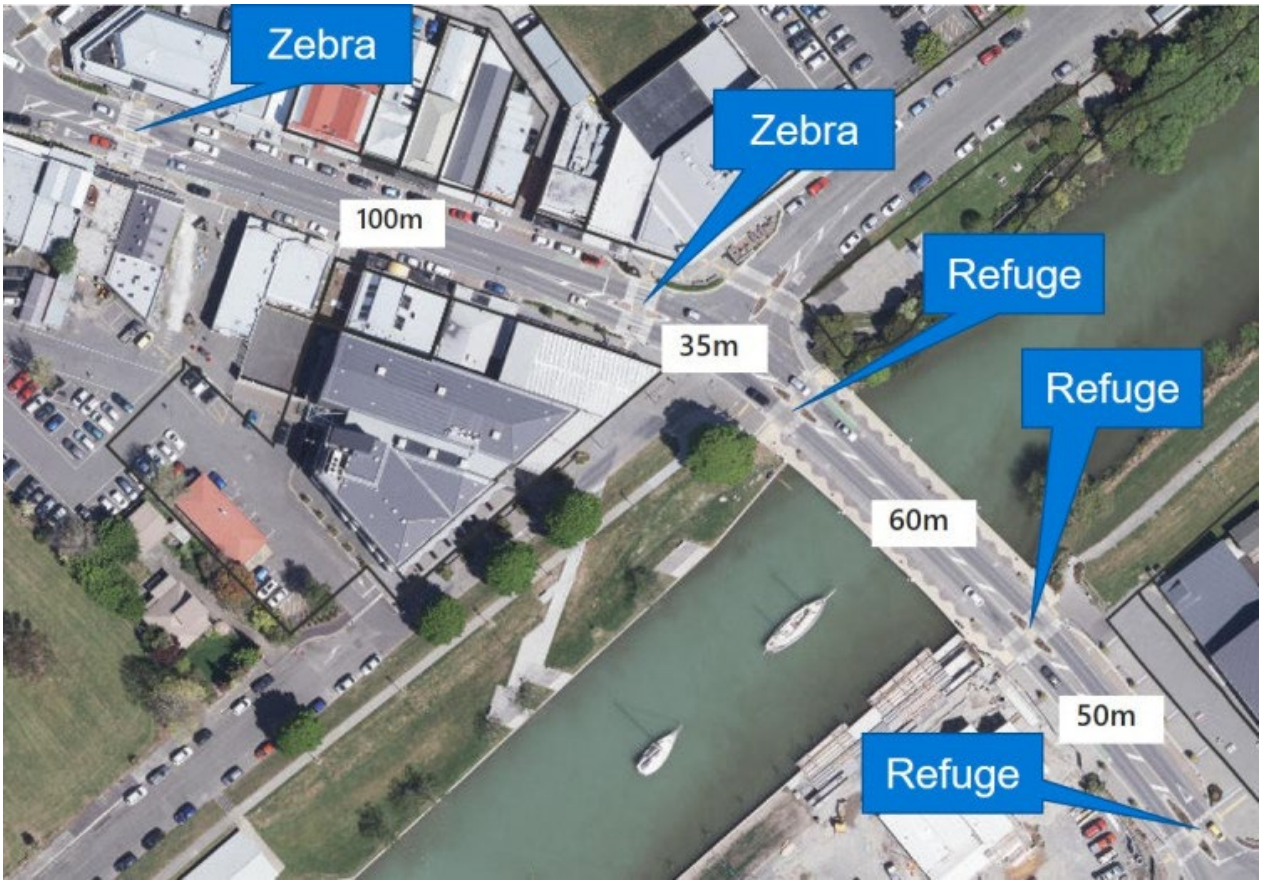


Figure 1: Spacing and type of crossings along a town centre main street. (Source: Canterbury Maps)

Figure 2: Frequent crossing opportunities along a town centre main street, Kaiapoi. (Photo: Jeanette Ward)

3.4.2d Crossing aids and pedestrian delay

Crossing aids reduce the crossing distance and/or the number of lanes pedestrians need to negotiate at each stage. The crossing distance can be reduced through kerb extensions and pedestrian refuges. Pedestrian refuges can also reduce delays to pedestrians and simplify the crossing task by allowing pedestrians to cross in two stages. However, for less able bodied and some less confident pedestrians (eg disabled people, elderly or children) crossing aids may not cater for their specific needs without the presence of a formal crossing facility.

The two charts below illustrate the level of delay for an average confident and able pedestrian crossing a typical two-way, two-lane road with a 50k m/h speed limit with various vehicle volumes, and how this improves through the provision of crossing aids. The crossing distance without physical aids assumes a 14 m kerb-to-kerb crossing distance; kerb extensions assume a 9 m crossing distance; a median refuge assumes two 6 m crossings; and kerb extensions and a median refuge assumes two 4.5 m crossings.

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

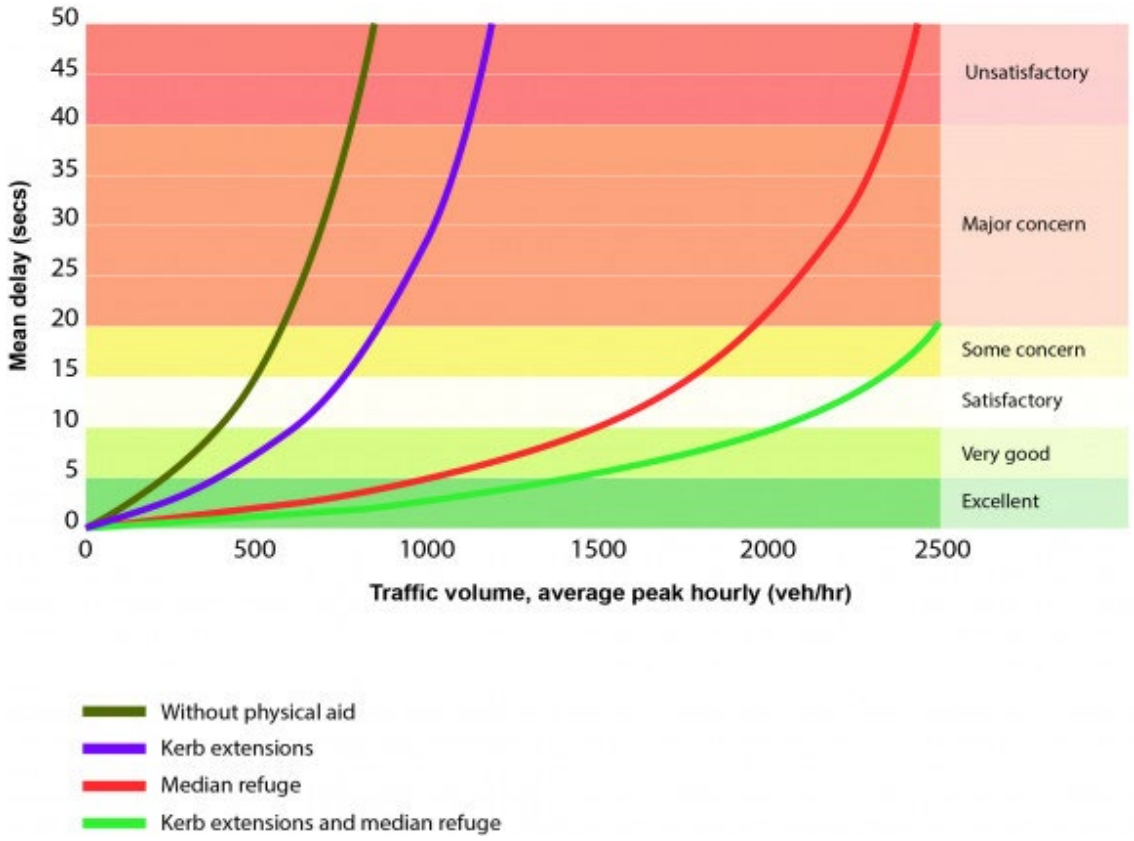


Figure 3: Mean waiting delay for pedestrians crossing at various facilities on a two-lane, two-way urban road (uninterrupted flow)

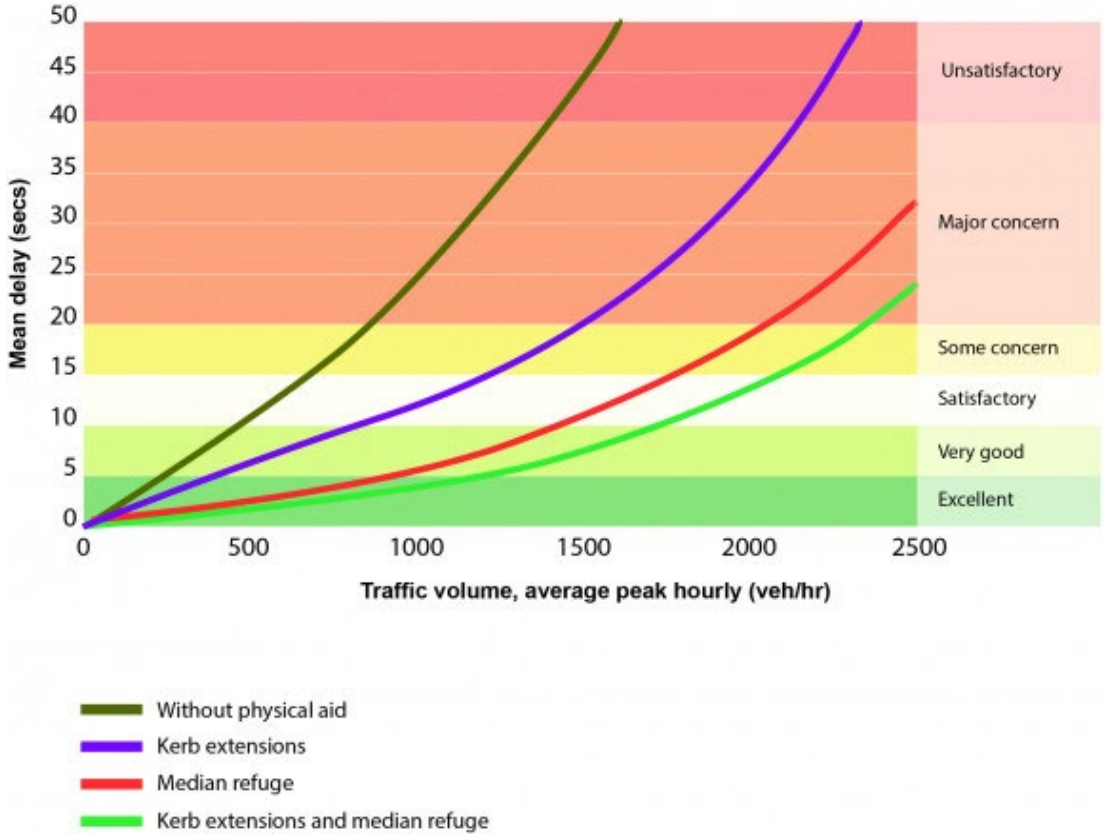


Figure 4: Mean waiting delay for pedestrians crossing at various facilities on a two-lane, two-way urban road (interrupted flow)

3.4.3. Crossing design principles

3.4.3a Design requirements for pedestrians

Crossings should meet the same standards as footpaths, especially in:

- being step-free
- the maximum permissible crossfall
- maintaining adequate overhead clearances and protrusions
- the surface standard (stable and firm, and slip resistant even when wet)
- not containing grates and covers.

All crossing points should be designed to minimise pedestrians' crossing distance, which means ensuring:

- crossings are at right angles to the direction of the road
- the roadway is as narrow as possible at the crossing point (being careful to avoid pinch-points for people cycling on the roadway).

Kerb extensions and/or pedestrian refuges can assist in minimising the crossing distance for pedestrians.

Adequate sight distances must be provided between pedestrians and other road users.

Crossings should be located on pedestrian desire lines. Where this is not possible or unsafe, use environmental and/or tactile cues to guide pedestrians to the crossing point. Fencing or barriers are sometimes used to guide pedestrians to safe crossing locations. However, these treatments can detract from pedestrian amenity and should be avoided. Alternatives should be considered such as planters, landscaping or other street furniture that can be installed in the street furniture zone to discourage pedestrians from crossing in unsafe locations.

Street furniture and vegetation should not obscure visibility. No stopping restrictions should be applied either side of the crossing point. To ensure compliance, this may need occasional enforcement or additional infrastructure restricting car parking could be installed.

Some crossings are raised to the same level as the footpath, while others require pedestrians to change grade. In both cases, it is important to ensure that all pedestrians can make the transition between the footpath and the crossing safely and easily. This is usually achieved through the inclusion of kerb ramps.

Further guidance

- For kerb extensions, refer to section 3.4.4b
- For pedestrian/median refuges, refer to section 3.4.4c
- For sight distances, refer to section 3.4.3d
- Section 3.3.1. Footpath design – principles in PNG: Paths
- Section 3.6.4. Barriers and fencing in PNG: Supporting infrastructure

3.4.3b Design requirements for other road users

Drivers and other road users such as people cycling should be able to see crossings easily so they can adjust their speed and be aware of the potential for pedestrians to step into the roadway.

Crossings should be conspicuous and enable road users to predict the route of pedestrians or other users who are about to move into the roadway.

On streets designated as over dimensional routes special consideration may have to be undertaken when designing pedestrian crossings. These routes require a 'design envelope' 10 m wide × 6 m high as per the

NZ Transport Agency Waka Kotahi Bridge manual. If the wider envelope of 11.5 m wide and 6.5 m high[3] can be accommodated this is preferred by the Heavy Haulage Association. Islands should have mountable kerbs and load bearing surfaces, with signs, poles and rails that can be conveniently removed or folded at ground level. Where the road edge protrudes into the 'design envelope' such as at kerb protrusions, road furniture, signs, poles and other objects should be less than 1 m high or be conveniently removed or folded over.

Design and operational considerations for other road users that are specific to certain crossing types are outlined in the relevant sections of this guidance.

3.4.3c Kerb ramp design

Kerb ramps are where a localised area of the footpath is lowered to the same level as the adjacent roadway. Kerb ramps are also known as 'kerb cut-downs', 'pram crossings', 'drop kerbs' and 'dropped kerbs'.

If the kerb ramp is too steep, or there is too much of a lip between the traffic lane and the channel, I can't use it and have to go find another one. It can mean a much longer walking trip for me.

Wendy[4]

Kerb ramps are an integral part of most crossings. The alternative is a blended kerb where the footpath and roadway meet at the same level which are usually found at pedestrian platforms, raised zebra crossings, kerb less streets or shared zones.

Design considerations

When designing kerb ramps, it is important to ensure that:

- if there is a kerb ramp on one side of the roadway, there is also one on the other side to prevent pedestrians being 'stranded' on the roadway itself (for example a wheeled pedestrian)
- there are no low points where the ramp meets the road surface where water can collect
- if installed at a pedestrian crossing point, the whole kerb ramp is contained within the crossing pavement markings
- transition between gutter and ramp should be smooth with no vertical face
- a shallow gradient is preferred.

Every kerb ramp comprises:

- the ramp, which is the area pedestrians cross to change their grade
- the landing, which is where pedestrians move between the ramp and the footpath
- the approach, which is the section of footpath next to the top landing
- the gutter, which is the drainage trough at the roadway edge.

[3] New Zealand Heavy Haulage Association (2019). Road design specifications for overdimension loads.

[4] For more information about the personas, see 2.1.1c in PNG: Planning.

Perpendicular kerb ramp

The general form of a kerb ramp is illustrated below.

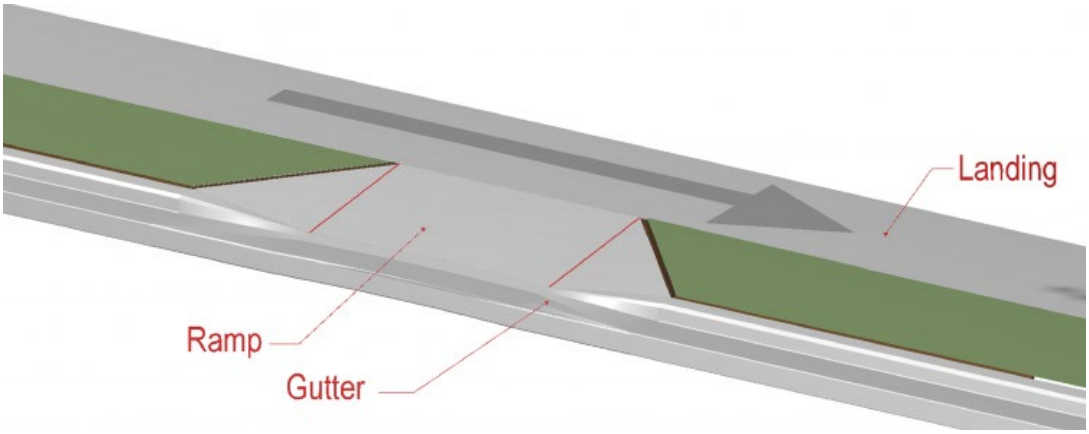


Figure 5: Typical perpendicular kerb ramp

Parallel and combination ramps

The use of parallel and combination ramps may be appropriate when the path is also used by people cycling or high volumes of people using wheeled mobility devices; however, they are generally less comfortable for pedestrians as they require people on the through route to change levels.

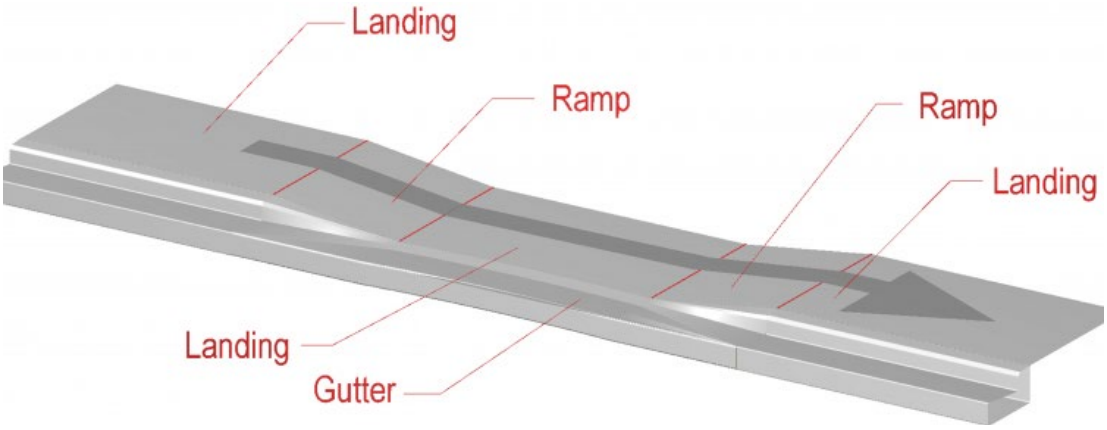


Figure 6: Parallel kerb ramp

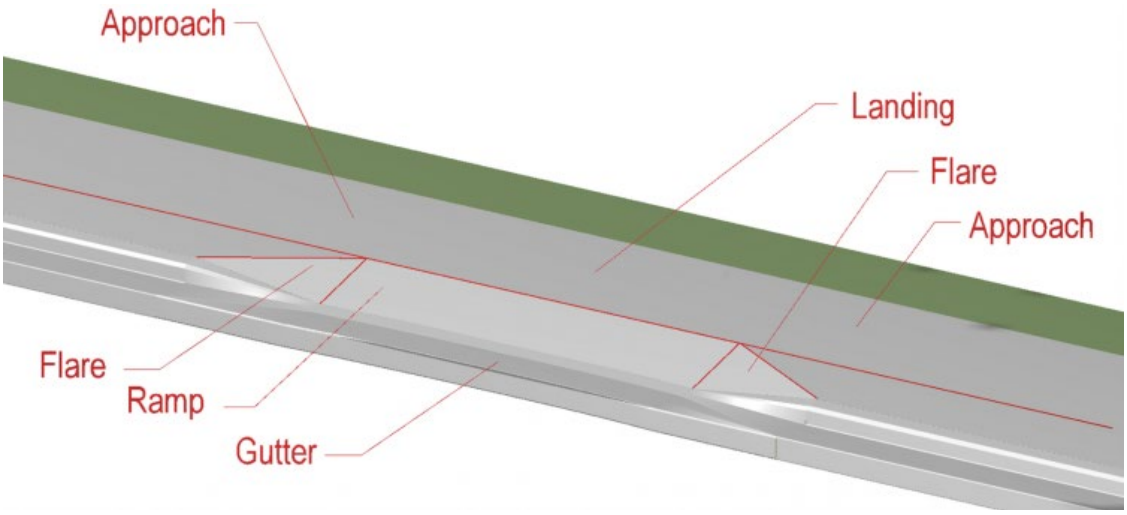


Figure 7: Combination kerb ramp

The Horizontal geometric design for mobility scooters technical note provides guidance on the radius or chamfer required to accommodate the turning envelope of a mobility scooter travelling between a kerb ramp and path.

