Appendix I

Accessibility Audit Report

BUSCONNECTS –C11 Kimmage to City Centre

Accessibility Audit Report

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1 INTRODUCTION

1.1 General Project Information

Técnica y Proyectos S.A (TYPSA) has been commissioned by the National Transport Authority to carry out a Disability Access Audit of the existing Kimmage to City Centre Bus Corridor (CBC). A Disability Access Audit is an assessment of a building, the external environment or a service to benchmark its accessibility for disabled people.

The Disability Act 2005 places a statutory obligation on public service providers to support access to services and facilities for people with disabilities. This report will assess the existing access support along the Scheme route, identify any existing Shortcomings, and make recommendations to address any such Shortcomings. The report will also set out any design criteria considered imperative to maintaining the dignity of people with disabilities as they interact with the external environment, including structures, people and services.

1.2 Project Description

In June 2018 the National Transport Authority (NTA) published the Core Bus Corridors Project Report. The report was a discussion document outlining proposals for the delivery of a core bus corridor network across Dublin. It set out the vision for the provision of 230kms of dedicated bus lanes and 200km of cycle lanes/tracks on sixteen key bus corridors.
The overall BusConnects Core Bus Corridors Programme (The Programme) has been sub-divided into four design Projects. Each Project is made up of three Schemes. The Schemes are either stand-alone Core Bus Corridors (CBCs) or a combination of two contiguous CBCs. In total there are 16 CBCs which have been combined into 12 Schemes and are divided into four Projects.

The four Projects are:

- Project A: Clongriffin to City Centre CBC plus Lucan to City Centre CBC plus Greenhills to City Centre combined with Clondalkin to Drimnagh (a combined CBC) - (3 Schemes)
- Project B: Swords to City Centre CBC plus Liffey Valley to City Centre CBC plus Bray to City Centre CBC - (3 Schemes);
- Project C: Blanchardstown to City Centre CBC plus Rathfarnham to City Centre combined with Tallaght to Terenure (a combined CBC) plus UCD Ballsbridge to City Centre combined with Blackrock to Merrion (a combined CBC) - (3 Schemes); and
- Project D: Ballymun to City Centre combined with Finglas to Phibsborough (a combined CBC) plus Kimmage to City Centre CBC plus Ringsend to City Centre CBC - (3 Schemes).

This document has been developed to be implemented in BusConnects Core Bus Corridors - Project D. In this case, route 11 corresponding to Kimmage to City Centre is specifically studied in terms of accessibility.

- Route 3: Ballymun to City Centre;
- Route 4: Finglas to Phibsborough;
- **Route 11: Kimmage to City Centre;**
- Route 16: Ringsend to City Centre;

The Kimmage to City Centre Core Bus Corridor commences on the R817 Kimmage Road Lower at the junction with Terenure Road West and Fortfield Road and is routed via the R817 along Kimmage Road Lower to R137 Harold's Cross Road, and then along the R137 through Harold's Cross Road, Clanbrassil Street Upper & Lower and

New Street South where it will join the Greenhills Core Bus Corridor at Kevin Street Upper junction.

Priority for buses is provided along the entire route, consisting primarily of dedicated bus lanes in both directions, with alternative measures proposed at particularly constrained locations along Kimmage Road Lower.

Due to constraints throughout an alternative route along the same corridor is proposed for the cycle tracks.

1.2.1. Objective of the Scheme

The purpose of the Kimmage to City Centre Corridor Study is to enhance public transport and cycling accessibility between the south suburbs and south inner city and the city centre. Improvements are proposed as part of the wider BusConnects programme, which will deliver a network of enhanced, reliable and frequent bus services to increase the attractiveness of interchange and facilitate longer distance, multi-stage public transport journeys throughout the city. The BusConnects network will service not just commuter journeys, but also leisure and other journeys.

1.3 Report Structure

The overall Kimmage to City Centre Core Bus Corridor (CBC) scheme can be broken down into three distinct sections, namely the 1) Terenure Road West to Sundrive Road-Kimmage road Lower, 2)Sundrive Road to Harold's Cross Road-Kimmage Road Lower, 3) Harold's Cross Road to Kevin Street Upper-Harold's Cross Road, Clanbrassil Street Upper & Lower, New Street South-and Inside Canal

These three sections form the macro-level basis of the report structure.

Each three sections are also divided into different drawing sheets which correspond to the Corridor design project.

Every sheet contains the information of images with shortcomings in terms of disabled user and brief recommendations in order to solution and comply with universal Design.

Within each of the three sections the recommendations for assessing the existing street infrastructure and its ability to support access for disabled users have been adopted mainly from the following documents:

- Irish Wheelchair Association [IWA] 'Best Practice Guidelines, Designing Accessible Environments'
- The National Disability Authority's [NDA] Shared Spaces, Shared Surfaces, and Home Zones from a Universal Design Approach for the Urban Environment in Ireland; and
- The National Disability Authority's [NDA] 'Building for Everyone: A Universal Design Approach'.

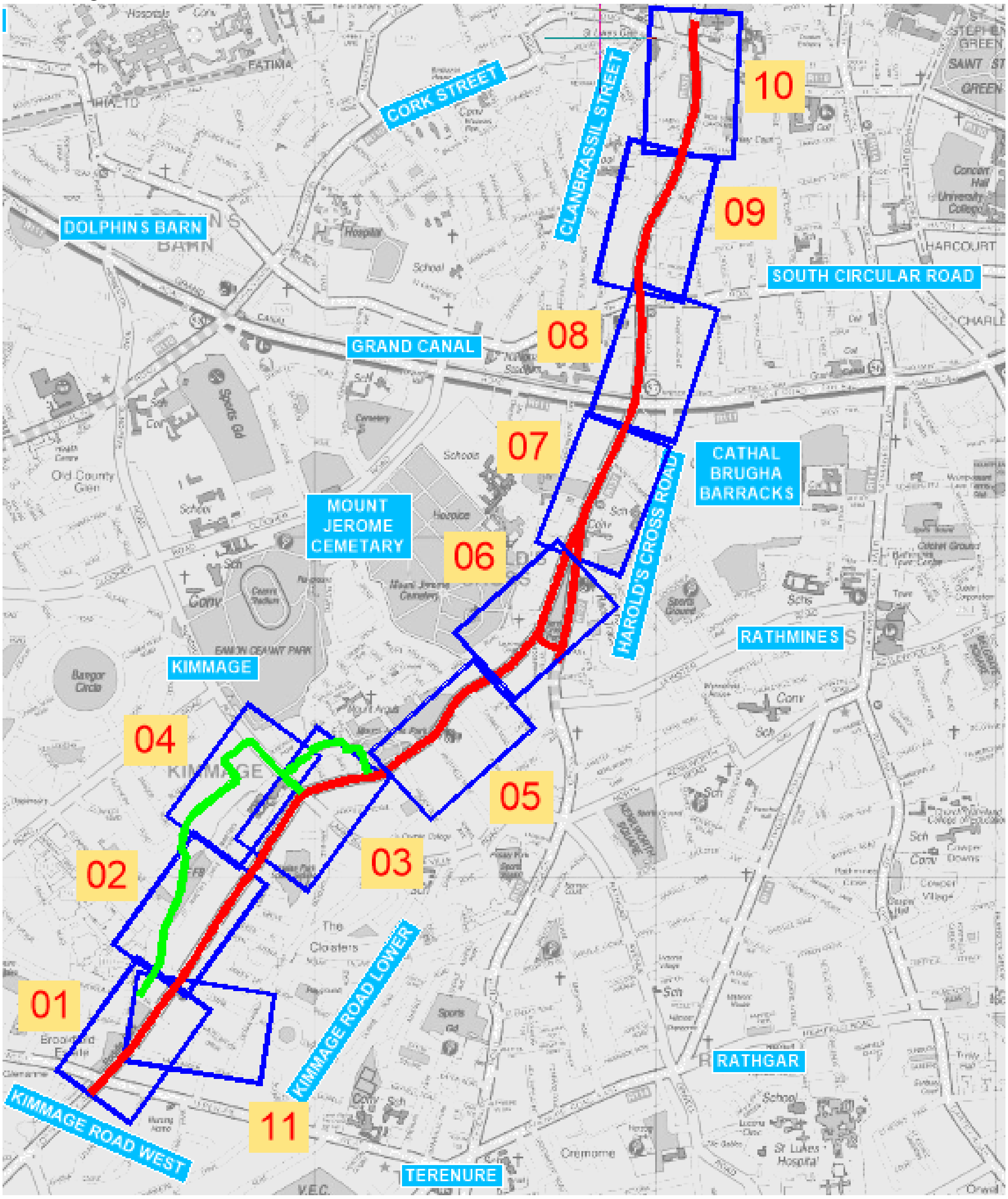
The National Disability Authority *Shared Space, Shared Surfaces and Home Zones from a Universal Design Approach for the Urban Environment in Ireland* report provides the following definitions for Universal Design and Vulnerable Pedestrians:

Universal Design – Universal Design is the design and composition of an environment so that it can be accessed, understood and used to the greatest extent possible by all people, regardless of their age, size, ability or disability.

Vulnerable Pedestrians – Vulnerable pedestrians is a term used to identify pedestrians such as older people, those with mobility, sensorial, or cognitive difficulties or children.

This report assesses the existing external environment as it affects the various vulnerable pedestrians and concludes with universal design considerations to be adopted for the detailed design of the Kimmage to City Centre Core Bus Corridor.

The report will be structured with the following sheet distribution, making reference to the route proposed in the PRO drawings for the 2nd Public consultation. This sheet distribution is shown in the image below:



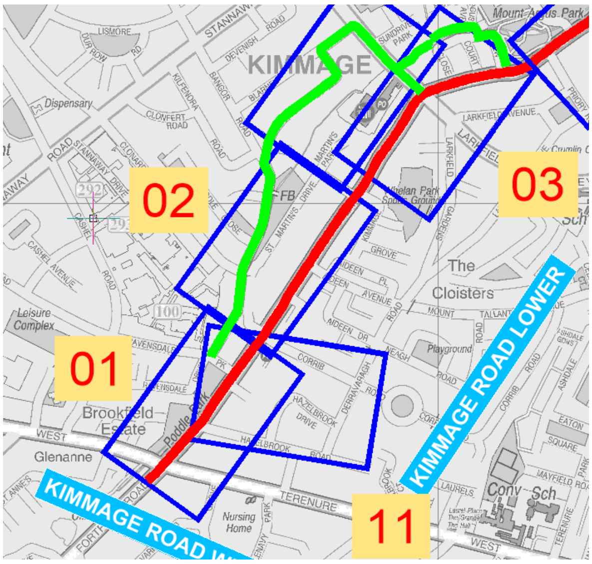
Sheet distribution for -Kimmage to City Centre Core Bus Corridor Scheme

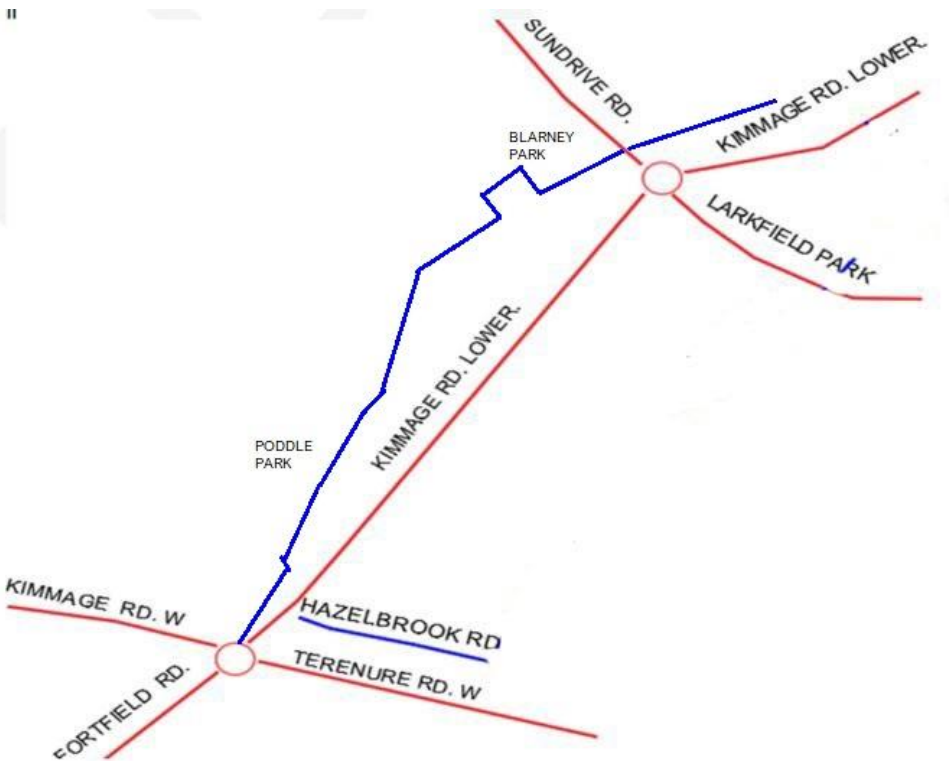
2. TERENURE ROAD WEST TO SUNDRIVE ROAD-KIMMAGE ROAD LOWER

2.1 Description of the route

The Kimmage to City Centre Corridor begins at the Londis KCR (gas station and store) as a place of identification, in the known as Kimmage Cross Roads.The crossroads are considered to denote the southern boundary with Terenure, intersecting Terenure Road West, Kimmage Road West, Fortfield Road and the Lower Kimmage Road.

This first route ends at the intersection of Kimmage RD Lower with Sundrive Road and Larkfield Park.





Map and Scheme of the Route

In the existing situation, the route starts from the Kimmage Cross Roads, heading North with two traffic lanes on both sides, adjacent cycle track and footpath until the junction with Ravensdale Park. After this intersection, it changes to a one lane of traffic with cycle track and bus stop areas in the carriageway to Sundrive Road

Some considerations in this part about the design proposal are:

The Kimmage Road West junction with Fortfield Road and Terenure Road West, it is proposed to upgrade the junction to provide bus priority and enhanced pedestrian / cyclist facilities.

The section of Kimmage Road Lower between Kimmage Road West and Sundrive Road / Larkfield Avenue is heavily constrained. It is proposed to provide footpaths plus one bus and one general traffic lane in each direction on this section. Due to various pinch points along this section, it is proposed to use some limited areas of land take between Corrib Road and Sundrive Road.
There is insufficient space to provide cycle facilities on this stretch of the road. To accommodate cyclists, it is intended to direct them on to an alternative cycle route along Kimmage Road Lower from the junction with Fortfield Road .

It is proposed to modify junctions along this route to provide priority for cyclists.
It is proposed to locate the Bus Gate just north of the Ravensdale Park junction, 0.8km further south along Kimmage Road Lower. This change will achieve bus priority by deflecting through traffic off the Kimmage Road Lower, without the need for road widening to provide bus lanes.. The existing street layout and on-street parking arrangements will remain unchanged on Kimmage Road Lower north of Ravensdale Park.

The existing cycle lanes will be retained on this stretch of the road and conditions for cyclists will be greatly improved through reduced general traffic as a result of the proposed Bus Gates. Local traffic will be permitted access from the south via Sundrive Road or Larkfield Avenue.

Traffic management measures will be required on the adjoining residential streets of Poddle Park to the west and Derravaragh Road to the east. These streets will be closed to through traffic, apart from cyclists, at suitable locations to prevent through traffic diverting off Kimmage Road Lower inappropriately. Traffic management measures such as turning restrictions at junctions or road closures will also be considered on other adjoining residential streets at suitable locations as required.

A proposal has been developed for a cycle route through the park alongside the River Poddle just north of Kimmage Cross-Roads, which will continue generally parallel to Kimmage Road Lower over a length of 2.3km to Harold's Cross Park. It will mainly follow quiet local streets including Poddle Park and Blarney Park with appropriate traffic management and will also include short sections of greenway across public park lands.

Urban Realm improvements will be made at the focal points on Kimmage Road Lower where there are clusters of shops and business at the Corrib Road junction and at the Sundrive Road junction.

For the Accessibility Audit Report in Route 11 of the BusConnects project, the corresponding sheets of the Design for Stage ii project are followed, so that it is easier to locate the points of interest in accessibility. This first section includes sheets 1, 2, 3, 11 and 11.

2.2 Problem Identification

The different sheets indicated in each of the points studied refer to the drawings in which is divided the conceptual project to facilitate their location.

2.2.1 Accessible Parking

There are hardly any provisions for accessible parking along the route.

2.2.2 Access Routes-General

The width of the footpath varies along the path from Terenure to Sundrive Road.
There are sections of footpath of 2 meters with average sections of approximately 3 meters.

a) Sheet 01

However, there are constraints in the eastern sidewalk of Kimmage Rd Lower near Riversdale Grove at the access to dwellings.
There are some traffic signs or litterbins that should be rethought in location to allow passing through.
The width can reduced to 1200 mm. minimum for not more than 2m. in length around existing obstructions.

Footpath in dwelling Access next to Riversdale Grove

Shortcomings: Insufficient travel width for people with disabilities, wheelchair users.
Recommendations: Where a level access route is provided, the minimum clear width (between walls, upstands or kerbs) should be 1500 mm. Street furniture, such as lighting columns, signposts should be located at or beyond the boundaries of the access route. In the new design width dimension should be guaranteed. TGD M
Ensure width is not less than 1200mm, on short constricted sections of an access route.

2.2.3 Access Routes-Drainage

The crossfall gradient of the footpaths within this section of the scheme was not considered too steep at any particular point.

While there are cases where the gradient should be studied or the pavement repaired to allow proper drainage and prevent the formation of puddles.

The complete sections of footpath should be constructed in their place with minimum cross fall gradients of 1:50.

2.2.4 Access Routes-Guardrails

There are no major differences in level in the section, which suggest the placement of guardrails for guidance and assistance to people with disabilities.

Some guardrails in single-family homes at Kimmage Rd Lower-Ravensdale Park serve as protection in the access of the dwellings towards the footpath. This is due to the proximity of the entrances to the carriageway.

Footpath with guardrails in Kimmage Road Lower -Hazel Park

Recommendations: Guardrails should be located at the boundaries of the access route and should contrast in color with the surfaces and allow visual permeability through them.

2.2.5 Pedestrian Crossing Points

The correct solutions for pedestrian crossing points can be checked in the article 5.3.5
We can differentiate three types of crossing points:
Uncontrolled crossings, controlled crossing points and staggered signalized crossings:

The standard of existing pedestrian crossing points through this section of the scheme varies with no dropped kerbs provided in some locations and dropped kerbs with

inadequate width preventing wheelchair users and pushchairs from navigating the crossings comfortably.
Along the route from Terenure road to Sundrive Road on route 11 we can find cases of the absence of dropped kerbs and correct tactile paving.

We are going to locate these Shortcomings through corresponding drawing sheets in design Project of Stage ii.

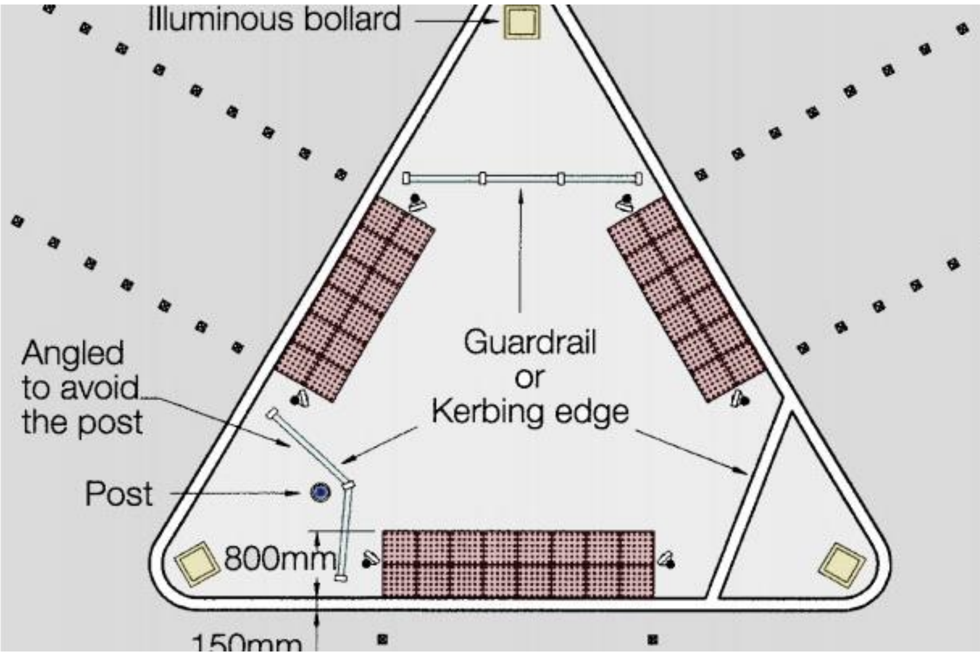
a) Sheet 01

We start at the first intersection (KCR Crossroads) Kimmage Rd-W / Terenure Rd-W and Fortfield Rd/ Kimmage Rd Lower.
Refuge island and crossing points on footpath can be observed without proper kerb and absence of pedestrian guardrails.

Crossing Kimmage RD W-Kimmage RD Lower

Shortcomings: Refuge island that combines controlled crossing point and uncontrolled crossing without the correct tactile paving, lack of dropped kerb.
Recommendations: Tactile paving surfaces should be provided across the full width of each dropped kerb to a depth of 800mm, set back behind the kerb, or 150mm from the carriageway on all sides. Rounded kerb edge and raised and central kerbs should be painted white yellow for the benefit of partially sighted people.
Traffic signals poles have to be located 500 mm. max. from tactile paving edge and with audible "bleep and sweep" and tactile signals at controlled crossing points.

A controlled crossing point would be advisable with adequate signal-controlled crossings and pedestrian guard rails. Waiting areas for pedestrians should be large enough to accommodate the expected numbers of pedestrians, particularly people using wheelchairs or pushchairs that also need space to turn. (Guidance of the use of Tactile Paving Surfaces.DETR.UK).



Location of blister surface on a triangular pedestrian island

Crossing Kimmage RD W-Kimmage RD Lower

Shortcomings: Isle with no correct tactile paving and dimensions.
Recommendations: Check dimensions of staggered crossing points. (5.3.5.3). Red blister tactile paving should be provided.
A staggered island crossing increases the crossing distance particularly for vulnerable pedestrians. The island also results in a constrained dwell area for potentially high volumes of pedestrians. The layout of the junction should be revised as part of the scheme to remove the staggered crossing, thereby improving the overall crossing facility and the dwell space at footpaths, and decreasing the required crossing distance.

Crossing Kimmage RD W-Kimmage RD Lower

Shortcomings: Controlled crossing point without the correct tactile paving and lack of dropped kerb.
Recommendations: Red tactile paving should be used. Crossing not in the direct line, gradient 1:12 max. Level difference: 6mm. At the crossing point, the tactile paving should be laid across the full width of the dropped kerb. This should be a minimum of 2.4m wide and should be 800mm (2 slabs) deep. The top of the dropped kerb at the crossing should be painted white for the benefit of partially sighted pedestrians.

Uncontrolled crossing point in Ravensdale Park Corner

Shortcomings: Uncontrolled crossing point without the correct tactile paving and located on the curve of the road. This can cause a risk of visually impaired users being misdirected by the orientation of the kerb.
Recommendations: “Buff or grey” tactile paving for uncontrolled crossing points. Depth of 1.2 m, gradient 1:12 max. Level dif. 6mm. Dropped kerbs should be located in the direct line of travel at any junctions.

Crossing Kimmage Road Lower-Ravensdale Park

Shortcomings: Uncontrolled crossing where refuge island don't reflect the proper tactile paving if the traffic island is intended as an area of pedestrians to wait.
Recommendations: Crossing situation should suggest a controlled crossing at this point and the incorporation of red blister tactile paving. It should be considered as an island of refuge and ensure an adequate crossing time for crossing. A red blister tactile paving should be provided if it is considered as an area for pedestrians to wait A stem of the surface, 1200 mm. wide should be extended to the building line.

Uncontrolled crossing at side road junction Hazelbrook road

Shortcomings: Level difference edge kerb and carriageway greater than 6mm. No vertical upstand should be between the road surface and the kerb.
Recommendations: Footpath and carriageway should be flushed correctly as in the figure below. Width of the central kerb should be extended as the width of travel.

b) Sheet 02

Crossing Aideen Av-Kimmage RD Lower

Shortcomings: Uncontrolled crossing point without the correct gradient and dimension.
Recommendations: Not enough depth of tactile paving (1.2 m. Three slabs), gradient 1:12 max. Level difference of dished kerb: 6mm (max).

