Appendix I1
Accessibility Audit Report - Ballymun Alignment

BUSCONNECTS –C3 Ballymun 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 Ballymun to City Centre Bus Corridor (CBC). The 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 03 corresponding to Ballymun 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 Ballymun to City Centre Core Bus Corridor (CBC) commences on the R108 Ballymun Road at its junction with Santry Avenue and Balbutcher Lane (Santry Cross) and is routed along Ballymun Road, St. Mobhi Road, Botanic Road, Prospect Road, Phibsborough Road, Constitution Hill and Church Street as far as Arran Quay, where it will join the prevailing traffic management regime on the North Quays.
The Ballymun to City Centre corridor begins on Ballymun Road at the junction with Santry Avenue and Balbutcher Lane. The bus will travel along Ballymun Road, St. Mobhi Road, Botanic Road and Prospect Road and will continue through Phibsborough Road,

Constitution Hill and Church Street. At Arran Quay, it will join the bus lanes on the North Quays.
The route is about 6 kilometres. There will be new cycle lanes along this route.

1.2.1 Objective of the Scheme

The objectives of the Proposed Scheme are to:

- Enhance the capacity and potential of the public transport system by improving bus speeds, reliability and punctuality through the provision of bus lanes and other measures to provide priority to bus movement over general traffic movements.
- Enhance the potential for cycling by providing safe infrastructure for cycling, segregated from general traffic wherever practicable.
- Support the delivery of an efficient, low carbon and climate resilient public transport service, which supports the achievement of Ireland's emission reduction targets.
- Enable compact growth, regeneration opportunities and more effective use of land in Dublin, for present and future generations, through the provision of safe and efficient sustainable transport networks.
- Improve accessibility to jobs, education, and other social and economic opportunities through the provision of improved sustainable connectivity and integration with other public transport services.
- Ensure that the public realm is carefully considered in the design and development of the transport infrastructure and seek to enhance key urban focal points where appropriate and feasible**Report Structure**

The overall Ballymun to City Centre Core Bus Corridor (CBC) scheme can be broken down into three distinct sections, namely:

- Section 1 — Ballymun Road from St. Margaret's Road to Griffith Avenue: 3 km long
- Section 2 — St. Mobhi Road, Botanic Road, Prospect Road and Phibsborough Road from Griffith Avenue to Western Way: 3 km long – Along St. Mobhi Road, Botanic Road, Prospect Road and Phibsborough Road,
- Section 3 – Constitution Hill and Church Street to Arran Quay: 1 km long.

The report will be structured in short sections, coincident with the the sheet distribution provided in the PRO drawings produced for the 2nd Public consultation, which is shown in the image aside. These sections cover are 400m approx each one.

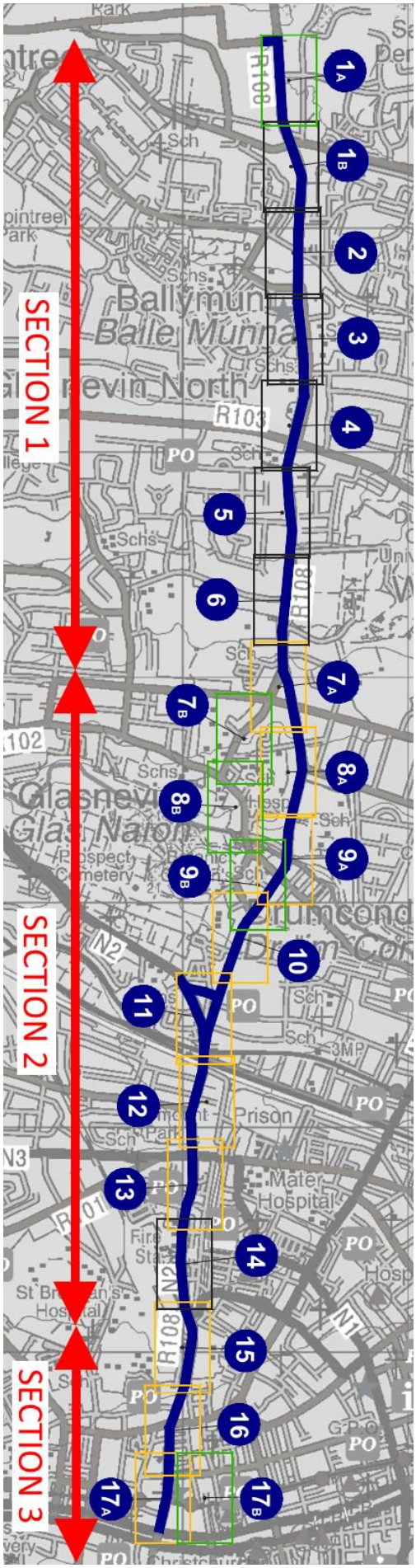
Every sheet contains the information of images with Shortcomings in terms of disabled user and brief recommendations in order to solution and comply with universal Design.