Design elements

Pedestrians, especially those with mobility impairments, pushing a heavy buggy or wheelchair, or carrying luggage are likely to experience difficulty in negotiating steep kerb ramps (gradients of 1:8) noting these gradients are relative to the horizontal and not the surrounding surface. In hillside areas it may not be possible to achieve these requirements, however due consideration needs to be given to the accessibility needs of all pedestrians. Many people pushing small wheels find it difficult to change direction while on the ramp. This means curved kerbs require kerb ramps with bottom landings as seen in the illustration below.

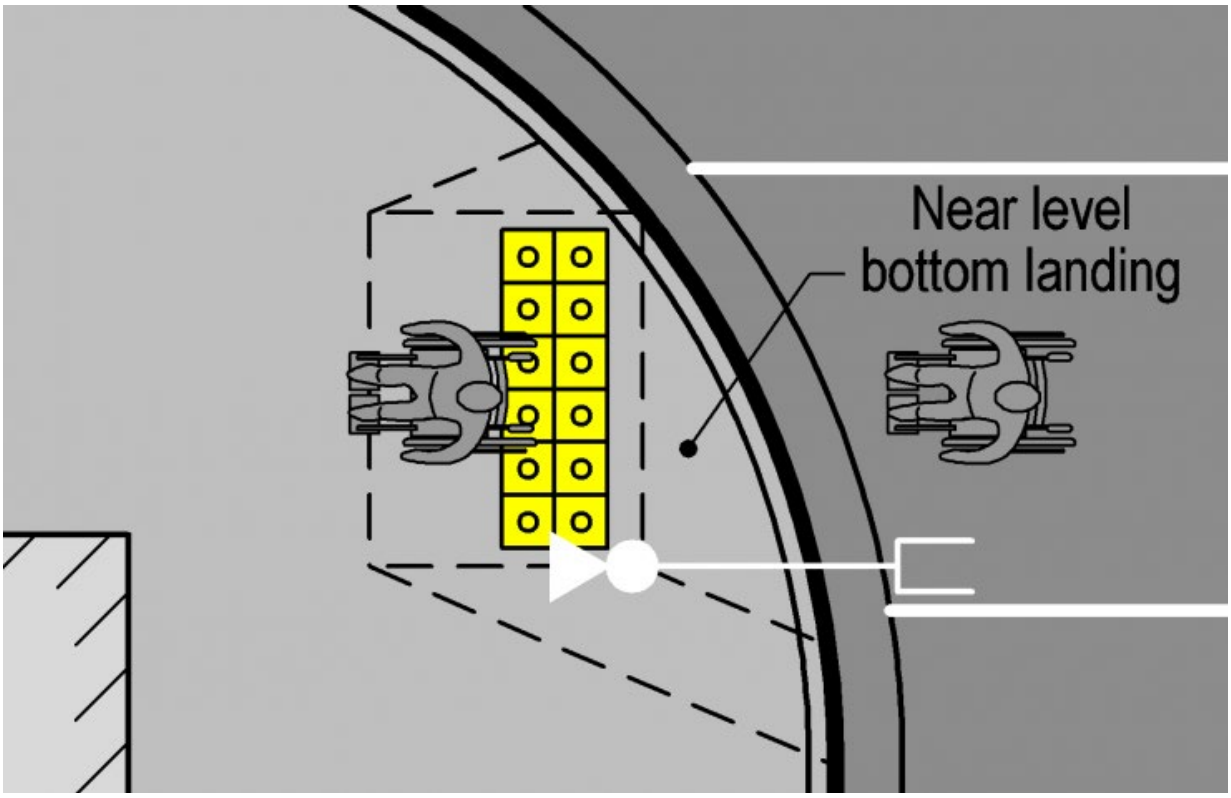


Figure 8: Correct bottom landing arrangement

Kerb ramps can be problematic for some people with impaired vision because they often use the kerb face as a tactile cue for the footpath edge and kerb ramps can increase the risk of inadvertently walking out into the roadway. To avoid this, all kerb ramps should incorporate appropriate tactile indicators. Warning tactile indicators should be arranged so that it is not possible to inadvertently bypass them and enter the roadway. They shall be installed a minimum of 600 mm deep and the full width of the kerb ramp. They do not need to cover the entire face of the kerb ramp.

Where it is desirable for users who are blind or have low vision, to detect that they are entering the kerb ramp from the side, flares with an abrupt change of grade steeper than 12.5% but no steeper than 17% are appropriate. This will be particularly appropriate where users entering from this direction could inadvertently enter the roadway by bypassing the warning tactile indicators. In most situations it will be desirable for the entry across the flare at the top of the ramp to be more gentle than near the kerb.

Figure 9 below shows a typical kerb ramp design.

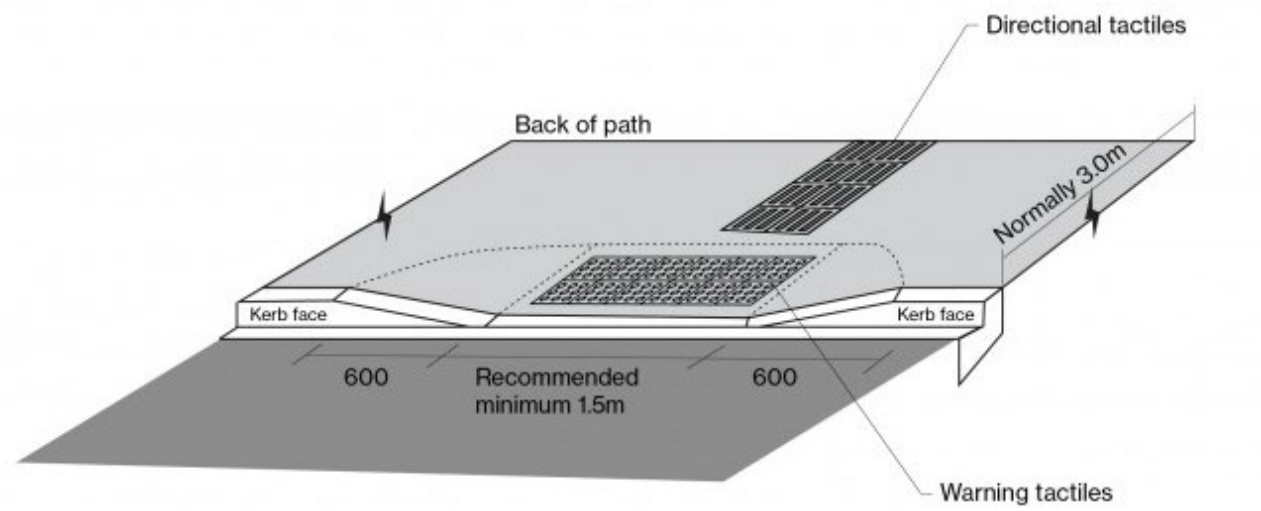
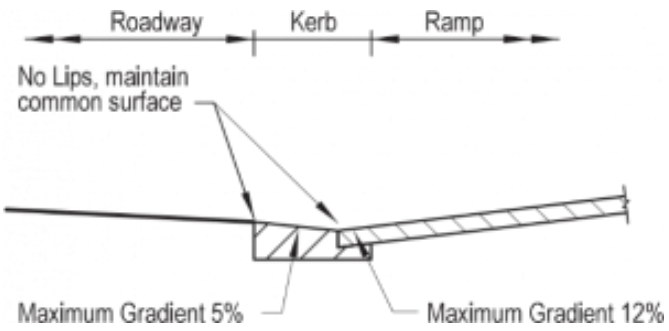


Figure 9: Typical kerb ramp design

Kerb ramps should comply with the general dimensions outlined in Table 2.

Table 2: Design elements of kerb ramps

Element	Key issues	Additional information
Ramp	Desired gradient is 5% where there is space. Normal maximum gradient 8%. Maximum gradient 12%.	A gradient of 10% should only be considered for constrained situations where the vertical rise is less than 150 mm. A gradient of 12% should only be considered for constrained situations where the vertical rise is less than 75 mm. Slopes more than 12% are very difficult for people pushing small wheels to negotiate. To avoid using these steeper gradients, lower the footpath as shown in the parallel ramp diagram.
	Maximum crossfall 2%.	Should be consistent across the whole ramp – avoid twist.
	Minimum width of 1.5 m.	Wider ramps may be necessary for higher pedestrian volumes.
	Maximum width: equal to the width of the approaching footpath.	Wider ramps are difficult for people with vision impairment to detect.
Landing	Maximum gradient 2%.	To prevent people pushing small wheels overbalancing, or accidentally rolling, and to provide a rest area.
	Maximum crossfall 2%.	
	Width: equal to that of the ramp.	
	Minimum depth 1.2 m (top landing).	A depth of 1.5 m is preferred.
Gutter	Maximum gradient 5%	Anything greater can cause some people to lose their balance at the transition.
	Transition between gutter and ramp	Should be smooth with no vertical face. Ensure that this does not inadvertently happen when the roadway has been resurfaced.  *Typical gutter design*
Flare	Maximum gradient 16%.	Use the steeper value if a vision impaired person could inadvertently enter and leave the kerb ramp from the side and bypass the tactile indicators.
	Maximum gradient: as per the ramp section.	Use these gentler values if mobility impaired people are expected to enter and leave the kerb ramp from the side due to the top platform being too small. For a kerb ramp perpendicular to a straight kerb this results in a splay angle of 45°.
Tactile indicators	All kerb ramps should incorporate appropriate tactile ground surface indicators.	Warning indicators shall be provided on all kerb ramps. Directional indicators are likely to be required unless the crossing point is on the continuous accessible path of travel. For installation requirements, refer to 3.1.3 Designing for blind and low vision people in PNG: Pedestrian design principles.

3.4.3d Sight distances

Pedestrian crossing facilities should be located and designed such that there is a clear view between approaching drivers and pedestrians on the crossing or waiting to cross the roadway.

The longer the distance to cross, the less likely I will enjoy that part of my walk. I have to keep looking over my shoulder to check no more traffic is coming, it is very stressful.

Aisha[5]

Guidance on sight distance at crossings for people walking is provided in various sections of the Austroads Guide to road design Part 4A: Unsignalised and signalised intersections and is provided below for ease of reference.

There are two key sight distance requirements at pedestrian crossing facilities:

- Approach sight distance (ASD) ensures that approaching drivers are aware of the presence of a crossing. The line of sight must not be obstructed as it ensures that the driver is aware of the crossing by seeing the pavement markings and other cues even if there is no pedestrian on the crossing, and is therefore alerted to take the appropriate action if a pedestrian steps onto the crossing. ASD should be provided at all formal, marked pedestrian crossings.
- Crossing sight distance (CSD) ensures that people about to cross can see approaching traffic in sufficient time to judge a safe gap and cross the roadway. It also ensures a clear view for approaching drivers to see people waiting to cross the road.

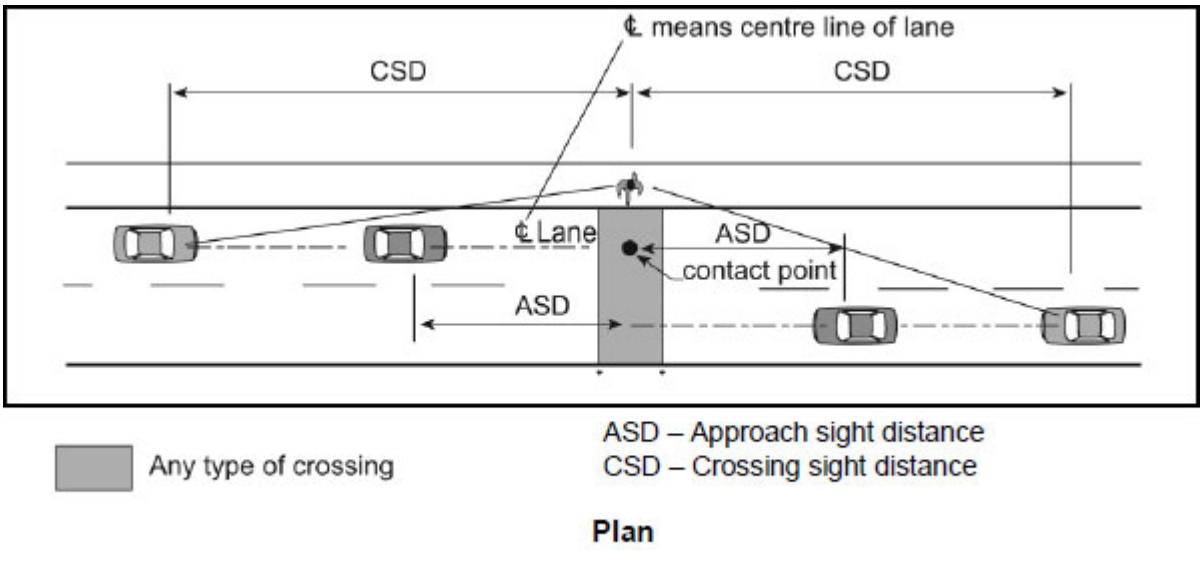
CSD should be provided at crossings, including:

- where the pedestrian does not have the priority, or
- where the pedestrian has the priority and must be seen by approaching drivers/riders who must give way (eg a zebra crossing).

CSD is desirable at crossings controlled by signals in case of signal failure.

Figure 10 illustrates the sight distance requirements at crossings.

[5] For more information about the personas, see 2.1.1c in PNG: Planning.



Note: The pedestrian offset from the edge of the pavement or kerb line is 1.6 m for determination of the sight triangle.

Source: Department of Main Roads (2006)[13].

Figure 10: Sight distance requirements at pedestrian crossings[6]

Crossing sight distance

Crossing sight distance (CSD) should be provided between approaching vehicles (1.1 m eye height) and a pedestrian waiting to cross the road (waiting 1.6 m from the pavement edge or kerb line). The pedestrian eye height should be taken as 1.07 m which accounts for a child or a person using a mobility device. CSD allows sufficient time for the pedestrian to cross the road, clear of any approaching traffic.

[6] Austroads (2023). Guide to road design Part 4A: Unsignalised and signalised intersections.

CSD is calculated from the critical safe gap in the traffic stream and the speed of approaching traffic using this equation:

$$CSD = t_c \times \frac{V}{3.6}$$

Where:

- t_c is the critical safe gap (sec) = (crossing length/walking speed) + 3 sec for pedestrian start up and end clearance time
- V is the 85th percentile vehicle approach speed (km/h).

Notes:

- Average walking speed is 1.2 m/s; however, pedestrians walk at different speeds and designers need to consider the type of pedestrians likely to use the crossing and their likely walking speeds.
- The crossing length shall include the pedestrian set back (eg 1.6 m from pavement edge or kerb line).
- The 3 seconds for pedestrian start up and end clearance time allows for decision making and navigating the kerb ramps, but may not be achievable in constrained situations. A risk assessment should be undertaken if the 3 second start up and end clearance time is omitted.

It is important that line of sight for CSD is not impeded by objects such as parked vehicles, stopped buses and street furniture (although minor obstructions such as poles and tree trunks less than 200 mm diameter may be ignored). Parked vehicles can cause visual obstructions, especially for children, and people using mobility devices. This may require restricting parking for some distance on each side of the crossing to ensure parked vehicles will not obscure the required sight lines. Where on-street parking needs to be maintained, kerb extensions at the crossing should be provided to improve the visibility of pedestrians.

Approach sight distance

Approach sight distances should be measured from the driver eye height (1.1 m) to ground level (0 m), which ensures that a driver is able to see any pavement markings and other cues at a crossing, and therefore be alerted to take the appropriate action if a pedestrian steps onto the crossing.

Approach sight distance (ASD) is calculated by:

$$ASD = \frac{R_T \times V}{3.6} + \frac{V^2}{254 \times (d + 0.01 \times a)}$$

Where:

- R_T is the driver reaction time (seconds), equal to 1.5 sec where drivers will be alert (eg in an urban area)
- V is the 85th percentile vehicle approach speed (km/h).
- d is the coefficient of deceleration, generally equal to 0.36
- a is a longitudinal grade in % (in direction of travel: positive for uphill grade, negative for downhill grade).

Table 3: Minimum approach sight distances based on the above equation and for different vehicle speeds and no gradient

Approach vehicle speed (km/h)	ASD (m)
10	5
20	13
30	22
40	34
50	48
60	64
70	83
80	103

Notes:

- Austroads Part 4A provides correction factors to account for road gradient if necessary
- In rural locations driver reaction times may be slower. The Austroads Guide to road design Part 4A includes approach sight distances assuming slower reaction times which may be more applicable in these instances.

The approach sight distances listed in the table above presume emergency braking and adequate skid resistance. It is important to assess the skid resistance of the roadway on the immediate approaches to a pedestrian crossing point. Treatment is justified if the skid resistance (sideways force coefficient) is less than 0.55.

3.4.3e Landscaping at crossings

Some pedestrian crossing aids, such as kerb extensions and pedestrian refuges, create opportunities for landscaping or public art. While this can improve the amenity of the street, it must not obscure visibility for pedestrians or other road users, such as drivers, particularly on the upstream side, at any time of the year.

The crossing aid must also continue to operate effectively during any landscaping maintenance, which means ensuring:

- drivers are not distracted by maintenance work or vehicles
- maintenance work or vehicles do not obscure pedestrian or driver visibility
- maintenance work or vehicles do not wholly or partially block pedestrian routes and force them to change direction
- loose material is not spilled into the pedestrian route
- auditory cues (important to vision impaired pedestrians) are not obscured.

For further guidance on landscaping, see section 3.6.1. Landscaping treatments in PNG: Supporting infrastructure.

3.4.3f Street lighting at crossings

Pedestrian crossing points need more intense lighting than footpaths to ensure they are conspicuous to pedestrians and that approaching drivers can see pedestrians clearly.

- AS/NZS 1158.3.1:2020 outlines requirements for lighting for pedestrians on local roads, intersections, pedestrian refuges, local area traffic management devices, pathways for pedestrians and people cycling, public activity spaces, connecting elements and car parks.
- AS/NZS 1158.4:2024 outlines requirements for lighting at pedestrian crossings.
- AS/NZS 1158.5:2014 outlines requirements for tunnels and underpasses.

Further guidance on street lighting, see section 3.6.5. Lighting in PNG: Supporting infrastructure.

3.4.3g Use of colour on crossings

The use of coloured surfacing or roadway art on or adjacent to crossings can highlight a crossing point, reinforce slow vehicle speeds and contribute to an attractive streetscape. However, the inappropriate use of colour or roadway art can be misleading or confusing for pedestrians and other road users.

Coloured surfacing beneath zebra crossings (eg red) can result in insufficient contrast beneath the crossing bars. The recommended approach that meets the needs of all road users and aligns with relevant legislation is to apply areas of red coloured surfacing on the vehicle approaches to zebra crossings as outlined in section 3.4.5a.

Roadway art is permitted under clause 5.6 of the Land Transport Rule: Traffic Control Devices (2004) (TCD Rule), provided that it:

- is installed in a lower risk environment (vehicle operating speeds of 30 km/h or less after the art and any other features have been installed)
- does not resemble and is not similar to an official road marking or sign (traffic control device), roadway art should not be confused with give way markings or zebra crossings for example
- does not mislead road users about the meaning of any traffic control device (official sign or marking) and
- is not part of or visually integrated into an official road marking.

For information on the use of coloured surfacing refer to section 3.6.6. Coloured surfacing in PNG: Supporting infrastructure.

3.4.3h Monitoring and maintenance

All pedestrian crossing points must be monitored so they continue to be appropriate for the location while operating safely and efficiently. They may need to be replaced by an alternative treatment if the types and/or numbers of pedestrians change or the speed, volume or composition of traffic changes substantially. Crossings should also be reviewed when nearby land use changes.

Crossing point design includes considering the cost and ease of maintenance, repair, reinstatement and replacement, especially in the materials used. It also includes considering the implications of maintenance for pedestrians and other road users.

Further guidance

PNG: Implementation and maintenance:

- Section 4.1. Maintenance and renewals
- Section 4.3. Monitoring and evaluation

3.4.4. Non-priority crossing aids

There are various crossing aids assisting some people to cross the road but do not give them right of way (that is, legal priority) over vehicles. They are: kerb crossings, kerb extensions, pedestrian/median refuges, pedestrian platforms and courtesy crossings. Note these crossing aids can be combined within one crossing.

3.4.4a Kerb crossings

Description

A kerb crossing aid consists of two kerb ramps on opposite sides of the road providing a smooth transition between the footpath and roadway that can be used by pedestrians to assist some of them to cross the road, as shown in the photo below.

Figure 11: Kerb crossing, Sumner, Christchurch. (Photo: Ben Jassin)

Contextual considerations

Benefits

- Guides some pedestrians to a place to cross.
- Provides a smooth transition between the footpath and roadway that can be used by pedestrians.

Implications

- Does not give pedestrians priority so can be unsuitable for less able and less confident pedestrians.
- Does not assist pedestrians to cross if street is wide.

Recommended parameters

- Operating speed 30 km/h or less.
- Only appropriate for low vehicle volume environment.
- Only appropriate for low pedestrian demands.
- Only appropriate where crossing distance is 9 m or less.

Legal considerations

The kerb and channel of any footpath must permit the safe and easy passage from kerb to kerb of any mechanical conveyance normally and lawfully used by a disabled person.

Refer to NZ Local Government Act 1974, s331(2), for more information.

Design considerations

Kerb ramps should be located opposite each other to provide the shortest crossing distance for pedestrians, and on their desire line. Refer to section 3.4.3c for detailed design guidance.