Crossing Poodle Cl-Poddle Park

Shortcomings: Uncontrolled crossing point without the correct tactile paving. Crossing point located on the curve of the road.
Pieces of asphalt pavement are broken at junction with footpath.
Recommendations: “Buff or grey” tactile paving. Depth of 1.2 m, gradient 1:12 max. It should be avoided to locate uncontrolled crossing points at curve of corners. The asphalt of carriageway needs to be restored and differences in the level of the dropped kerb less than 6 mm.

Controlled Crossing at Kimmage Rd Lower.

Shortcomings: Some measures of controlled crossings need to be reviewed.
Recommendations: Installing red tactile paving at central refuge area if traffic island is intended for pedestrian to wait. The stem of the paving should be extended to the back of the footway to intercept people who might otherwise walk past the facility.
The tactile paving should be laid across the full width of the dropped kerb. This should be a minimum of 2.4m wide and should be 800mm (2 slabs) deep.
The top of the dropped kerb at the crossing should be painted white for the benefit of partially sighted pedestrians.

c) Sheet 03

Crossing in St Martin´s Park-Kimmage RD Lower.

Shortcomings: Deteriorated blister tactile paving at uncontrolled crossing point.
Recommendations: Renovate blister tactile paving. Avoid placing on the curve of the footpath.

Crossing Sundrive Road-Kimmage RD Lower

Shortcomings: The stems in controlled crossing need to be reviewed.
Recommendations: It should be considered as an island of refuge and ensure an adequate crossing time for crossing. A red blister tactile paving should be provided if it is considered as an area for pedestrians to wait. A white/yellow dished kerb should be provided. The stem of the paving should be extended to the back of the footpath.

Sundrive Rd-Larkfield Ave

Shortcomings: Check the lack of a red blister tactile paving stem.
Recommendations: The stem of the paving should be extended to the back of the footpath. In the design proposal, the traffic island is supposed to be removed, reducing the time of crossing. It is important to define when a refuge island is intended for pedestrian to wait, in order to place proper tactile paving. Ensure an adequate crossing time

Some others uncontrolled crossing in the route 11 of CBC:

d) Sheet 11

For uncontrolled crossing it may not be possible to provide tactile paving at all existing locations and therefore the provision of such facilities may need to be prioritised.

Image 1. Uncontrolled Crosspoint at Hazelbrook drive

Shortcomings: Uncontrolled crossing point without the correct tactile paving.
Recommendations: “Buff or grey” tactile paving. Depth of 1.2 m, gradient 1:12 max. Level difference in dished kerb: 6mm. It should be avoided placing the cross point in the curve.
In the alternative cycle route of the design, along Kimmage Road Lower from the junction with Fortfield Road and Terenure Road West to Hazelbrook Road, Derravargh Road and Priory Road is contemplated that: no dropped kerbs with tactile paving and with inadequate width are provided in the footpath.
These should be provided for wheelchair users and pushchairs to navigate the crossings comfortably.
Some examples of these locations are included in the report but this happens in most of the crossings in this area.

Uncontrolled Crosspoint at Derravaragh Road

Shortcomings: Uncontrolled crossing point without the correct tactile paving. It should be located on the curve of the footpath.

Recommendations: “Buff or grey” tactile paving. Depth of 1.2 m, gradient 1:12 max. Level difference of dropped kerb: 6mm (max).

2.2.6 Tactile Paving Surfaces

Of all the things seen in the previous section of Pedestrian Crossing Points where along the route it has been possible to observe the absence of tactile surfaces in some of the crossings.
Any crossing locations within the proposed scheme shall be upgraded to provide the necessary tactile paving surfaces.

2.2.7 Change in Level

There are no significant changes in level within the majority of this section of the scheme.
Not enough level changes are developed on routes to have public access ramps or have to develop external ramps or external steps.

2.2.8 Shared Spaces, Share Surfaces

There are not explicitly designated shared surfaces.

2.2.9 Surface Material

It is observed during the audit walking that many of the footpaths are deteriorated. With fractured concrete slabs that cause differences in level and hazard for the comfortably transition of people with disabilities.
The footpaths shall be homogenous in material, however, and where concrete footpaths have been patch repaired with asphalt, and vice versa, full sections of the footpaths shall be broken out and replaced to provide a smooth finish along the footpath.
Special care should be taken with the joints with manhole covers.
Some examples of inconveniences in the surface materials used are the following:

a) Sheet 01

Side road and Footpath Kimmage RD Lower

Shortcomings: Uneven surfaces, cracked footpath with level difference in the junction of the footpath and the side road.

Recommendations: Consider a level and homogenous footpath pavement

b) Sheet 02

Footpath in Poddle Park

Shortcomings: Uneven surfaces with different concrete finishes, cracked footpath with level difference. Crossfall gradient is not considered. This can cause the formation of puddles.
Recommendations: Consider a level and homogenous footpath pavement

c) Sheet 11

Footpath at Hazelbrook Road

Shortcomings: It is observable that in some locations, the roots of trees have lifted the concrete pavement from the footpaths causing differences in levels and the consequent stagnation of water and slippery surfaces.
Recommendations: It should be restored concrete slabs with proper expansion joint. To surround trees with the suitable protection enclosure and kerbs that warn person with disability of hazard by existence of trees when possible.

Footpath at Derravaragh Road

Shortcomings: Cracks and lifting of the pavement by the growth of tree roots.
Recommendations: Pavement restoration. Close-up considerations around tree should be provided, when possible, to warn of their location.
The gap between paving slabs and any vertical deviation between slabs should not exceed 5 mm.

2.2.10 Street Furniture

Some aspects of street furniture were recorded during the walking audit of this section of the scheme:
In some cases, the placement of traffic signs, lighting columns, street furniture, etc. reduce the width of access routes.
These urban elements should be relocated out of the direct line of travel as part of the overall design and construction of the scheme.

a) Sheet 02

Bus Stop in Kimmage-Rd-Lower-Aideen AVE

Shortcomings: Traffic signs and litterbins are close and to the building line for allowing the enough travel access for mobility impaired pedestrians.
Recommendations: Location of litterbin and the pole should be reconsidered. These elements can narrow the width of the path possibly causing a constraint to passing wheelchair users or buggies, or they may coincide with the location of the bus door

2.2.11 Bus Stop Design

The following comments can be extracted from the existing route:

a) Sheet 01

A new situation for bus stops is proposed for the bus stops in both sides of Kimmage Road Lower in front of Poddle Park.

Bus Stop at Kimmage RD Lower-Poddle Park

Recommendations: For the new situation of the bus stops is recommended to introduce textured paving at the edge and "Kassel kerbs". Street furniture associated to the bus stop has to be considered in order to let a clear width of 1.2 m. minimum for disabled people.

b) Sheet 03

Bus stop in Kimmage RD Lower to Sundrive Road.

Shortcomings: Inappropriate edge kerb in the bus stop. The location of the shelter should be reconsidered.
Recommendations: For the bus stops placed almost in the middle of the path, their location should be such that there is 1.2m clear width in front of them, placed to the back of the path and out of the direct line of travel.
A “Kassel Kerb” should be provided. Height fixed to suit kneeling suspension of modern buses, curved profile to enable accurate bus positioning at the stop and also to reduce lateral impact between wheel and kerb.

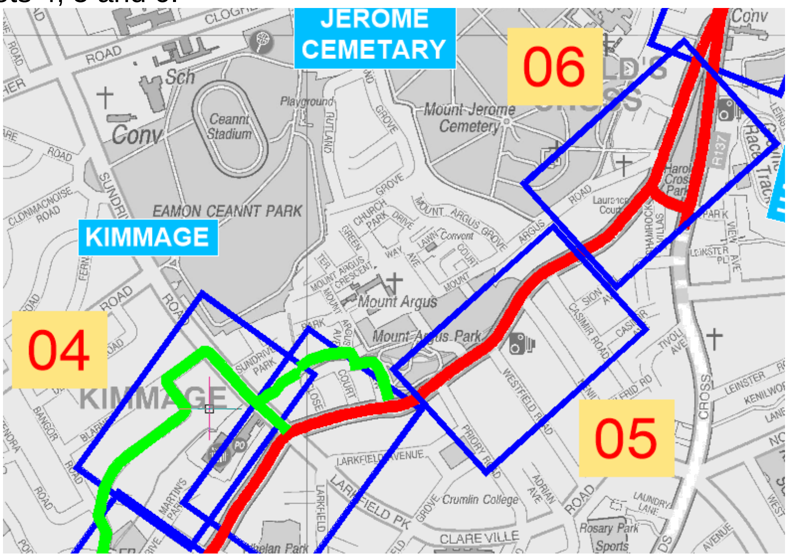
For more graphic information on the shortcomings in the route, drawings in the Appendix A of this report should be consulted.

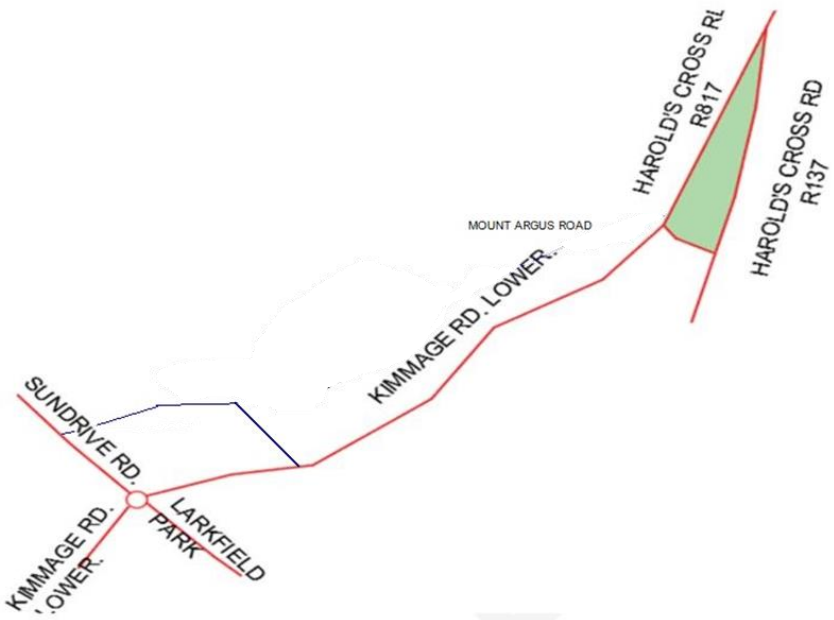
3. SUNDRIVE ROAD TO HAROLD'S CROSS PARK-KIMMAGE ROAD LOWER

3.1 Description of the Route

The second part of this route extends between intersection of Sundrive Road-Larkfield Park and Kimmage Road Lower to the end of Harold's Cross Park, intersection of R817 and R137. This existing scheme is defined by a traffic lane in both directions and a cycle track to Mount Argus and to Harold's Cross Road. The bus lanes join adjacent to each vehicular path.

Some considerations in this part about the design proposal are:
The Bus Gate proposed in the design project is moved south to Ravensdale Park so the local traffic access will remain available from Sundrive Cross to both the southern and northern part of Kimmage Road Lower. However, the left-turn from Sundrive Road will be restricted so as to prevent through traffic from using Kenilworth Park instead of Clareville Road. The existing street layout and parking arrangements along Kimmage Road Lower will remain unchanged.
To accommodate local access to Kimmage Road Lower from the north, the junction of Harold's Cross Road and Kenilworth Park will be modified to provide for the southbound right-turn movement. The operation and capacity of this junction will be improved by restriction of the link from Kenilworth Square to a westbound Bus Gate, with westbound general traffic diverted via Rathgar Avenue.
The proposed Poddle Cycleway will run along Sundrive Road from Blarney Park to the shopping centre entrance and then follow the river northward to Mount Argus Park. The cycleway travels through the car park of Mount Argus Church to Mount Argus Road, utilizing a Quiet Street Treatment to Harold's Cross. Previous proposals to divert cyclists via quiet streets east of Kimmage Road Lower at Priory Road, Larkfield Avenue and Larkfield Grove are no longer required with reduced general traffic on Kimmage
Junctions along these proposed alternative traffic routes will be altered where necessary to facilitate these traffic movements. On the west side of the Harold's Cross Park, additional bus stop facilities will be provided.
For the scheme of the Accessibility Audit Report in Route 11 of the BusConnects project, the corresponding sheets of the Design for Stage ii project are followed, so that it is easier to locate the points of interest in accessibility. This second section includes sheets 4, 5 and 6.





Map and Scheme of the Route

3.2 Problem Identification

The different sheets indicated in each of the points studied refer to the drawings in which is divided the conceptual project to facilitate their location.

3.2.1 Accessible Parking

There are hardly any provisions for accessible parking along the route.
In some areas where the sidewalk is widened, car drivers have considered this place as a place to park because they do not have the correct pedestrian protection measures:

a) Sheet 04

Junction Blarney park-Sundrive road

Shortcomings: Some of the footpaths in the corner of Blarney Park with Sundrive Road have been overrun by parked cars that hinder the pedestrian mobility. This happens also in footpaths of Sundrive road to Kimmage Road Lower.
Recommendations: Incorporate street furniture, landscaping or bollards, only if necessary in this case, to prevent cars from parking without proper car parking marks.

3.2.2 Access Routes-General

As in the previous part of the route, the footpath and carriageway scheme is similar.
The existing footpath maintains wider than 2m. in an area of dwellings.
In the design, this part of the route covers two sections: the poddle cycle as a quiet street cycle route shared with local traffic and the section of Kimmage Road Lower with shared surface for buses, cyclists, taxis and local traffic.
Designers must ensure that the footpath width is not less than 1500mm. (TGD M) except in constrained points 1200mm. And if possible, 2 meters to guarantee the passage of people with disabilities.

b) Sheet 04

Footpath in junction Mount Argus Ave-Kimmage Road LW

Shortcomings: The footpaths in Blarney Park have no kerbs in general.
Recommendations: It should be recommended to dispose kerbs as a separation border from the carriageway in order to protect pedestrians and disabled people; except in the access points for the dwellings where dished kerbs should be provided.

There exist some points where the width is reduced, as examples:

c) Sheet 05

Footpath in junction Mount Argus Ave-Kimmage Road LW

Shortcomings: Insufficient width to allow wheelchairs users to pass.
Recommendations: Check 1200 mm minimum width of footpath. Traffic signal pole has to be located 500 mm max from tactile paving edge.

d) Sheet 06

Footpath between Casimir Road and Harold's Cross Road

Shortcomings: Signal post blocking footpath width.
Recommendations: Relocate signal post.Street furniture, such as lighting columns, signposts, litter bins, seats, etc, should be located at or beyond the boundaries of the access route.(TGD M). Ensure width is not less than 1200mm, on short constricted sections of an access route.

There is a narrowing on the western side of Harold's Cross Park where the footpath is reduced to almost the minimum for the passing through a mobility impaired person also taking into account that it is also necessary to incorporate urban elements such as traffic signs, bins and protective elements.

Footpath in the occidental side of Harold’s Cross Park.

Shortcomings: Constrained Footpath. Check the minimum width.
Recommendations: Reconsider the width of footpath in Harold’s Cross Park in order that minimum clear width to be 1500mm, between walls, upstands or kerbs (TGD M) and 1200mm. for specified points.

3.2.3 Access Routes-Drainage

The crossfall gradient of the footpaths within this section of the scheme was not considered too steep at any particular point while sometimes due to the construction of this slopes can be badly repaired and provoke un inadequate drainage and difficulties for people with mobility impairment.

Footpath at Kimmage Road Lower to Harold Cross Road

Shortcomings: Different gradients in crossfall.
Recommendations: Footpath should be rehabilitated for being homogeneous and the complete sections of footpath to be in their place with minimum cross fall gradients of 1:50.

3.2.4 Access Routes-Guardrails

There are no major differences in level in the section, which suggest the placement of guardrails for guidance and assistance to people with disabilities. There is flatness in the route of the sidewalks that negates the placement of ramps or guardrails due to the lack of gradient.

3.2.5 Pedestrian Crossing Points

Several types of crossing points can be differentiated:
Uncontrolled crossing controlled crossing points and staggered signalized crossings.

For uncontrolled crossings it may not be possible to provide tactile paving at all the existing locations and therefore the provision of such facilities may need to be prioritised. In deciding relative priorities, discussions should be held with local groups representing both vision impaired and restricted mobility, such as wheelchair users, pedestrians. Tactile paving should be provided at the locations where new works are being constructed like: raised entry treatments, speed tables, traffic islands, dished crossings, dished crossings at traffic signals without a pedestrian stage.
We are going to locate some particular examples of shortcomings in pedestrian crossing points through the corresponding drawing sheets in design Project of Stage ii.
The correct solutions for pedestrian crossing points can be checked in the article 5.3.5

a) Sheet 04

Uncontrolled Crossing-Clooney road-Poddle Park

Shortcomings: Uncontrolled crossing point with no tactile paving.
Recommendations: "“Buff or grey” not red Blister tactile paving in uncontrolled crossing point. Depth of 1.2 m. in direct line, gradient 1:12 max. Level difference of dropped kerb: 6mm (max). If a traffic island is not intended as an area for pedestrians to wait then tactile paving should not be used at the island.

Junction in Blarney Park Road

Shortcomings: Uncontrolled crossing point with no tactile paving, located on the curve of the road and absence of central dropped kerb.
Recommendations: “Buff or grey” tactile paving. Depth of 1.2 m if in direct line of travel. Gradient of 1:12 max. and level difference : 6mm.

Junction in Sundrive Road and Sundrive Park

Shortcomings: Uncontrolled crossing point without the correct tactile paving and located on the curve of footpath. No dished kerb has been provided.
Recommendations: “Buff or grey” tactile paving for uncontrolled crossing points. Depth of dished kerb: 1.2 m, gradient if 1:12 max. Level difference of dished kerb: 6mm.

b) Sheet 05

Uncontrolled crossing at side road junction Westfield Road

Shortcomings: Level difference edge kerb and carriageway greater than 6mm.The side road carriageway has been raised to the level of the footpath.
Recommendations: Footpath and carriageway should be flushed correctly. Width of the central kerb should be extended as the width of travel.

Uncontrolled crossing in line at Casimir Road

Shortcomings: Uncontrolled crossing point with wrong dimension.
Recommendations: Depth should be of 1.2 m. (3 slabs), gradient if 1:12 max. Level difference: 6mm.

At the intersection between Kimmage Rd Lower and Mount Argus View there are triangular refuge islands that combine controlled and uncontrolled crossing point.

Refuge island in junction Kimmage Rd Lower and Mount Argus View

Recommendation: The blister surface should be installed across the full width of each dropped kerb to a depth of 800mm, set back behind the kerb or 150mm from the carriageway on all sides. Pedestrians should be kept away from the comers of the triangular island by the use of a kerbing edge surface or guard railing.

In general, Traffic islands should be illuminated so that road users can see them in the hours of darkness. Where islands have been provided without adequate illumination the risk of vehicles colliding with them is significantly increased.

c) Sheet 06

I 

Junction Harold's Cross Rd-Leinster Park

Shortcomings: Uncontrolled crossing point with no tactile paving. Located in the curve and steep gradient directed towards the carriageway.

Recommendations: “Buff or grey” tactile paving. Depth of 1.2 m. if in direct line of travel. A ramp slope of 1 in 20 is desirable with a maximum of 1 in 12. The kerb should be flush with the road surface or have a maximum upstand of 6mm.

Crosspoint-Entrance Harold’s Cross Greyhound Stadium

Shortcomings: Uncontrolled crossing with no tactile paving.
Recommendations: “Buff or grey” tactile paving. Depth of 1.2 m if in direct line of travel, gradient 1:12 max. Level difference in kerb: 6mm.

3.2.6 Tactile Paving Surfaces

Its arrangement in the route can be seen in conjunction with the previous chapter on pedestrian crossing points.

A significant number of uncontrolled crossings do not have tactile paving at the dished kerbs.

Tactile paving shall be provided at all crossings as required by the crossing type, whether controlled (red blister) or uncontrolled (buff).

Tactile paving is used to guide those with visual difficulties, whether this is to guide them towards certain features or warn them of potential hazards. At controlled crossings and zebra crossings, red tactile blister paving should be used in an L-shaped configuration. Grey or buff coloured tactile paving should be used at uncontrolled crossings to warn of dished kerb edge and prevent them for accidently stepping out onto the road.

Contrasts in colour and tone should be used to accentuate the presence of certain key features.

Tactile paving surfaces can be used to convey important information to visually impaired pedestrians about their environment, for example, hazard warning, directional guidance, or the presence of an amenity.

3.2.7 Change in Level

There are no significant changes in level within the majority of this section of the scheme.

Not enough level changes are developed on routes to have public access ramps or to develop external ramps or external steps.

3.2.8 Shared Spaces, Share Surfaces

There are no public shared spaces between vehicles and pedestrians along this section of the route.

3.2.9 Surface Material

It is frequently found in this part of the route - Kerbs, loose or cracked paving. or sunken chamber covers.

The footpaths are predominantly constructed in concrete. In some locations asphalt was used for patch repair in the concrete footpaths, creating undulations in the surface and potential trip hazards due to poor finishing.

Some parts of concrete had been saw cut and broken out but not refilled creating a serious trip hazard.

At these locations full sections of the footpaths shall be broken out and replaced to provide a smooth finish and non-slippery along the footpath.

a) Sheet 04

Junction Blarney park-Sundrive road

Shortcomings: Deteriorated pavement. Sunken chambers covers may pose a hazard in the itinerary of the disabled people.
Recommendations: Level the pavement and homogenize with urban elements. Gaps and vertical deviations greater than 5 mm. should be avoided and also gaps greater than 10 mm perpendicular to the line of travel.

b) Sheet 05

Footpath in Mount Argus ave.

Shortcomings: Broken Paving Slab.
Recommendations: Pavement should be repaired and level differences eliminated. Gaps and vertical deviations greater than 5 mm. should be avoided. Create expansion joints in pavement.

Footpath Harold Cross Road

Shortcomings: Cracked pavement in footpath that has been refilled with asphalt.
Recommendations: Renovate pavement with an homogenous surface. The surface should be firm, well-levelled, non-slippery and durable.

3.2.10 Street Furniture

a) Sheet 03

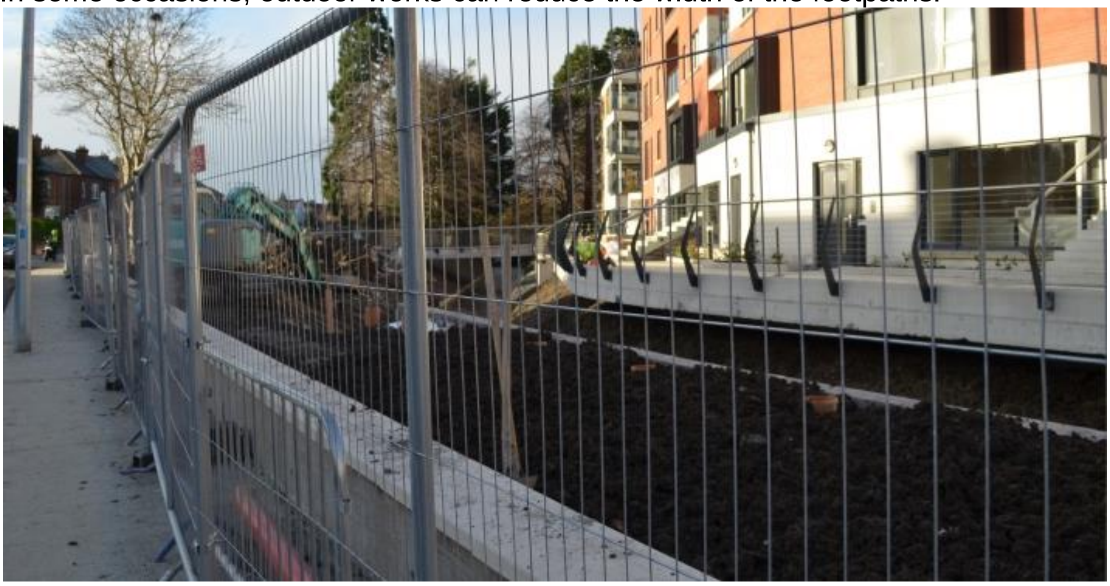
Bollards and street furniture are used to define the footpath from the carriageway therefore still providing delineation between the two sections of the road and separate motorized vehicles and pedestrians.

Bollards in intersection Kimmage Rd Lower and Sundrive Rd/ Larkfield Ave

Shortcomings: There is a gap in the edge boundary that is used by cars to access and park improperly. This implies hazard for passers-by.
Recommendations: The separation line should continue the alignment at the whole edge of the footpath, incorporating bollards, if necessary, or street furniture or landscaping to complete the widened area of the footpath.

b) Sheet 05

In some occasions, outdoor works can reduce the width of the footpaths.