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 Ballymun to City Centre Core Bus Corridor.



2. SECTION 1: BALLYMUN ROAD FROM ST. MARGARET'S ROAD TO GRIFFITH AVENUE

2.1 Description of the Route

The Ballymun Corridor starts at the junction of Ballymun Road and St. Margaret's Road and runs south along the Ballymun Road dual carriageway for 3 km in Section 1 to the junction with Griffith Avenue.

The proposed road layout will generally retain the existing one bus lane and two general traffic lanes in each direction, except in two locations as described further below. The tree-lined existing median will be retained. Segregated 2m wide cycle tracks will be provided at the edge on the outer sides of the carriageway and will segregated from the adjoining bus lane by upstand kerbs, with some localised narrowing of the adjoining wide footpaths in places. There are occasional street trees in the footpaths at the road edges, some of which will need to be removed as shown on the drawings. The existing footpaths are quite wide ranging from 2.5m to 4m. In some locations these footpaths may need to be narrowed by 0.5m to 1m accommodate the proposed cycle tracks, but generally will not be reduced to less than 2.5m wide.

2.1.1 St. Margaret's Road to Shangan Road

In the stretch between St. Margaret's Road and Shangan Road the existing road layout will be modified to provide two 2m wide segregated cycle tracks alongside the existing bus lane and two general traffic lanes on each carriageway. This will be achieved mainly by narrowing of the traffic lanes and modification of the kerbs, which will be moved slightly backwards between 0.5m and 1.0m narrowing the footpaths.

The segregation of the cycle track will be implemented, as for most of Ballymun Road, by installing a raised kerb between the roadway and the cycle track, keeping it at grade and allowing the passage of runoff, thus minimising changes to the existing drainage scheme by just relocating the existing gullies.

The existing median is paved and will be converted to a green landscaped area, retaining most of the existing trees and proposing new ones.

Bus stops will be upgraded to island bus stops, for improved safety of pedestrians and cyclists in the boarding and alighting zone.

The junctions of St. Margaret's Road, Northwood Avenue and Santry Cross will be upgraded to provide bus priority and segregated cycling facilities, such as protected corners, with associated signal staging to minimise conflicts with general traffic.

At the Santry Cross junction left-turn traffic lanes will be provided in both the southbound and northbound directions to enable segregated signal operations between turning traffic and buses and cyclists. These left turn lanes will replace one of the two existing straight-ahead lanes.

2.1.2 *Ballymun* Town Centre

From the Shangan Road junction to Gateway Crescent, through the town centre along Ballymun Main Street, it is proposed to narrow the road from two traffic lanes to a single traffic lane. The space of the removed lane will be used to provide permanent on-street parking spaces at the commercial and civic premises along the street, and improved cycle and pedestrian facilities The cycle track will be segregated from the roadway behind the parking, separated by a 0.75m wide buffer. New green areas and trees will be provided to improve public realm in the town centre. On the western side of the street, the existing high step between the footpath and the road will be reduced to provide a continuous public space. The median will be narrowed by 0.5m on each side to accommodate the provision of cycle tracks along the outer edges of the street. The existing trees are too close to the kerb, and they cannot be retained when the kerbs are moved inwards, so they will be removed and replaced with new trees.

The signal-controlled junctions of Shangan Road and Gateway Crescent will be upgraded to provide bus priority and segregated cycling facilities, such as protected corners, with associated signal staging to minimise conflicts with general traffic. Priority controlled junctions at side streets and entrances will be provided with raised platform crossings along the street edges for pedestrians and cyclists.