3.4.4b Kerb extensions

Description

Kerb extensions are a localised widening of the footpath at intersections or mid-block, which extend the footpath into and across parking lanes or the road shoulder to the edge of the traffic lane. Kerb extensions are also known as buildouts, outstands or blisters. They reduce the crossing distance for pedestrians. An example of a kerb extension is shown below.

Figure 12: Retrofit kerb extension, Brightwater. (Photo: Jeanette Ward)

Contextual considerations

Kerb extensions should also be considered to support other crossing types to minimise the distance pedestrians have to cross.

Benefits

- Reduces crossing distance and therefore crossing time.
- Improves safety of pedestrians because they are more visible to oncoming drivers and can view approaching traffic better.
- Creates space for pedestrians to wait without blocking others walking past.
- Physically prevents drivers from parking and blocking the crossing point.

- Can help to slow vehicle speeds by narrowing the road.

Implications

- Does not give pedestrians priority so can be less suitable for some pedestrian user groups, eg less abled or less confident pedestrians such as elderly or children.
- Can cause issues for people cycling particularly on narrower roads.
- Can create an obstruction that may be struck by people cycling and vehicles.
- Where the kerb alignment is being altered, they can create drainage issues and places where rubbish can accumulate ('stick on' extensions could overcome this if designed well).

Recommended parameters

- Should be a complementary treatment for other crossing types and aids to reduce the crossing distance.
- Only appropriate on their own for low pedestrian demands and vehicle volumes less than about 7500vpd.
- Do not use where any part of the kerb extension would protrude into a lane used by moving traffic or leave insufficient space for safe cycling.

Section 3.4.2d discusses the effect of kerb extensions on pedestrian delay compared with other treatments.

Kerb extensions on their own are most beneficial on roads with flows less than 500 vehicles per hour. They should also be used to support:

- pedestrian platforms (section 3.4.4d)
- zebra crossings (section 3.4.5a)
- signalised crossings (section 3.4.5c)
- and, where there is sufficient width, pedestrian or median refuges (section 3.4.4c).

Legal considerations

A road controlling authority (RCA) may provide a kerb extension to guide a pedestrian to a place at which to cross a roadway (TCD Rule, 8.8(4)) and the device must convey a clear and consistent message to road users (TCD Rule, 8.8(5)).

On its own, a kerb extension does not require a driver to stop their vehicle while a pedestrian crosses the roadway (TCD Rule, 8.1(2)).

Design considerations

When considering the installation of kerb extensions, the following should be considered:

- Kerb ramps (installed partly or wholly within the kerb extensions) should be installed in combination with kerb extensions to provide a smooth transition from the footpath to the kerb extension area.
- Ensure sufficient width for people cycling past the kerb extension.
- Whether on-street parking spaces should be marked, and/or no stopping lines included around the kerb extensions to ensure vehicle parking occurs away from the crossing aid.
- A kerb extension can be co-located at a residential driveway to minimise on-street parking loss.
- Landscaping and street furniture must not obscure visibility for both pedestrians and drivers, particularly on the upstream side, at any time of the year. For more information refer to section 3.4.3e and to section 3.6.2 Street furniture in PNG: Supporting infrastructure.

Design elements

Kerb extensions should comply with the general dimensions in the table below. An example of a mid-block kerb extension is shown in Figure 7-1 of the Traffic control devices manual (TCD manual) Part 5.

Table 4: Kerb extension design elements

Element	Requirement	Additional information
Extension depth	0 m to 7 m, typically 2 m to 4 m	Ensure the depth does not create a pinch point for people cycling by providing adequate lane widths. Further information on lane widths with and without cycle lanes is provided in the CNG and here.
Extension length	At least 3m.	The length should be based on the potential number of pedestrians waiting to cross, so it is also affected by the extension depth.
Approach length	2 m to 5 m.	
Departure length	2 m to 8 m.	
Curve radii	0.5 m to 6.5 m, typically above 5 m (concave). 0.5 m to 5 m, typically above 2 m (convex).	Above 5 m facilitates mechanical street sweeping.
Lighting	In accordance with AS/NZS 1158.3.1: 2020 Lighting for roads and public spaces Part 3.1: Pedestrian area (Category P) lighting – Performance and design requirements.	Further information is provided in section 3.6.5. Lighting in PNG: Supporting infrastructure.
Signs and roadway markings	Width markers on upstream approaches.	It is advisable to paint the kerbs with white or reflective paint. Parking controls and no stopping markings may be required.
Tactile indicators	Warning indicators required. Directional indicators required unless crossing is on the accessible path of travel.	Further information is provided in section 3.1.3. Designing for blind and low vision people in PNG: Pedestrian design principles.
Overdimension routes	Provide a clear width of at least 10 m.	Further information is provided in section 3.4.3b.

3.4.4c Pedestrian/median refuges

Description

Pedestrian refuges, also known as refuge islands or pedestrian islands are elongated, raised portions of pavement within the roadway that provide a place for pedestrians to wait whilst undertaking a staged crossing of a road. Pedestrian refuges can be contained within a flush median. Examples are shown below.

Figure 13: Pedestrian waiting in refuge to cross second traffic stream on Linwood Ave, Christchurch. (Photo: Ben Jassin)

Figure 14: Pedestrian refuge, Christchurch. (Photo: Ann-Marie Head)

Median refuges are provided within a continuous raised median and are similar to pedestrian refuges in that they provide a place for pedestrians to wait whilst undertaking a staged crossing of a road. An example of a median refuge is shown below.

Figure 15: Median refuge, Hereford Street, Christchurch. (Photo: Ann-Marie Head)

Contextual considerations

Benefits

- Splits up the crossing distance for pedestrians.
- Simplifies the crossing task as pedestrians only need to find gap in one stream of traffic at a time.
- Can reduce delays to pedestrians.
- Can help to slow vehicle speeds by narrowing the traffic lanes.

Implications

- Does not give pedestrians priority so can be less suitable for some pedestrian user groups, eg less abled or less confident pedestrians such as elderly or children.
- Can cause issues if cycling is expected to occur adjacent to vehicle traffic, wider traffic lanes would be required (at least 4.2 m wide). Alternative provision for people cycling such as cycle bypasses could be used or narrow the lanes.
- Can create an obstruction that may be struck vehicles.
- Can restrict vehicle access to adjacent driveways.

Recommended parameters

- Appropriate for low to medium pedestrian demands.
- Also appropriate for high pedestrian demands in a low speed environment if an alternative priority crossing is nearby.
- Could be appropriate on multilane high-volume roads with a solid median if vehicles arriving in waves with sufficient gaps.
- Should be combined with kerb extensions to further reduce crossing distance where space permits.
- Must be designed so the refuge storage area does not cause issues for people cycling.

The effect of pedestrian/median refuges on pedestrian delay compared with other treatments is discussed in section 3.4.2d.

On their own pedestrian/median refuges are most beneficial on roads where vehicle flows are less than 7500 vehicles per day. Pedestrian/median refuges can be combined with kerb extensions (section 3.4.4b) and platforms (section 3.4.4d).

Pedestrian/median refuges permit a staggered layout when used at zebra crossings (section 3.4.5a) and signalised crossings (section 3.4.5c).

Legal considerations

A pedestrian/median refuge is a type of traffic island. An RCA may provide a traffic island to guide a pedestrian to a place at which to cross a roadway (TCD Rule, 8.8(4)) and the device must convey a clear and consistent message to road users (TCD Rule, 8.8(5)). One of the reasons an RCA can install a traffic island is to provide protection for pedestrians, people cycling or other road users crossing a road.

When providing a raised traffic island an RCA must install reflectorised signs and markings and delineation on the road beside the island to inform drivers of the presence of the island (TCD Rule, 7.7(1&2)).

Design considerations

When considering the installation of pedestrian refuges/medians, the following should be considered:

- Pedestrian refuges should be built as kerbed islands – 0.15 m to 0.18 m above the road's surface.
- They should have a different colour from the road.
- They should be easily accessible by pedestrians, ie step-free.
- Low landscaping or signage can be included on the refuge or median, but cannot obscure pedestrians (including children or people in wheelchairs).
- Kerb ramps on the adjacent footpaths must be provided (see section 3.4.3c).

If there is another pedestrian refuge nearby, consider linking the two with a continuous raised or flush median. If a flush median already exists, it should be smoothly widened if necessary to enclose the raised island. Traffic lanes should never terminate immediately before an island.

When providing pedestrian refuges, or any device that narrows the roadway, it is important to maintain enough width for people cycling and vehicles to pass each other or alternatively the traffic lanes should be narrow so that people cycling and drivers travel in single file and share the lane. The appropriate width must be maintained along all approaches and departures, so in constrained situations this may mean removing car parking.

Refer to the TCD manual Part 5 and CNG for appropriate dimensions depending on the context and speed environment (cycle lane widths and wide and narrow traffic lane widths).

There are three different pedestrian refuge layouts: the straight walk-through, the angled walk-through and the chicane. A common feature to all these pedestrian refuge types is that the walk-through area is at

roadway level (ie step-free). Regardless of the layout, pedestrian refuge islands should be designed to fit at least one mobility scooter and rider. These layouts are illustrated and described below.

Straight walk-through

The straight walk-through is a common layout that provides direct access for pedestrians.

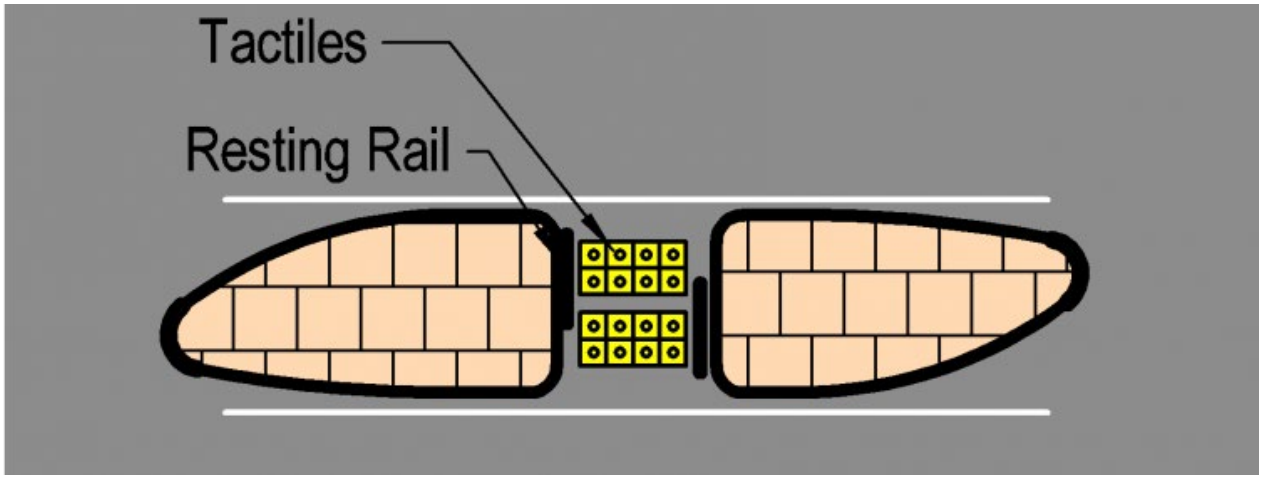


Figure 16: Straight walk-through layout option

Angled walk-through

Also known as a diagonal refuge, the angled walk-through may be appropriate for larger, wider pedestrian refuges as pedestrians are turned to face oncoming vehicles. Note an angle in the opposite direction is not appropriate as pedestrians are directed away from oncoming vehicles.

The ‘points’ on the cut-through can be potential trip hazards and tactile indicators are more complex to lay out.

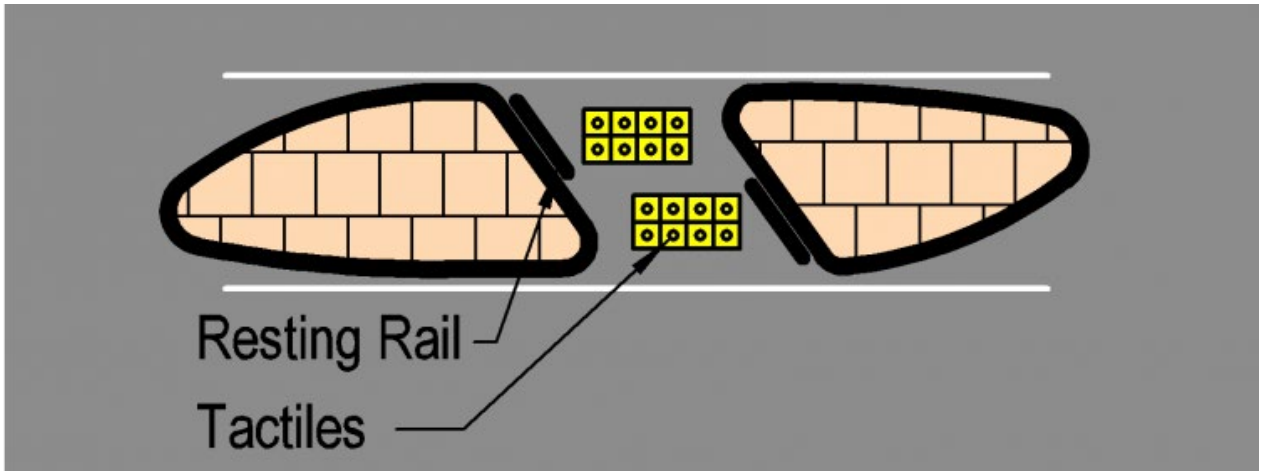


Figure 17: Angled walk-through layout option

Chicane

The chicane layout is generally a last resort option for stand alone pedestrian refuges but can be useful for median divided roads combined with traffic signals or zebras where the stagger clearly creates two crossings that operate separately. A chicane arrangement can hold more pedestrians on narrow roads. Physical barrier can be provided to guide pedestrians through the island. This can itself present a safety hazard under vehicle impact and increases maintenance requirements.

This layout also increases crossing distances and can be difficult for people with prams, wheelchairs and cycles to negotiate hence the through route through a chicane refuge should provide for the manoeuvring

of mobility scooters. For more information on the design for mobility scooters, refer to Horizontal geometric design for mobility scooters (TAN #21-06).

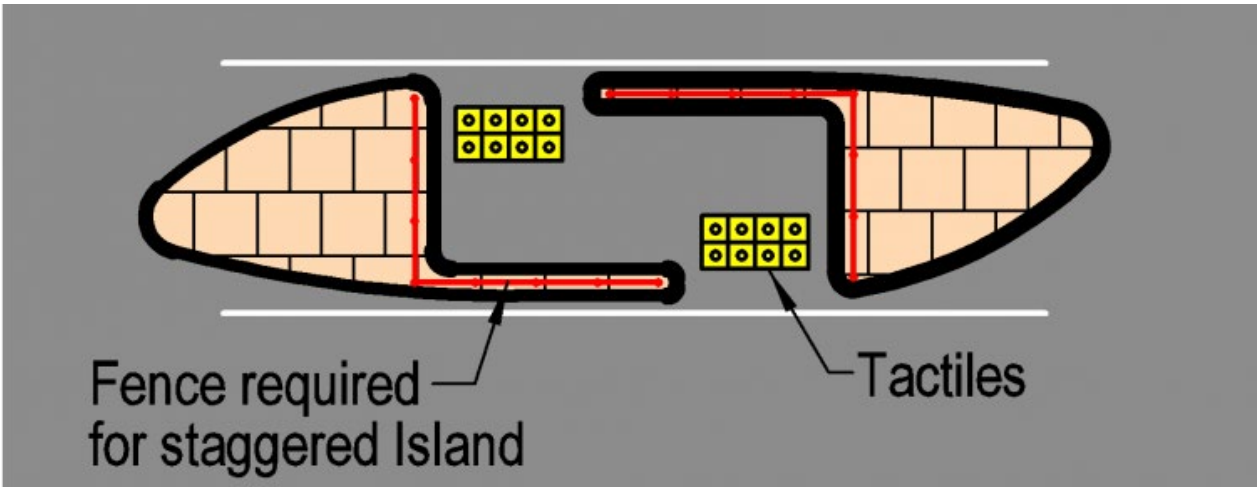


Figure 18: Chicane layout option

Design elements

The table below outlines the design elements of pedestrian refuges. Figure 7-2 of the TCD manual Part 5 shows a typical pedestrian refuge layout.

Table 5: Design elements of pedestrian refuges

Element	Requirement	Additional information
Islands (if a pedestrian refuge)	Length at least 8 m.	Site specific according to: • the road type (larger islands on busier, wider roads) • the potential number of pedestrians waiting on the island • possible vehicles turning into adjacent accesses.
Approach nosing taper	1 in 10 or refer to council specifications.	
Approach nosing radius	0.6 m or refer to council specifications.	
Median depth	At least 1.8 m, preferably 2 m.	This is required so that waiting pedestrians and their belongings do not protrude into adjacent traffic lanes. Consider an increased depth (2.5 m) where people cycling will use the refuge (for example where the refuge connects to a shared path). Where the roadway has a constrained width, the desirable width can be achieved by narrowing the traffic lanes.
Width of route through refuge	At least 1.8 m or the width of the adjacent kerb ramps (whichever is greatest).	The actual width should be based on the potential number of pedestrians waiting on the island, so it is also affected by the island's depth. The route through the island should accommodate mobility scooters. See Horizontal geometric design for mobility scooters (TAN #21-06).

Element	Requirement	Additional information
Holding rails (also known as resting rail)	1 m high. At least 0.35 m from the kerb face at the edge of adjacent traffic lane(s).	Ideally two holding rails either side or one central rail are provided to give choice for people who may only have use of one side of their body. Rails should be frangible to avoid injury to drivers whose vehicles leave the roadway, and built of iron pipe or some other such material (refer to holding rail recommended design below). Holding rails should be conspicuous and painted in a contrasting colour to their surroundings. They should not reduce the route width to below the minimum and should have a bar near ground level that the vision impaired can detect with a cane.
Lighting	In accordance with AS/NZS 1158.4:2024	Some RCAs have used a white globe (similar to a Belisha beacon) mounted on a 4 m high white pole within the island. Floodlighting (as used for zebra crossings) has also been used. Lighting poles on islands must fold down for overdimension loads.
Island kerbing	Mountable splay kerbs.	Other kerbs are only acceptable if the traffic lanes more than 3 m wide and the island is wider than 2 m. It is advisable to paint the island kerbs with white or reflective paint.
Signs	R3-13 (‘keep left’).	Keep left signs installed as close to the island ends as possible and facing oncoming vehicles. Not required if refuge is within a continuous median. No more than 0.15 m between the bottom of the sign and the island surface.
Roadway markings	Refuge island is fully contained within a flush median.	Flush median paint marking including end tapers are provided in the TCD manual Part 5
Overdimension routes	Maintain at least 10 m wide and 6 m high envelope.	To achieve this envelope islands may need to have mountable kerbs and load bearing surfaces, with signs, poles and rails that can be removed or folded at ground level. Refer to 3.4.3b.
Tactile indicators	Warning indicators are required.	Refer to TCD manual Part 5 for indicative layouts for different refuge types. Further information is provided in section 3.1.3. Designing for blind and low vision people in PNG: Pedestrian design principles.

Figure 19 shows the recommended holding rail design. It includes a lower bar that enables people using a cane to detect the rail.

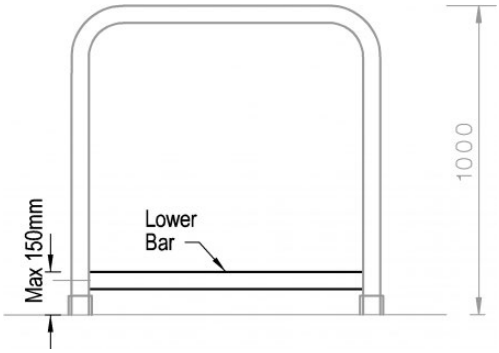


Figure 19: Holding (resting) rail recommended design

Chicane type pedestrian/median refuges should have a physical barrier to encourage pedestrians to cross at the cut through or kerb ramps provided. The barrier should provide good visual contrast with the surrounding environment. An example of a chicane pedestrian refuge is shown below.

Figure 20: Chicane pedestrian refuge, Amberley. (Photo: Jeanette Ward)

The location of warning tactile indicators on pedestrian refuges or medians depends on the depth of the waiting space and whether the cut through is staggered. Directional indicators should only be installed between the warning indicators where there is no kerb to follow or where other cues are insufficient.

Further guidance

- Section 3.1.3. Designing for blind and low vision people in PNG: Pedestrian design principles.
- RTS 14 – Guidelines for facilities for blind and vision impaired pedestrians.