Footpath-Junction Kenilworth Park

Shortcomings: Construction fence blocking footpath pass.
Recommendations: Alternatives should be sought if it is impossible to maintain this minimum distance. Rethink access in footpath.

3.2.11 Bus Stop Design

In the area adjacent to Harold's Cross road the design project intends that the western and eastern carriageway will be sections for buses, bicycle taxis and local Access only. During this part, the following conclusions have been drawn regarding bus stops.

a) Sheet 06

Bus Stop at Harold Cross Road

Shortcomings: Inappropriate edge kerb in Bus Stop.
Recommendations: Incorporate ”Kassel Kerbs” with appropriate height and textured surface.

The optimum kerb height at a bus stop to cater for these persons should be around 180mm. All new bus stops and improvements to existing ones should be designed to this height. Special kerb units such as "Kassel Kerbs" (or similar) are available which give this upstand. They should contrast in colour with the footway.

For ease of access, buses should be able to maneuver the entry/exit platforms right up to the kerbside. Gaps of 100mm or more can present access difficulties for some users such as the elderly; people with push chairs or wheelchairs and people with sight impairment or with walking difficulties.

The street furniture around bus stops must be carefully considered. Where footway widths are restricted it is easy for them to become cluttered. This can cause Shortcomings for wheelchair and pushchair users and people with visual impairment

For more graphic information on the shortcomings in the route, drawings in the Appendix A of this report should be consulted.

4. HAROLD'S CROSS ROAD TO KEVIN STREET UPPER – HAROLD'S CROSS ROAD, CLANBRASSIL STREET UPPER & LOWER, NEW STREET SOUTH-AND INSIDE CANAL

4.1 Description of the Route

Similar to the previous Section, this third part of the Route 11 of BusConnects (Kimmage to City Centre) extend between Harold's Cross Park to the intersection of Kevin Street Upper-Dean Street and New Street S-Patrick Street.
In the existing situation, From Harold's Cross Park, a bus line joins adjacent to each car lane. From the Emmet Bridge crossing, the two traffic lanes continue with extensions for bus stops. The cycle tracks lanes that are distinguished by their colour. It is from Clanbrassil Street Lower when they are extended to two lanes with a central median and a cycle track on the east side until reaching New St S and thus to the intersection with Kevin Street Upper.

Some considerations in this part about the design proposal are:

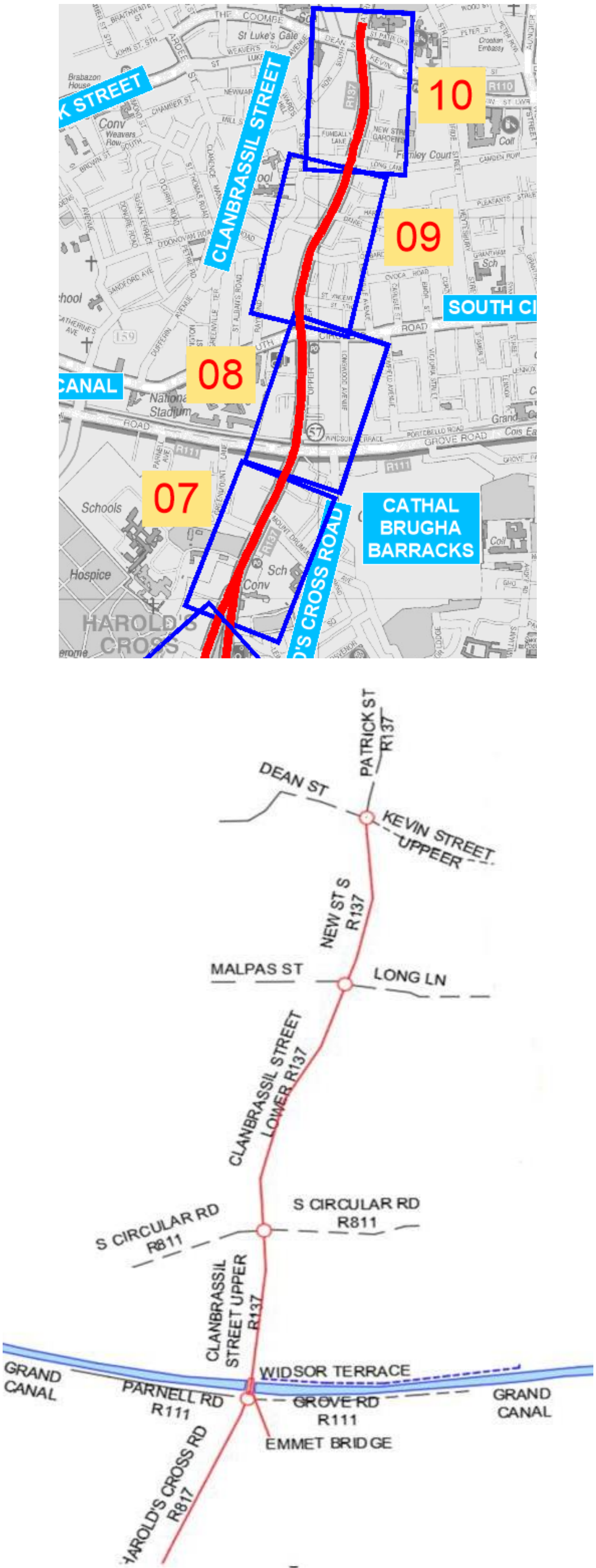
It is proposed to provide a footpath, one bus lane and one general traffic lane in each direction in this section. Between Harold's Cross Park and Parnell Road it is now proposed to also include a cycle track to this section of road. It is no longer proposed to provide a separate cycle route to the west via Our Lady's Hospice and Greenmount Lane.

Between Parnell Road and Lombard Street West, it is proposed to maintain a footpath, one bus lane and one general traffic lane in each direction as in the EPR, with the new addition of segregated cycle tracks. The northbound bus lane will not continue between Leonard's Corner junction at South Circular Road and Lombard Street West, where the street is not wide enough. Signal Controlled Priority will enable buses to pass through this short section ahead of general traffic. To accommodate this cross section, the following works will be required:

-Widening of Robert Emmett Bridge across the Grand Canal on the western side and along the retaining wall at Gordon's Fuel Merchants;
-Removal of some on-street parking; and
-Limited land-take on Clanbrassil Street Upper north of the Grand Canal, and at the junction of Clanbrassil Street Lower and St. Vincent Street South.

Between Lombard Street West and Kevin Street Upper, it is proposed to modify the street layout to accommodate a cycle track alongside a bus lane and one general traffic lane in each direction. The existing central median island will be largely retained along with all existing trees in the median. It is proposed to close access from Vincent Street South to Clanbrassil Street. At Kevin Street Upper, this scheme ties in with the Greenhills to City Centre CBC.

For the scheme of the Accessibility Audit Report in Route 11 of the BusConnects project, the corresponding sheets of the Design for Stage ii project are followed, so that it is easier to locate the points of interest in accessibility. In this third section, it covers sheets 7, 8, 9 and 10.



Map and Scheme of the Route

4.2 Problem Identification

The different sheets indicated in each of the points studied refer to the drawings in which is divided the conceptual project to facilitate their location.

4.2.1 Accessible Parking

Throughout this third section of Route 11 we can find the following parking bays for people with disabilities to which we can make the following comments:
In the existing situation, there are some areas of car parking bays in the Clanbrassil Street Upper but no accessible car parking bays provided.
Designers should take into account that for buildings (including apartment buildings), at least 5% of the total number of spaces should be designated car parking spaces, with a minimum provision of at least one such. As per TGD M. The Irish Wheel Chair Association recommends that where public parking is provided, eg on streets, then one in 15 spaces should be designated for drivers and passengers with disabilities.

a) Sheet 09

Parking bay Clanbrassil Rd-Lombard Street

Shortcomings: Disabled parking bay without the adequate dropped access kerb.
Recommendations: Incorporate an accessible dropped kerb. A suitable spot should be found for their relocation in the scheme. It shall be considered dimensions of 3.6 x 7 m for each bay (on-line parking spaces). All designated parking bays should
be clearly marked on the ground with the symbol of access and, if necessary further signage should be provided.

4.2.2 Access Routes-General

In general, the common road scheme is maintained in this section: one footpath, one bus lane and cycle track, and one general traffic lane for both directions.
In the design project the cycle track runs parallel to footpath in sections of Clanbrassil St. Upper and New Street South. For CBC project a cycle facility segregation is preferred (vertical and horizontal)
Some particular points in the scheme can be remarked:

a) Sheet 08

The layout varies once we cross the Emmet Bridge and travel to the right along Windsor Terrace parallel to the canal. Here we find sidewalks that are practically the minimum width around the bridge and a pedestrian footpath adjacent to the canal.

Footpath to Windsor Terrace

Shortcomings: Insufficient width of footpath. The gradient slope to study.
Recommendations: Gradient should be checked and width of the footpath. A gradient of 1:20 (5%) or steeper is considered to be a ramp. Where a ramped access is provided the minimum clear width should be 1500mm and handrails should be provided with a minimum unobstructed width not less than 1200mm.

Gradients of footpath around the Emmet Bridge should be checked. It can result sections of the footpath in design with a gradient steeper than 1:20.

b) Sheet 09

There are cases in which an inadequate crossfall can cause the formation of puddles and water accumulation turning them into a hazard for the person with some type of disability and making the pavements slippery.

Parking bay Clanbrassil Street Upper

Shortcomings: Parking bay with wrong gradient fall and direction forming puddles.
Recommendations: Establish a correct gradient fall and direction of pavement.

c) Sheet 10

Footpath in New St S-Long Ln.

Shortcomings: Insufficient width to allow wheelchairs to pass
Recommendations: 1200 mm minimum width. Take into account the protection outdoor works

4.2.3 Access Routes-Guardrails

a) Sheet 10

We can observe in the access to residential blocks at the end of New St S how those have been incorporated for access ramps and change of level.

Example of guardrail in access route to building entrance in New St S. Park

Recommendations: Guardrails at this point are necessary due to the high level difference. Designers would need to be aware to ensure the guardrails are retained for safety.

b) Sheet 14

Guardrails should be incorporated to help people with disabilities in footpath environment surrounding the river.
Access routes with a gradient exceeding 1 in 20 should be consider as a ramp.

Crossing Point at Harold's Cross Park

Shortcomings: The descent slope on the north side of the Emmet bridge should be checked.
Recommendations: Length and gradient >1:20, suggest the placement of guardrails to help people with mobility impaired.

4.2.4 Pedestrian Crossing Points

As in the previous sections, there are crossing points in the scheme with no dropped kerbs provided in some locations and dropped kerbs with inadequate width and in some uncontrolled crossing points a complete absence of tactile paving.
In some cases there is currently no means for visually or mobility impaired users to travel straight from Clanbrassil Street Lower to Kevin Street Upper intersection.

Some examples of this point in this third part of the Route 11 are the following:

a) Sheet 07

Controlled crossing Point at Harold’s Cross Park

Shortcomings: Level difference in edge kerb >6mm. Lack of guardrails.
Recommendations: Match correctly height of dished kerb to carriageway level. This should not be higher than 6mm. It should be convenient to establish guardrails around the refuge island.

Uncontrolled crossing point at St. Clares Ave.

Shortcomings: Uncontrolled crossing point without the correct tactile paving and a high upstand.
Recommendations: “Buff or grey” tactile paving. Depth of 1.2 m, gradient 1:12 max. Level difference of dished kerb with carriageway: 6mm.

Uncontrolled crossing point at Greenmount Ave.

Shortcomings: Uncontrolled crossing point without the correct tactile paving and located on the curve of the road. This can cause a risk of visually impaired users being misdirected by the orientation of the kerb.
Recommendations: “Buff or grey” tactile paving for uncontrolled crossing points. Depth of 1.2 m, gradient 1:12 max. Level difference of kerb: 6mm. Dropped kerbs should be located in the direct line of travel at any junctions.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Uncontrolled crossing point Levere Terrace

Shortcomings: Uncontrolled crossing point with no tactile paving.
Recommendations: “Buff or grey” tactile paving. Depth of 1.2 m (in line), gradient 1:12 max. Level difference of dished kerb: 6mm.

Uncontrolled crossing point Mount Drummond Avenue

Shortcomings: Uncontrolled crossing point without the correct tactile paving in the corners.
Recommendations: "Buff" or grey tactile paving should be installed and the appropriate dished kerbs. Depth of 1.2 m (in line), gradient 1:12 max. Level difference of dished kerb: 6mm. If the refuge is intended as an area for pedestrians to wait, then the tactile surface should be installed.
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b) Sheet 08

Uncontrolled crossing at Windsor Terrace

Shortcomings: Uncontrolled crossing point without the correct tactile paving.
Recommendations: "Buff or grey" tactile paving. Depth of 1.2 m, gradient 1:12 max. Upstand should be less than 6mm.

Uncontrolled crossing Wesley Pl

Shortcomings: Uncontrolled crossing point without the correct tactile paving. Cracked asphalt in the junction.
Recommendations: “Buff or grey” tactile paving. Depth of 1.2 m, gradient 1:12 max. Level difference of dished kerb: 6mm.
The pedestrian travel through the carriageway should be repaired and be uniform for people with mobility impaired to cross comfortably.

c) Sheet 09

Uncontrolled crossing Clanbrassil St-Rosedale Terrace

Shortcomings: Cracked pavement in uncontrolled crossing at a side road.
Recommendations: Renovate pavement in carriageway intersection with the side road. The pedestrian travel through the carriageway should be repaired and be uniform for people with mobility impaired to cross comfortably. For crossing points in line the depth of the tactile surface should be 1.2m. (3 slabs).

Uncontrolled crossing Clanbrassil Terrace

Shortcomings: Uncontrolled crossing point without the correct tactile paving. It is observed the lack of blister tactile paving at a side road junction where the side road carriageway has been raised to the level of a footpath.
Recommendations: “Buff or grey” tactile paving. Depth of 1.2 m minimum. Gradient 1:12 max. Level difference of upstand: 6mm. max.

d) Sheet 10

Staggered crossing point New St S-Malpas St

Recommendations: A staggered island crossing increases the crossing distance particularly for vulnerable pedestrians. The island also results in a constrained dwell area for potentially high volumes of pedestrians. The layout of the junction should be revised as part of the scheme to remove the staggered crossing, thereby improving the overall crossing facility and the dwell space at footpaths, and decreasing the required crossing distance.

Uncontrolled crossing at Portobello Road

Shortcomings: Uncontrolled crossing point without the correct tactile paving. Upstand kerb deteriorated. Poorly designed or constructed dished crossings with excessive ramp slope or significant kerb upstand.
Recommendations: “Buff or grey” tactile paving. Depth of 1.2 m (in-line). A ramp slope of 1 in 20 is desirable with a maximum of 1 in 12. The kerb should be flush with the road surface or have a maximum upstand of 6mm.

4.2.5 Tactile Paving Surfaces

A significant number of uncontrolled crossings do not have tactile paving at the dished kerbs.
Its arrangement can be seen in conjunction with the previous chapter on pedestrian crossing points.
Tactile paving shall be provided at all crossings as required by the crossing type, whether controlled (red blister) or uncontrolled (buff).

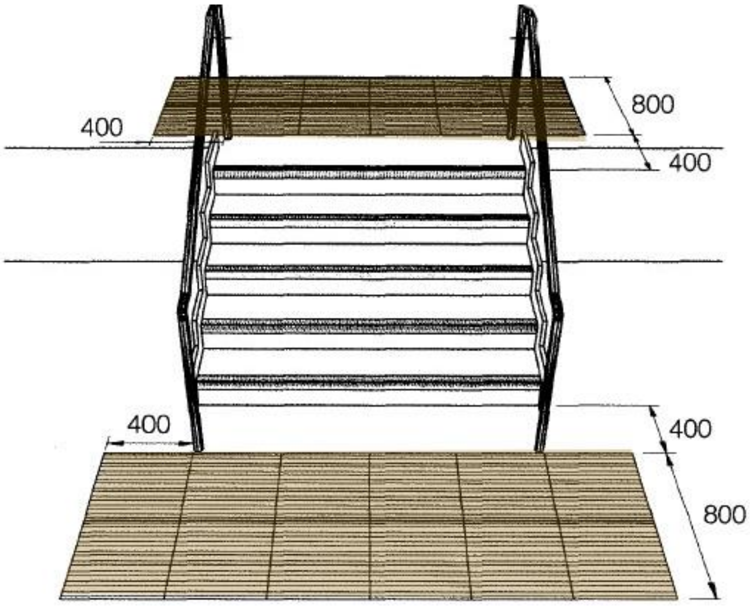
4.2.6 Change in Level

The access routes that approach to the Emmet bridge should be reviewed because in this area is appreciated that certain slopes can be greater than 1:20 and therefore have to be considered as ramped access route and to comply with the accessibility regulations.

a) Sheet 08

Stairs in footpath at Clanbrassil Street Upper

Shortcomings: Stairs occupying the entire width of the footpath.
Recommendations: A corduroy tactile surface should be implemented to warn visually impaired people of the presence of steps. Follow the figure below



Layout of corduroy hazard warning surface at the top& bottom of a flight of stairs

4.2.7 Shared Spaces, Share Surfaces

There are not explicitly designated shared surfaces. Footpaths and carriageways have difference surfaces and levels along the route.

4.2.8 Surface Material

The existing surface along the Harold's Cross Road to Kevin Street Upper comprises solid concrete for footpaths and asphalt for carriageway. Due to construction activities and material fatigue, certain sections of these footpaths have been subjected to patch repairs.

a) Sheet 14

Crossing Point Groove Rd-Clanbrassil Street

Shortcomings: Deteriorating pavement patched with asphalt.
Recommendations: Renovate and level surface of footpath and kerbs.

4.2.9 Street Furniture

Some examples of street furniture in the route to be consider:

a) Sheet 07

Example of the use of street furniture constraining the footpath width in Groove Rd

Shortcomings: Traffic signal and lighting column blocking footpath pass.
Recommendations: Consider location of street signs in order access route width to be wider than 1200mm. in punctual sections.

The extent of existing traffic signs and posts shall be reviewed to identify those that can be removed or relocated to lighting columns or other signposts. The need for new traffic signs shall be done with a view to only providing those that are statutorily required.

Street furniture and traffic signs in Greenmount Ave.

Shortcomings: Traffic signal in the flared side of an uncontrolled crossing point not well defined.
Recommendations: Sign posts should not interfere with a pedestrian through path. At least 1200mm. should be guarantee for wheelchair users access.

4.2.10 Bus Stop Design

Between Lombard Street West and Kevin Street Upper, it is proposed to maintain a footpath, one cycle track, one bus lane, and one general traffic. To maintain bus priority through the South Circular Road Junction, it is proposed to introduce bus priority signals for city bound traffic.

a) Sheet 08

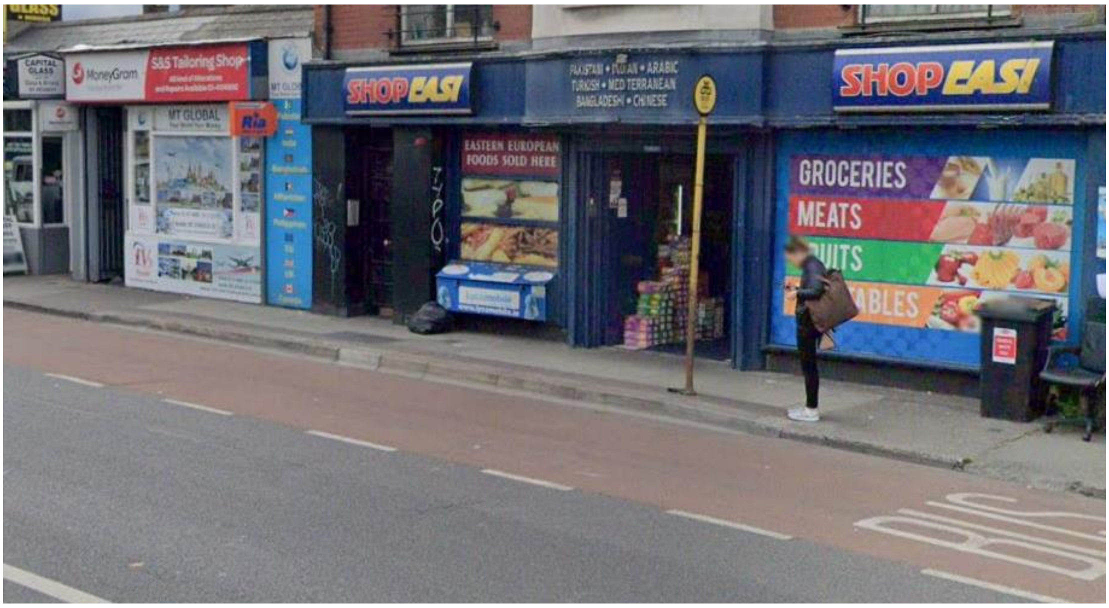
Bus Stop in Clanbrassil Street Upper

Shortcomings: Reduced length of the pick-up point in the bus stop. It can be a hazard in the access for people with mobility impairment.
Recommendations: An appropriate distance between signals poles should be provided.

Bus Stop in Clanbrassil Street Upper

Shortcomings: Reduced length of the pick-up point in the bus stop. It can be a hazard in the access for people with mobility impairment.
Recommendations: An appropriate distance between signals poles should be provided.

b) Sheet 09



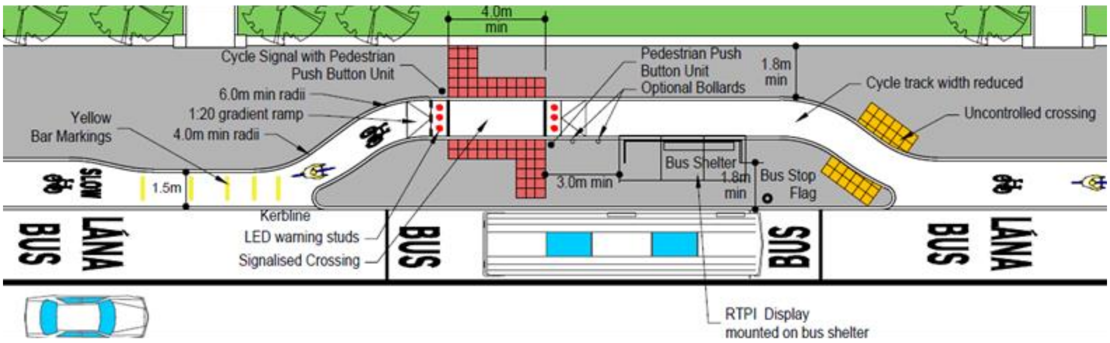
Bus Stop in Clanbrassil Street Lower

Shortcomings: Reduced width of bus stop.
Recommendations: At bus stops in front of shops, the pavement should be increased to a recommended width of 3000mm and 3500 to 4500mm, wherever possible. This will help to minimise congestion and the inconvenience that it can cause. The pavement width should be sufficient to enable people to pass in the opposite direction without stepping into the path of a passing vehicle (Building for Everyone 1).

There are going to be cases where a cycle track passes behind a bus stop (Saint Kevin's Parade, Malpas St, Kevin Street Upper). It shall be considered a Bus stop bypass solution allowing pedestrians to wait for a bus while cyclists do not have to dodge into traffic around parked buses.
Where a segregated cycle track approaches a bus stop, it is routed around the back of the passenger boarding area, allowing cyclists to 'bypass' the bus stop. There might also be a ramp up and down the cycle track on each side of the bus stop.

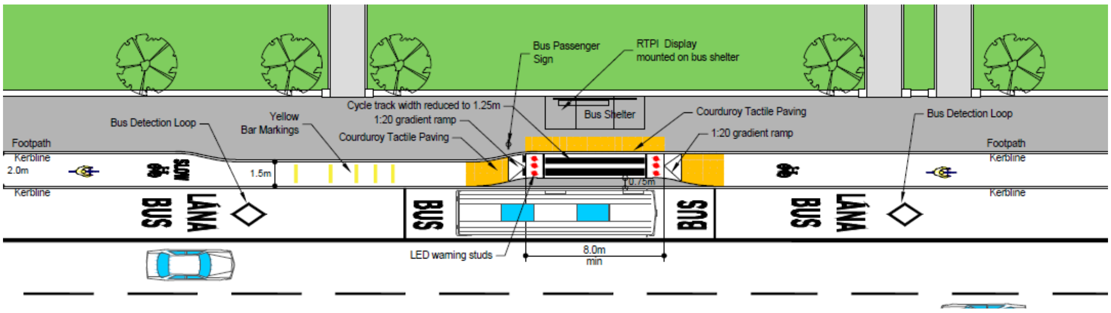
Design features of bus stop bypasses should be considered encouraging people cycling to slow down and make them more likely to ride single file such as chicanes, ramps or a narrowing of the cycle track.
Passengers cross the cycle track when it is safe to do so, using a crossing point that is marked by tactile paving and coloured surfacing. It seems than zebra crossing would make it easier for bus passengers, particularly older and disabled people, to cross the cycle track compared with uncontrolled crossings.