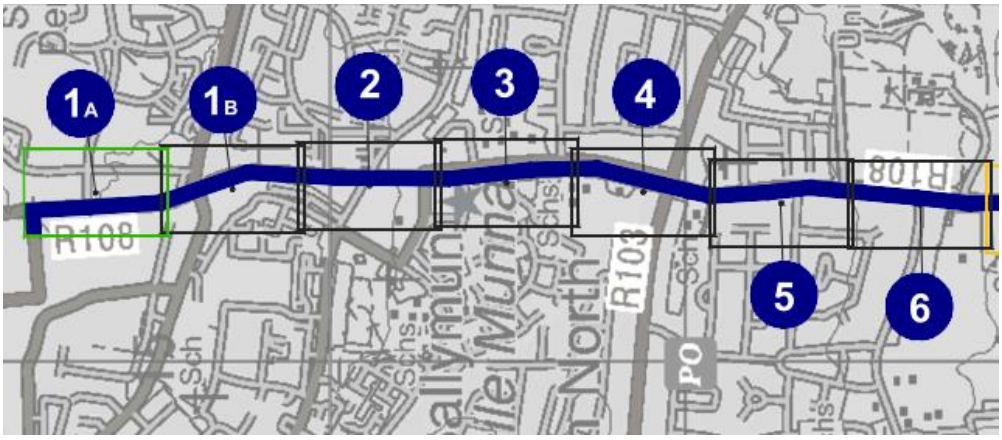
2.1.2.1 *Ballymun Town Centre to Griffith Avenue*

South of Ballymun Town Centre the existing road layout will be generally retained with one bus lane and two general traffic lanes in each direction. Segregated cycle tracks will be provided in the same manner as further north requiring slight movement of the kerbs and narrowing of the footpaths and verges.
At the Collins Avenue junction left-turn traffic lanes will be provided in both the southbound and northbound directions to enable segregated signal operations between turning traffic and buses and cyclists. These left turn lanes will replace one of the two existing straight-ahead lanes.
On the western side of the road south of Collins Avenue to St. Pappin Road, one northbound traffic lane will be removed to accommodate on-street parking spaces, to serve frequent drop-off activity related to the Our Lady of Victories National School.
The existing signal-controlled junction of St. Pappin Road will be upgraded to provide bus priority and segregated cycling facilities, such as protected corners, with associated signal staging to minimise conflicts with general traffic. At St. Canice's Road traffic signals will be provided, which will provide for easier and safer turning movements. Other priority controlled junctions at side streets and entrances will be provided with raised platform crossings along the street edges for pedestrians and cyclists.

2.1.2.2 *Griffith Avenue Junction*

At the gyratory junction of Griffith Avenue, the traffic system will be modified to divert southbound traffic on St. Mobhi Road turning east onto Griffith Avenue. This traffic will instead circulate around the western and southern arms of the triangular road system which will be modified to two-way movement on those arms. Likewise, eastbound traffic from the western section of Griffith Avenue will continue directly along the southern side of the gyratory instead of diverting around the northern end of it. This arrangement will remove a significant traffic conflict at the corner of St. Mobhi Road and Griffith Avenue which will benefit buses and cyclists.
Segregated cycle tracks will be provided through the traffic gyratory, plus a 2-way cycle track along Griffith Avenue on the southern side to facilitate the cycle connection between Griffith Ave and St. Mobhi Road, which is much used by students to and from nearby schools.

The sections considered, coinciding with the sheets of the design plans mentioned in section 1.3, are the following:



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

This first part of the route begins at Ballymun Road R108 in the intersection with St. Margaret's Road and finishes in the junction with St. Mobhi Road.

a) Sheet 01b

From the Junction of Ballymun Road with Balbutcher Lane and Santry Avenue some dispersed parking areas can be appreciated:

Footpath is used by cars in Ballymun Main Road

Shortcoming: In the absence of protection, certain footpath areas have been used as parking areas in front of the Nursing Home and the building of the Goulding.
Recommendation: It is suggested an adequate and strategically disposition of street furniture or landscaping to prevent the access to the footpath.

b) Sheet 02

Two disabled parking bays are located in Ballymun Road close to Ballymun City Center for the disability people..