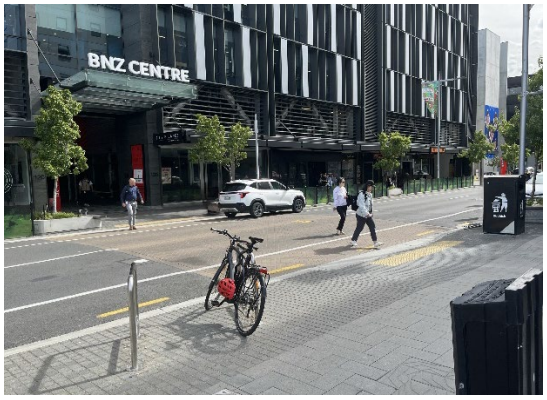
3.4.4d Pedestrian platforms

Description

Pedestrian platforms are crossing aids for pedestrians raised above the roadway level. Because they are raised, they also act as a speed management device. They generally have a flat top and sit flush with the kerbs. Pedestrians must still give way to vehicles.

Pedestrian platforms can support other forms of control such as zebra crossings and signalised crossings.

Table 6: Courtesy crossings and pedestrian platforms – what's the difference?

Courtesy crossing	Pedestrian platform
	 7
Courtesy crossings are intended to facilitate eye contact between pedestrians and drivers resulting in a mutually negotiated position over who goes first.	On their own pedestrian platforms provide a focus for pedestrians to cross, however pedestrians must still give way to vehicles.
Vehicle operating speeds very low, at most 30 km/h, ideally 20 km/h or less. The lower the speed the more effective the crossing as vehicles are going slower so are more likely to be courteous to pedestrians wishing to cross.	Vehicle operating speeds less than 50 km/h (the platform should be designed to slow vehicle speeds to 30 km/h).
Likely to be found on Activity streets, and Main streets where pedestrian volumes are high.	Likely to be found on Local streets and Activity streets.
It can be on a platform with steep approach ramps to reduce vehicle speeds.	On a platform with approach ramps to reduce vehicle speeds.
Crossing colour/texture should contrast with the road and footpath to indicate both users are guests over the crossing.	Crossing colour/texture should contrast with the footpath to indicate that pedestrians do not have priority and ideally be the same material as the road.
Ideally more suitable for low vehicle volume roads (up to 7500vpd depending on the road context).	

Contextual considerations

Benefits

- Guides pedestrians to a safer place to cross.
- Reduces or helps to reinforce slower vehicle speeds.
- Can eliminate grade changes from the pedestrian route and therefore the need for kerb ramps.

Implications

- Does not give pedestrians priority so can be less suitable for some pedestrian user groups, eg less abled or less confident pedestrians such as elderly or children.
- Can result in less safe use if pedestrians assume they have right of way and drivers are not courteous.
- Can create discomfort for vehicle occupants travelling over platforms if not well designed (particularly buses).

[7] Pedestrian platform, Christchurch. (Photo: Ben Jassin) Note: shows old zig zag markings

- May increase noise as vehicles brake, slow, pass over them and then accelerate (particularly heavy vehicles).

Recommended parameters

- Platform ramps and other features should be designed to slow speeds to 30 km/h or less.
- Ideally more suitable for low vehicle volume roads (up to 7500vpd depending on the road context)
- Only appropriate for low pedestrian volumes.
- Should be combined with kerb extensions to minimise crossing distance.
- Crossing should be of an appearance and colour that is clearly distinguishable from the footpath to indicate that pedestrians do not have priority.

Pedestrian platforms can be combined with other elements such as kerb extensions (section 3.4.4b), pedestrian refuges (section 3.4.4c) and zebra crossings (section 3.4.5a)

Legal considerations

Platforms can be installed to guide pedestrians to a place at which to cross a roadway. A platform on its own does not require a driver to stop their vehicle while a pedestrian crosses the roadway (TCD Rule, 8.1(2)).

The rule also imposes obligations to ensure the platform:

- has the appropriate signs, markings, delineation and illumination
- has no permanent vegetation, traffic control device or other object placed on it impairing visibility
- is safe and appropriate for the road, its environment or the use of the road
- conveys a clear and consistent message to all road users
- is placed so as to be visible to road users and allow adequate time for their intended response.

Design considerations

Besides the considerations mentioned in the TCD Rule, it is important to note that pedestrian platforms on their own do not require a driver (or a person cycling or motorbiking) to stop and give way to pedestrians and as such pedestrians need to be aware that they do not have priority over other road users on a pedestrian platform. Hence a clear demarcation between the roadway and the footpath must be provided in the following ways:

- The material used on top of the platform must be significantly different in colour and/or texture from the footpath but can be the same colour/texture as the roadway.
- There should be a clear demarcation between the platform and the footpath, for example using a white concrete kerb or line between the edge of the platform and the footpath.
- Tactile warning indicators must be used at the boundary with the platform.

Platforms must either be flush with the footpath (so no kerb ramps necessary) or the transition between the footpath and the platform must provide for the smooth passage of all pedestrians including those using small wheels. It is noted that at some existing pedestrian platforms, the edges taper to the drainage channels, however these are generally not desirable for pedestrian crossing locations.

Bollards or other access control devices should not be used where they would restrict access by mobility devices or create a tripping hazard.

Drivers (and other road users, eg people cycling) should be made aware of a pedestrian platform in good time so they are able to reduce their speed, for example they should not be located immediately after a sharp bend. Markings are also required on the approach ramps as the driver's view of the top of the platform is restricted.

Design elements

Pedestrian platforms must adopt a flat top profile. The recommended approach ramp grades to achieve Safe System impact speeds are detailed in the table below. These grades optimise the likelihood of vehicles slowing to the desired speed on the approach to a pedestrian platform. Easing of ramp grades below the values listed may be considered to accommodate certain road users, such as heavy vehicles, emergency vehicles, buses or cycles. However, this needs to be balanced against the impact if most road users are able to traverse the platform without slowing down thus reducing the effectiveness of the platform.

Table 7 outlines the design elements for pedestrian platforms. Figure 14-5 of the TCD manual Part 5 shows a typical layout for a pedestrian platform.

Table 7: Design elements for pedestrian platforms

Element	Requirement	Additional information
Platform height	100 mm recommended.	75 mm may be considered where site constraints and traffic composition suggest a lower height profile is suitable (ie on bus routes). 150 mm may be considered for low speed (<50 km/h) and low traffic volume environments.
Platform length	Minimum length 2 m. Maximum length 6 m.	On bus routes: • 6 m may be considered. • The top of the device should be at least the length of the wheelbase for the longest bus likely to use the road.
Approach ramp gradient	At least 1:15 for 30 km/h platform speed, steeper ramps are more effective in slowing vehicle speeds. 1:20 for 40 km/h platform speed or for bus routes; or 1:25 for 50 km/h platform speed but these ramp gradients are not safe system compliant for pedestrian crossings.	Ramp grade should be designed to achieve the required Safe System impact speed (30 km/h or less) prior to entering the conflict point. Steeper ramp gradients are more effective in lowering vehicle speeds over the platform.
Departure ramp gradient	Maximum 1:35.	Where the platform is located on an undivided roadway, the departure ramp gradient will be the same as the approach ramp gradient.
Ramp markings	The face visible to approaching drivers should be marked with hump ramp markings.	Further information can be found in the TCD manual Part 5.
Surfacing/colour	The platform surface should be clearly distinguishable from the footpath and ideally the same material as the road.	Also refer to roadway art guidance found in section 3.6.6. Coloured surfacing in PNG Supporting infrastructure.
Tactile indicators	Warning indicators are required and directional indicators may be necessary.	Further information is provided in section 3.1.3. Designing for blind and low vision people in PNG: Pedestrian design principles.
Signage	W14-4 Hump warning sign is required.	Further information can be found in the TCD manual Part 5.
Lighting	In accordance with AS/NZS 1158.3.1: 2020	Further information can be found in section 3.6.5. Lighting in PNG: Supporting infrastructure.

Surfacing materials

A wide variety of surfacing material can be used on pedestrian platforms, however they must:

- be highly durable
- be able to withstand the impact of moving vehicles
- retain their colour, texture and/or contrast well
- have a high skid resistance, with a sideways force coefficient higher than 0.55
- bond well with road marking material
- be compatible with underlying or adjacent material
- minimise the effects of glare, bright sky reflection and wet roads at night.

3.4.4e Courtesy crossings

Description

Courtesy crossings are usually made of distinctive materials (eg bricks) and may be raised above the level of the road. Courtesy crossings are intended to facilitate eye contact between pedestrians and drivers (as well as people cycling and on motorbikes) resulting in a mutually negotiated position over who goes first. However, this can create uncertainty between road users as to who has the right of way, which can be very uncomfortable (or unacceptable) for some pedestrians.

I don't really like to eyeball a driver so I prefer zebra crossings and traffic signals. Usually I can work out my own way to go that has the crossings I like but sometimes it means a much longer walk which is hard if I'm trying to get somewhere in a hurry.

Josh[8]

Courtesy crossings should provide a place where drivers can stop safely to allow pedestrians to cross. Drivers are not required to stop at courtesy crossings, however the official New Zealand road code recommends that drivers are courteous to pedestrians using or waiting to use a courtesy crossing.

An example of a courtesy crossing is shown in Figure 21.

[8] For more information about the personas, see 2.1.1c in PNG: Planning.

Figure 21: Courtesy crossing, Christchurch. (Photo: James Wratt)

For the differences between courtesy crossings and pedestrian platforms see Table 6.

Contextual considerations

As courtesy crossings are not obvious to both pedestrians and drivers, their use is generally discouraged except where the pedestrian volumes are very high and vehicle volumes and speeds are low. Courtesy crossings may be appropriate in locations where there are alternative priority crossing(s) located nearby as this provides crossing choice particularly for less able and less confident pedestrians.

Benefits

- Intended to facilitate eye contact between pedestrians and drivers (as well as people cycling and on motorbikes) resulting in a mutually negotiated position of who goes first.
- Can improve pedestrian safety and level of service while causing minimal delay to vehicles.
- Can result in courteous behaviour where drivers give way to pedestrians.
- If raised, can eliminate grade changes from the pedestrian route and therefore the need for kerb ramps.

Implications

- Are not obvious who has right of way so can create uncertainty and can be unsuitable for some pedestrians, eg less able or less confident pedestrians such as elderly or children.
- Can result in less safe use if pedestrians assume they have right of way and drivers are not courteous.

- If raised, can create discomfort for vehicle occupants travelling over platforms if not well designed (particularly buses).
- If raised may increase noise as vehicles brake, slow, pass over them and then accelerate (particularly heavy vehicles).

Recommended parameters

- Not obvious who has right of way, so their use is discouraged except where pedestrian volumes are very high and vehicle volumes and speeds are low and where alternative priority crossings are located nearby as this provides crossing choice particularly for less able and less confident pedestrians.
- May be suitable on Activity streets and Main streets where pedestrian volumes are significant (high).
- Ideally more suitable for low vehicle volume roads (up to 7500vpd depending on the road context)
- Only appropriate for crossing distances 7 m or less (can combine with kerb extensions to achieve) as only used in slow speeds where people cycling share the roadway with vehicles.
- Should be on a raised platform unless in very slow speed environments.
- Crossing should be a colour that contrasts with both the adjacent roadway and footpaths.
- Courtesy crossings can be combined with other infrastructure such as kerb extensions (section 3.4.4b) and pedestrian refuges (section 3.4.4c).

Legal considerations

Courtesy crossings are not specifically mentioned in the TCD Rule. However, the following rules about traffic control devices apply.

An RCA may provide signs, markings, surface texture or raised platforms or kerb extensions and traffic islands or other techniques to guide a pedestrian to a place at which to cross a roadway (TCD Rule, 8.8(4)).

If an RCA installs a device as above that does not require a driver to stop their vehicle to allow a pedestrian to cross the roadway, the RCA must ensure that the device conveys a clear and consistent message to road users (TCD Rule, 8.8(5)).

Design considerations

When considering the installation of courtesy crossings, the following should be considered:

- a coloured surface, using a colour that contrasts with both the adjacent roadway and footpaths
- a low-speed environment (operating speeds <= 30 km/h; ideally even lower).

Design elements

Design details for courtesy crossings should be consistent with each element including provision of tactile indicators and handrails. More information about these design elements can be found in sections: 3.4.4b (kerb extensions), 3.4.4c (pedestrian/median refuges) and 3.4.4d (pedestrian platforms).

Table 8: Design elements for courtesy crossings

Element	Requirement	Additional information
If crossing includes a platform: platform height, length, gradients, ramp markings, platform signage	As per pedestrian platforms, see Table 7.	Note, courtesy crossings require vehicle approach speeds to be 30 km/h or less, so platform ramp gradients need to be designed to support this requirement.
Surfacing/colour	The platform surface should be clearly distinguishable from the footpath and the roadway to indicate that neither pedestrians or vehicles have priority and to encourage courteous behaviour.	Section 3.6.6. Coloured surfacing in PNG: Supporting infrastructure.
Tactile indicators	Warning indicators are required and directional indicators may be necessary.	RTS 14 – Guidelines for facilities for blind and vision impaired pedestrians.
Lighting	In accordance with AS/NZS 1158.3.1: 2020.	Section 3.6.5. Lighting PNG: Supporting infrastructure.

3.4.5. Priority crossings

Priority crossings provide pedestrians legal priority over vehicles. These can be zebra crossings or signalised crossings, or their raised variations.

Note that crossing aids can be installed with these crossings to support pedestrians to cross.

3.4.5a Zebra crossings

Description

Although legally described in New Zealand's traffic legislation as a 'pedestrian crossing', a priority crossing featuring white striped bars running from kerb to kerb across the road is commonly known as a 'zebra crossing'. Vehicles are required to give way to pedestrians approaching or using the zebra crossing. An example of a zebra crossing is shown in Figure 22.

Figure 22: Zebra crossing, Geraldine. (Photo: Ann-Marie Head)

Contextual considerations

Benefits

- Gives pedestrians priority resulting in minimal delays for pedestrians.
- Are obvious for all road users as a place for pedestrians to cross.

Implications

- Zebra crossings safety performance can be enhanced by using other measures like kerb extensions, median refuge or vertical deflection.
- High pedestrian flows can dominate and cause vehicle delays, which may be acceptable depending on the street function (One Network Framework).

Recommended parameters

- Posted speed of 50km/h or less (>50 km/h posted speed requires approval from NZ Transport Agency Waka Kotahi as per TCD Rule Clause 8.2(2)).
- Maximum of one traffic lane in each direction to avoid vehicle in adjacent lanes blocking visibility of people crossing or waiting to cross.
- More suitable for medium to high pedestrian demand so drivers are expecting pedestrians.

Zebra crossings can be combined with other elements including kerb extensions, and pedestrian refuges or installed on a platform when they are known as raised zebra crossings.

Guidance on the design of dual use crossings for pedestrians and people cycling can be found in the CNG.

Vehicle speed is a critical factor for whether drivers yield to pedestrians. As vehicle speeds increase, the percentage of drivers who yield to pedestrians at a priority crossing decreases dramatically as shown in the figure below. Hence the conspicuity of the zebra crossing should be enhanced with other elements such as for example through its vertical deflection or kerb extensions.

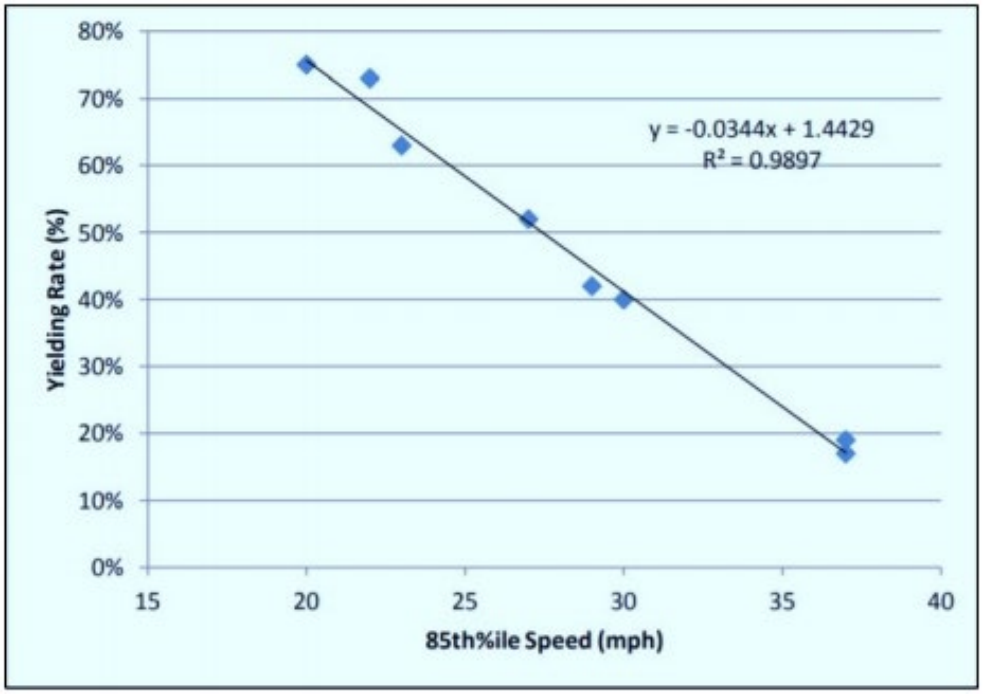


Figure 23: Inverse relationship between the rate of drivers yielding to pedestrians and approach traffic speed[9]

Table 9 highlights considerations for the location of zebra crossings.

Table 9: Location considerations for zebra crossings

Factor	Potential difficulties	Solution/mitigation
Posted speed > 50 km/h	Drivers are less likely to give way to pedestrians. Specific approval is required from NZ Transport Agency Waka Kotahi where the speed limit exceeds 50 km/h.	Reduce speeds. Consider alternative crossing types.
Multi-lane or divided roads	Stationary vehicles can obscure pedestrians. Some drivers may overtake a car stopped in another lane.	Reduce to single lane in each direction. Consider alternative crossing types.
Close to intersections	Drivers' focus can be on the intersection rather than the crossing. Forward visibility of the crossing may be less than desirable.	Ensure vehicle speeds are low (this can be reinforced through for example a platform at the zebra crossing). Set back the zebra crossing to provide space for a turning vehicle to yield to pedestrians out of the stream of through traffic. Consider alternative crossing types.

[9] Bertulis, T., & Dulaski, D. M. (2014). 'Driver approach speed and its impact on driver yielding to pedestrian behavior at unsignalized crosswalks.' *Transportation Research Record*, 2464(1), 46−51.

Legal considerations

Drivers approaching a pedestrian crossing must give way to pedestrians on the pedestrian crossing or obviously waiting to cross it and who are not behind a school patrol sign. 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 (Road User Rule, 10.1).

Pedestrians must not suddenly enter a pedestrian crossing when an approaching vehicle is so close that the driver is unable to give way to the pedestrian (Road User Rule, 11.5).

There are many traffic control device requirements for zebra crossings (TCD Rule, 8.2). Key points include that:

- Approval from NZ Transport Agency Waka Kotahi is required to mark a pedestrian crossing on a road (ie a zebra crossing) with a speed limit over 50 km/h.
- It must be marked in reflectorised white, or if white does not contrast with the colour of the adjacent roadway then it must be resurfaced or marked to provide contrast.
- It must not exceed 15 m across the roadway unless it is interrupted by a traffic island(s) to form multiple pedestrian crossings.
- Markings must be placed, as far as practicable, either at right angles to the middle line of the roadway or so as to provide the most convenient route for pedestrians.
- It must be placed so that it is visible to a driver approaching the crossing from any direction and the driver's view of the entire length of the pedestrian crossing is unobstructed by any permanent growth (vegetation), construction or physical feature.
- It must be kept illuminated when street lights are operating.
- For specific signs and marking requirements see TCD Rule, 8.2(9−12).

Any crossing not meeting the requirements specified in the TCD Rule makes enforcement of road user obligations difficult by providing a technical defence to an errant user.

Design considerations

When considering the installation of zebra crossings, the following should be considered:

- Flush medians must not be used to interrupt zebra crossings. They should be terminated either side of the crossing, with a pedestrian island installed in the centre, to divide the crossing into two stages.
- Kerb ramps on the adjacent footpaths provide access to zebra crossings.
- Zebra crossings should not be longer than 10 m (although they may be legally up to 15 m long). Where a longer distance is likely, kerb extensions should be used to reduce the distance travelled in one crossing movement. If kerb extensions cannot be used, pedestrian refuges may be installed instead, noting this legally divides the crossing into two stages which can be problematic in terms of drivers giving way.
- Parking should be restricted close to a zebra crossing through the use of kerb extensions and/or no stopping lines. Because parked vehicles can impact on drivers' sightlines, making it difficult to see pedestrians waiting to cross.[10]
- Cycle lanes or cycle paths across zebra crossings require careful treatment.

[10] Huard, K. (2021). 'Zebra crossings: a threatened species in New Zealand?' 2Walk and Cycle conference paper.

Further guidance

- For kerb ramp design, refer to section 3.4.3c
- For kerb extensions, refer to section 3.4.4b
- For pedestrian/median refuges, refer to section 3.4.4c
- For sight distances, refer to section 3.4.3d
- TCD Manual Part 5 – Cycle lanes at pedestrian crossings.

Design elements

The tables below outline the markings, signs and other design elements for zebra crossings. Further detail on the traffic control device elements is provided in TCD Manual Part 5 – Pedestrian crossings (zebra).

Typical layouts for zebra crossings are shown in the TCD Manual Part 5, Figure 7-10 (zebra with kerb extensions) and Figure 7-12 (zebra with pedestrian refuge island in a flush median).