Example of a bus stop bypass solution



Island Bus Stop Option as the preferred bus stop option

To address the pedestrian/cyclist conflict, a formal crossing point is provided on the upstream side of the island for pedestrians accessing the bus stop area, consisting of an on-demand signalised pedestrian crossing with appropriate tactile paving, push button units and LED warning studs. A secondary informal crossing should be provided on the desire line on the downstream side of the island.
Where space constraints do not allow for an island bus stop, an option consisting of a shared bus stop landing zone should be considered. There a some cases of this example in the design of bus stops in New Street South. Tactile pavings (uncontrolled crossing) should be considered in order to guarantee the flow of pedestrians and disabled people with no hazard, and corduroy tactile paving in cycle tracks.



Shared Bus Stop Landing Zone Arrangement

As examples in this part of the route:

Bus Stop in Clanbrassil Street Lower-Donovan Lane

Shortcomings: The scheme of the bus stop will change as per the Design Project.
Recommendations: An island bus option is proposed. It should be considered for avoid the pedestrian/cyclist conflict, with an on-demand signalised pedestrian crossing (tactile paving, push button, led warning studs) and a secondary uncontrolled crossing on the downstream of the island. Designers should narrow the cycle track to less than 2.0 m.

Bus Stop in Clanbrassil Street Lower-Saint Kevin's Parade

Shortcomings: The scheme of the bus stop will change as per the Design Project.
Recommendations: An island bus option is proposed with the measures viewed in the previous paragraph.

c) Sheet 10

Bus Stop in New Street South

Shortcomings: The scheme of the bus stop will change as per the Design Project.
Recommendations: An island bus option is proposed. It should be taken into account accessibility measures for disabled people to avoid the pedestrian/cyclist conflict.

For more graphic information on the shortcomings in the route, drawings in the Appendix A of this report should be consulted.

5. SCHEME WIDE DISABILITY ACCESS DESIGN CONSIDERATIONS

This point establishes in a summarized way the points dealt with in the previous sections, so that the designers can know the criteria that have been taken into account. This scheme follows the guidelines of the Building for Everyone - A Universal Design Approach (2012) guide.

5.1 Design Issues

Table 01 Design Issues

DESIGN ISSUES
Consider access routes, levels, gradients and site layout at earliest design stage
Locate car parks and access route to promote safety and convenience.
Ensure pedestrian environments are logical and clear to understand.
Match dished kerbs on opposite sides of the road at crossing points

5.2 Accessible parking

5.2.1 Design Criteria.

Table 02 Accessible parking

ACCESSIBLE PARKING
Locate as close as possible to main entrance maximum .Distance **25 m**.
Minimum one accessible bay, then **one** accessible bay for every **15 parking bays**.
Firm level surface with white markings on **blue** background. **Dished kerb** to access pavements.
Size of **standard** accessible bays should be **4800 x 6000 mm**. This include 1200 mm. wide access zone on both side and rear
Size of bay for **multi-purpose** vehicles should be 5400 x 7800 mm. This includes 3000 mm. access zone to one side and rear.
Minimum **2600 mm**. **height clearance** to be maintained throughout.
Provide **clear signage** to highlight location of designated parking spaces within the park.
Ensure off-street spaces are 2400 mm(min) x 4800 mm (min) with 1200 mm wide access zones to both sides and end of space
Provide on-street spaces 3600mm. wide x 7000mm long.
Be careful that no street furniture is obstructing the pavement side
Cross-fall gradient not exceeding 1 in 50.

5.2.2 Off Street Parking Spaces

Off-Streets (Perpendicular) designated parking spaces should be: **2400mm wide x 4800mm long.**

Each space should have a recommended **1200mm clear access** zone to both sides and the end of the space.

Adjacent spaces may share a side-access zone. The access zones to the side of the space enable car doors to be fully opened and drivers and passengers, including infants carried in removable car seats, to transfer in and out of the vehicle without being obstructed by an adjacent car. The access zone to the end of the space provides a safe area for access to the car boot and for cars with rear hoists.

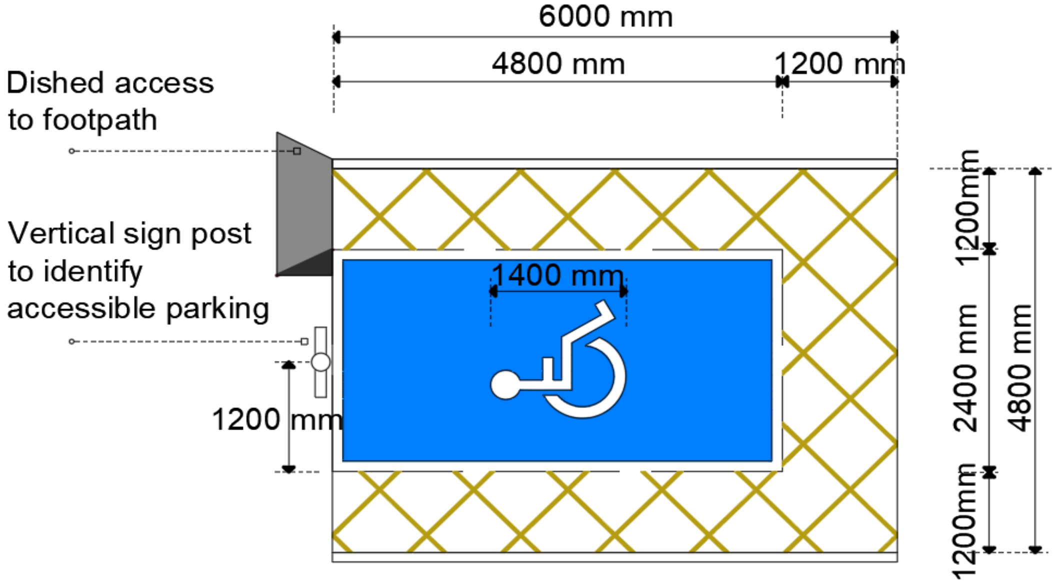


Figure 1. Example of Perpendicular parking. Cars and small vans

There should be adjacent dished access to the footpath. The kerb dish should have a slip-resistant surface with a minimum width of 1200mm and minimum gradient of 1:12.

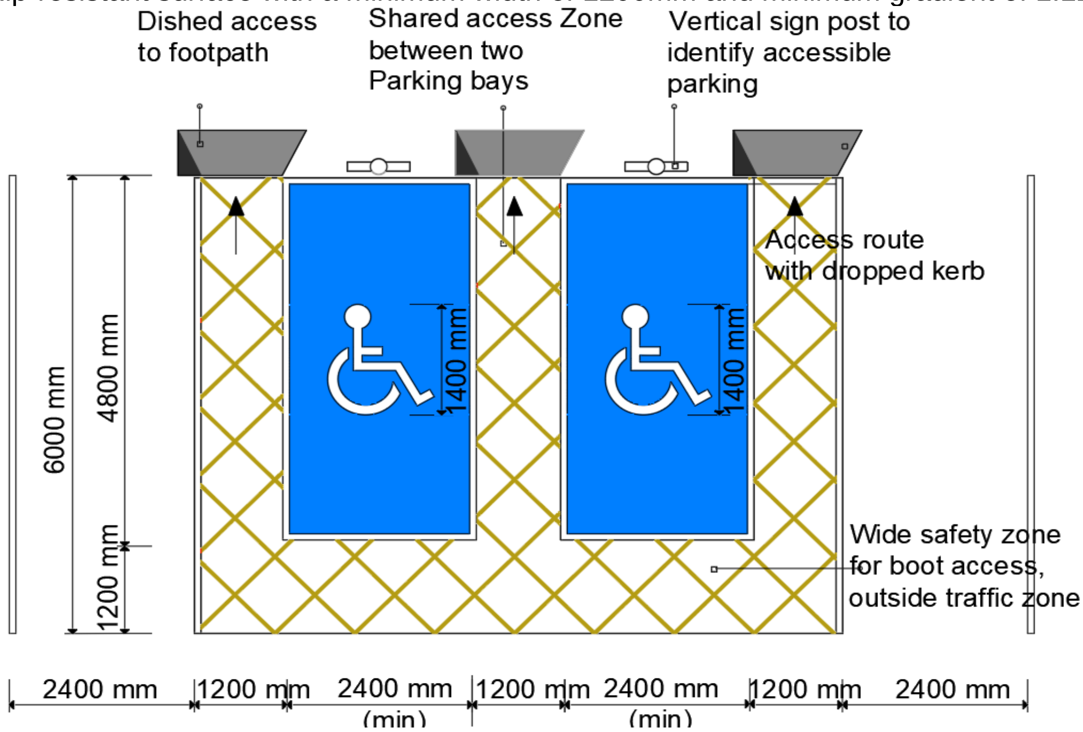


Figure 2. Accessible parking showing shared access zone

5.2.3 On-Street Parking Spaces

On-street (or parallel) designated parking spaces should be: **3600 mm wide x 7800mm** in length

These dimensions enable a driver or passenger to safely transfer in or out of a car where there is passing traffic and to access the rear of the vehicle using a ramp or tail lift.
In some situations, particularly where the pavement width is restricted, it may be appropriate to lower the pavement to road level for the full length of the parking space. There should be no street furniture obstructing egress on the pavement side.

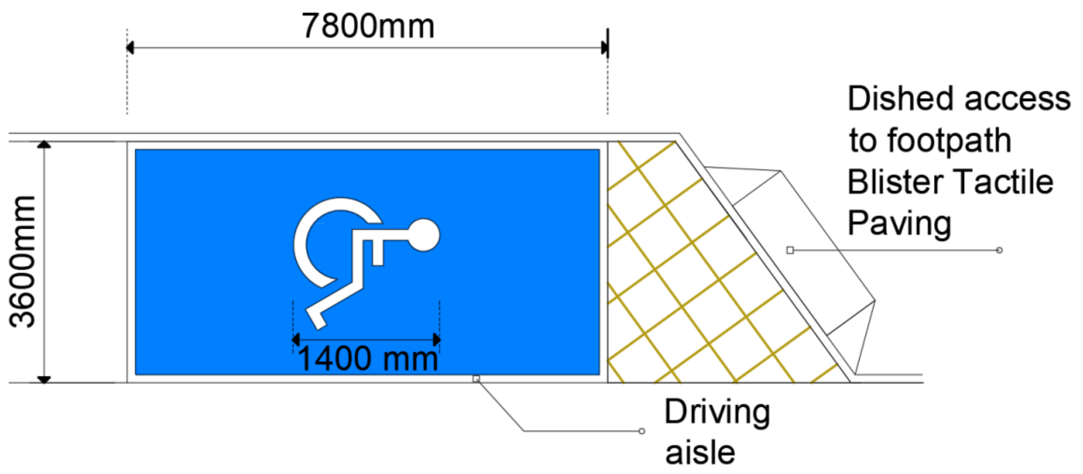


Figure 3. Example of Parallel parking

On-street bays should be located where the road gradient and camber are no greater than **1 in 50.**

Wherever possible, a number of car parking spaces that are larger than the standard dimensions should be provided

Where designated bays are at a different level to an adjacent path or pavement, a dropped kerb should be provided to facilitate easy access for wheelchair users. A **dropped kerb** should incorporate the appropriate tactile marking

5.2.4 Surface and markings.

The surface of the bay and adjacent accessibility zone should be **firm, durable** and **slip-resistant**. with no variation in surface profile exceeding 5mm.
A **1-in-50** maximum cross-fall gradient is acceptable where necessary to ensure water run-off.
Examples of inappropriate materials are loose sand, cobbles or grave.
The colouring used for accessible parking bays should be **white markings** on a **slip-resistant blue** surface. The adjacent accessibility zone should be cross-hatched in yellow.

All parking spaces should be firm, level and even, with no variation in surface profile exceeding 5mm. An uneven surface or an inclined bay makes transfer into and out of a car very difficult and may present a hazard to some pedestrian.

5.2.5 Number of accessible car parking bays required

Where public parking is provided, a minimum of one, and then **one in 15 spaces** should be designated for drivers and passengers with disabilities.
Of these designated spaces, **one in four** should be designed to accommodate large multi-purpose vehicles. The recommendation is that these 1:4 bays would be of the largest size (5400mm x 7800mm) to accommodate vehicles using all entry/exit options i.e.. hoist/lift/ramp

A perpendicular arrangement is characteristic of off-street parking facilities such as large car parks and parallel parking more typical of on-street parking spaces. In both arrangements, there should be sufficient space for a person to alight from a car and to safely move around parked vehicles to an accessible, understandable and useable pedestrian route.

5.2.6 Location of Car and Multi-Purpose Vehicle Bays

The designated accessible parking spaces should be located at the same level as and no more than 25m from the principal entrance to the building or buildings served by the car park.

Approach routes should be **level** and accessible in their design with **dished kerbs** and adequate **lighting**. In multi-storey car parks, the route to accessible parking bays should be **signposted** at the entrance and on all levels.

Ideally accessible bays should be at the same level as the principal entrance.

A suitable passenger lift or ramp should be installed to facilitate access from the parked vehicle to any level where facilities are located.

5.2.7 Car parking signage and wayfinding

Designated accessible parking spaces should be **clearly marked** both on the **roadway** surface and with a **post-** or wall-mounted sign at the end of the bay.

Roadway markings are insufficient on their own as they are not easy to see when the bays are in use and can be covered by snow or leaves.

Post- or wall-mounted signs should be at least **300mm wide x 450mm high** and positioned 1500 to 2500mm to the centreline from ground level. Painted roadway symbols should be at least **1400mm** in plan height.

The location of designated spaces should be clearly signed from the car park entrance.

Signage indicating the location of designated spaces should incorporate the International Symbol of Access.

Figure 4. Example of the international symbol of access.

In addition to the public parking, ‘setting down’ and ‘picking up’ points should be provided adjacent to high use **public buildings** and places of interest such as bus/train terminals, hospitals, busy shopping areas and tourists sites, etc. These should be clearly sign-posted and should be located on firm and level ground.
The surface of the setting-down point should be **level with the carriageway** or provide dished access (gradient no steeper than**1:12**) to the adjacent path.

This will allow for convenient access to and from the building entrance for people with walking difficulties or people using a wheelchair. Seating and shelter should be provided within the setting down point.

The setting-down point should include both side and rear access zones with provision for the use of passenger lift/hoist/ramp at the rear and to the side of all vehicles. The required additional rear and side space for the use of passenger hoist/lift/ramp is 3000mm.
Wherever a kerb adjacent to a drop-of bay is dished in the direct line of pedestrian travel allowing flush access between footpath and road, corduroy-type tactile paving (hazard warning) must be installed for the safety of people who are blind or have a visual impairment.

5.2.8 Setting -down points and Pick up point facilities

Table 03 Setting down points and pick up point facilities

SETTING DOWN POINTS
Provide **setting-down** point close to **building service**
Ensure a canopy height clearance of 2600 mm.
Make sure the road surface is **flush** with the **path**, with the appropriate tactile surface
Avoid dished **gullies**, **grilled** and **manhole** covers.

5.2.9 Taxi ranks

Table 04 Setting down points and pick up point facilities

TAXI RANKS
Provide taxi ranks in **appropriate locations**
Orientate taxi ranks to enable passengers to alight and board on the nearside of a taxi
Ensure **pavement width is 4040mm** to allow for wheelchair ramp and maneuvering space
Size of standard accessible bays should be **4800 x 6000 mm**. This include 1200 mm. wide access zone on both side and rear
Provide undercover queuing areas with seating
Provide taxi ranks in **appropriate locations**

Taxi ranks should be provided in appropriate town and city centre locations. Where taxi ranks serve a specific venue, they should be located as close as possible to the entrance and be **clearly signposted**, both within the venue and outside.

Taxi ranks should be orientated so that passengers can alight and board on the nearside of the taxi. Pavements should be at least 4040mm wide to allow adequate space for a wheelchair user to maneuver and for a wheelchair ramp, which can extend 2000mm from the side of the vehicle.
When designing a taxi rank, consideration should also be given to parents with strollers; guide dog users; people with visual difficulties; and those with walking aids when designing a taxi rank.

A pedestrian crossing-point with dropped kerb and the appropriate tactile markings should be provided close to the taxi rank.

Wherever possible, queuing areas should be undercover and incorporate seating, or provide seating close by.

5.3 Access routes

Table 05 Access route

ACCESS ROUTE
Ensure access route has sufficient width for expected number of people.
Provide recommended clear width **2000mm** wherever possible.
Provide **passing places** where clear width is less than 2000mm.
Include **resting places** at intervals on long routes
Ensure width is not less than **1200mm**, on short constricted sections of an access route
Widen pavements in front of shops and where there are bus stops
Use **firm, smooth** and even surface on access routes, with **maximum crossfall** gradient of **1 in 50**
Avoid gaps and vertical **deviations** between paving slabs greater than **5 mm.**
Keep any break in surface or gap such as **drainage gulley** no greater than **10 mm**. and perpendicular to line of travel.
Prevent accidents at changes in level to side of access route with kerb upstands, barriers or guardrail.
Ensure access route has sufficient width for expected number of people.
Provide recommended clear width **2000mm** wherever possible.
Provide **passing places** where clear width is less than 2000mm.

Access routes in the external environment include paths, pavements and other rights of way, such as pedestrian routes through a public space. An access route may be a path through a rural location; a pavement alongside a city centre street; or a route of travel between a car park and building entrance.

All access routes where possible should be designed for use by everyone.

Existing wayfinding signage, such as information signs and nameplates, shall be reviewed to ensure adequate provision for all pedestrian users. Refer to the Road Infrastructure Audit report for further information.

2.0m is the desirable minimum width for a pedestrian footpath. This width should be increased in areas catering for significant pedestrian volumes where space permits. DMURS defines the absolute minimum footway width for road sections as 1.8m based on the width required for two wheelchairs to pass each other

5.3.1 Passing spaces

The design of the scheme should strive for a minimum footpath clear width of **2000 mm**, and a minimum **1500 mm** clear width where existing **obstacles** cannot be removed.

Where **existing trees** constrain the route, the footpath clear width may be reduced to **1200mm** only over a maximum distance of 2000 mm

Where the clear width of an access route is **less than 2000mm**, passing places should be provided.

Passing places should be **2000mm** wide x **2500mm** long, at a reasonable frequency and located within sight of another passing place, subject to a maximum distance of **25m**.

This will allow groups of people to pass each other, particularly on busy routes. On **long routes,** level resting places should be provided off the path of travel at intervals of no more than **30 metres.**

The recommended variations in widths of footpaths in urban environments are demonstrated in the illustration below.

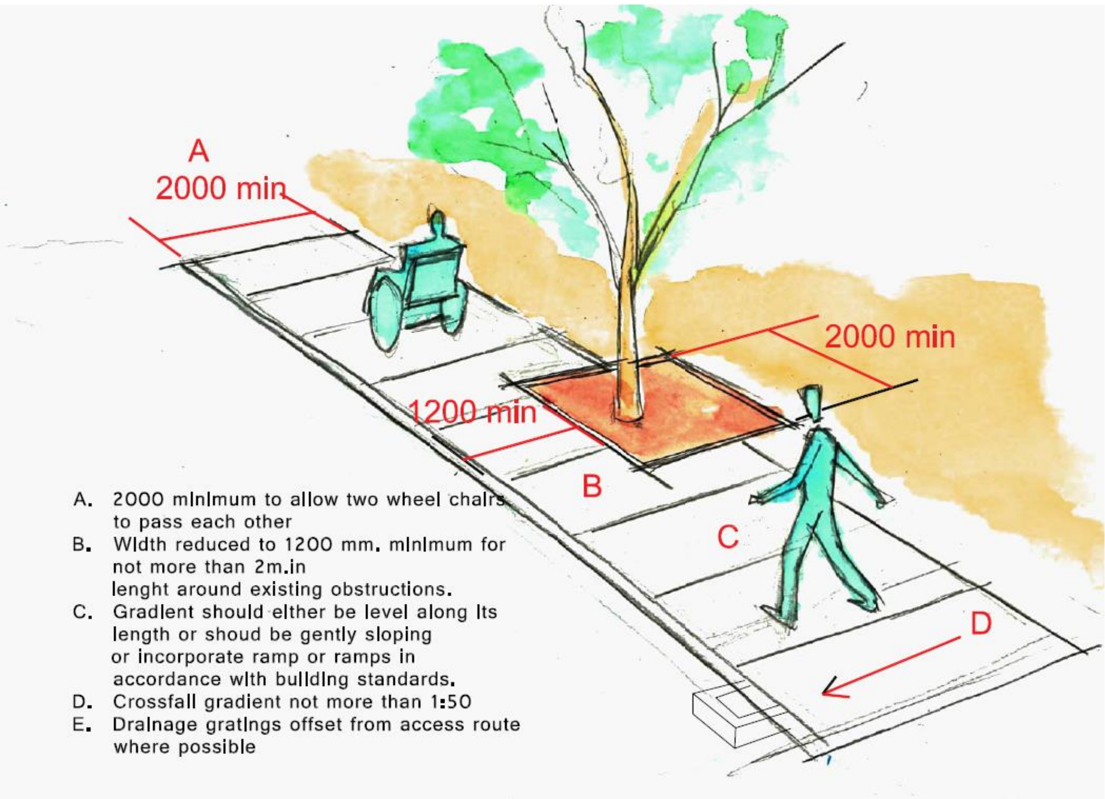


Figure 5. Urban environment pavement layout

At bus stops in front of **shops,** the pavement should be increased to a recommend width of **3000mm** and **3500 to 4500mm**, wherever possible. This will help to minimise congestion and the inconvenience that it can cause. The pavement width should be sufficient to enable people to pass in the opposite direction without stepping into the path of a passing vehicle.

Pavements should be **separated** from the traffic by a **kerb,** a railing or barrier, or by using tactile paving surfaces.

5.3.2 Drainage

The proposed scheme should, as a minimum, accurately identify all areas of failed or badly repaired footpath surfaces to be broken out, and homogenous, complete sections of footpath to be constructed in their place with minimum cross fall gradients **of 1:50.**

Access routes **should be laid** to even falls to allow proper drainage and prevent the formation of puddles.

Where the cross-fall is insufficient, silt may accumulate after rain and cause the surface to become slippery. Puddles can also cause the surface to become slippery; lead to glare in bright sunshine after other parts of the path or pavement have become dry; and become a hazard in frosty weather.

The gap between paving slabs and The gap between paving slabs and any vertical deviation between slabs should not exceed 5mm

Any **break** in the surface, for example drainage channels, or gaps between boards on a walkway, should not be greater than **10mm wide** and should be perpendicular to the direction of movement. This will prevent walking sticks, heels of shoes and wheels getting caught in the gaps.
In grilles or mesh covers, the mesh size should be maximum **10mm x 20mm.**

The long side of the mesh should be used in the direction of travel for easier use by guide dogs.

Service covers to manhole and inspection chambers should **not** be positioned on pavements, particularly at **crossing points**. They can be dangerous when opened for inspection, forming a trip hazard and reducing the clear width.
If there is a change in level to either side of a path or to the rear of a pavement, **edge protection** should be provided to prevent people from falling.

Edge protection may take the form of an **upstand kerb, 150mm** high and **visually contrasting** with the path or pavement, where the change in **level** is **between 200mm and 600mm**. A **guardrail** or barrier can be used where the change in level is greater than **600mm.**

5.3.3 Guardrails

Guardrails or barriers should be **1200mm high** and should **visually contrast** with the surrounding surfaces so that they are readily identifiable by all pedestrians and road users.
Galvanised railings are **not acceptable.** Metal handrails should be avoided as they can become very cold in winter weather conditions.

Preferred materials that are not cold to the touch include timber and plastic-coated steel.
Handrails can be used by some people not only for support but also to pull themselves up and to reduce speed of descent when going down when using a ramp or stair.

Handrails whose surface is of a low thermal conductivity, such as timber or **nylon sleeved** steel tube, are the **most comfortable** to touch in extremes of temperature.

Handrails fabricated from metals with a relatively low thermal conductivity, such as **stainless steel**, are more suitable in locations where resistance to **vandalism** and/or low maintenance are key factors.
Guardrails should be designed so that people with a lower eye level, including children, people of smaller stature, and wheelchair users, can see and **be seen through the railings**, and to prevent assistance dogs from walking underneath.