Table 10: Marking requirements for zebra crossings

Element	Requirement	Additional information
Crossing bars	Bar width = 600 mm. Gap = 600 mm. Bar length = 2.0 m minimum.	The bars should be marked parallel to the direction of approaching vehicles and so as to provide the most convenient route for pedestrians. Markings must be reflectorised white and the roadway must contrast with the white crossing bars. Note: Existing zebra crossings can be remarked using an interim format with bar widths of 450 mm with 450 mm gaps.
Centre-line	A centre-line should be marked.	A centre-line should be marked if there is not one. The centre-line should stop short of the crossing point at the limit line.
Limit lines	300 mm minimum limit lines are required.	Located 5 m in advance of the crossing bars.
No-stopping lines	No-stopping lines should be marked.	No-stopping lines should be marked not more than 1 m out from the kerb or edge of seal and for a minimum distance of 6 m prior to the crossing bars. This distance should be increased to 15 m where operating speeds are greater than 30 km/h.
Advance warning diamond	Diamond symbol is good practice but optional.	If marked, the diamond should be at least 50 m in advance of the crossing bars. There may be situations where installation of an advance warning diamond would conflict with other markings or be confusing to road users. In these situations, the diamond should be omitted.

Sufficient contrast should be provided between the crossing bars and the roadway. Therefore use of paving, such as shown in Figure 24, or red or pink colouring between the white bars does not provide sufficient contrast.

Figure 24: Paved zebra crossing providing insufficient contrast of white bars. (Photo: Jeanette Ward)

Table 11: Signage requirements for zebra crossings

Element	Requirement	Additional information
W16-2 Pedestrian crossing	Must be installed in advance of all marked pedestrian crossings.	Installation as per Table 7-6 of the TCD manual Part 5 – Pedestrian crossings (zebra)
W16-3 Belisha beacon disc or Belisha beacon on black and white poles	Belisha beacon disc or a Belisha beacon installed on black and white poles located within 2 m of each end of the zebra crossing.	

Table 12: Other design elements and considerations for zebra crossings

Element	Requirement	Additional information
Tactile indicators	Warning indicators are required and directional indicators may be necessary	Refer to section 3.1.3. Designing for blind and low vision people in PNG: Pedestrian design principles.
Lighting	Crossings must be illuminated at night. If the road controlling authority (RCA) is of the opinion that the crossing will not be used at night, it must still be illuminated by street lighting.	Lighting for zebra crossings should meet the requirements of AS/NZS 1158.4: 2024 Lighting of pedestrian crossings).
Warning lights	On road flashing lights are rarely installed as they are relatively expensive to install and maintain and other measures to enhance safety at zebra crossings should be considered first. These include lowering vehicle speeds, vertical separation (ie raised zebra) or conversion to a different crossing type (eg. signalised crossing).	Further guidance on the installation of warning lights can be found in the TCD manual Part 5 – Illuminated markings and markers.
Use of coloured surfacing treatment	Coloured surfacing treatment is optional. A recommended approach to highlight zebra crossings whilst ensuring that sufficient contrast is provided between the crossing bars and roadway is the use of coloured (eg red) surfacing on the vehicle approaches to the zebra crossing.	Further guidance on the appropriate coloured surfacing treatment is provided below.

Use of coloured (eg red) surfacing treatments

Some RCAs highlight the presence of a zebra crossing to road users using coloured surfacing. However, the use of coloured (red) surfacing should only be used, or approved, by an RCA in a manner that compliments and enhances regulatory markings and signs.

When installing coloured surfacing it is important that sufficient contrast is provided between the crossing bars and the roadway for all road users. For example, visually impaired road users have reported that red and pink colouring between the white bars does not provide adequate contrast. Red coloured surfacing is permitted under the TCD Rule provided it is not part of or visually integrated into an official road marking. Refer to section 3.6.6. Coloured surfacing in PNG: Supporting infrastructure for further information.

Hence it is not recommended to apply red coloured surfacing immediately beneath the zebra crossing bar markings.

A recommended approach that meets the needs of all road users and aligns with the above legislation is to apply areas of (red) coloured surfacing on the vehicle approaches to zebra crossings as shown in the figures below with dimensions outlined in the following table.

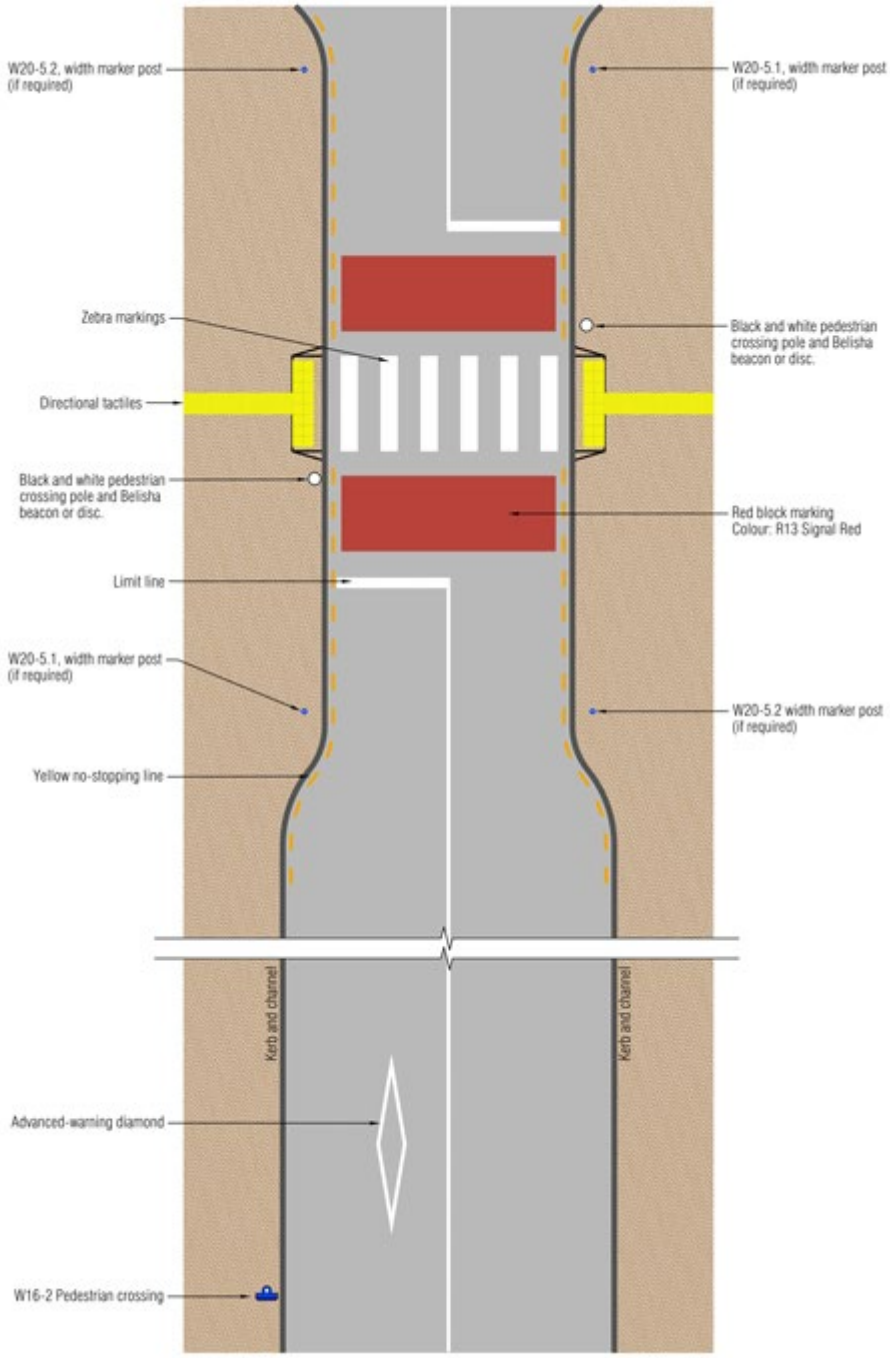


Figure 25: Typical layout for zebra crossing with red surfacing treatment

If using red coloured surfacing, the recommended red is R13 Signal Red, as set out in NZ Transport Agency Waka Kotahi P33 Specifications for coloured pavement surfacings, with the layout dimensions outlined in the table below. The red coloured surfacing must not encroach onto the no-stopping lines.

Table 13: Red surfacing treatment dimensions

Marking	Dimension
Typical length of red surfacing	3.0 m
Minimum gap between red surfacing and limit line	0.5 m
Minimum gap between red surfacing and crossing bars	0.5 m

3.4.5b Raised zebra crossings

Description

A raised zebra crossing (also called a zebra crossing on a raised platform) incorporates a priority crossing featuring white striped bars on a platform raised above the roadway. A raised zebra crossing can reduce or reinforce slower vehicle approach speeds making the crossing safer for pedestrians.

An example of a raised zebra crossing is shown in the photo below.

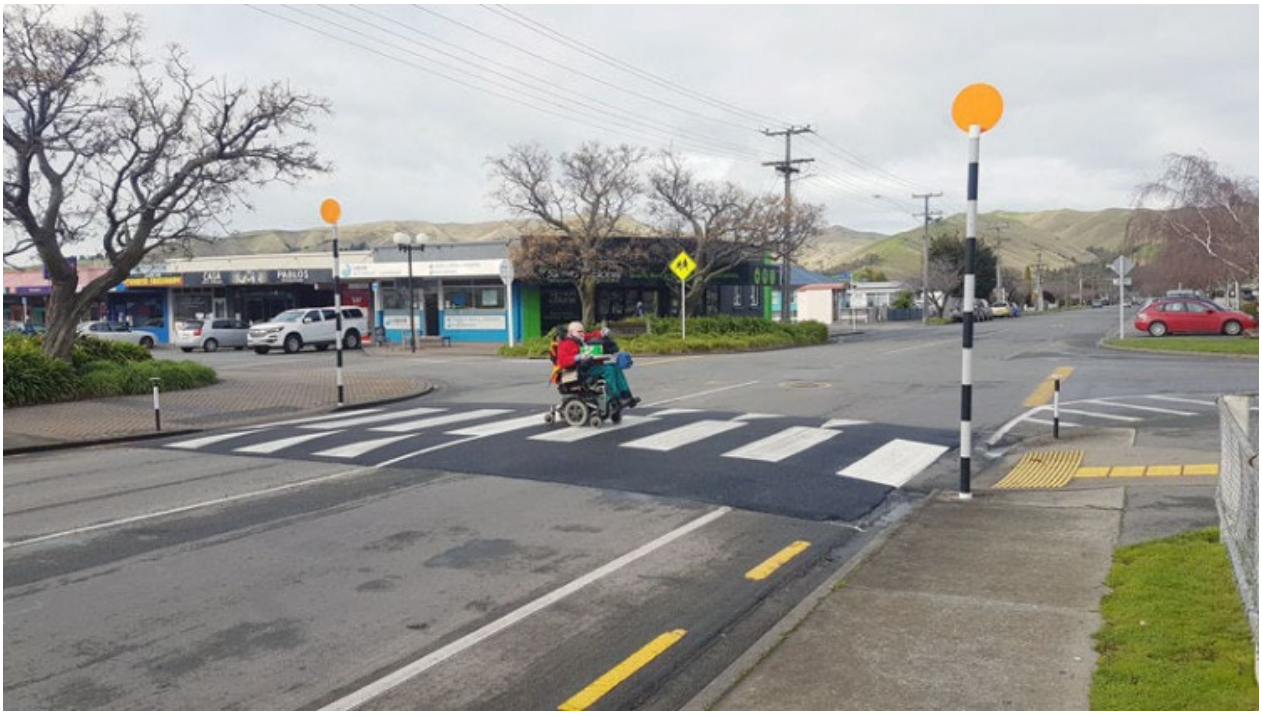


Figure 26: Retrofit raised zebra crossing, Blenheim. (Photo: Peter Kortegast)

Contextual considerations

Benefits

- Gives pedestrians priority resulting in minimal delays for pedestrians.
- Are obvious for all road users as a place for pedestrians to cross.
- Reduces or helps to reinforce slower vehicle speeds and increases likelihood of drivers' give way rates.
- Can eliminate grade changes from the pedestrian route and therefore the need for kerb ramps.

Implications

- High pedestrian flows can dominate and cause vehicle delays, which may be acceptable depending on the street function (One Network Framework).
- Can create discomfort for vehicle occupants travelling over platforms if not well designed (particularly bus passengers).
- May increase noise as vehicles brake, slow, pass over them and then accelerate (particularly heavy vehicles).

Recommended parameters

- Posted speed of 50 km/h or less (>50 km/h posted speed requires approval from NZ Transport Agency Waka Kotahi as per TCD Rule clause 8.2(2)).

- Low approach speeds result in higher yielding by drivers.
- One traffic lane in each direction.
- Suitable for medium to high pedestrian demand so drivers are expecting pedestrians.
- Can be combined with kerb extensions and/or a pedestrian/median refuge.

Legal considerations

The legal considerations are the same as for zebra crossings (see section 3.4.5a).

Design considerations

When considering the installation of raised zebra crossings, the following should be considered:

- Raised zebra crossings should not be longer than 10 m (although they may be legally up to 15 m long). Where a longer distance is likely, kerb extensions should be used to reduce the distance travelled in one crossing movement. If kerb extensions cannot be used, pedestrian refuges may be installed instead, noting this legally divides the crossing into two stages which can be problematic in terms of drivers giving way.
- Cycle lanes or cycle paths across zebra crossings require careful treatment. Refer to TCD manual Part 5: Cycle lanes at pedestrian crossings for more information.

Design elements

The tables below outline the markings, signs and other design elements for raised zebra crossings. These are similar to flush zebra crossings with some additions. Further detail on the traffic control device elements is provided in the TCD manual Part 5 – Pedestrian crossings (zebra).

Typical layouts for raised zebra crossings is shown in the TCD manual Part 5 Figure 7-11.

Table 14: Marking requirements for raised zebra crossings

Element	Requirement	Additional information
Crossing bars	Refer to Table 10	
Centre-line		
Limit lines		
No-stopping lines		
Advance warning diamond		
Hump ramp markings	Hump ramp markings should be marked on the face of the vertical deflection device visible to approaching drivers (ie the ramp of a raised zebra). The markings consist of evenly spaced white triangles.	Dimensions and spacing of hump ramp markings are provided in the TCD manual Part 5 – Vertical deflection devices.

Sufficient contrast must be provided between the crossing bars and the roadway. Therefore, use of paving or red or pink colouring between the white bars does not provide sufficient contrast.

Table 15: Signage requirements for raised zebra crossings

Element	Requirement	Additional information
W16-2 Pedestrian crossing	Refer to Table 11	
W16-3 Belisha beacon disc or Belisha beacon on black and white poles		
W14-4 Hump	Vertical alignment hump sign may be used to warn drivers that the zebra crossing is on a raised platform.	If used, the sign should be located adjacent to the hump or no more than 20 m in advance of it to ensure the sign does not obscure the Belisha discs/beacon for approaching drivers. It should be located where approaching drivers have an uninterrupted view of it over a distance of at least 60 m. Installation as per the TCD manual Part 5 – Vertical deflection signs.

Table 16: Other design elements and considerations for raised zebra crossings

Element	Requirement	Additional information
Platform height	100 mm recommended.	75 mm may be considered where site constraints and traffic composition suggest a lower height profile is suitable (ie on bus routes). 150 mm may be considered for low speed and low traffic volume environments.
Platform length	Minimum length 2 m. Maximum length 6 m.	On bus routes: • 6 m may be considered. • The top of the device should be at least the length of the wheelbase for the longest bus likely to use the road.
Approach ramp gradient	At least 1:15 for 30 km/h platform speed, steeper ramps are more effective in slowing vehicle speeds. 1:20 for bus routes or for 40 km/h platform speed; or 1:25 for 50 km/h platform but these ramp gradients are not safe system compliant for pedestrian crossings.	Ramp grade should be designed to achieve the required Safe System impact speed (30 km/h or less) prior to entering the conflict point. Steeper ramp gradients may be appropriate for lower operating speeds.
Departure ramp gradient	Maximum 1:35	Where the raised zebra crossing is located on an undivided roadway, the departure ramp gradient will be the same as the approach ramp gradient.
Tactile indicators	Refer to Table 12	
Lighting		
Use of coloured surfacing treatment		

Use of red surfacing treatments

Some RCAs highlight the presence of a zebra crossing to drivers and riders using coloured surfacing. However, the use of coloured surfacing should only be used, or approved, by an RCA in a manner that compliments and enhances regulatory markings and signs.

When installing coloured surfacing it is important that sufficient contrast is provided between the crossing bars and the roadway for all road users. Visually impaired road users have reported that red and pink colouring between the white bars does not provide adequate contrast. Red coloured surfacing is permitted under the TCD Rule provided it is not part of or visually integrated into an official road marking. Refer to section 3.6.6. Coloured surfacing in PNG: Supporting infrastructure for further information.

Hence, it is not recommended to apply red coloured surfacing immediately beneath the zebra crossing bar markings.

A recommended approach that meets the needs of all road users and aligns with the above legislation is to apply areas of (red) coloured surfacing on the vehicle approaches as shown in the figure below for a raised zebra crossing with dimensions outlined in the following table.

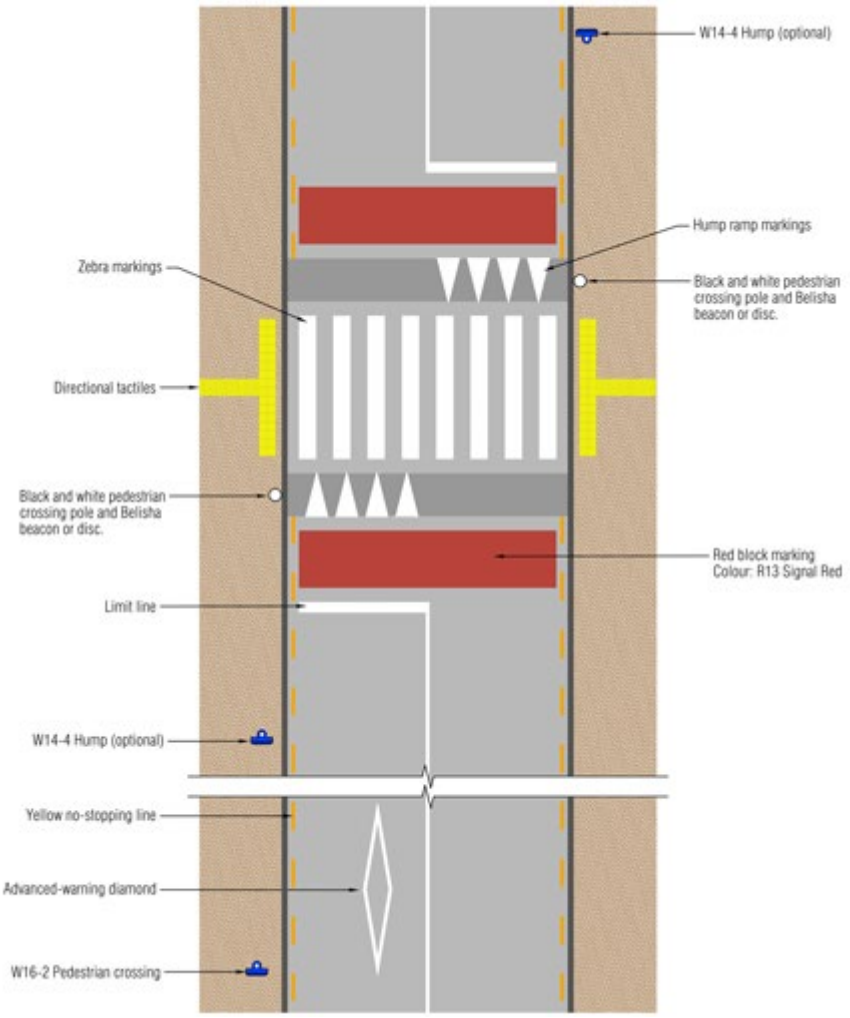


Figure 27: Typical layout for raised zebra crossing with red surfacing treatment

If using red coloured surfacing, the recommended red is R13 Signal Red, as set out in NZ Transport Agency Waka Kotahi P33 Specification for coloured pavement surfacings, with the layout dimensions outlined in the Table 17. The red coloured surfacing must not encroach onto the no-stopping lines.

Table 17: Red surfacing treatment dimensions for raised zebra crossings

Marking	Dimension
Typical length of red surfacing	2.0 m
Minimum gap between red surfacing and limit line	0.5 m
Minimum gap between red surfacing and hump ramp markings	0.5 m

Note that the dimensions of red surfacing treatments at zebra crossings that are flush with the roadway are different – see section 3.4.5a.

3.4.5c Signalised crossings

Description

Mid-block pedestrian signalised crossings are installations that stop vehicles so pedestrians can cross unimpeded.

I prefer traffic signals because once the traffic has stopped and I have my green signal, I trust it is safe to go. At unsignalised intersections I have to look around all the time to check because I cannot hear anything coming.

Aisha[11]

Mid-block pedestrian signals most commonly operate with two phases, one for vehicles, the other for pedestrians. However, they can include intelligent features, such as extending the pedestrian phase for slower pedestrians and detecting that pedestrians have already crossed prior to the pedestrian phase being displayed. Mid-block signals can also be designed to accommodate people cycling and other users.

An example of a mid-block signalised crossing for pedestrians is shown in Figure 28.

[11] For more information about the personas, see 2.1.1c in PNG: Planning.

Figure 28: Mid-block signalised pedestrian crossing, Wilsons Road, Christchurch. (Photo: Gemma Dioni)

Contextual considerations

Benefits

- Provides clear information on when a pedestrian can cross so it is better for less able or less confident pedestrians.
- Can balance the delays to pedestrians and vehicles through time separated priority.
- Allows pedestrians to cross multiple vehicle lanes.
- Can reduce community severance across busy streets.
- Can encourage pedestrians to cross in groups, rather than intermittently, minimising overall vehicle delays.

Implications

- Can delay pedestrians when vehicles are given more green time. This can result in pedestrians' frustration and therefore crossing the street when the pedestrian signal is still red.
- Slower pedestrians may find it difficult to cross within the allotted time.
- More costly to install, operate and maintain than other at-grade crossing types.
- May increase risk for pedestrians crossing near the signals from drivers not expecting them.
- Can be disruptive to high vehicle flows if frequently called.

Recommended parameters

- Suitable for high pedestrian demand (existing or latent) so signals are activated regularly.
- For locations with lower pedestrian demand, conspicuous advance signal display is recommended.
- Can be combined with kerb extensions, raised platforms and pedestrian refuge.
- Different signal display, activation and detection options are available.

Mid-block pedestrian signalised crossings are often the best option for multi-lane roads and on busy two-lane roads.

Mid-block pedestrian signalised crossings are usually installed where there are enough pedestrians to ensure the signals are activated regularly. If the signals are not activated regularly, drivers can develop the expectation that pedestrians will not be crossing, leading to safety issues. The alternative may be to signalise a nearby intersection.

There may be locations where, due to a desire to encourage pedestrian priority, a signalised crossing may be appropriate with lower than normal pedestrian flows. In such circumstances, it may be appropriate to introduce additional crossing elements to enhance the visibility and likely driver compliance with the crossing, for example raised platforms, pedestrian refuges and overhead mast arms.

Types of mid-block signalised crossings

There are several different types of mid-block signalised crossings, these include:

- standard pedestrian only signals
- two-stage pedestrian crossings
- pedestrian only signals with countdown timer displays
- nearside pedestrian signals (similar to PUFFIN[12])
- combined pedestrian and cycle crossings.

More information about each of these signalised crossing types are described in the following sections.

Standard pedestrian only signals

The standard pedestrian only signals are the most common form of mid-block signalised crossing for pedestrians. It uses far side signal displays that are visible to the pedestrian waiting to cross the road. People activate the crossing by pushing the button. An example of standard pedestrian only signals is shown in Figure 29.

[12] PUFFIN (Pedestrian User Friendly Intelligent Crossing) pedestrian crossings are widely used in the United Kingdom and their use is endorsed by the UK Department for Transport. They are not defined as PUFFIN crossings in New Zealand, the correct terminology is mid-block signal-controlled pedestrian crossing that uses nearside signals.

Figure 29: Pedestrian-only signal display. (Photo: Gemma Dioni)

Two-stage pedestrian crossings

Two-stage signalised crossings are commonly used when the roadway is particularly wide (usually over 15 metres and median divided), and where people may have difficulty crossing in one stage. An example of a two-stage crossing is shown in the photo below. Table 18 provides additional considerations for a two-stage crossing.

Figure 30: Two-stage crossing for pedestrians. (Photo: Lorelei Schmitt)

Table 18: Advantages and disadvantages of two-stage pedestrian crossings

Advantages	Disadvantages
Central island breaks up the crossing distance for people crossing the road.	Greater space required to provide sufficiently large central island for people to wait safely.
Can reduce vehicle delays as the crossing is split and can be operated as two separate crossings.	Requires pedestrians to cross in two-stages which can result in increased waiting times.
Separate crossings increase flexibility – pedestrians may get more opportunities to cross per signal cycle and overall waiting time may decrease depending on signal phasing.	Walking distances increase. If there is a more direct crossing available nearby then pedestrians may not use the two-stage crossing.
Central island breaks up the crossing distance for people crossing the road.	Greater space required to provide sufficiently large central island for people to wait safely.

The design should include detection and a call button for pedestrians in the median to ensure they are not trapped there.

Pedestrian only signals with countdown timer displays

Countdown timer displays are an optional addition to the crossing. The pedestrian signalised crossing operates the same as a standard crossing however during the clearance phase (when the flashing red human figure symbol is displayed), an additional countdown 'clock' showing the number of seconds remaining in the pedestrian phase is displayed. Countdown timer displays can only be used with fixed pedestrian clearance times and not variable clearance times.

People activate the crossing by pushing the button. To reduce delay to drivers, some crossings use kerb-side detectors that cancel the call if the pedestrians move out of the detector area, ie away from the crossing. An example of countdown timers at pedestrian only signals is shown in the photo below.

Figure 31: Pedestrian only signal display with countdown timer. (Photo: Gemma Dioni)

Nearside pedestrian signals

Nearside signals show the pedestrian display on the nearside rather than the far side of the street. These are similar to PUFFIN crossings; however, they are not defined as such in New Zealand. The pedestrian phase is activated by pushing the button. The nearside display is mounted next to pedestrians waiting on the footpath and orientated so that people crossing can see approaching vehicles and the display to see their pedestrian phase called. Unlike the standard mid-block signalised crossing there is only a steady red

and green walking human figure symbol displayed, with no flashing red standing human figure symbol displayed.

In terms of detection, the nearside crossing uses kerb side detectors that cancel the call from the pedestrian button if the pedestrian moves away from the detector area, and on-road detection can lengthen the clearance period if required. An example of nearside pedestrian signals is shown below.

Figure 32: Nearside pedestrian signal display. (Photo: Gemma Dioni)

Combined pedestrian and cycle crossings

These crossings can be used by pedestrians and people cycling and generally use far side signals. An example of a combined signalised crossing is shown in the photo below.

Figure 33: Pedestrian and cycle crossing with separate signals, Linwood Avenue in Christchurch. (Photo: John Lieswyn)

Like pedestrians waiting to cross, people cycling should receive some confirmation that they have been detected and will get their chance to cross.

Further guidance and considerations to accommodate people cycling can be found in the CNG.

Historically, separate signal displays have been provided for pedestrians and people cycling. However, in 2018 a combined signal face for pedestrians and people cycling commenced trials around New Zealand (see Land Transport Rule: Traffic Control Devices 2004—Two-aspect Cycle Signals Trial (2018-au1574) for more information).

This reduces the amount of signal infrastructure to be provided as can be seen in Figure 34. Note that people cycling may find a hold rail useful, however less infrastructure provides a wider uncluttered crossing.

Figure 34: Combined pedestrian and cycle signal display *(Photo: Gemma Dioni)*

Mid-block pedestrian signals selection

The designer will need to consider which is the most appropriate signal arrangement for the situation, so it is simple and effective. The context, length of crossing, detection and clearance times, as well as display details described in Table 19 will need to be considered.

Table 19: Choosing the right display type for a signalised crossing

Method	Application	Advantages	Disadvantages
Standard farside display	Short crossings on two lane roads or for staggered crossings.	Standard infrastructure.	The green person symbol stops being displayed when people are still crossing and switches to a flashing red person symbol.
Countdown display	Locations with high pedestrian crossing demand such as central city and suburban centres where people crossing are a priority.	Highlights to the people crossing the time left to start or complete the crossing.	Only suitable for farside signal displays. Only to be used where there are no conflicting motorised vehicle movements. As countdown relies on a fixed clearance period, the use of on-crossing detection is unsuitable.
Nearside display	Standalone crossings on busy roads. Not for narrow streets as there is little need for the ability to extend the crossing time.	Sends a clear message to pedestrians when they can start to cross and when they should not enter the road. After the green person symbol has ended, the solid red person symbol is shown straight away and the clearance period starts. Extends the clearance period if a pedestrian is still using the crossing.	The display may not be visible to all pedestrians waiting to cross because the display may be mounted at a position lower down the pole next to the pushbutton. Particularly an issue in central city locations.

Consideration should also be given to providing consistent mid-block signalised crossings along sections of roads to minimise the risk of confusion for people moving along and across the road.

Legal considerations

Pedestrian displays including how the green and red pedestrian signal aspects and countdown pedestrian signals should be installed and operated are outlined in the TCD Rule, 6.6.

Pedestrians, riders of mobility devices, and riders of wheeled recreational devices who are using the footpath must not enter the roadway when the flashing or steady red standing human figure is showing, and may enter the roadway when the green walking human figure is showing (Road User Rule, 3.5).

Pedestrians must not cross any other part of a roadway that is within 20 m of the part controlled by traffic signals (Road User Rule, 11.3(2)).

Design considerations

General layout

Typical layouts for mid-block signalised crossings for pedestrians are provided in the TCD manual Part 5 Figure 7-16.

When a roadway is more than 15 m wide a two-stage layout should be provided. If the roadway width is between 11 m and 15 m a two-stage layout should be considered. A two-stage arrangement can include a chicane arrangement so that pedestrians are turned to face oncoming vehicles. This also means crossings on either side of the median can be activated at different times (staged crossings). If designing

two-stage crossings, visors should be long enough and installed on each set of pedestrian displays so that pedestrians do not mistake one stage for another.

There are several supporting elements that should be considered during the concept and cost estimating stage to improve the safety for all road users and improve the level of service for pedestrians crossing the road. These include:

- Adding kerb extensions to increase the crossing conspicuity and reduce the overall crossing distance (see section 3.4.4b).
- Incorporate pedestrian detection that can extend the crossing time to help slower pedestrians to cross.
- Have a detection system that shows pedestrians they have been detected and allows the push button to reactivate the pedestrian phase and/or extend the pedestrian phase.
- Adding a raised platform at the crossing to increase the crossing conspicuity, reduce the operating speeds of vehicles on the approaches, and allow for seamless travel for people using assisted devices, wheelchairs and pushchairs (see section 3.4.4d).

Pedestrian capacity

When considering the width of the mid-block signalised crossing the following should be considered:

- The location and context of the crossing.
- The volume of people wishing to use the crossing.
- Whether a single stage or two-stage crossing is required.
- The available footpath area for people waiting to cross and through pedestrians.

As an example, if the path width approaching a crossing is 3 m, then the queuing area and crossing width should be wider (up to twice as wide) to accommodate the expected groups of people wanting to cross the road or pass people queuing at the facility.

The TCD manual Part 5 - Signalised-pedestrian crossings recommends a minimum width between crossing lines of 2.0 m, with a desirable width of 2.5 m. However, in areas of high pedestrian demand, wider crossing widths will be necessary. These need to remain as clear widths so additional space would be needed around traffic signal infrastructure.

For two-stage crossings, the waiting area in the middle of the roadway needs to be designed to hold the expected number of pedestrians in addition to devices such as mobility scooters, scooters, push chairs and (in the case of combined crossings) people cycling.

Walking speeds

Walking speeds are an important consideration at signalised crossings. Designers should be mindful of the following:

- some people can take up to 1.5 seconds to start crossing
- people at the back of a large group of pedestrians, for example in high pedestrian areas, close to schools etc, will take some time to enter the crossing. It is recommended to add 2 seconds for each additional row of pedestrians waiting.[13]

[13] Austroads (2020) Guide to traffic management Part 9: Transport control Systems – strategies and operations Appendix G.5.1

- if the crossing is not wide enough for demands, there could be congestion on the crossing and conflict between people crossing in the different directions.

Further guidance

Section 2.1.1b Physical space and walking speeds in PNG: Planning.

Signal phases and timings

Generally pedestrian displays move between red, green and flashing red. However, there are some variabilities, for example, many new signal installations include a countdown timer display in addition to the human figure signals.

Safe operation of signals requires high levels of compliance by all road users. As such the signals should respond promptly to pedestrian demand. Different ways of improving signal responsiveness to pedestrians include:

- Exclude the mid-block pedestrian signals from the area wide urban traffic control system that manages the operation of all the traffic signals in a network.
- Consider the wider area and determine if the system reflects the modal priorities. Shorten the cycle times accordingly.
- Let the signals rest in the pedestrian walk phase until a vehicle is detected.

The signal timings should allow for the maximum practical crossing time for pedestrians. Table 20 summarises ideal pedestrian timings.

Table 20: Pedestrian signal aspects

Symbol	Meaning	Ideal timings	Minimum timings
 *Steady red standing human figure*	Do not step out on to the roadway. Wait by the kerb.		The longest average waiting time should be 30 seconds to avoid pedestrians choosing their own gap and trying to cross.
 *Green walking figure*	After checking it is safe to do so, walk across the roadway.	The green walking pedestrian symbol should be displayed as soon as practicable after the push button is pressed. Provide sufficient time for all waiting pedestrians to enter the crossing. This depends on the depth of waiting space occupied.	Five seconds (six seconds preferred). At shorter intervals, some pedestrians may start to cross and then turn back.
 *Flashing red standing human figure*	Do not step out on to the roadway, but finish crossing if already on the roadway.	A pedestrian who has just entered the roadway and is travelling at the 15th percentile speed (default 1.2 m/s) on the longest valid crossing route, should be able to reach the opposite kerb before the steady red standing human figure appears.	

Further guidance

Further guidance on traffic signal operations is available in the Austroads Guide to traffic management Part 9.

Detection

There are several methods for detection that offer advantages and disadvantages that are outlined in Table 21. The table describes the following detection methods:

- push (or call) button
- kerbside
- vehicle actuation and linking with other traffic signals
- on-crossing pedestrian detection.

Table 21: Methods of detection

Method	Detection	Comments and recommendations

Push (or call) button	• Pedestrians are usually detected when they press a push button.
	• After pressing the push button, a detected pedestrian should have their presence acknowledged so they know the signals are working and they will receive a crossing signal. If their detection is shown to be cancelled (possibly by walking away from the detector) they can re-call their phase.
	• This detection acknowledgement may be by:
	  ○ an audible sound
	  ○ the opposite or nearside pedestrian signal head showing the steady red figure.
		• Push (or call) buttons can be complemented by kerbside detection methods – see below.
		• To acknowledge detection after pushing the button one other way that could be introduced would be a large indicator light near or around the push button, similar for people on bicycles below.
		 
		• Or similar to overseas examples where something lights up after the button is pushed.
		 
		 

Method	Detection	Comments and recommendations
Kerbside	• Kerbside detection holds the demand when a person arrives at the crossing but cancels the demand if the person has either crossed without a pedestrian phase or has walked away from the detection area, which would allow the traffic to continue as they are not required to stop. Pedestrians are detected through pressure-sensitive mats or cameras (in-ground or above ground). • Kerbside detection is not always required, for example in situations where pedestrian flows are high and there are few opportunities to cancel demands, or the signals are linked to an adjacent intersection.	• It is recommended that intelligent detection systems should be supported by a push button system, and that it is more essential in this instance for users to know they have been detected. • Where wide crossings are used in areas of high pedestrian demand additional kerbside detectors are required to ensure the full width of the crossing is covered. For example, they should cover the same area as the warning tactile paving. • There are a number of other factors to be taken into consideration when looking at the pedestrian wait area and the kerbside detection. • Speed of the road and vehicle classification (percent of heavy vehicles). At a busy, fast road with lots of trucks, people may stand back to feel more comfortable and so the detectors should still identify a person waiting. • If there are issues with ponding and or drainage, the detection area may need to be moved from the immediate area until the issue is fixed.
Vehicle actuation and linking with other traffic signals	• In a connected signal network, signal timings are most frequently based on minimising vehicle delays, which results in a poor level of service and increased delays to pedestrians. Pedestrians having to wait for an apparent excessive time due to the linking with other traffic signals, may take risks and cross against the traffic.	• In general, the signalised crossing should operate independently of adjacent traffic signal-controlled intersections. • However, in more dense urban networks, if located close to a signalised intersection for example, then it is likely that the two traffic signals will be co-ordinated.
On-crossing pedestrian detection	• On crossing pedestrian detection is used to extend the pedestrian clearance period whilst pedestrians are still on the crossing. Thus, catering for: ○ large groups of pedestrians ○ pedestrians with lower walking speeds ○ pedestrians who start to cross towards the end of the pedestrian green. • the on-crossing detection allows the onset of the vehicle green phase as soon as the crossing is clear.	• If people cross outside of the crosswalk detector zone, their phase will not be extended, and the traffic will be able to proceed.

Design elements

Table 22 summarises the key design elements of signalised crossings related to traffic signal equipment, road markings and other elements such as kerb ramps, tactile indicators, etc.

Table 22: Design elements of signalised crossings

Sign/marking	Feature	Dimensions and location
Traffic signal equipment (refer to ITS standards and specifications for more detailed information)	Signal poles	• Drivers must be able to see the signal displays on their approach to the crossing. If needed, consider the following to improve the conspicuity of the crossing for drivers: o overhead mast arm (considering over-dimension routes/wind loading, maintenance) o tall poles and dual primary poles (considering over-dimension routes) o kerb buildouts. • Signal poles should generally be yellow. Where overhead signals are being used, a minimum height of 6.5 m should be provided on over-dimension routes. Alternatively, they can be either hinged or able to be swung away to provide clearance.
	Signal lanterns	• The nominal size of signal lanterns is 200 mm, and 300 mm for extended range signals. The extended range signals are used on overhead mast arm displays, high speed approaches and on cycle routes with directional cycle signals. • On two stage crossings, visors (cowls) should be installed on each set of pedestrian signal displays so that pedestrians do not mistake one set for another.
	Signal controller cabinet	• The largest element of traffic signal infrastructure is the controller cabinet. • Intervisibility between the approaching driver and a person waiting to cross is required. The cabinet should not be placed so that it obstructs people accessing the crossing or blocking the view of people waiting at the crossing including children. • It should be placed so maintenance teams can work on the controller cabinet without obstructing pedestrians. • The controller is an expensive and critical part of the traffic signals. When locating the cabinet on a new installation, care should be taken to install the cabinet in a location where it is least likely to be struck by an errant vehicle.
	Push buttons	• Pedestrian push buttons are usually mounted on traffic signal poles. Further information is provided in RTS14.
Road markings	Pedestrian crossing lines (crosswalk lines)	• Typical details for crosswalk lines should be continuous white lines extending entirely across the road and there should be no longitudinal lines such as edge lines, centrelines or turning guide lines continue through the crosswalk area. Refer to the TCD manual Part 5 for marking specifications. • The width between crosswalk lines is usually determined by the widths of the footpaths and the number of pedestrians using the crossing and should match the location and width of the kerb ramps. The desirable width is 2.5 m but may need to be wider for higher pedestrian volumes. • Note the crossing lines for people cycling should be at least 3.0 m apart as per the CNG to accommodate people cycling in both directions.
	Limit lines	• Limit lines at signalised pedestrian crossings should be located at least 6 m clear of the nearest crosswalk line, but not less than 10 m

Sign/marking	Feature	Dimensions and location
		in advance of the secondary signal. The primary traffic signal should be located as close as possible to the limit line.
	No stopping lines	• Should be marked in advance of signalised mid-block pedestrian crossings to ensure signal conspicuity. At least 30 m of broken yellow line on the upstream approach to the crossing should be provided in the absence of any kerb build outs which are a good option to improve visibility and also require less parking removal. It will be location dependent as to whether no stopping lines are required on the downstream side.
	Lane lines	• On multi-lane roads, lane lines should be marked.
Other elements	Kerb ramps	• Kerb ramps provide access to the crossing point. • These should be installed so that adjacent drainage infrastructure collects water from the waiting area and excess water does not collect at crossing point. Raised crossings can reduce ability for ponding to occur and makes it easier for people to walk out at the same level.
	Tactile indicators	• Warning indicators are required and directional indicators may be necessary if the crossing point is outside the continuous accessible path of travel. See 3.1.3 Designing for blind and low vision people in PNG: Pedestrian design principles. • Audible tactile devices for pedestrians are to be provided at all new and upgraded installations.
	Warning signage	• W10-4, Traffic Signals Ahead, signage can be provided as advance warning and can be used on both approaches in advance of the crossing. This is more important where the signals are out of context with the road network. • Temporary warning signs (new road layout) will be required for new facilities and remain in place for two weeks after opening to inform road users of the change.
	Hazard free	• It is preferable that all surface obstructions associated with the traffic signals (access covers, grates etc) are outside of the footpath, the path of travel for pedestrians, and the waiting area.
	Pedestrian fencing	• Pedestrian fencing may be used on the median to restrict pedestrian access to the roadway at traffic signal crossings. However, fencing can have an adverse effect on the convenience for pedestrians and the attractiveness of the street and place. • Refer to 3.6.4 Barriers and fencing in PNG: Supporting infrastructure. • It is important that the fencing does not block the view of the pedestrian waiting for the crossing signal either on the kerb or in a two-stage waiting area, either through the material or the placements of the upright rails that can create a more solid view and restrict the intervisibility of people and traffic. • The fence height, placement and construction material should be designed/selected to minimise any potential sight obstruction between vehicles and pedestrians about to cross the road. •
	Lighting	• Designers should check existing lighting levels and where required recommend an assessment to determine if an upgrade to the street lighting is required. See Street lighting at crossings (section 3.4.3f). • At appropriate locations it is possible to combine streetlights and traffic signal poles.