If the top of the guardrail is intended to provide support to pedestrians, it should comprise a tubular rail, **40 to 50mm in diameter**. An oval rail 50mm x 40mm can also be used.

Where the ground level to the side of an access route is flush with the path or pavement surface, a **change in the surface treatment** at the edge of a path, such as grass or a ground flora verge, will help prevent people from straying off the path in order to safely negotiate a ramp

5.3.4 Dished kerbs

Table 06 Dished kerbs

DISHED KERBS
Dished kerbs should be provided at **pedestrian crossing** points and **parking bays**.
These dished kerbs should be painted **white/yellow** for the benefit of people with **vision impairment**.
The **central kerb** dishing should **be flush** with the road/carriageway and have a width of **1200mm**.
The gradient on the dished kerb should be no steeper that **1:12 (max)**.
The kerb dishing should be located **away** from **corners** and always at opposing sides of the street.
The dished crossing should also be located **away** from any **drainage gratings**/manholes.
Colour and **layout** of tactile paving to be determined by **type of crossing**.
Central kerb area to be max. **6 mm**. above carriageway surface.
Standard kerb height generally **125 mm** above carriageway.
The correct tactile paving must be laid along the **full width** of any dished kerb
The **depth** of the tactile paving into the footpath will depend on whether the crossing is **in line** with the pedestrian travel route **or not**.

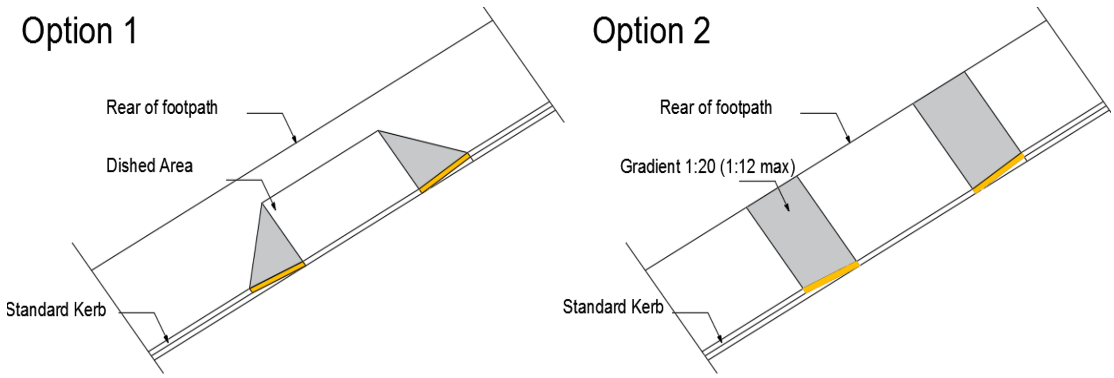


Figure 7. Dished Kerb Options

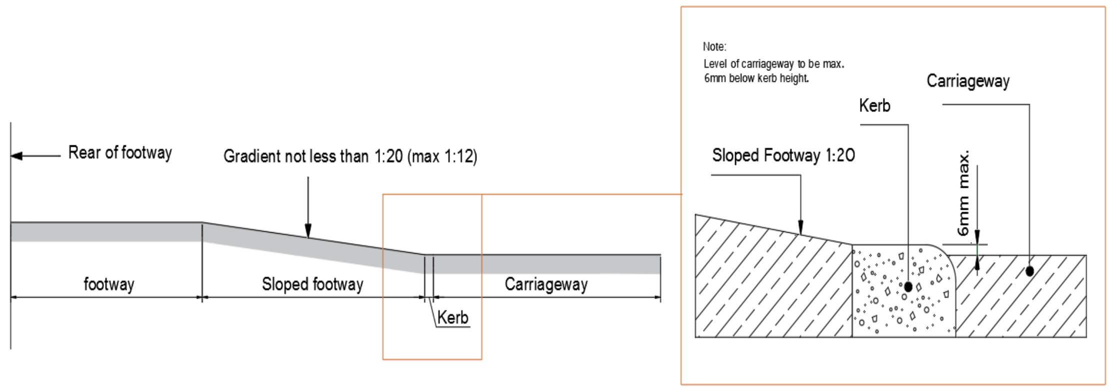


Figure 8. Dished Kerb Section Detail

5.3.5 Pedestrian Crossing Points

Table 07 Pedestrian crossing points

PEDESTRIAN CROSSING POINTS
Provide crossing points following **consultation** with relevant roads authority.
Location crossing points **where they are safe** and convenient for all road users.
Provide level or **flush crossing** points **at all controlled crossing points**, junctions at side roads and other access points.
Ensure crossing points incorporating a dropped kerb
Ensure recommended **1200mm**. width of level surface to the rear of pavement at crossing point.
Make sure crossing points are well drained, with a maximum **cross-fall gradient of 1 in 50**.
In **busy streets**, controlled crossing points with **traffic lights** should be provided.
Audible crossing signals being essential for people with **visual difficulties**.
In **residential areas**, dropped kerbs should be provided at least **every 100 metres**
6mm rounded kerb edge is acceptable
Pavement should be ramped perpendicular to the road with a recommended gradient of 1 in 20, where practicable, but **not exceeding 1 in 12**
Crossing point in the direct line of travel. Dropped kerb and red blister paving surface at controlled crossing points.

We can differentiate two types of crossing points:
Uncontrolled crossing and controlled crossing points
Pedestrian crossing points should be provided with a tactile paving in each direction of approach, as indicated in the publication 'Guidance on the use of Tactile Paving Surfaces' by the UK DETR Nov 98.also Section 13.3 of the Traffic Management Guidelines (DTO 2003).

5.3.5.1 Uncontrolled crossing points

At an uncontrolled crossing the **pedestrian** does **not** have **priority** over vehicular traffic.
The pedestrian must decide whether it is safe to cross.
Blister tactile paving must be used when the **kerbing is dished** at uncontrolled crossing the blister tactile paving should be "Buff" or grey. **(not red)**

Blister tactile paving must be **laid along the full width** of any dished kerb. Depth of paving will depend on whether the crossing is in line with pedestrian travel.

<u>*Uncontrolled Crossing. In Line*</u>

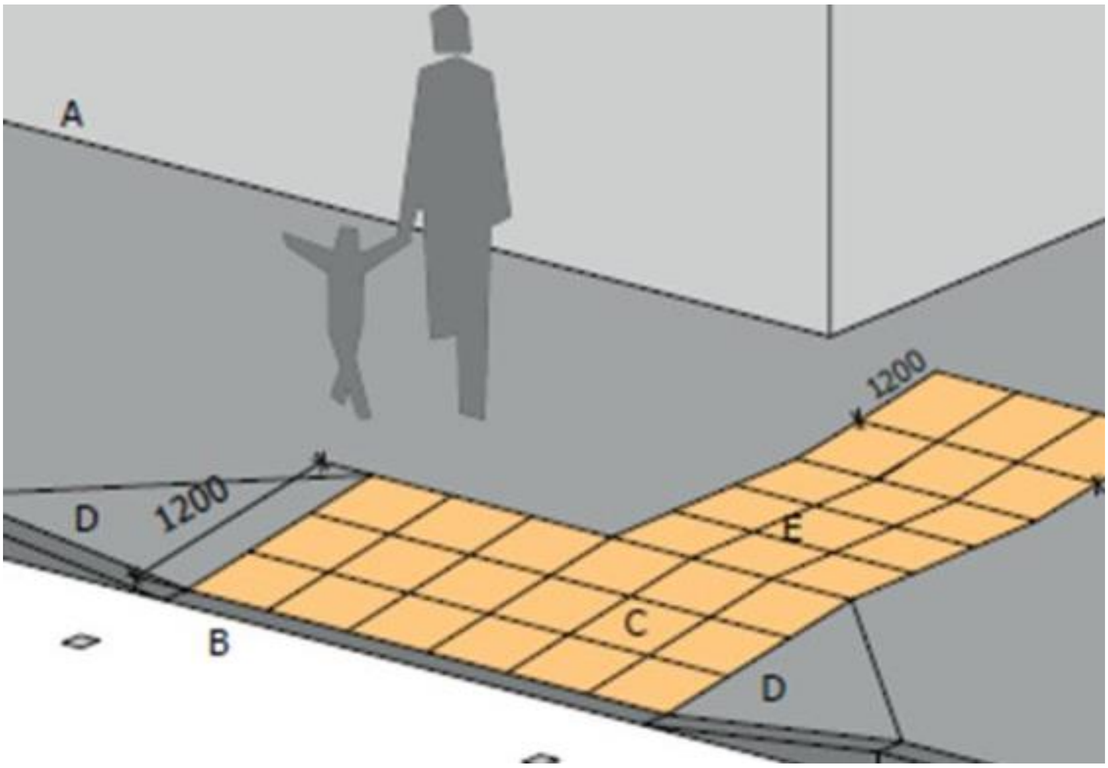


Figure 9. Uncontrolled Crossing. In line

A: Rear of pavement or building line
B: Dropped kerb to flush with carriageway, or subject to a max 6mm. level difference, rounded kerb edge.
Buff blister paving to full width of dropped kerb.
C: Ramped section of pavement perpendicular to crossing to be 1 in 20 (max 1 in 12)
D: Flared sides to be max 1 in 11.
E: L-Shaped stem of blister paving to guide people to crossing points

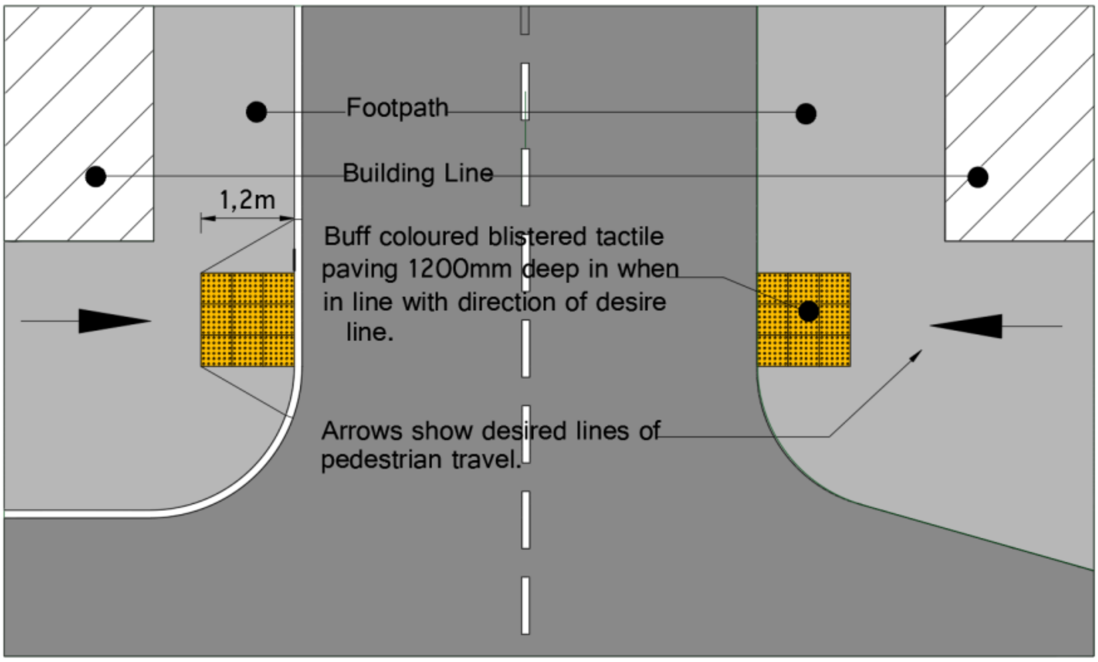


Figure 10. Uncontrolled Crossing. Direct Line of travel

Uncontrolled Crossing. Not In Direct Line

Blister tactile paving should be installed to a depth of **800 mm.**

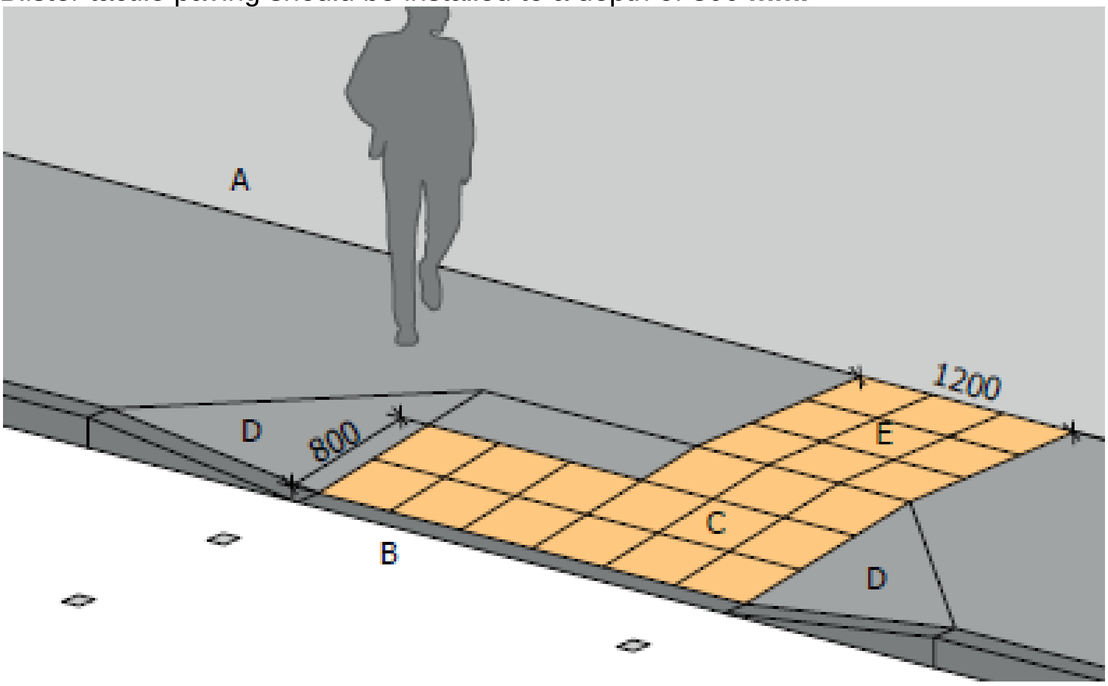


Figure 11. Uncontrolled Crossing at Side Road

A: Rear of pavement or building line
B: Dropped kerb to flush with carriageway, or subject to a max 6mm. level difference, rounded kerb edge.
Buff blister paving to full width of dropped kerb.
C: Ramped section of pavement perpendicular to crossing to be 1 in 20 (max 1 in 12)
D: Flared sides to be max 1 in 11.
E: L-Shaped stem of blister paving to guide people to crossing points

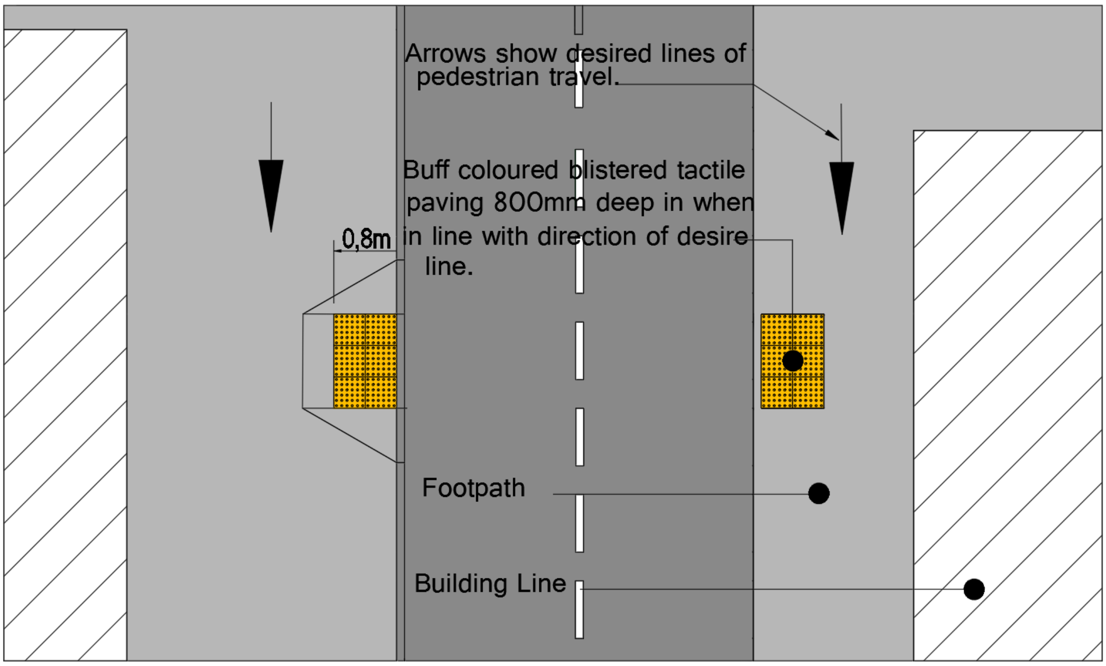


Figure 12. Uncontrolled Crossing. Not in Direct Line of Travel

Uncontrolled Crossing at Angled Junction

Blister tactile paving should be installed to a depth of **800 mm**.

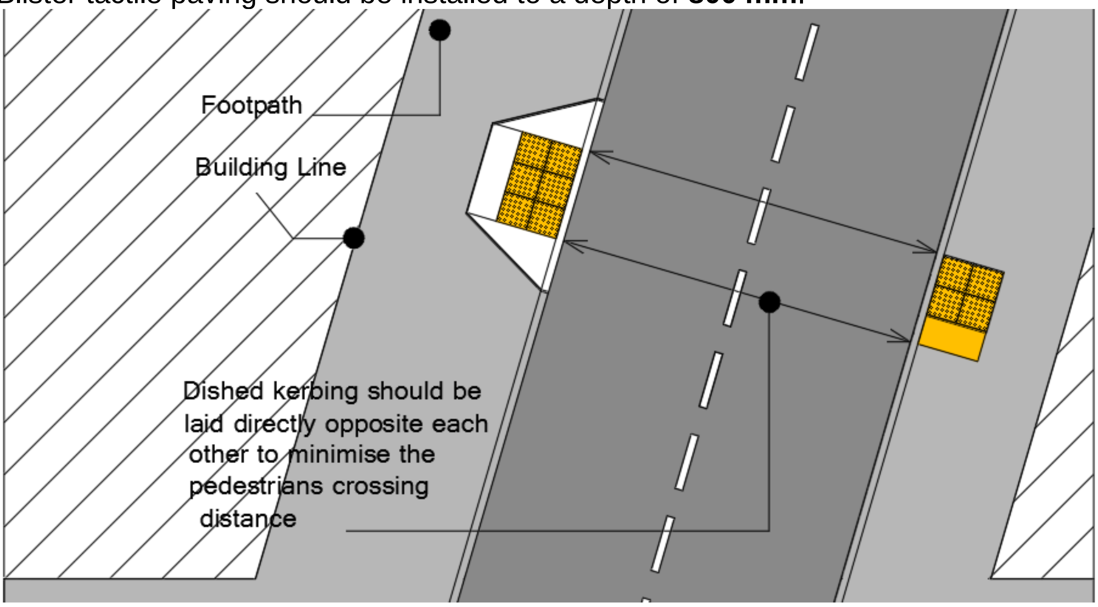


Figure 13. Uncontrolled Crossing. Angled Union

Uncontrolled Crossing. Island of Refuge

Blister tactile paving should be installed to a depth of **800 mm** at each part of the crossing.

Tactile Paving used to alert and enable to continue to cross.

If Island is 2m wide or less then the tactile paving should continue all the way across it.

If the island is **greater than 2 m**. wide: then a **gap** should be left between adjacent strips of tactile paving (800 mm. deep).

Consider the provision of an Island of refuge where the carriageway is wider than 7 m.

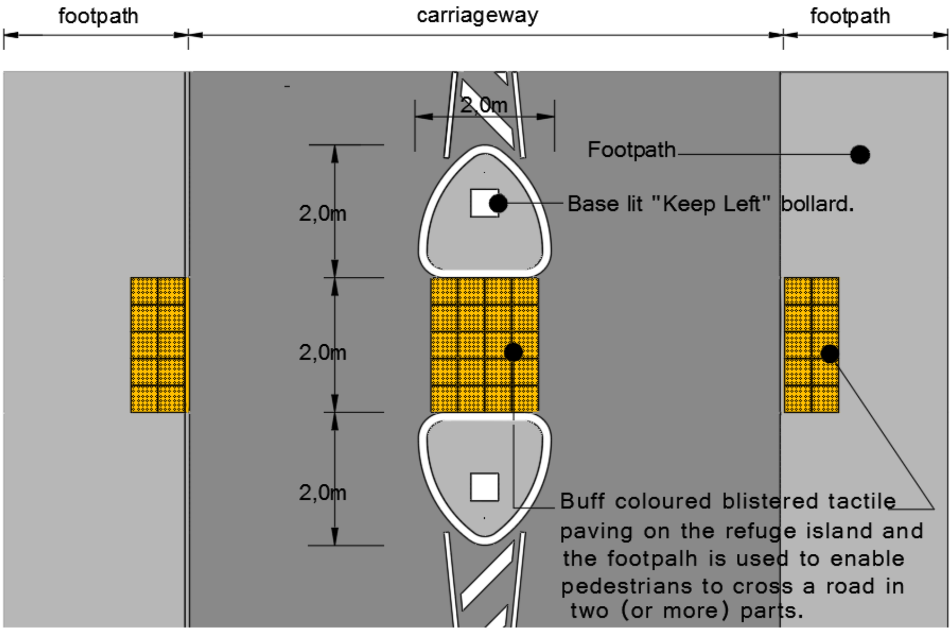


Figure 14. Uncontrolled Crossing. Island of Refuge.

5.3.5.2 Controlled crossing points

Controlled crossing points give positive **signal control** to both pedestrians and drivers and are generally used in the following circumstances:

- Where traffic speeds are 60 Km/ h or less
- Where traffic volumes warrant it
- Where pedestrian flows warrant it.

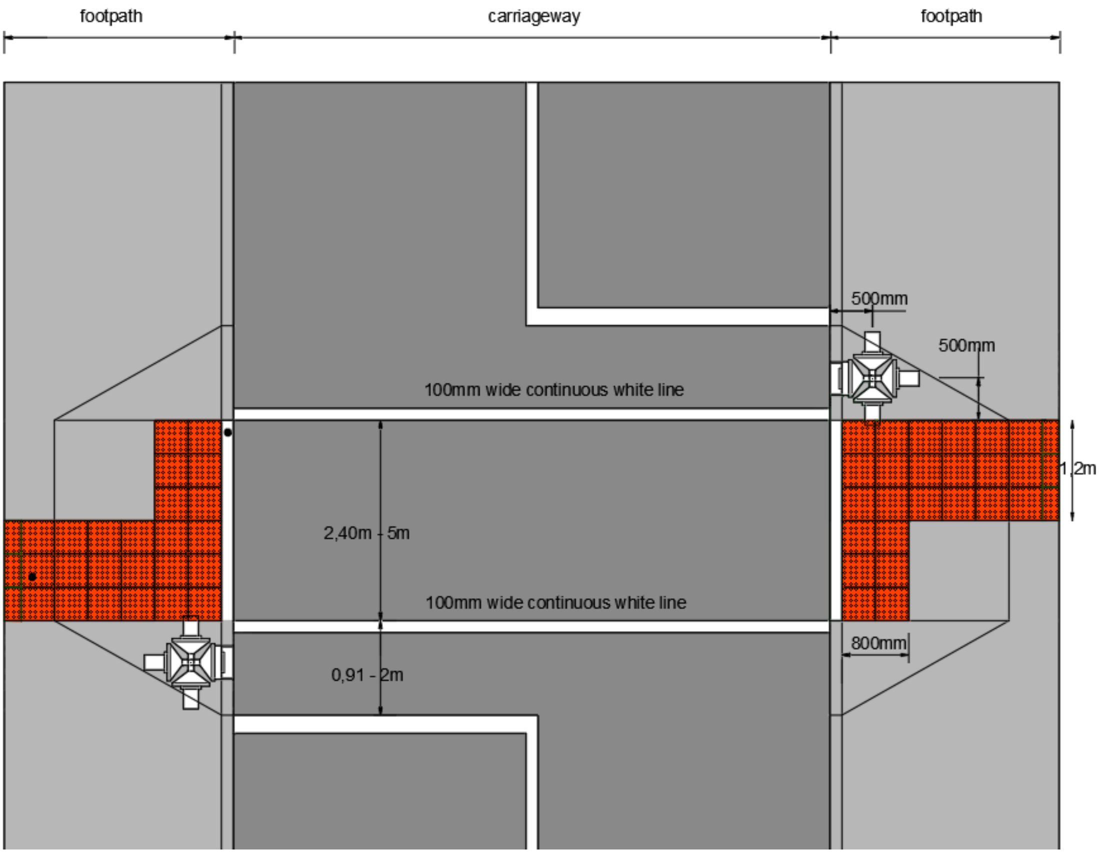


Figure 15. Controlled Crossing. Not in Direct Line of Travel

Central dished max. gradient **1:20 (5%)** to be above carriageway surface and painted white for the benefit of partially sighted people.
The Stem must extend back from the tactile paving adjacent to the push button control box, forming an "L" arrangement in red Blister tactile paving slabs
The Stem can then be followed to the **push button** control which should be at the **right hand side** of the approach to the crossing.
900mm. is the optimum level surface to back dished kerb to provide safe carriage to pedestrians not using crossing.
Where the surround footway or carriageway material is also red then it should be necessary to provide contrasting border and a minimum of 150 mm. wide around the tactile surface.