Push (or call) buttons

Pedestrian push buttons are usually mounted on traffic signal poles. An example of a push button is shown in Figure 35.

There are several key principles that should be followed when installing pedestrian push buttons at signalised crossings. Push buttons should have all the audible and tactile features specified in AS 2353: 1999: Pedestrian push button assemblies and summarised in RTS 14 – Guidelines for facilities for blind and vision impaired pedestrians.

Figure 35: Pedestrian push button with explanatory placard. (Photo: Gemma Dioni)

Pedestrian push buttons should be:

- Located consistently in relation to the continuous accessible path of travel and kerb ramps.
- Placed with the push button facing the direction of travel, except on narrow medians where a single push button for both directions may be located with the face parallel to the pedestrian crossing lines.
- Considered in the median where pedestrians have to cross a two-stage pedestrian crossing. Care must be taken to avoid confusion between separate phases or sections of a crossing in such circumstances, to ensure pedestrians don't try and cross the full distance when not meant to or stop in the median when this is not required.
- Located on the traffic pole adjacent to the pedestrian crossing lines. Where there is no pole or the poles are too far from the crossing, an additional pole must be installed. The additional pole must be correctly positioned so as not to confuse pedestrians.
- Located less than 1 m outside the pedestrian crossing line and less than 1 m from the kerb face.
- Not closer than 4 m from the next nearest pedestrian push button (to avoid confusion between audible signals). Poles closer than 4 m apart may confuse pedestrians who are blind or have low vision over which direction the audible signal applies. If the poles cannot be located more than 4 m apart then consideration should be given to reducing the volume of the signal. The vibrating tactile signal must never be turned off.

- Easily accessible by all pedestrians. Some guidance is provided in Table 1 of the Tactile Indicator Installation Note (TAN #20-20), and in addition the push button should be:
    - within 350 mm (horizontally) from the end of the tactile paving area (for persons, particularly those who are blind or have low vision, waiting on a warning indicator, and to ensure persons cannot accidentally pass between the warning indicators and push button pole)
    - between 800 mm and 1000 mm above the ground surface (for children and wheelchair or mobility scooter users)
    - away from obstructions such as a raised portion of an island (which may inhibit wheelchair access to the pedestrian push button with their elbow).

3.4.6. School crossings

3.4.6a Description

School crossings assist children crossing roads on their journey to and from school. Children are among the most vulnerable of pedestrians due to their limited abilities and lack of experience. Their abilities vary according to their age (see section 2.1.1a Human capabilities and states in the in PNG: Planning).

There is some evidence[14] that the most risky part of a child pedestrian's journey to school is when crossing busy roads further than 500 m from the school gate. The pedestrian network around schools should be assessed to determine whether interventions away from the school gate will improve safety and amenity for children walking to school.

If there is a nice safe crossing near school, I can walk at least part of the way home by myself.

Tom[15]

Crossing facilities near the school gate should also be assessed. These aspects should be considered as part of the NZ Transport Agency Waka Kotahi School travel plans guidance.

Near schools the number of children walking increases to the extent that formal crossing points are typically provided near school gates. As well as children walking, cycling and scooting to school, school crossing facilities also assist children who are dropped off or take the bus to school.

Depending on the local context, various types of crossings are possible to assist children on their way to/from school. Examples of school crossing facilities are shown below.

[14] Toran Pour, A., Moridpour, S., Tay, R., and Rajabifard, A. (2018). 'Influence of pedestrian age and gender on spatial and temporal distribution of pedestrian crashes.' *Traffic injury prevention*, 19(1), 81–87.

[15] For more information about the personas, see 2.1.1c in PNG: Planning.

Figure 36: School patrolled zebra crossing, Christchurch. (Photo: Penny Gray)

Figure 37: Kea crossing, Christchurch. (Photo: Penny Gray)

The appropriate type of crossing facility may be influenced by the speed limit around the school and whether it is a permanent or variable speed limit in force during school travel periods.

Crossing facilities near schools experience short periods of high pedestrian flows, but may have little use outside these times. Therefore, crossing facilities that give full-time priority to pedestrians instead of vehicles may not be the best solution. Where crossing facilities that give priority to pedestrians are the best solution, they generally require additional devices and assistance.

Crossings mainly used by school children have two major differences from other pedestrian crossings.

1. Flows will generally be tidal at any one time, towards the school in the morning and away from the school in the afternoon.
2. Large numbers of children and caregivers will likely wish to cross in small time periods (before and after school) and therefore sufficient storage space either side of the crossing must be provided to accommodate waiting pedestrians.

Four types of crossing assistance are available for places where school children are particularly concentrated, and should be supported where appropriate by school speed zones. Table 23 describes the range of solutions.

Table 23: Types of crossing assistance for school children

Assistance	Description
Crossing aids (not affecting priority)	These are devices that do not provide pedestrians legal priority over vehicles, but make crossing the road easier for some pedestrians. They include pedestrian refuges, raised medians, kerb extensions, pedestrian platforms and traffic calming.
School warden crossing	This involves adults or older children who guide school children on when to cross at: • mid-block crossing points, such as pedestrian refuges and mid-block pedestrian signals • crossing points at intersections, including those with give way or stop controls, traffic signals and roundabouts • zebra crossings. Wardens do not have the use of signs to control vehicles.
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 to allow pedestrians to cross the roadway.
Grade separation	Grade separating pedestrians and other road users may be necessary, for example, where school students need to cross a motorway or high-speed rural road to access a school.

Crossing aids

Non-priority crossing aids (section 3.4.4) should be considered first as they provide benefits for both children and adult pedestrians. Reducing vehicle speeds through variable speed limits in school zones (Traffic Note 37: 40 km/h variable speed limits in school zones – guidelines) or traffic reduction techniques should also be considered.

Zebra crossings installed on high vehicle volume streets and/or wider two-lane streets may include a pedestrian/median refuge. It is likely to be difficult for school patrols to operate effectively at these crossings as a school patrol must not extend the 'School Patrol' sign into the roadway to stop a vehicle except during a pause in the flow of traffic (TCD Rule 8.3(9)) and drivers do not need to give way to pedestrians if they are waiting behind a school patrol sign (Road User Rule 10.1). This can make it difficult for both sides of the school patrol to find a gap in the vehicle flow and operate effectively together. For

such locations it is preferable to form a continuous single stage zebra crossing or to consider other treatments such as providing a signalised crossing.

Pedestrian platforms should also be considered for school crossings in appropriate environments.

School wardens

School wardens are adults or older children who provide a valuable safety check for children crossing – most commonly at unmarked crossing points, but also at pedestrian crossings where no school patrols are operating and at traffic signals

Unlike school patrols, school wardens (sometimes called traffic wardens) have no power to control vehicular traffic other than by calling a pedestrian phase at traffic signals. School wardens use their arms (as ‘barrier arms’) to stop pedestrians crossing the road until it is clear of approaching vehicles. School wardens do not use stop signs, or any other sign or flag.

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

School wardens can easily find suitable gaps to cross if vehicle flows are less than 500 vehicles per hour and the crossing distance is 9 m or less.

School patrolled zebra crossings and kea crossings

School patrols are normally operated by two or three appointed children under adult supervision.

They control the flow of vehicles and pedestrians at zebra crossings and kea crossings. Operating before and after school, patrol members extend STOP signs onto the road in both directions, which signal to approaching drivers to stop. Once the vehicles are slowing or have stopped or there is no traffic, the patrol signals to waiting pedestrians that it is safe to cross the road.

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.

Figure 38:Extract from the School Traffic Safety Team Manual

Kea crossings were developed to address the often issue outside schools that the number of pedestrians wishing to cross is concentrated to before and after school times, with little demand outside of these hours.

Kea crossings operate the same as a marked pedestrian crossing with a school patrol; however, when the signs and patrol are not present the crossing point reverts to a section of road where pedestrians do not have a priority crossing to assist them crossing the road.

School patrols should be considered whenever vehicle flows at before and after school times would make it difficult for school traffic wardens to find safe gaps in the traffic.

School patrols may not be needed below 500 vehicles per hour in roads with appropriate widths.

There is no specific number of children wishing to cross that justifies a school patrol, but as the patrols require a significant commitment of effort, alternative ways of assisting children across the road may be considered when there are fewer than 20 children per hour, for example the use of school wardens.

The provision of a zebra crossing for a school patrol should be made based on the use of the crossing outside of school times. If there is likely to be infrequent pedestrian use outside school times, then a kea crossing should be considered instead.

Further guidance

- NZ Transport Agency Waka Kotahi Education Portal | Teacher resources:
  - School patrols
  - Kea crossings
- For crossings aids and pedestrian delay, refer to section 3.4.2d

Signalised crossings/intersections

Signalising an intersection or installing a signalised mid-block crossing may be an appropriate solution in some cases to provide crossing assistance. Providing signals may be necessary where there are higher vehicle speeds, higher vehicle volumes, there is more than one lane of traffic in each direction to be crossed (assuming the number of lanes cannot be reduced) or the crossing point is at an intersection.

Further guidance

- For midblock signalised crossings, refer to section 3.4.5c
- For signalised intersections, refer to section 3.5.4. Signalised intersections in PNG: Intersections.

3.4.6b Legal considerations

Legislation relevant to school crossing points including the signs and markings requirements are outlined in the TCD Rule, 8.4. This includes that a school crossing point can be provided on a road where the speed limit is 50 km/h or less. Where the speed limit is more than 50 km/h, approval from NZ Transport Agency Waka Kotahi is required and conditions may be applied.

The legal requirements for how school patrols must operate are outlined in the TCD Rule, 8.3.

Legislation relevant to school crossing points is also outlined in the NZ Transport Agency Waka Kotahi School traffic safety team manual.

If considering a school patrol where vehicle volumes are high, note that a school patrol should not extend the ‘School Patrol’ sign into the roadway to stop a vehicle except during a pause in the flow of traffic, having regard to the number of vehicles approaching the crossing (TCD Rule, 8.3(9)). A driver must give way at a pedestrian crossing to those who are (ii) obviously waiting to cross it and who are not behind a school patrol sign (Road User Rule, 10.1). This can make it difficult for school patrols to operate effectively where vehicle flows are high resulting in few gaps in the vehicle flow. In these situations, other solutions should be considered (for example, a signalised crossing).

3.4.6c Design considerations

It is important that any crossing used by school patrols incorporates non-priority crossing aids (section 3.4.4) to improve their safety such as kerb extensions or pedestrian refuges. Note that kerb extensions are usually preferred over a pedestrian refuge as it results in a single stage crossing that is easier for school patrols to manage.

Crossing and approach sight distances must be met (see section 3.4.3d).

Managing parking near school crossings can be a challenge as drop off and pick up activities often occur nearby. As well as no-stopping restrictions, physical treatments may be necessary to maintain safe sight lines.

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.

3.4.6d Design elements

School patrol crossings

The zebra crossing (section 3.4.5a) that the school patrol operates on should be designed as per a standard zebra crossing or a raised zebra crossing (section 3.4.5b), and may include kerb extensions, pedestrian platforms and pedestrian refuges.

In addition to the usual signage and markings (including no stopping markings), a W16-5.1 'SCHOOL' sign should be fitted below the W16-2 pedestrian crossing sign.

The word SCHOOL can also be painted on the approach lane between the standard diamond and the crossing itself, and may be placed on a red block as shown in the photo below.

Figure 39: SCHOOL marking on red block prior to zebra crossing. (Photo: Simon Kennett)

Kea crossings

Kea crossings have permanent signs and markings as well as temporary signs that are only present when the crossing is in operation. These signs are removed when the patrol finishes operation and the site reverts to normal roadway where pedestrians give way to vehicles. Operational requirements for school patrol crossings and kea crossings are outlined in the NZ School Traffic Safety Team Manual

Further detail on the traffic control device elements is provided in the TCD manual Part 5. A typical layout for a kea crossing is shown in the TCD Manual Part 5, Figure 7-5.

3.4.7. Grade separation crossings

3.4.7a Description

In some instances, such as to reduce the pedestrian network's severance by a motorway, pedestrian crossings can be provided through a grade change such as an underpass (tunnels and subways) or overpass (footbridges and elevated walkways). This grade separation puts pedestrians and other road users including rail at different heights. This usually increases greatly travel distances for pedestrians using such facilities.

Grade separation can also be provided by having underpasses or overpasses for motor vehicles with the pedestrian route remaining at-grade.

Grade separation infrastructure is often designed to accommodate people cycling as well as pedestrians.

Figure 40: Underpass under Harewood Road/Russley Road roundabout, Christchurch. (Photo: Jeanette Ward)

3.4.7b Contextual considerations

Benefits

- Allows pedestrians to cross unhindered by vehicles.
- Allows free vehicle flow.
- Can be covered for weather protection.

Implications

- May increase the safety risk if pedestrians continue to cross at-grade.

- Can increase pedestrians' travel time due to requirement to change level or other detours.
- Can result in personal security concerns because of reduced natural surveillance.
- It can be unsuitable for less able or less confident pedestrians.
- Costly to construct.
- Can be visually intrusive.
- Gradients, steps and increased walking distance can create difficulties for less able pedestrians or pedestrians carrying loads.

Recommended parameters

- Should only be used to cross transit corridors (check One Network Framework street categories), natural features (such as waterbodies) and railways; suitable for some rural roads particularly where the operating speed is 80 km/h or more.
- Grade separated route must be more convenient to pedestrians than any other option (use topography to minimise grade changes for users).
- If cost prohibitive, consider reducing vehicle speeds so other crossing types become feasible.

A comparison of the advantages and disadvantages of overpasses and underpasses are outlined in the table below.

Table 24: Overpass and underpass considerations for pedestrians

Overpasses	Underpasses
• Generally require greater vertical separation than underpasses due to the clearances for overheight vehicles and to comply with universal access, and therefore, longer approach ramps and greater travel distances. • Can provide attractive views and visual connections with adjacent land uses resulting in a safer and more pleasant experience for pedestrians. • Can be made visually appealing. • Are more likely to be open to the weather and the risk of objects being thrown onto the roadway. • Are usually cheaper to construct than underpasses in an existing environment.	• Are generally perceived as providing less personal security than overpasses due to lower natural surveillance. • Can have drainage or watertable issues. • Naturally provide weather protection. • Generally require less level change for pedestrians. • Sightlines on approaches can be difficult to achieve and are particularly important when the underpass is shared with higher speed users (eg people cycling or using micromobility devices).

3.4.7c Legal considerations

A pedestrian or rider of a mobility device must use an underpass or a footbridge (overpass) when one is reasonably available to the pedestrian for that purpose within a distance of 20 m (Road User Rule, 11.3(1)).

3.4.7d Design considerations

Grade separated crossings are most effective when they are more convenient for pedestrians than at-grade crossings. Pedestrians should ideally stay at the same grade when crossing or have only a minor change in level. The road could be elevated or sunk to reduce the amount of elevation change for pedestrians. In planning for new areas where grade separation is required, it may be possible to utilise the terrain to achieve this.

Further guidance

Section 3.3.4a Ramps and stairs in PNG: Paths.

Both overpasses and underpasses can result in longer walking journeys than at-grade crossings – and they are unlikely to be used where the walking distance is more than 50 percent greater than the at-grade distance. Even when less than this, some pedestrians will try to take the shortest route which may be across an unsafe location. As such check whether grade separation is the suitable treatment and only option for your site. If it is, then improving the convenience and aesthetics of the grade-separated option and potentially installing fencing may be necessary. Fencing should be continuous, unclimbable and long enough to prevent people walking around the ends.

Pedestrians can be concerned for their personal security at underpasses and overpasses, particularly if they are not well used. See also Safety from other people in section 2.3.3a Safe in PNG: Planning.

To overcome this:

- structures should be well lit, potentially on a continuous basis
- pedestrians should always be able to see their whole route without any obstructions or recesses, and (where possible) from a public place some distance away
- skylights should be provided in underpasses
- the route should include direction signs
- each entry/exit should have passive surveillance from adjacent buildings or public space
- CCTV installations may be helpful.

Overpasses or underpasses may require the relocation of utilities. They can also provide a conduit for utilities.

Further guidance on the design of overpasses and underpasses for pedestrians can be found in Bridging the gap: NZTA urban design guidelines.

3.4.7e Design elements

Many dimensions for overpasses and underpasses are determined by specific site conditions. The table below provides some general dimensions.

Table 25: Overpass and underpass design elements

Feature	Value	Further information
Width	At least 2.4 m.	It should be greater where the route is shared with other users (eg people cycling, scooters, etc).
Overhead clearance	Desired minimum 2.4 m, absolute minimum 2.1 m.	Greater clearance can help make the overpass or underpass feel more open.
Grade change	No more than 6.5 m for overpasses. No more than 3.5 m for underpasses.	There may be exceptions where constraints mean these grade changes need to be greater, eg an overpass over electrified railway lines.
Roadway clearance	At least 4.9 m (6.5 m on overdimension routes) for overpasses only.	See overdimension route information in section 3.4.3b.
Approach ramps	Refer to the requirements in 3.3.4a.	
Access control devices	Provide access control devices if necessary.	Access control devices on paths design guidance note
Lighting	Ensure lighting does not impact the overhead clearance.	Bridging the gap: NZTA urban design guidelines 3.6.5 Lighting in the PNG: Supporting infrastructure.

Appropriate emergency vehicle and maintenance vehicle access should also be provided.

3.4.8. Rail crossings

3.4.8a Description

This section covers pedestrian (and often also cycle) crossings of any kind over railway corridors. Although railway crossings are rare compared with road crossings, pedestrians can feel extremely apprehensive when using them.

The TCD Manual Part 9 Level crossings covers pedestrians only briefly and is light on cycling facilities. As a result, the approach to choosing rail crossing treatments for these users has been ad hoc in the past, and there is limited evidence that they have been based on a consistent or objective understanding of risk.

NZ Transport Agency Waka Kotahi and KiwiRail's Design guidance for pedestrian and cycle rail crossings should be used for design guidance of pedestrian and cycling facilities at rail crossings both stand-alone and alongside roadways in New Zealand.

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:

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

Examples of a pedestrian level crossing and a shared use level crossing are shown in the photos below.

Figure 41: Pedestrian level crossing at Grove Road, Christchurch. (Photo: Glen Koorey)

Figure 42: Shared path and automatic pedestrian gates at Matai Street, Christchurch. (Photo: Glen Koorey)

The advantages and disadvantages of level and grade separated crossings across rail are similar to those across roads (see section 3.4.7).

3.4.8b Legal considerations

Section 9 of the TCD Rule sets out the mandatory and optional requirements for level crossings on roads and paths (both public and private); the details are also covered further in the TCD Manual Part 9: Level crossings. Note that crossings of light rail lines are not considered in this legislation.

It is also important to appreciate that, under section 80 of the Railways Act 2005, the default presumption is always that rail vehicles have right of way along a line, and all other parties must keep clear of a railway line when trains are passing level crossings. Therefore, all steps should be taken to design level crossings to make other parties aware of their obligations.

Historically, there have been two situations in which the need for a level crossing has arisen, either when a new road or path is built across an existing railway line or when a new railway line is built across an existing road or path. This has resulted in two broad categories of level crossing – statutory and deed of grant (of right of way). The TCD Manual Part 9 provides further information on this.

3.4.8c Design considerations

Rail corridor operators (predominantly KiwiRail in New Zealand) 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.

New at-grade railway crossings must be carefully considered, as KiwiRail do not encourage the provision of additional crossing points on the rail network. It may be that one crossing needs to be closed to allow for another crossing to be created. Refer to KiwiRail's guidance for applicants for further information.

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 rail lines as trespassers at-grade, putting themselves at risk of being hit by trains.

It is important to consider rail lines 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 rail lines, consider how pedestrians will gain access across the rail lines. New rail crossings may be necessary, so it is important to involve the rail corridor operator from the outset.

3.4.8d Design elements

There are several design issues to address for locations where pedestrians cross a rail line at-grade. The key considerations are to ensure pedestrian **awareness** of a rail crossing (and the presence of any trains) and to create a design that encourages **compliance** with any crossing controls. More detailed design guidance can be found in the NZ Transport Agency Waka Kotahi and KiwiRail's Design guidance for pedestrian and cycle rail crossings.

KiwiRail's Level crossing risk assessment guide provides information on level crossing safety impact assessments (LCSIA), a process developed to assess the level of crash risk of existing and new/upgraded level crossings (for road and/or path users). All new or upgraded pedestrian level crossings must have an LCSIA undertaken to satisfy KiwiRail's requirements for approving the crossing.

Appendix A – Crossing selection process

Choosing the appropriate pedestrian crossing facility is essential to ensuring safe and easy pedestrian movement. This decision should be guided by a comprehensive, context sensitive assessment of the street and surrounding environments, incorporating both the crossing type and necessary supporting treatments. It should also be guided by the project context.

The guidance below applies to mid-block crossings in New Zealand cities and towns. It excludes crossings at intersections, school-specific crossings, dual crossings, rail level crossings, and rural roads. For rural contexts with paths requiring crossings, refer to the Cycling Network Guidance.