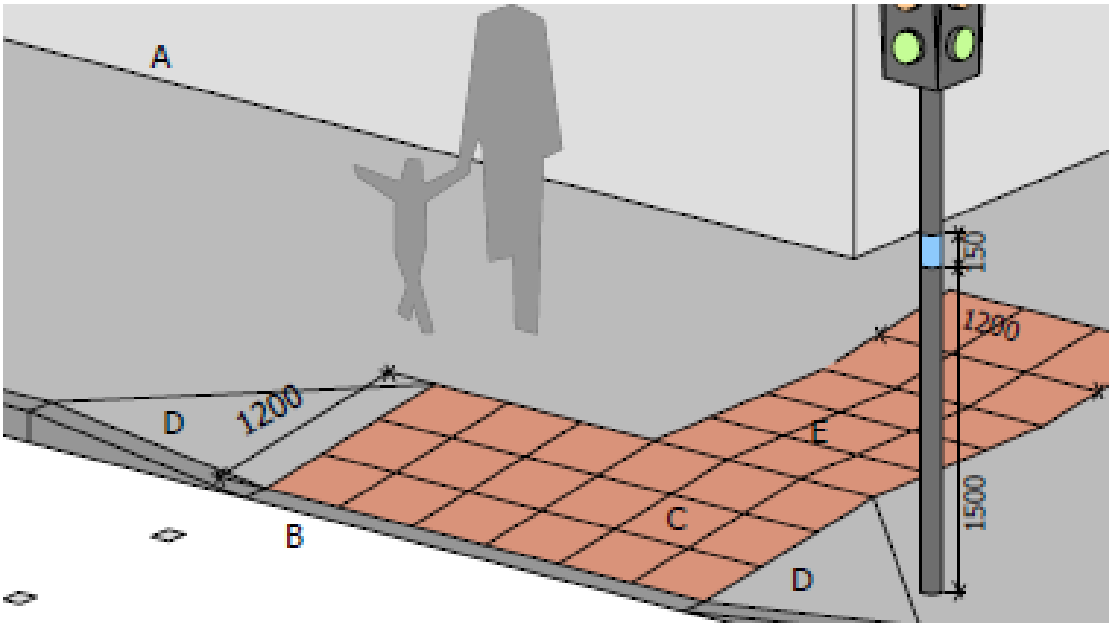


Figure 16. Controlled Crossing. In Direct Line of Travel

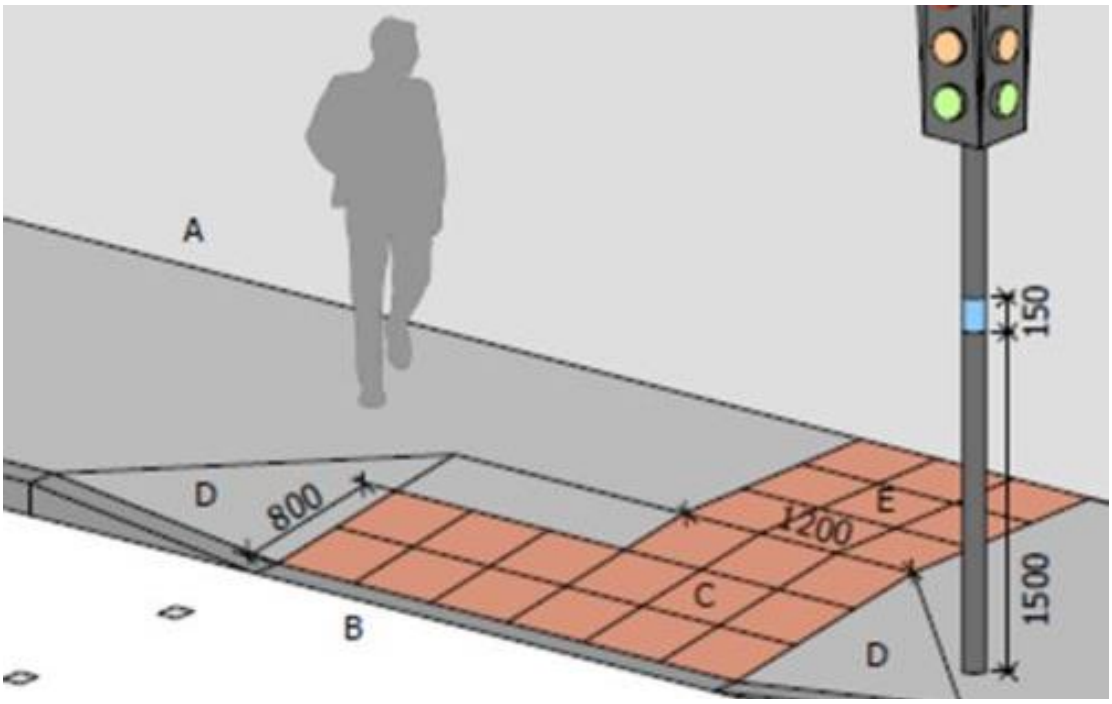


Figure 17. Controlled Crossing. Not in Direct Line of Travel

A: Rear of pavement or building line
B: Dropped kerb to flush with carriageway, or subject to a max 6mm. level difference, rounded kerb edge.
Buff blister paving to full width of dropped kerb.
C: Ramped section of pavement perpendicular to crossing to be 1 in 20 (max 1 in 12)
D: Flared sides to be max 1 in 11.
E: L-Shaped stem of blister paving to guide people to crossing points
Note: Red blister paving to full width of dropped kerb. All dimensions in millimeters.

5.3.5.3 Staggered signalized crossing

Staggered signalised crossing gives positive **signal control** to both pedestrians and drivers and are generally used in the following circumstances:
Where the carriageway is **wider** than **10m**.
When crossing at dual carriageways.
Where traffic **volumes** are **high**
Where **pedestrian** volumes are **high.**

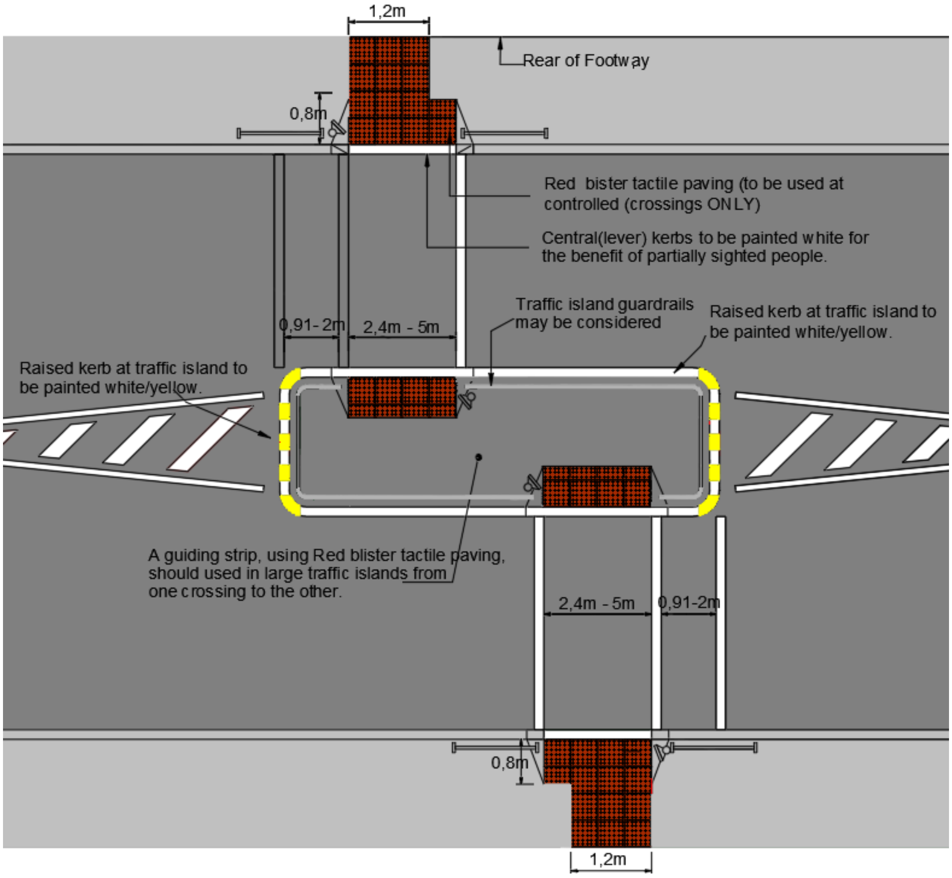


Figure 18. Controlled Crossing. Staggered Signalized Crossing

Staggered pedestrian crossings, and particularly staggered toucan crossings where they exist, shall be designed out as per the Design Manual for Urban Roads and Streets [DMURS]. The space provided within the islands of staggered crossings is generally constrained and difficult for vulnerable pedestrians to navigate. Single stage crossings should be provided to improve dwell space, crossing legibility and to reduce crossing distances.
Guardrails are required and must provide a minimum 50% Transparency from all angles.
Where the ramped section abuts the carriageway, the road camber should be no more than 1 in 20 for a **horizontal distance of 600mm**. This is to prevent the front wheels of a wheelchair or footrest becoming caught.

The pavement should be sufficiently wide to provide a **recommended 1200mm** width of level surface to the rear of the ramped section for people to pass without having to traverse the inclined surface.
Where a raised road crossing is provided, the width of the raised area should be at least **2400mm** and the surface should be flush with the pavement on both sides.
Where uncontrolled crossing points are provided at road junctions, **dropped kerbs** should be located **away from the curve** of the road.
Dropped kerbs should be located **perpendicular** to the **line of travel** of a person crossing the road and directly opposite a dropped kerb on the other side.
People with visual difficulties risk being misdirected by the orientation of the kerb if it is located on the curve of the road.
In street and roadway environments, **kerbs** are an essential indicator for people with visual difficulties to detect the **edge** of the pavement.
Where dropped kerbs are provided at crossing points, they should incorporate tactile paving surfaces to highlight the absence of a kerb and to orientate pedestrians to the direction of the crossing.
The provision of double yellow line markings or other form of parking restriction should prevent cars parking either side of a dropped kerb and will help to ensure the area remains unobstructed.
Crossing points should always be **well drained**. If puddles form at the base of a ramped slope, it can render the crossing impassable. Adequate drainage should be achieved using cross-fall gradients (maximum 1 in 50) and materials that are themselves pervious or are laid to enable water to drain through joints.
Rainwater gullies should never be positioned in the immediate area of the crossing as they may present a trapping hazard for wheels or sticks.

Table 08 Details tactile layouts at crossing points

DETAILS OF TACTILE LAYOUTS AT CROSSING POINTS			
USE	COLOUR	SHAPE	WIDTH OF BLISTER PAVING
Controlled crossing facility	Red	Varies (see below)	
1.On footways at either side of road		L shape	Stem 1200 mm wide kerbside 800mm/1200mm ay inset or 1200mm at in line
2. On central islands (refuges)		Kerbside	800mm wide at each side if greater than 2m wide or full width if less than 2m wide
Uncontrolled crossing points	Grey or Buff	Varies (see below)	
3. On footways at either side of road to the rear of pavement at crossing point.		Kerbside	800mm wide at inset crossing point 1200mm wide at in-line crossing point
4. On central islands(refuges).		Kerbside	800mm wide at each side if greater than 2m wide or full width if less than 2m wide

5.3.6 Tactile Paving Surfaces

Table 09 Tactile paving surfaces

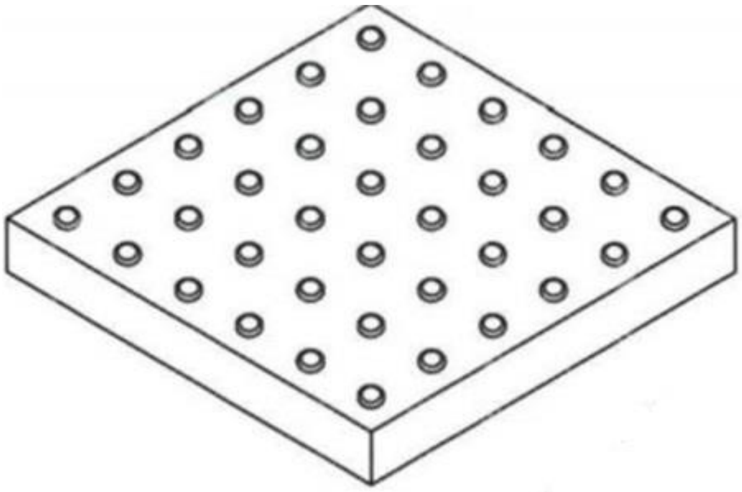
TACTILE PAVING SURFACES
Use tactile paving surfaces sparingly and after consultation with groups representing people with visual difficulties.
Use tactile paving consistently and strictly in accordance with detailed recommendations.
Use blister tactile surfacing to highlight the **absence of a kerb**.
Use **red blister** surfaces at **controlled crossings.**
Use **buff blister** surfaces at **uncontrolled crossings.**
Use **corduroy hazard** warning surface at top and bottom of external steps.

The **colour and layout** of tactile paving is determined by the **type of crossing** or to give a hazard warning.

Tactile paving should contrast as strongly as possible with the background pavement. Smooth, shiny metal tactile paving is not acceptable, as it is slippery when wet.
People with vision impairment also report that in bright sunlight shiny **metal paving** creates a very unhelpful **dazzling** effect

Different tactile paving surfaces have prescribed meanings and all convey important information about the external environment. Some tactile paving surfaces provide guidance and others indicate the presence of a potential hazard such as an approaching change in level or the absence of a kerb at a road crossing.
The back edge of all blister surfacing, whether at controlled or uncontrolled crossing points should be perpendicular to the line of travel. This will help people who align themselves with the rear edge of the tactile paving to orientate themselves correctly with the direction of the crossing.
Can difference between two main tactile paving:

5.3.6.1 Blister Tactile Paving



Blister Tactile

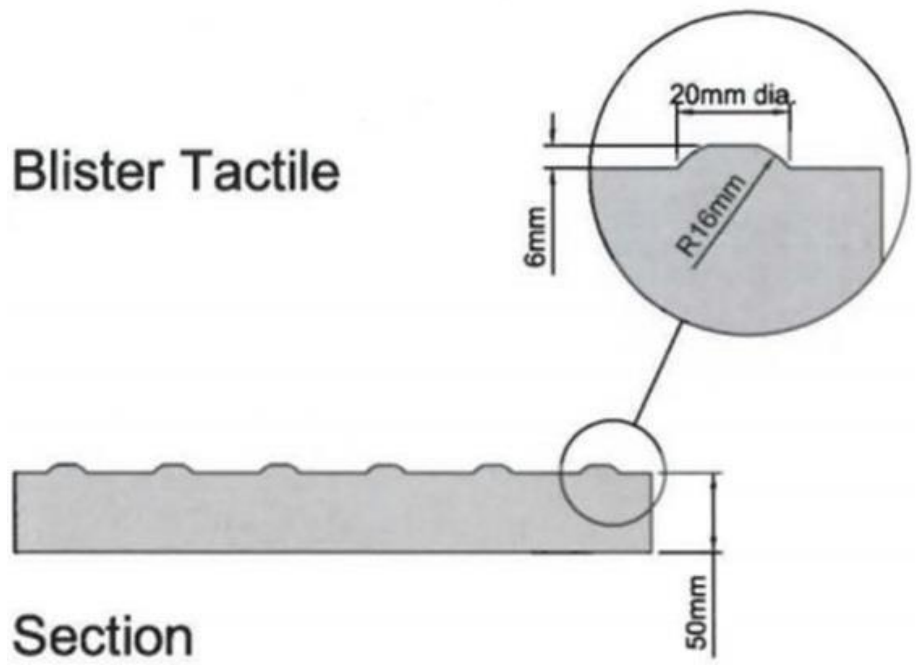


Figure 19. Blister tactile paving tile and studs dimensions.

The blister tactile surface should be installed in the **absence of an upstand** at both controlled and uncontrolled crossing points.

- Where the **footway** has been **dropped** flush with the **carriageway.**
- Where the **carriageway** has been raised to the level of the **footway**.

Tactile paving with a blister surface is used to warn pedestrians with visual difficulties where a pavement **ends** and a **carriageway begins**, in locations where there is **no kerb.**

It may be used at road crossing points with dropped kerbs, raised road crossings and in partially pedestrianised areas where the pavement and carriageway is only differentiated using different colours or materials.

Controlled Crossings:

At controlled crossings the pedestrian is able to establish priority over vehicular traffic. For the purpose of this advice the following crossing types are described as controlled:

Zebras, Toucans and traffic signalized junctions with pedestrian phases.

The RED blister surface should be used at controlled crossings only.

Example of red blister surface at controlled crossing and offset blister used to indicate the edge of the platform at rail and tram stations.

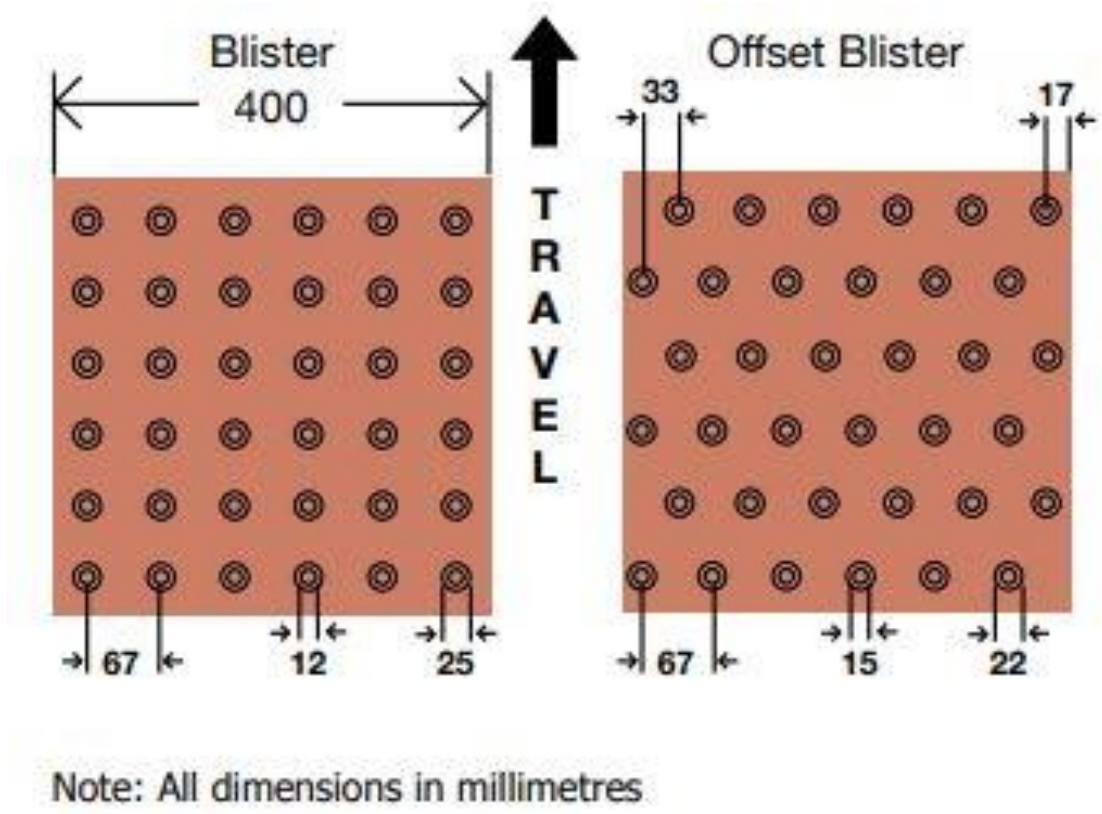


Figure 20. Red blister surface at controlled crossing and offset blister

The **Offset Blister** units are used to indicate the **edge** of the platform at **Rail** and Tram stations, also referred to as off-street applications. Note that the orientation of the offset blister units is critical - the rows of blisters MUST be parallel to the platform edge, and they are generally placed approximately 500mm back from the edge.

Uncontrolled Crossings:

At **uncontrolled** crossings the pedestrian does **not** have **priority** over vehicular traffic and must make a decision about whether it is safe to cross.
For the purposes of this advice the following locations are described as uncontrolled crossings:

Side road crossings, busy crossovers (**vehicle crossings**), crossings away from junctions,
kerb to kerb flat top road humps, signal controlled junctions without pedestrian phases (traffic lights), including those where studs indicating a pedestrian crossing place are provided.

The blister surfaces should be **BUFF** or **any colour** (**other than red**) which provides a contrast with the surrounding footway surface.

Partially sighted people will be assisted by **strong colour contrast** this can be achieved by painting or marking the kerb edge white/yellow.

5.3.6.2 Corduroy Tactile Paving

Can be used for any situation (**except** for **pedestrian crossings**) where visually impaired people need to be warned of a **hazard** and advised to proceed with caution.

Use to warn visually impaired people of the **presence of steps** and is also used **where a footway joins a shared route**, i.e. cycle lanes. at level crossings and at the bottom of ramped approaches to on street light rapid transit platforms.

Corduroy hazard warning paving should **visually contrast** with the adjacent paving surfaces, but it should not be red as this colour is restricted to blister paving at controlled crossing points.
The raised bars of the corduroy paving should be laid **perpendicular** to the direction of travel in all situations.

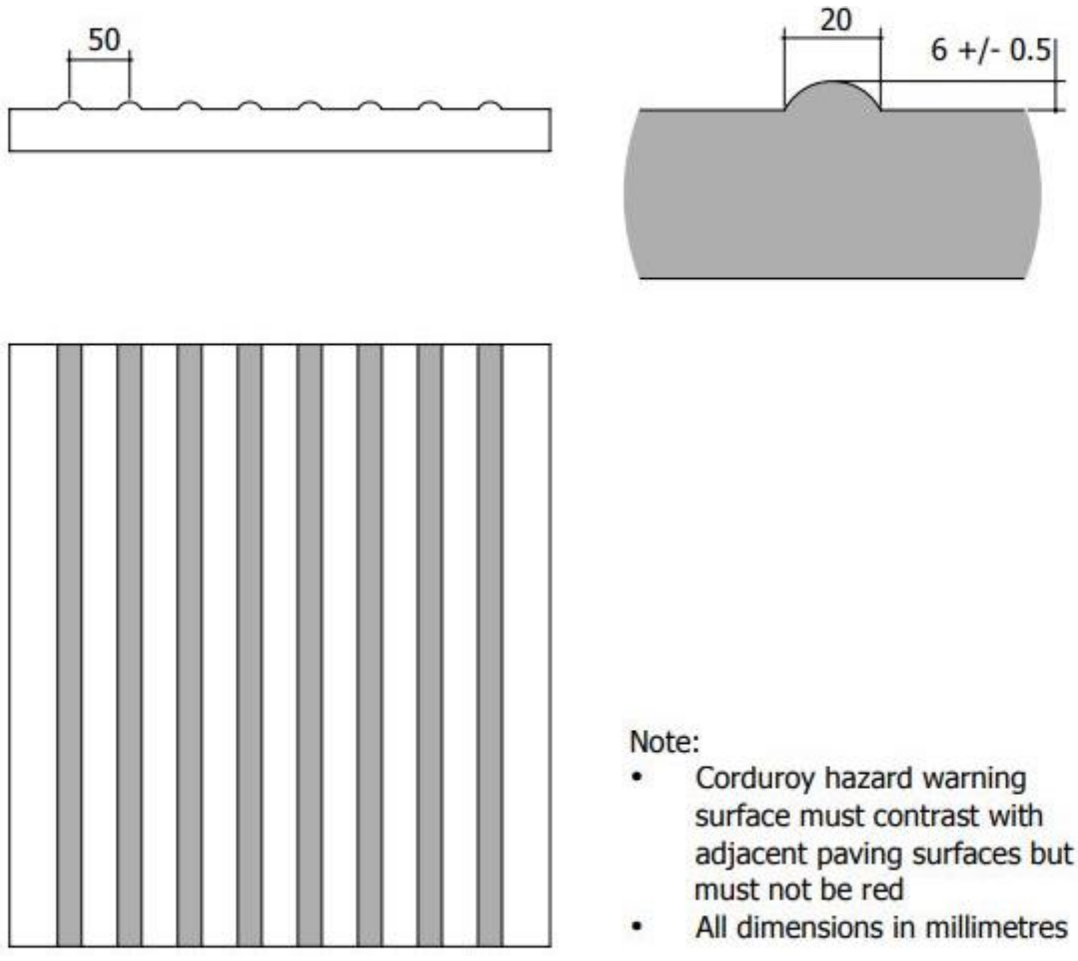


Figure 21. Corduroy tactile paving tile and raised bars dimensions.