In some streets, such as shared zones, pedestrians share the space with other road users meaning crossing facilities may not be required. Refer to section 3.2.2 in PNG: Streets and public realm for further guidance on the characteristics and implementation of these streets.

A1 Key considerations for choosing crossing facilities for pedestrians

Rather than following a linear process, practitioners should consider a range of contextual factors to inform their decision. These include:

- Street context and pedestrian characteristics
- Project context
- Crossing treatment options
- Design integration
- Flexibility and iteration

A1.1. Street context and pedestrian characteristics

Prior to determining the suitable type of crossing, the need for a crossing has likely already been identified at a specific location. This decision should be informed by broader planning considerations outlined through the PNG, particularly sections 3.4.2c and 3.4.3a, and the types of information that should be collected to help support and / or refine that decision.

Table A1 outlines the type of information to collect and provides prompts to assist practitioners understanding and assessing the street context and pedestrian characteristics to inform the decision-making process.

Table A1 Street context and pedestrian characteristics

Topic	Prompts	Why it matters
Pedestrian desire lines	• Where do pedestrians want to go to or come from? • Where do pedestrians cross now? • Do they cross in one place or are they spread out along the street, or at an intersection? • What other crossing opportunities are nearby and what type are they?	Crossings should be located on pedestrian desire lines as far as practicable. The availability and type of other crossings nearby can influence the choice of crossing treatment. It may be appropriate to provide priority crossings at key locations along with non-priority crossings or aids (pedestrian refuges) in between.
Street function	• What is the current and future movement and place classification of the street? (One Network Framework (ONF)). • What is the modal classification for walking and other modes? • Is the street part of the strategic (or supporting) pedestrian network? • Based on its classification, should pedestrians have priority when crossing the street?	The place function ranking guides the level of priority that should be given to pedestrians crossing the street. As well as more strategic links of the pedestrian network. Therefore ONF P1-P3 rankings and W1-W3 classifications generally require priority crossings or traffic managed or traffic free environments, whereas crossing aids might be acceptable on P4 and W3 streets depending on the other modes ranking, as well as speed and volume of motor vehicles (see below).

Pedestrian volumes and composition	• Who is most likely to walk here and wants to cross? Think about pedestrian age, ability and accessibility needs.
	• How many people want to cross here? Consider:
	  ○ People currently crossing here.
	  ○ People who would cross here but currently divert to a safer crossing nearby.
	  ○ People who would like to cross but can't, so don't end up walking here (suppressed demand).
	• What needs are they likely to have?
	• What is the surrounding land use and nearby trip attractors/ generators and how might these activities affect the types, times, and volumes of pedestrians wishing to cross?
	• Are there public transport stops or stations nearby and how does that affect crossing demands?
	• What would pedestrians expect in this area?
		Higher crossing demand and less able or less confident pedestrians (for example, young, elderly or disabled people) elevates the need for a priority crossing facility particularly where traffic volumes are considerable because pedestrians then do not need to find a suitable gap in the traffic flow to cross.
		If few pedestrians are currently crossing, or only certain types of pedestrians are crossing, this can indicate the existing crossing is inadequate.

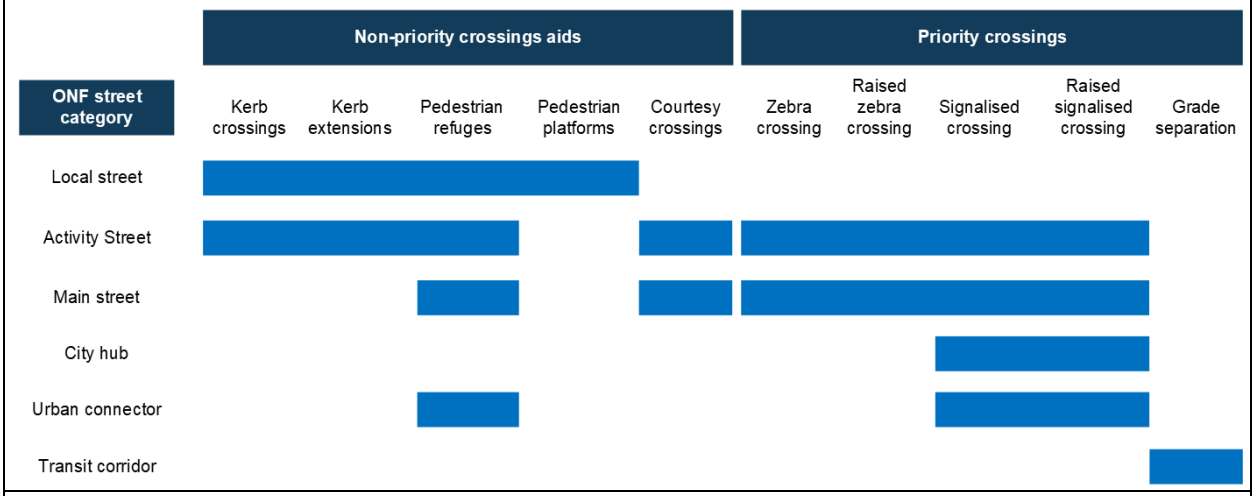
Vehicle speeds	• What is the speed environment, operating speeds, posted speed limit and the Safe and Appropriate Speed based on the ONF classification?	Vehicle operating speeds over 30 km/h increase the severity of injury or likelihood of death in crashes involving pedestrians.

Topic	Prompts	Why it matters
	• Should traffic calming and speed management be used along the route/area to achieve Safe System speeds for people crossing?	Higher speeds make it more difficult for pedestrians to judge safe gaps, affect the driver's ability to react, and require longer sight distances and longer braking distance. Further, higher speed streets are more difficult, and act as barriers, for less able or less confident pedestrians (for example, elderly). The target Safe System speed is 30 km/h where pedestrians and other "vulnerable users" risk collision with motor vehicles[16]. Therefore, primary Safe System crossing treatments are those where the operating speed over the crossing will be no more than 30 km/h.
Vehicle volumes and composition	• What are the traffic volumes and composition of traffic (including heavy vehicles, buses and people cycling)? • Should the traffic volumes be reduced? • Should the traffic composition be modified or restricted?	Priority crossing treatments can result in delays to other road users, which in urban areas is generally appropriate. At non-priority crossing treatments (crossing aids), people walking must identify a safe gap in the traffic flow to cross. As traffic volumes increase above 7,500 vehicles per day, this increasingly becomes more difficult, particularly for less able or less confident pedestrians (for example, elderly, children, disabled people), and delays can cause frustration and risk taking, and in walking journeys not made. Refer to section 3.4.2d for more information on pedestrian delays. The frequency of heavy vehicles, buses and people cycling using the street also influences the crossing choice and design.
Road layout and allocation	• How many traffic lanes are there in each direction? • What is the roadway width? Can it be reduced? • Can road space be reallocated to reduce the number of lanes? • Are there special vehicle lanes such as bus lanes, transit lanes, cycle lanes or cycle paths? • Are there conflict zones such as driveways? • How might the road alignment or other obstructions affect visibility and therefore the location and type of crossing?	The number of traffic lanes directly influences the crossing distance for pedestrians, as well as the width of the roadway. Crossing points should be designed to minimise the crossing distance. When using kerb extensions to reduce the crossing distance, care is needed to not create pinch-points for people cycling on the street. Zebra crossings are not suitable where there is more than one traffic lane in a direction as vehicles in adjacent lanes might block visibility of people crossing or waiting to cross.

[16] NZ Transport Agency Waka Kotahi Safe System audit guidelines. https://www.nzta.govt.nz/assets/resources/road-safety-audit-procedures/docs/safe-system-audit-guidelines.pdf

One network framework (ONF)

The illustration below shows the ONF street categories, provides additional locational context and which crossing types typically relate to what ONF street category. Note this illustration is indicative. When using it, practitioners need to take into consideration your contextual factors (street context and pedestrian characteristics; project context, etc).



Notes:

Civic spaces – By definition these have high place function, involve low vehicle speeds and low vehicle volumes, and should be designed to allow users to share the space. Therefore, it is highly unlikely that a formal crossing treatment will be necessary.

Activity streets – pedestrian refuges, kerb extensions and kerb crossings may only be appropriate where there is a priority crossing treatment nearby, ie, within an acceptable distance to provide adequately for less able or less confident or slower pedestrians (eg mobility impaired people).

Main streets and urban connectors – pedestrian refuges may only be appropriate where there is a priority crossing treatment nearby, ie, within an acceptable distance to provide adequately for less able or less confident pedestrians (eg visually impaired people).

A1.2. Project context

Besides the considerations described above, practitioners should also take a holistic approach when choosing the type of facility. Ponder:

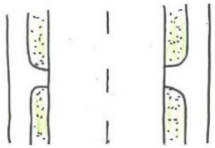
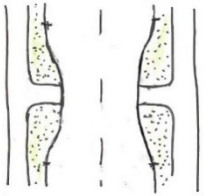
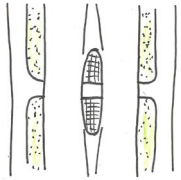
- What are the overarching strategic goals and benefits being sought by the project?
- Is the crossing provision part of a wider street change project?
- Is the crossing provision for a specific location needing to address safety and/or accessibility issues?
- Is the crossing provision to complement existing or planned infrastructure?
- What is the role of this crossing location in the pedestrian network?
- Is it crucial to address severance? Etc.

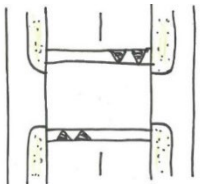
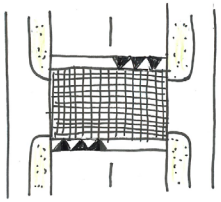
A1.3. Crossing treatment options

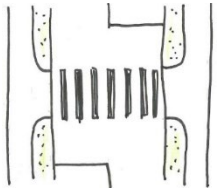
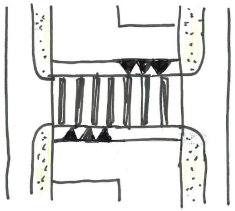
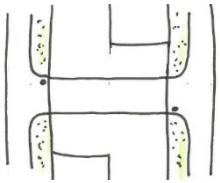
Crossing treatments fall into two broad categories: priority crossings and non-priority crossings / aids (refer to section 3.4.2a).

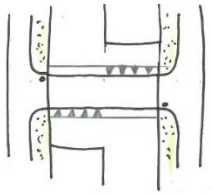
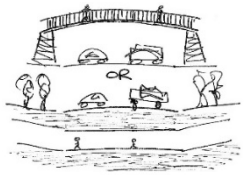
Table A2 describes the benefits, implications and the recommended parameters of each crossing treatment. This table can help practitioners to identify a safe and appropriate crossing for their project.

Table A2 Crossing treatments – detailed considerations

Treatment	Benefits	Implications	Recommended parameters
Non-priority crossings / aids			
Kerb crossing 	• Guides some pedestrians to a place to cross. • Provides a smooth transition between the footpath and roadway that can be used by pedestrians.	• Does not give pedestrians priority so can be unsuitable for less able and less confident pedestrians. • Does not assist pedestrians to cross if street is wide.	• Operating speed at the crossing is 30 km/h or less. • Only appropriate for low vehicle volume environments. • Only appropriate on their own for low pedestrian demands.[1] • Only appropriate where crossing distance is 9 m or less. For longer crossing distances, consider kerb extensions. • Ensure on-street parking does not block access or visibility from the crossing point.
Kerb extension 	• Reduces crossing distance and therefore crossing time for pedestrians. • Improves safety of pedestrians because they are more visible to oncoming drivers and can view approaching traffic better. • Creates space for pedestrians to wait without blocking others walking past. • Physically prevents drivers from parking and blocking the crossing point. • Can help to slow vehicle speeds by narrowing the roadway.	• Does not give pedestrians priority, so it can be less suitable for some pedestrian user groups, eg less abled or less confident pedestrians such as elderly or children. • Can cause issues for people cycling particularly on narrower roads. • Can create an obstruction that may be struck by people cycling and vehicles. • Where the kerb alignment is being altered, they can create drainage issues and places where rubbish can accumulate (‘stick on’ extensions could overcome this if designed well).	• Should be a complementary treatment for other crossing types and aids to reduce the crossing distance. • Only appropriate on their own on local or activity streets with low pedestrian demands[1] and vehicle volumes less than about 7500 vpd. • Can be combined with pedestrian refuge, pedestrian platform, zebra crossing, and signalised crossing.
Pedestrian refuge 	• Splits up the crossing distance for pedestrians. • Simplifies the crossing task as pedestrians only need to find a gap in one stream of traffic at a time. • Can reduce delays to pedestrians. • Can help to slow vehicle speeds by narrowing the traffic lanes.	• Does not give pedestrians priority, so it can be less suitable for some pedestrian user groups, eg less abled or less confident pedestrians such as elderly or children. • Can cause issues if cycling is expected to occur adjacent to vehicle traffic; wide traffic lanes would be required (at least 4.2 m wide). Alternative provision for people cycling such as cycle	• Appropriate for low to medium pedestrian demands.[1] • Also appropriate for high pedestrian demands in a low speed environment if an alternative priority crossing is nearby. • Could be appropriate on multilane high-volume streets with a solid median if vehicles arriving in waves with sufficient gaps. • Should be combined with kerb extensions to further reduce crossing distance where space permits. • Must be designed so the refuge storage area does not cause a pinch point for people cycling.

		bypasses could be used or narrow the lane. • Can create an obstruction that may be struck by vehicles. • Can restrict vehicle access to adjacent driveways.	
Pedestrian platform 	• Guides pedestrians to a safer place to cross. • Reduces or helps to reinforce slower vehicle speeds. • Can eliminate grade changes from the pedestrian route and therefore the need for kerb ramps.	• Does not give pedestrians priority, so it can be less suitable for some pedestrian user groups, eg less abled or less confident pedestrians such as elderly or children. • Can result in less safe use if pedestrians assume they have right of way and drivers are not courteous. • Can create discomfort for vehicle occupants travelling over platforms if not well designed (particularly buses). • May increase noise as vehicles brake, slow, pass over them and then accelerate (particularly heavy vehicles).	• Platform ramps and other features should be designed to slow speeds to 30 km/h or less. • Ideally more suitable for low vehicle volume roads (up to 7500vpd depending on the road context). • Only appropriate for low pedestrian volumes.[1] • Should be combined with kerb extensions to minimise crossing distance. • Crossing should be of an appearance and colour that is clearly distinguishable from the footpath to indicate that pedestrians do not have priority.
Courtesy crossing 	• Intended to facilitate eye contact between pedestrians and drivers (as well as people cycling and on motorbikes) resulting in a mutually negotiated position of who goes first. • Can improve pedestrian safety and level of service while causing minimal delay to vehicles. • Can result in courteous behaviour where drivers yield to pedestrians. • If raised, can eliminate grade changes from the pedestrian route and therefore the need for kerb ramps.	• Not obvious who has right of way. Therefore it can create uncertainty and be unsuitable for some pedestrians, eg less able or less confident pedestrians such as elderly or children. • Can result in less safe use if pedestrians assume they have right of way and drivers are not courteous. • If raised, can create discomfort for vehicle occupants travelling over platforms if not well designed (particularly buses). • If raised, may increase noise as vehicles brake, slow, pass over them and then accelerate (particularly heavy vehicles).	• Not obvious who has right of way, so their use is discouraged except where pedestrian volumes are very high and vehicle volumes and speeds are low and where alternative priority crossings are located nearby as this provides crossing choice particularly for less able and less confident pedestrians. • May be suitable on Activity streets and Main streets where pedestrian volumes are significant (high). • Ideally more suitable for low vehicle volume roads (up to 7500vpd depending on the road context). • Only appropriate for crossing distances 7 m or less (can be combined with kerb extensions to achieve) as only used in slow speeds where people cycling and motor vehicles share the roadway. • Should be on a raised platform unless in very slow speed environments.

			• Can be combined with kerb extensions and pedestrian refuges. • Crossing should be of a colour that contrasts with both the adjacent roadway and footpaths.
Priority crossings			
Zebra crossing (flush) 	• Gives pedestrians priority resulting in minimal delays for pedestrians. • Are obvious for all road users as a place for pedestrians to cross.	• Zebra crossings safety performance can be enhanced by using other measures like kerb extensions, median refuge or vertical deflection. • High pedestrian flows can dominate and cause vehicle delays, which may be acceptable depending on the street function (One Network Framework).	• Posted speed of 50 km/h or less (>50 km/h posted speed requires approval from NZ Transport Agency Waka Kotahi as per TCD Rule Clause 8.2(2)). • Maximum of one traffic lane in each direction to avoid vehicle in adjacent lanes blocking visibility of people crossing or waiting to cross. • More suitable for medium to high pedestrian demand[1] so drivers are expecting pedestrians. • Can be combined with kerb extensions and/or a pedestrian refuge.
Raised zebra crossing 	In addition to zebra crossings, the platform component: • Reduces or helps to reinforce slower vehicle speeds and increases likelihood of drivers' give way rates. • Can eliminate grade changes from the pedestrian route and therefore the need for kerb ramps. • So, it is more suitable for less able or less confident pedestrians	In addition to zebra crossings, the platform component: • Can create discomfort for vehicle occupants travelling over platforms if not well designed (particularly for buses). • May increase noise as vehicles brake, slow, pass over them and then accelerate (particularly heavy vehicles).	• Posted speed of 50 km/h or less (>50 km/h posted speed requires approval from NZ Transport Agency Waka Kotahi as per TCD Rule Clause 8.2(2)). • Lower approach speeds result in higher yielding by drivers. • One traffic lane in each direction. • Suitable for medium to high pedestrian demand[1] so drivers are expecting pedestrians. • Can be combined with kerb extensions and/or a pedestrian refuge.
Signalised crossing 	• Provides clear information on when a pedestrian can cross so it is better for less able or less confident pedestrians. • Can balance the delays to pedestrians and vehicles through time separated priority. • Allows pedestrians to cross multiple vehicle lanes. • Can reduce community severance across busy streets.	• Can delay pedestrians when vehicles are given more green time. This can result in pedestrians' frustration and therefore crossing the street when the pedestrian signal is still red. • Slower pedestrians may find it difficult to cross within the allotted time. • More costly to install, operate and maintain than other at-grade crossing types.	• Suitable for high pedestrian demand[1] so signals are activated regularly. • For locations with lower pedestrian demand conspicuous advance signal display is recommended. • Can be combined with kerb extensions and/or pedestrian refuge. • Different signal display, activation and detection options are available.

	• Can encourage pedestrians to cross in groups, rather than intermittently, minimising overall vehicle delays.	• May increase risk for pedestrians crossing near the signals from drivers not expecting them. • Can be disruptive to high vehicle flows if frequently called.	
Raised signalised crossing 	In addition to signalised crossing: • Can eliminate grade changes from the pedestrian route and therefore the need for kerb ramps. • Reduces or helps to reinforce slower vehicle speeds.	In addition to signalised crossing: • Can create discomfort for vehicle occupants travelling over platforms if not well designed. • May increase noise as vehicles brake, slow, pass over them and then accelerate (particularly heavy vehicles).	• Suitable for high pedestrian demand* so signals are activated regularly. • For lower pedestrian demand conspicuous advance signal display is recommended. • Can be combined with kerb extensions and/or a refuge. • Different signal display, activation and detection options are available.
Grade separation 	• Allows pedestrians to cross unhindered by vehicles. • Allows free vehicle flow. • Can be covered for weather protection.	• May increase the safety risk if pedestrians continue to cross at-grade. • Can increase pedestrians' travel time due to requirement to change level or other detours. • Can result in personal security concerns because of reduced natural surveillance. • It can be unsuitable for less able or less confident pedestrians. • Costly to construct. • Can be visually intrusive. • Gradients, steps and increased walking distance can create difficulties for less able pedestrians or pedestrians carrying loads.	• Should only be used to cross transit corridors (check ONF street categories), natural features (such as waterbodies) and railways. • Also suitable for some rural roads particularly where the operating speed is 80 km/h or more. • Grade separated route must be more convenient to pedestrians than any other option (use topography to minimise grade changes for users). • If cost prohibitive, consider reducing vehicle speeds so other crossing types become feasible. • Design should comply with CPTED and Universal Design principles

Notes:

[1] Pedestrian demand may be existing volumes or aspirational volumes because of a project or latent demand. The range for low, medium and high pedestrian demands should be based on local expectations and likely pedestrian characteristics and needs at the crossing.

Crossing sketches are for illustrative purposes only and practitioners must consult the relevant sections of the Pedestrian Network Guidance for design details such as dimensions, gradients, and tactile indicators etc.

vpd = vehicles per day.

A1.4. Design integration

Once a treatment (which may involve a combination of treatments) is selected to be implemented, refer to the relevant crossing facility type design sections for:

- Legal requirements
- Design considerations and elements (eg tactile indicators, ramps, signage)
- Traffic control device requirements

A1.5. Flexibility and iteration

Further to the key considerations discussed above, selection of a crossing treatment should be iterative and adaptable. If constraints (eg speed, geometry) limit the feasibility of a preferred treatment, consider:

- Adjusting the crossing location
- Combining treatments to meet safety and accessibility needs
- Implementing traffic calming or speed management