Hazard Warning units use continuous half-rods**, raised 6mm** higher than the surface of the paving, to denote a hazard, such as the top/bottom of a flight of steps. Again, the rods should be **parallel** to the edge of the **hazard**.

Cycleway paving uses continuous flat bars to indicate a cycle lane. The **bars run parallel** to the direction of **travel** so as not to impede cycles.

Where a cycleway and a footpath are adjacent, these pavings may also be used for the pedestrian section, with the bars running transversely, and a demarcation strip between the two.

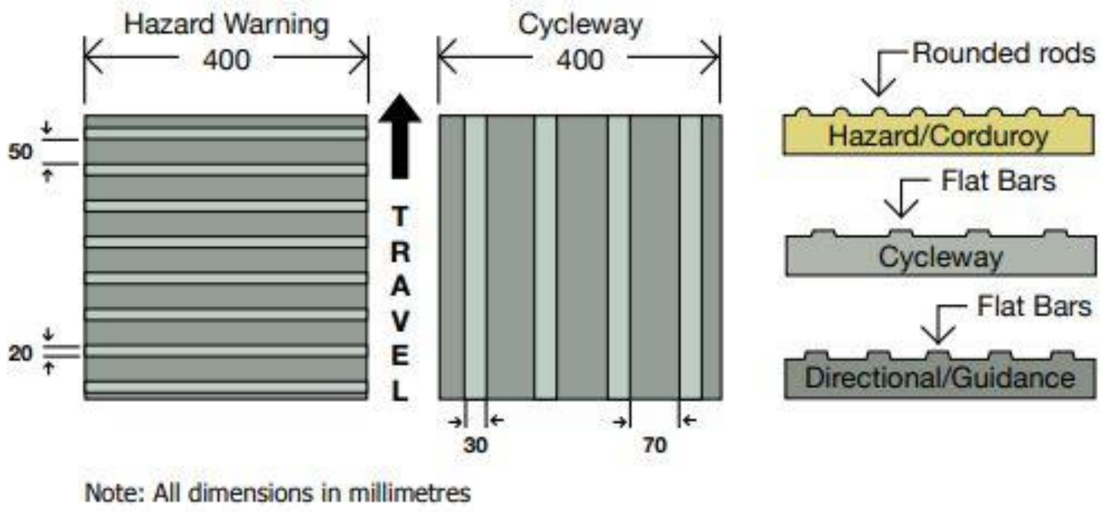


Figure 22. Examples of hazard warning and cycle way paving

Where used to warn of an approaching **flight** of steps, corduroy paving should extend to the **full width** of the steps, plus at least **400mm** to either side wherever possible.

However, the corduroy paving must **not extend** across an adjacent **ramp**, access **route** or facility such as a lift.

Corduroy paving should be positioned **400mm from** the **first step** and extend to a depth of **800mm** if the steps are **in the direct line of travel** or **400mm** if a deliberate turn through **90 degrees** is required. The dimensions and positioning are critical to alert people to the approaching hazard and to give adequate time for people to adjust their walking speed

5.3.7 Route finding (colour, contrasts and textural changes in paving)

Clearly defined logical routes can be identified with the use of **colour contrasts** and **textural changes** in paving. Planting can assist in defining routes or identifying hazards through scent and colour but should not obstruct or present an overhead hazard.

5.3.8 (Lighting) Signage and wayfinding,

Lighting columns and signs should be mounted on buildings or walls wherever possible to **reduce** the frequency of **interruption at path** or pavement level.

Where this is not possible, they should be placed as close as possible to the back of the pavement, subject to a maximum distance of **275mm** from the outer face of the post or column to the **property line**.

Where they are placed on the road side of a pavement, they should be **at least 500mm** from the **kerb** edge, or 600mm if the road has a steep camber or cross-fall. Posts and columns should be at least 1000mm apart.

Overhead signs and any item suspended above a path or pavement such as wall mounted lights or overhanging trees should provide a vertical **clearance** of at least **2300mm** to the footway surface.

In some instances, such as on pedestrian-only areas within rail or bus stations, signs may be mounted to provide a clearance of 2100mm, but in any areas where cyclists are likely to use a route, a clearance of at least 2300mm must be maintained. Where trees or shrubs overhang a footway, they should be cut back to provide a clearance of 3000mm to allow room for new growth.

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

5.3.9 Traffic and Audible Signals

For traffic signals pole has to be located 500 mm max from tactile paving edge and with audible and tactile signals at controlled crossing points.

At signal **controlled crossings**, audible bleepers emitting a pulsed tone are normally used during the pedestrian green period. There are two types of push button unit in common use.

However, there are **difficulties** using audible signals in the following situations:

- at a staggered crossing facility with each side having independent operation
- at traffic signals with split pedestrian phases (operating on a "walk with traffic" basis)

It may be difficult for the vision impaired or people with hearing deficiencies to establish exactly which crossing movement the audible signal applies to. This could lead to pedestrians stepping into live traffic. "Bleep and sweep" crossings have been used in these circumstances. These produce separate distinctive tones and the audible range is restricted to minimize any potential confusion.

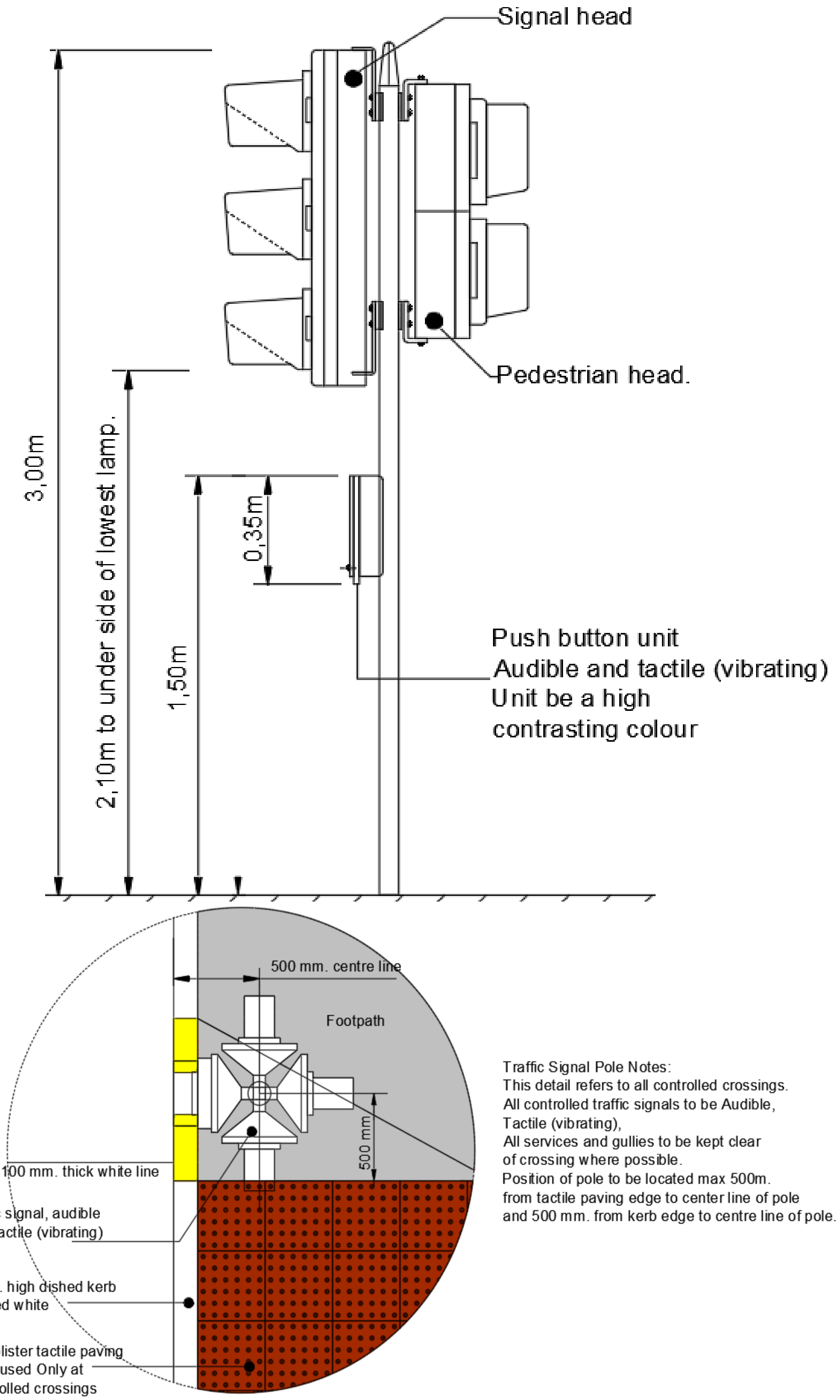


Figure 23. Plan and Elevation of traffic Signal

5.3.9.1 Push buttons

Push buttons are used to call **pedestrian phases** and can incorporate tactile indicators for blind or partially sighted people.

Push button units should be located close to the point where pedestrians will cross (ideally 0.5m from the kerb and 0.5m from the edge of the crossing guidance lines).

Push button units should be mounted at a **height of 1m** to the bottom of the push button unit.

Two types of push-button unit are now commonly used in new installations in Ireland:

The **first** is a unit where the entire electronic front panel area acts as a push-button. A **direction indicator** on top of the unit should point in the direction of travel for the pedestrian. A **vibrator** is located under the direction indicator and allows **blind** or partially sighted pedestrians to know when to cross.

The second type has a **large push-button**, a small flashing light and audible indicator. The audible indicator "ticks" slowly whilst a red pedestrian aspect shows. It then ticks more quickly and vibrates when a green pedestrian aspect shows.

An earlier type of push-button unit was subject to vandalism in some areas but some of that type are still in use.

Additional push-button units should be provided on any central islands in the signal layout. This is to cater for slower moving pedestrians who may be unable to cross the full road width in the time allocated.

Figure 24. Pedestrian push button

5.3.10 Bus Stop Design

Appropriate location of bus stops is essential as they automatically generate pedestrian crossing demands on the roads served by the bus. It is preferable that bus stops are located in **advance** of **crossing points** from a traffic and safety viewpoint.

5.3.10.1 Parking

Good design can discourage parking in areas that would restrict access for buses. A programme of **upgrading existing conventional kerbside** bus stops on principal bus routes will help to encourage increased use particularly by those groups that find access difficult at present.

5.3.10.2 Passenger Access Arrangements

As a general rule, all bus stops should be designed to **accommodate** the current generation **of low-floor buses**.

For ease of access, buses should be able to maneuver the entry/exit platforms right up to the kerbside.

Gaps of 100mm or more can present access difficulties for some users such as the elderly; people with push chairs or wheelchairs and people with sight impairment or with walking difficulties.

The **optimum kerb** height at a bus stop to cater for these persons should be around **180mm**. All new bus stops and improvements to existing ones should be designed to this height. Special kerb units such as "**Kassel Kerbs"** (or similar) are available which give this upstand. They should contrast in colour with the footway.

It should be provided smooth, level footpaths to and from stops and station entrances and exits with dished pavements at road crossing points; safe, accessible, road crossing facilities; good lighting; and convenient drop-off and pick-up facilities for people with disabilities at bus stations.

5.3.10.3 Kerbside bus stops

They should be supported with textured surface and taking to account the following characteristics:

Height fixed to suit **kneeling suspension of modern buses**, curved profile to enable accurate bus positioning at the stop and also to reduce lateral impact between wheel and kerb.

5.3.10.4 Lighting

Each bus stop should be immediately adjacent to high quality street lighting such as high-pressure **sodium lamps**. This gives a better feeling of security to waiting passengers during the hours of darkness. It can also assist safe boarding and alighting for passengers. Where bus boarders or promontories are provided, reflective bollards and lighting will be required to highlight the kerb extension into the carriageway.

5.3.10.5 Passenger shelters

High quality shelters are essential, as the majority of journeys will start with passengers having to wait at the roadside for a period.

Shelters do **not** have to be **fully enclosed** but, where possible, should be sited so as to provide protection from the prevailing wind and rain. The side of the shelter on the bus approach side should provide good visibility of buses.

Seats or a form of **"resting rail"** should be provided for passengers to lean on. They should be constructed from materials that are vandal resistant and can be cleaned easily. For security reasons shelters should be illuminated and should be located in highly visible areas well away from dense planting.

The structure should stand clear of the ground to avoid drainage Shortcomings and to ease cleaning. High capacity **litterbins** should be provided as people often eat, drink and smoke, while waiting for their bus.

5.3.10.6 Street Furniture

The street furniture around bus stops must be carefully considered. Where footway **widths** are **restricted** it is easy for them to become **cluttered**. This can cause Shortcomings for wheelchair and pushchair users and people with visual impairment.

Careful design could lead to the integration of the many essential elements that should be at each stop. For example lighting, service information, sitting/resting facilities, litterbins, even public telephones could be incorporated into one passenger shelter structure.

Bus poles have bus stop number sign in Braille and large font to aid visually impaired people, this number can be used to get information

5.4 Changes in Level

Table 10 Changes in Level

CHANGES IN LEVEL
Ensure the **routes** are **accessible**.
Consider the design of routes and levels at **early planning stages**.
Design **access routes** so they are understandable, **easy to use**, and offer choice
Provide inclined routes with a gradient between **1 in 33 (3%)** and **1 in 25 (4%)** with level landings at regular intervals.
Ensure ramped and stepped routes are **clearly visible** or well signed.
Ensure the **routes** are **accessible**.

5.4.1 External Ramps

Table 11 External ramps and handrails

EXTERNAL RAMPS AND HANDRAILS
Shallowest possible gradient or any sloped approach
Gradient **1:20 (5%),** maximum rise **500 mm** and **maximum length 10m.**
Ramp width **1500 mm**, with **1800 x 1800 mm. level landing at top and bottom.**
Non-slip surface, with **1:50 (2%)** cross-fall to ensure drainage, and 150 mm high edge protection.
Provide a continuous handrail on both sides at a height between **900-1000mm**. extending **300mm**. beyond the ramp and terminating in a close end.
Design **access routes** with a gradient **exceeding 1 in 25 as a ramp**
Make the gradient of a **ramp slope constant** and consistent with consecutive ramp slopes.
Provide an **alternative means of access** where the overall rise of a **ramp exceeds 2000mm**.
Design **surfaces to drain water** effectively
Avoid curved rams. Ramps slopes **to be straight**.
Plan for top and bottom landings to be 2400mm x 2400 mm and intermediate landings 2000mm. long (multiplied by) ramp width.
Provide a **kerb upstand of guarding** to the side of a ramp where the adjacent ground is at lower level.
Illuminate ramp and landing surfaces to **150 lux.**

5.4.1.1 Gradient

The preferred gradient of a ramp is **1:20** and the length of individual sections should be **no more** than **10m**. with a maximum **rise of 500mm.**

Intermediate **landings** should be provided after each 10m slope. In very exceptional circumstances, where site constraints require it, slopes no steeper than 1:12 may be provided.
Individual sections in these circumstances should be no longer than 2m.

These measurements change with the different ramp gradients as follows:

When the ramp gradient is **1:20**, there should be a maximum rise of **500mm** and a maximum length of 10m between landings.

- When the ramp gradient is **1:15**, there should be a maximum rise of 333mm and a maximum length of **5m** between landings.
- When the ramp gradient is **1:12**, there should be a maximum rise of **166mm** and a maximum length of **2m** between landings

All ramps, steps and landings should be kept **clear** of **obstacles** such as bins and bicycles and should be regularly swept clean of **fallen leaves** and any litter.

Where the gradient of an access route **exceeds 1 in 25**, the route should be designed as an **external ramp.**

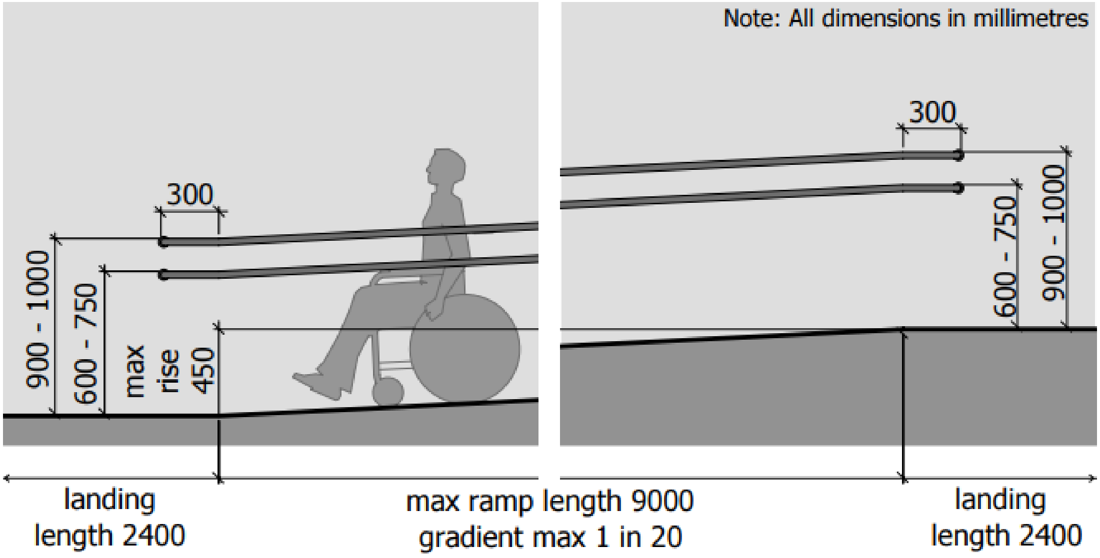


Figure 25. Examples of external ramp

All ramp slopes and landings exposed to the weather should be detailed and constructed to drain water.

Changes in the direction of travel should occur at an intermediate landing.
Landings should be provided at the top and bottom of a ramp and should be **2400mm x 2400mm** to provide turning space for wheelchair users and parents with strollers

5.4.1.2 Width

The **clear width** of a ramp should be determined by the **expected level of use** and whether people are likely to be using the ramp in both directions simultaneously.

In any case, the clear width should **not be less than 1500mm.**

Where a large number of people are expected to use the ramp at any one time and in **both directions**, a clear width of **1800mm** or more may be appropriate.

5.4.1.3 Edge Protection

In addition to the handrails, a raised **kerb** of at least **150mm in height** should be provided on any **open side** of a ramp.

A kerbed upstand should be **100mm high** (above the ramp and landing surface) and **contrast visually** with the ramp surface.

If a balustrade or guarding is provided to the side of a ramp, this is able to provide appropriate edge protection, as long as the gap between the ramp surface and lower edge of the balustrade or guarding is no more than 50mm.

5.4.1.4 Surface Finish

The **approach** to the ramp should be highlighted by the use of **colour contrast**, tone and texture change, to facilitate use by people with vision impairment.

The surface of the ramp should be non-slip.
Rainwater lodgment must be avoided by ensuring appropriate drainage cross-fall of 1:50.

The floor surface of the ramp should **be flush at the top and bottom** of the ramp where the level begins to change. Where there are different materials along the access route, they must have similar frictional characteristics.

The difference in level at joints between paving units should be no greater than **5mm** and the gap between paving units should be no wider than 10mm, with the joins filled flush. If unfilled.

5.4.1.5 Lighting

Lighting for ramps should come from the sides to **avoid shadow**. Lighting should be consistent along the length of the ramp and have non-glare illumination of **200 lux.**

5.4.1.6 Handrails

Handrails should be provided to **both sides** of the ramp and should be continuous to the full length of the flight and around intermediate landings.

Handrails should be positioned with the upper surface **900 to 1000mm** above the ramp slope and 900 to 1100mm above landings.

The provision of a **second lower handrail**, with the upper surface positioned **600 to 750mm** above the ramp and landing surface is **desirable** and will benefit people of different heights.

It is recommended that handrails should extend 300mm beyond the top and bottom of the ramp.

Handrails should be easy to grip and be either circular in cross-section or noncircular with a broad horizontal face, with a diameter of 40 to 50mm.

Where a second lower handrail is provided, the diameter may be 25 to 32mm in recognition that it is likely to be used predominantly by children and that a smaller profile will make it easier to grip.

For both rails, a **clearance of 50to 75mm** between the rail and any support wall or mounting surface should be maintained along the full length of the rail

The ends of handrails should terminate in a way that signifies that the top or bottom of the ramp has been reached. Handrails should **visually contrast** with the surfaces they are viewed against so that they are readily apparent to all users.

Metal handrails should be avoided as they can become very cold in winter weather conditions. People who need to firmly grip handrails in order to safely negotiate a ramp will find a cold handrail extremely uncomfortable and possibly painful to use. Preferred materials that are not cold to the touch include timber and plastic-coated steel.

5.4.2 External Steps

Table 12 External steps

EXTERNAL STEPS
Steps should be provided **in conjunction with a ramp**. Avoid single steps
1500 mm. stairway width recommended.
Risers to be between **150-180mm** and goings between **300-450mm**.
Provide **corduroy tactile warning** on **top** and at **bottom** of the staircase running across full width of steps.
Provide a continuous handrail on both sides, at a height between **900-1000mm**, extending **300mm** beyond the last step and terminating in a close end. Central handrail required when the stair width more than **2000mm**.
Step edges should **contrast** with the rest of the surface. Provide adequate **lighting**. Avoid confusing shadows.
Provide **steps** in conjunction with a ramp
Visually highlight each step edge.
Ensure that the clear width of steps suits expected level of use but is **not less than 1200mm**.
Provide consistent number of steps in consecutive flights.
Include clear landings at top and bottom of steps, with the length equivalent to the step width.
Protect any area below steps which has headroom less than 2100mm.
Light step and landing surfaces adequately to **150 lux**.

5.4.2.1 Gradient

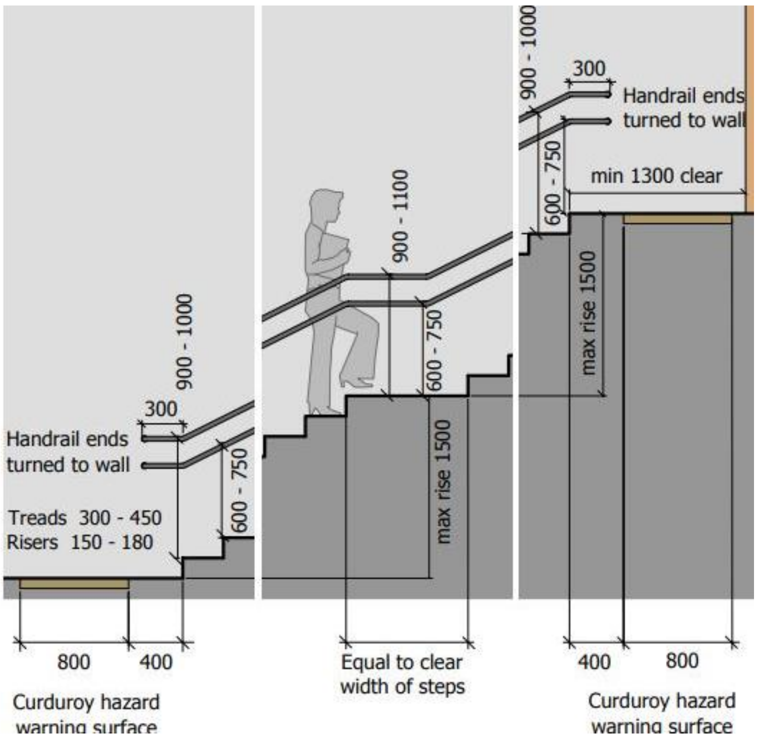


Figure 26. Examples of external steps

5.4.2.2 Tactile Surface

Top and bottom landings should be provided with a **corduroy-type hazard**-warning tactile surface in a ridged pattern to give advanced tactile warning of the change in level.

This tactile surface should comprise rounded bars running **transversely** to the direction of pedestrian **travel**.

The bars should be **6mm** (+/− 0.5 mm) in **height**, **20mm** in **width**, and **spaced 50mm** from the centre of one bar to the centre of the next.

This ridged surface should extend the full width of the stairs at both the top and bottom of the flight.

This surface should be of a contrasting colour to the surrounding area, but should not be red.

The ridged surface should start 400mm from the first step nosing, where possible.

When steps are in the direct line of travel, a depth of 800mm for the tactile surface is needed.
This depth can be reduced to 400mm if a pedestrian has to make a conscious turn to encounter the stairs.

Where one flight of stairs is followed immediately by a second flight, there is no need for additional tactile surface areas, as the handrails should give warning of another flight.
However, if the stairs are accessed by a landing, then tactile warning will also be required on that level.

5.4.2.3 Stair Design

Level landings with at least a **1500mm length** free from **any door swings** should be provided at the top and bottom of each flight of steps.

Single steps should be avoided as they present a tripping hazard even if there is visual contrast provided. In the design of stairs, the **rise** of each step should be consistent and between **150–180mm**. The **going** of each step should be consistent and between **300–450mm**.

Tapered treads and open risers should not be used.
Nosings should be integral with the step and **distinguishable** in tone and colour.

The **surface** material of the steps should be **non-slip.** The outer edges of all steps in each flight must provide a permanent visual contrast with the rest of the steps, known as ‘edge stair marking’. The edge stair marking should be 50–65mm on the tread and 30–55mm is recommended.

5.4.2.4 Lighting

Lighting for steps should come from the sides to avoid shadow. **Lighting** should be **consistent** along the **full flight** and adjoining landings and have non-glare minimum illumination of 200 lux.

5.4.2.5 Handrails

People using wheelchairs do not normally use handrails while using ramps, but they may find handrails useful to **steady** themselves on a long/steep ramp.

People with disability who are ambulant and people who have visual impairment find it easier to negotiate steps and ramps with a handrail.

Therefore, handrails should be provided on both sides of every ramped and stepped access route.
There should be a continuous handrail on each side of the ramp and steps including landings.

The top of the handrail should be **900–1000mm** above the pitch line of the stair flight/ramp and 900–1100mm above the surface of any landings.

To accommodate people of different stature, provision of a second handrail should be considered on each side at 600mm height from the pitch line of steps/ramp surface.
Both **handrails** should **extend** at least **300mm** beyond the outer edge of the top and bottom steps/ramp, and terminate in a closed end which does not project into a route of travel.
Handrails on **intermediate landings** should be **continuous**, to guide people who are blind or have a visual impairment. When the **width** of the steps/ramps exceeds **2000mm**, a **central handrail** should be provided.

This allows users to be within easy reach of a support especially when many people are using wide ramp/steps.

The handrail should follow the exact pitch line or contour of the steps/ramp. In this way, information about the steps/level change is communicated through the person's hand.

Handrails should be **distinguished** from the **backgroun**d environment in contrasting colour and/or tone. A round or oval profile of handrail is preferred.
Round handrails should be 32–45mm in diameter, and oval handrails should be 38mm in depth and 50mm in width.

Any wall-mounted handrail should have a clearance of **60–75mm** from the **wall.**

A support connection located at the bottom of the handrail permits uninterrupted use.

The materials used for the handrail can include wood and nylon-sleeved steel tubing and should have a smooth finish with no sharp edges.

5.4.2.6 Signage And Wayfinding

Steps can present a **hazard** to people with visual difficulties, particularly when they are located in the **direct line of travel**.

The use of a **tactile hazard warning** surface at the **top and bottom** of a flight of steps provides a means of highlighting the approaching change in level.

However, it must be of the appropriate type and be installed correctly in order to convey the right message and to provide adequate warning to pedestrians.

The hazard warning surface should be positioned sufficiently in advance of the steps to give adequate time to stop.

It should also extend a sufficient distance in the direction of travel to ensure it is detectable to all pedestrians. If only a narrow strip is provided, a person may step over it with a single stride and be unaware of the approaching hazard.

External steps with corduroy hazard warning surface at top and bottom of stairs.

Hazard warning surfacing should **not generally** be **used** on **intermediate landings** as this can give the false impression that the end of a flight has been reached.

The exception to this is if the stepped route can be joined at intermediate landing level from another direction, such as via a doorway or adjoining path. Also, if an intermediate landing is significantly longer than would otherwise be expected and the handrails are not continuous, the use of tactile warning surfacing could be used on the basis that there were two separate flights of steps.

5.5 Surface Materials

Table 13 Surface materials

SURFACE MATERIALS
Ensure logical and creative use of materials to enhance legibility of external environment.
Ensure all surfaces are **firm, hard and slip-resistant**.
Avoid uneven and **loose** surfaces.
Be aware that some surfaces are a potential source of glare.
Avoid surfaces with a strong pattern or contrasting lines that may be visually confusing.
Consider the ease and cost of future repairs.

Surface materials should be carefully selected, designed and detailed to provide safe and robust environments for everyone to use. The logical and creative selection of materials can make it easier to demarcate different zones, for example, to clearly delineate between pedestrian and vehicular zones in a typical street profile.

The surface of all access routes should be hard and firm with a good grip.

Smooth paving surfaces are easier for everyone to navigate and are particularly valued by people pushing prams and pushchairs and by people who use wheelchairs and walking aids.

Uneven surfaces such as cobbles and bare earth and surfaces such as **loose gravel** and **sand** should be **avoided**. These are difficult and uncomfortable for many people to cross and may present a tripping hazard. Surfaces should be slip resistant when wet and dry, with a dry friction coefficient between 35 and 45.

Surface materials should be selected to reduce the potential for **glare** from bright sunlight or other light sources such as street lights.

The ground surface should not have a strong pattern as this can be a source of visual confusion.

The use of contrasting lines or bands should be avoided in locations where they may be perceived by some people as highlighting a step edge.

Regular and **effective maintenance** should prevent or replace cracked and uneven paving slabs and those with loose joints, as they become tripping hazards and are difficult to walk on, cause puddles to form and become slippery.

5.5.1 Natural and Tempered Landscapes

Gravel, currently a common surfacing material in natural and tempered landscapes, should be used only if it is of a grade which is well compacted, with **no** loose stones **greater** than **5mm**. Regular maintenance will be required to repair potholes and erosion.

Alternatively, a bound gravel surface, where a top dressing of gravel is applied to a bitumen layer, gives the feel and appearance of gravel on a firm base. This surface will wear with use, requires regular maintenance and is not suitable for intense vehicular movement.

Epoxy bound gravel is a more expensive surface that gives the appearance of gravel. Bound in a clear resin, the colour of the gravel comes through but the surface is very firm, non-slip and requires little maintenance. Bitumen macadam has the effect of 'suburbanising' a landscape but may be necessary where paths are used intensively or where maintenance is sporadic.
Different colours are available, made from clear bitumen coloured with a dye and mixed with stone chippings of a similar colour.

Buff and red colours are readily available and the source should be local so that repairs are easy to implement. **Red** is typically used for **cycle paths** and it may be appropriate to use the same material as a continuation of a wider network of cycle paths in the environs in order to avoid confusion.

Sustainable solutions to hard landscapes should specify **permeable surfaces** to allow direct percolation of water to the soil substrate.

Where **grass tracks** are used, a reinforcing system can be used below the surface to give a firm but free-draining layer on which grass can grow. It should be installed so that the **edges** do not become a **tripping hazard**.

The disadvantages of grass surfaces are that they inhibit the use of wheelchairs, prams and pushchairs and present a further disadvantage to people with visual difficulties who will find it difficult to orientate themselves in the space.

5.5.2 Urban environments

The unit size of materials used in surfacing is often related to the function or load it is expected to handle.

Large slabs can be employed for light pedestrian use, although the **larger** the surface area of the slab, the **thicker** it should be to prevent it from cracking.

Large slabs can be unwieldy and difficult to lay evenly.

The **smaller** the unit size, the **more resistant** the paving unit will be to vehicular loads. However, the surface itself may become distorted through use, unless a strong enough bed has been laid.
Shortcomings can be **rectified easily** when the units are bedded **in sand** but are more difficult when the joints are mortared.

Light traffic on small modular paving bedded on sand can encourage **grass** and moss to **grow** in the **joint**s which may present a **tripping hazard** and be a hindrance for wheelchair users; parents with strollers; people with walking difficulties; and those using walking aids.
This type of surface requires **regular maintenance**. Differential settling can result in an uneven surface that becomes a trip hazard.

Polished surfaces cause glare and are not suitable in a damp climate, as they remain slippery in a moist atmosphere, even after rain has passed.
Likewise, fine-grained stones with **high calcium** content can **erode quickly** with use, forming a polished surface that will be slippery in wet weather.

There are numerous mechanical finishes to stone paving, from a simple cleaving or sawing, to pin- and bush-hammering, which produces a non-slip textured finish. Different finishes will also draw out different qualities in the stone.

5.6 Street furniture

Table 14 Street Furniture

STREET FURNITURE
Place items of street furniture at or **beyond boundary** of access route
Ensure overhead signs and fixtures provide clearance of **2300mm**. to the path or pavement.
Ensure all street furniture **contrasts visually** with background.
Incorporate a **visually contrasting band** in all free-standing posts and columns.
Provide tapping rail where post-mounted items present a hazard to pedestrians with visual difficulties.
Never link **bollards** with **chain** or ropes.
Ensure gates are easy to operate and provide clear space adjacent to latch.
Position drinking **fountains** to **suit seated** and standing use.
Provide **seating at regular intervals**, away from line of travel.
Design picnic **tables** for easy approach with **clear path** to full **perimete**r.

Furniture in the external environment consists of a variety of elements such as lighting columns, junction boxes, electrical pillars, mini pillars, seats, picnic tables, litter bins, information panels, traffic signs, parking meters and post boxes, often installed independently over time and without coordination.

The placement of these elements can result in an obstacle course for most people and present particular difficulties for people with visual difficulties, wheelchair users, people using walking aids, those with walking difficulties and people pushing strollers and buggies.

In both rural and urban situations, **furniture** should be placed at or **beyond the boundary** of an **access route**.

Elements should be placed **in straight lines**. For instance, where lighting columns define the main zone of street furniture, other objects such as bollards, traffic signs and post boxes can follow this line.

Existing traffic sign poles shall be reviewed as to their necessity and moved out of the direct line of travel along footpaths if they must be retained
Any new public lighting poles should be placed to the front of the path where possible and kept out of the direct line of travel

All bus stops signs and infrastructure shall be rationalised to prevent clutter at stops and to ensure sufficient space for wheelchair users to access the bus doors. Where bus stop islands are proposed or being retained, they shall be reviewed in the context of appropriate dwell areas for the expected volumes of patrons and shall be easily located and accessible by vulnerable pedestrians in particular. The safety of all users shall be considered, particularly where pedestrians are required to cross any cycle track. Refer to the Bus Stop Usage Survey report for more information.

All signage and traffic signal heads shall be mounted with a head height clearance of 2.3m minimum.

Bulky objects such as parking meters and post boxes should **not be placed** where they will become a visual obstruction, for example at **crossing points**.

All street furniture should visually contrast with the background against which it is seen. **Grey posts** and **columns should be avoided** as they tend to blend into the general background.

Items such as free-standing posts and columns should be highlighted by means of a 150mm-high feature, such as a crest or band, positioned 1500mm above ground level, which visually contrasts with the furniture itself.

Bollards can be effectively highlighted by incorporating a light into the top.

Furniture should be continuous to ground level. Pedestal-mounted objects such as litter bins, telephones and letter boxes should be avoided as the pedestal can obstruct access. Items attached to posts should face in the direction of travel so that they do not interfere with the line of movement.

Where eye-level signs, such as **maps**, are supported on **two vertical posts**, a **tapping rail** located between the posts at 250 to 400mm above ground level will help prevent an unsuspecting pedestrian colliding with the sign. The sign should not extend more than 150mm beyond the posts and the rail and posts should contrast visually with the background surfaces.

Street furniture and signage should always be located either close to, or recessed into, the inner shoreline (that is, a wall, fence or building), or alternatively, on the kerb edge, leaving the middle of the pavement clear.

A clear path width of preferably 2000mm should be maintained along the circulation route.
Cycle parking must be kept clear of pedestrian routes.

All existing and proposed street furniture should be reviewed and designed in the context of improved visibility. High contrast colours shall be considered, and the use stainless steel shall be restricted unless considered absolutely necessary to prevent glare in bright sunshine.

5.6.1 Public Lighting

The NDA guidance recommends that where public lighting cannot be mounted on walls or buildings they should be placed to the back of the footpath. Where they are proposed on the road side of the footpath they shall be placed at least 500mm from the kerb edge, or 600mm if the road has a steep cross-fall or camber. Preferably the scheme design shall place the public lighting in build-outs as a means of completely removing them out of any line of travel by pedestrians.

Specifics of existing public lighting infrastructure have been identified in the Road Infrastructure Audit report, such as the use of LED lanterns or not. LED lanterns provide improved visibility over SOC lanterns and all older lanterns shall be upgraded to LED lanterns as identified in the Road Infrastructure Audit.

5.6.2 Bins

Litter bins should have an overall height of approximately **1300mm** and a bin opening at 1000mm above ground level.

5.6.3 Bollards

Bollards should only be installed where absolutely necessary, e.g. to prevent cars parking on pavements. Bollards, if used, should be a minimum of **1000mm in height**, **200mm in width** and contrast in colour and tone with the background. Adjacent bollards should **not be linked with a chain** or rope, and should be a minimum of 1200mm apart.

5.6.4 Gates

Gates are sometimes hinged or sprung in such a way as to be self-closing. These should be adjusted so as not to slam shut on an unsuspecting pedestrian or to prevent wheelchair or pushchair access. The opening mechanism should be robust but easy to grip and maneuver.

The path should extend **500mm** to the side of the gate with the latch to make it easier to approach and open the gate.

The approach to the gate should be a recommended 2000mm long and free of obstructions**.**

5.6.5 Drinking Fountains

Where drinking fountains are provided, they should be **clearly identified**, understandable, useable and accessible to all users.

They should provide a clear knee-space for seated users and have a projection from the wall to the front of the fountain of **430 to 500mm** and a **spout height** above the floor within the range **750 to 915mm.**

The provision of two drinking fountains, one with a height at each end of the suggested range, is likely to meet the needs of most people.

A **clear area of 800mm x 1300mm away** from any **access route** should be provided in front of each drinking fountain to provide convenient and unobstructed approach.
One solution is to locate a drinking fountain in an **alcove** so that it does not present an obstruction or hazard to other pedestrians.

The water spout should be positioned towards the front of the fountain and have a recommended 100mm height of water flow to enable a cup to be filled.

Controls should be easy to operate, positioned towards the front of the unit and to both sides to enable operation by a person using either hand.

A drain should be located under the drinking fountain to prevent the ground surface from becoming waterlogged or muddy. Consideration should be given to providing a shallow tray or bowl to enable assistance and other dogs to get a drink of water.

5.6.6 Seating

Seating should be **provided at regular intervals** along access routes and, wherever possible, in conjunction with changes in level such as external steps and ramps.

In recreational or countryside environments, seating should be located in sheltered places and where people can enjoy a good view.

Table 15 Recommended maximum distances without rest

Recommended maximum distances without rest	
USERS	DISTANCE (meters)
People with visual difficulties	150 m
People using wheelchairs	150 m
People who are ambulatory without walking aids	100
People using walking sticks or mobility aids	50

Seats should be placed **600mm** (to the front of the seat) back from the line of movement so they do **not obstruct** adjacent **access routes**.

The surface on which seats are placed should be flush with surrounding levels and be firm and stable. **A 900mm square of firm paving** beside a seat will enable a wheelchair user to sit alongside other people. It will also allow a parent with a stroller to safely park the stroller beside the seat.
Seats should be at least **450mm high** and a recommended **500mm wide.** Perching seats with a height of 500 to 750mm are easier for some people to use and may be provided as an alternative in some locations. A heel space at least 100mm deep makes it easier for people to stand up off the seat or perch.

Seats with backrests are useful for additional support, and **armrests**, positioned approximately **200mm above seat level**, are also useful to lean against, as well as assisting in getting in and out of the seat.
Seats positioned or linked in a row should all be of the same style, such as all with armrests or all without.
A mixture of seat styles in a single row can cause confusion for some people with visual difficulties.

Picnic tables should be placed on level sheltered sites and served by accessible paths. The design of the table and seats should be such that they do not topple when unbalanced. A clearance of **700mm** to the **underside** and a table top surface 750 to 850mm above ground level should enable universal use.
A firm, **level surface 2000mm** wide around the perimeter of the picnic table and seats will provide comfortable, convenient, understandable and useable access for all users regardless of their age, size, ability or disability.

5.6.7 Hazard protection into access route

The **swing of doors**, windows and the location of vending machines, public telephones, etc should **not extend into any access route**. If this intrusion is unavoidable, then hazard protection should be provided where objects project more than 100mm into an access route and their lower edge is more than 300mm above ground.
Hazard protection on the ground can be provided by a **solid kerb** or fixed element between **100–300mm** above floor level under the protruding obstacle so that it is detectable by a cane.
The hazard protection should not extend beyond the front edge of the object, nor should it be set back more than 100mm from its front edge.

5.7 Shared Spaces, Shared surfaces

The predominant form of shared spaces throughout the scheme requires the interaction of pedestrians and cyclists, particularly at junctions. Shared spaces should not be used in areas where space in constrained. Shared spaces should be confined to areas where there is ample room for cyclists and pedestrians to maintain a wide berth.
Instances of crossover pedestrian / cycle facilities should be carefully considered, and other design alternatives implemented instead where possible.

Existing constrained shared areas identified within the report should be designed out as part of the scheme. At signalised junctions, particularly those with high volumes of both pedestrians and cyclists, cyclists should not be forced off-road to merge with pedestrians in shared spaces. Improved junction design should seek to maximise segregation by adopting Dutch style cycle layouts or similar at junctions. Where it is not possible to eliminate shared spaces, pedestrian priority zones should be created to

minimise potential conflict with fast moving cyclists and shared spaces should only be considered at junctions where the volume of cyclists is low.
Existing road marking shall be reviewed to ensure it is clearly understood and legible by all road users, particularly in the context where the road layout has dramatically changed from existing. Refer to the Road Infrastructure Audit report for further information.

5.8 Protection of Outdoor Works

The process of **construction work**, whether maintenance, repair or new build, can cause significant **risk** to passers-by unless it is carried out properly.

Work to premises on privately-owned land may require the erection of **scaffolding** or the **temporary use** of areas of the **footpath** or roadway for storage purposes.

Maintenance and repair work to underground services, such as drains, water mains, gas mains and telephone and electrical cables, often involves the excavation of public rights of way and frequently the **storage of spoil and construction materials** in the vicinity of the works.
The erection of scaffolding or hoarding on pavements and public rights of way can narrow the walking space and can, unless **properly protected**, increase the risk of collision with protruding objects.

Where scaffolding is positioned over the pavement, clear headroom of 2200mm should be maintained. An overhead platform should be erected to the full width and length of any pavement to protect people below from falling objects.
The use of cross-bracing should be avoided below 2200mm, unless it is located away from the route of pedestrian travel. Where cross-bracing is used, a tapping rail or board should be provided.

It is **preferred** that **scaffolding** in public areas is **enclosed** within a **hoarding** as this reduces the potential for collision. The hoarding should have no protruding parts, sharp edges or outward opening-doors and be well illuminated during darkness.

Any scaffolding that is not enclosed should be highlighted in a **contrasting colour** or tone so that it is clearly visible to all pedestrians.

Where a hoarding or scaffolding is erected on the footpath, and passage is restricted, a **1800mm unobstructed width** should be maintained in **busy areas** or a recommended width of **1200mm** in **less populated** areas to enable pedestrians to pass safely. Protruding parts such as pole ends should be minimised, but where they do occur, should be sleeved or boxed in. Hoardings should be highlighted with a contrasting band, at least 150mm deep, and positioned 1400 to 1600mm above ground level.

The provision of a continuous **handrail** 900 to 1000mm above ground level will assist pedestrians with visual difficulties in finding **a safe route** through scaffolding and to locate any public entrance.
If it is not practical to provide a safe route through the scaffolding, an **alternative route** should be provided. If pedestrians are diverted onto the roadway, the pedestrian route should be separated from the traffic and any site vehicles or equipment by a physical barrier on either side.
The name and address of the scaffolding company and of the authority which granted the hoarding licence should be clearly displayed.

5.8.1 Roadway and pavement maintenance

Work on pavements and roads, such as the renewal of surfaces, buried cables and pipes also present an inconvenience and a potential hazard to pedestrians.

All work should be **protected** to the full extent by a **continuous barrier**, which should be between 1000mm and 1200mm high and incorporate a tapping rail, 150mm to 200mm deep, with its lower edge on the ground or up to 200mm above the ground surface.

The barrier should be a rigid hoarding that cannot be knocked over and it should **visually contrast** with the surrounding surfaces.

Where temporary paths are located on the carriageway, dropped kerbs or raised footways should be provided. If people must use the public roadway it should be clearly marked and signalled to motorists

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APPENDIX A
DRAWINGS

Project Ireland 2040
Building Ireland's Future

Rev	Date	Drn	Chk'd	App'd	Description

Client: NTA Údarás Náisiúnta Iompair National Transport Authority

Engineering Designer: ROD Roughan & O'Donovan TYPSA

Project Title: **BUSCONNECTS INFRASTRUCTURE DUBLIN**

Drawing Title: ROUTE 11: KIMMAGE TO CITY CENTRE ACCESSIBILITY AUDIT

Date	Scale	Drawn	Checked	Approved
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Engineering Designer: ROD TYPSA

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DETERIORATING PAVING AT UNCONTROLLED CROSSING POINT.
TACTILE PAVING SHOULD BE REPAIRED AT THIS CROSSING IN-LINE. 1200MM DEEP (3 SLABS)

A KASSEL KERB SHOULD BE PROVIDED WITH AN OPTIMUM RISE HEIGHT OF 180MM TO ADAPT TO LOW-FLOOR BUSES AND THEIR KNEELING SUSPENSION.

IF THE CENTRAL ISLAND IS INTENDED TO BE AN AREA TO WAIT, THEN TACTILE PAVING SHOULD BE DISPOSED.

L-SHAPED STEM IN CONTROLLED CROSSING SHOULD BE EXTENDED TO THE BUILDING LINE.
IF THE CENTRAL ISLAND IS INTENDED AS AN AREA TO WAIT AS PER TIME OF CROSSING; THEN RED BLISTER TACTILE PAVING SHOULD BE PROVIDED.

THE CURRENT DISPOSAL OF CAR PARKING BAYS IS A POTENTIAL HAZARD FOR PEDESTRIANS BECAUSE IT HAS TO BE INVADED IN THE ACCESS TO PARK.
THIS AREA IS REMOVED IN THE DESIGN PROJECT AND NEW CAR PARKING DISPOSED IN PARALLEL BAYS.

IN THE DESIGN PROJECT THESE AREAS SHOULD BE PROPOSED AS A CAR PARKING. IN TERMS OF NUMBERS OF ACCESSIBLE CAR PARKING BAYS. A 5% OF THE TOTAL OF CAR PARKING SPACES ASSIGNED SHOULD BE ACCESSIBLE. (TGD M).
IWA RECOMMENDS 1 EACH 15 UNITS. POSSIBILITY OF INCORPORATE AN ACCESSIBLE CAR PARKING SHOULD BE CONSIDERED.

IN CONTROLLED CROSSING POINTS THE L-SHAPED STEM SHOULD EXTEND TO THE REAR OF THE FOOTPATH.

THERE ARE SOME ACCESSIBLE POINTS FOR CARS TO THE FOOTPATH.
STREETFURNITURE OR LANSCAPING SHOUL BE RECCOMENDED TO LOCATE AND AVOID CARS CAN ACCESS TO THE PEDESTRIAN PATH..

BusConnects Core Bus Corridor
11: Kimmage > City Centre
Map 3: Preferred Route

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Client: NTA Údarás Náisiúnta Iompair National Transport Authority	Engineering Designer: ROD Roughan & O'Donovan TYPSA	Project Title: **BUSCONNECTS INFRASTRUCTURE DUBLIN**
Date: JUNE 2020 / Scale: 1:500 @ A1, 1:1000 @ A3	Drawn: FBH / Checked: MRG / Approved: EFD	Drawing Title: ROUTE 11: KIMMAGE TO CITY CENTRE ACCESSIBILITY AUDIT
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Project Title: BUSCONNECTS INFRASTRUCTURE DUBLIN

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BusConnects Core Bus Corridor
11: Kimmage > City Centre
Map 6: Preferred Route

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JUNE 2020	1:500 @ A1 1:1000 @ A3	FBH	MRG	EFD

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BCID	----		0011-KIMMAGE	11 of 11	S0	P01