Accessible car parking spaces at Ballymun City Centre

Shortcomings: In the proposed design, these parking bays are going to be removed.
Recommendations: A suitable spot should be found for their relocation in the scheme. It would be a good strategy to place the places in the vicinity of the Ballymun Healthcare facility. It shall be demarcated to conform to the requirements of Department of Transport's Traffic Signs Manual.

An off-street accessible parking bay is located in Sillogue road.

Accessible car parking bay in Sillogue Road.

Shortcoming: Lack of dished kerb and adequate signal post.
Recommendations: A dished kerb for the accessible parking bay should be provided. For design criteria check 5.2.2.

c) Sheet 04

Accessible car parking in Ballymun Library

Recommendations: The Department of Transport Traffic Signs Manual Chapter 7, which sets out the road marking requirements, indicates that parallel disabled parking bays should be 7m long and preferably 3.6m wide. Alternatively, if a 2m buffer zone is provided the parking bay width can be reduced to 5.8m.

d) Sheet 05

One off-street accessible parking bay is located in St.Pappin Road.

Accessible car park at St. Pappin Road

Recommendations: Dropped kerbs should be provided to facilitate easy transfer from the designated parking bay to the access routes without undue effort or barrier. Perpendicular parking bays should be 6m in length, 2.4m wide with 1.2m buffer zones either side of the parking bay.

e) Sheet 06

A row of parking spaces has been provided next to the entrance of Dublin Centre University.

Accessible car park at Dublin City University (DCU). Hamsptead Park

Shortcomings: No accessible parking bay has been provided.
Recommendations: Minimum one accessible bay for every 15 parking bays (IWA).
As per Technical Guidance Document M: where on-site car parking is provided, whether for residents, employees, visitors or others, a number of designated car parking spaces should be provided, on a proportional basis.
In the absence of a specific number of designated spaces being required by a Local Authority through Development Plans or as a condition of planning 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 space.

2.2.2 Access Routes-General

The access route of this part from St. Margaret´s road is levelled to the cycle track and separated in some parts by a white lane. In other parts, it is barely noticeable this separation except for the different surface treatment.
One of the core objectives of the CBC project is to provide segregated cycling facilities along the routes.

Shared route with no clear segregation

Shortcomings: The shared route (pedestrians, cyclists) has no clear segregation. The limits are confusing. The width of footpath is reduced.
Recommendations: The width recommended for pedestrian path is 2 meters and a segregated share route is preferred.

This width of the footpath begins to be wider as we approach to the residential and commercial areas of Ballymun, where the cycle track runs levelled to the carriageway. Resting concrete cobbles areas of footpath and some disperse trees and plant pots are characteristic of this part, from the Metro Hotel to St. Pappin's Nursing Home.
From Collins Avenue to city centre the typical footpath is located in a low rising house area independent of the cycle track and carriageway and with concrete pavement.

a) Sheet 06

It is defined for Busconnects Bus Corridor project a segregated cycling facility close to Dublin City University. In the existing route, in the east side, there is no cycle path. In its update, the minimum width of 2 meters should be taken into account.

Footpath of DCU (Dublin City University)

From Hampstead Avenue, bike lanes will once again be arranged on both sides of the carriageway in the existing situation.
This first part of the accessibility audit report finishes in the junction with St. Mobhi Road and Ballymun Road with Griffith Avenue.
For more considerations about Access Routes check article 5.3.

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.
Poor drainage at some crossing points was also noted. The gradients of the road carriageway at the crossing points shall be designed to ensure water drains away from the line of travel.

2.2.4 Access Routes-Guardrails

In this first part of the route there are some guardrails on the footpath:

a) Sheet 02

Guardrails in a ramp for access to commercial area in Ballymun Road West side road to Gateway Crescent.

Recommendations: Guardrails at this point are necessary due to the high level difference between the road and the path. Designers would need to be aware to ensure the guardrails are retained for safety or the level difference designed out.

2.2.5 Pedestrian Crossing Points

We can differentiate types of crossing points:
Uncontrolled crossing points, controlled crossing points and staggered signalized crossings:

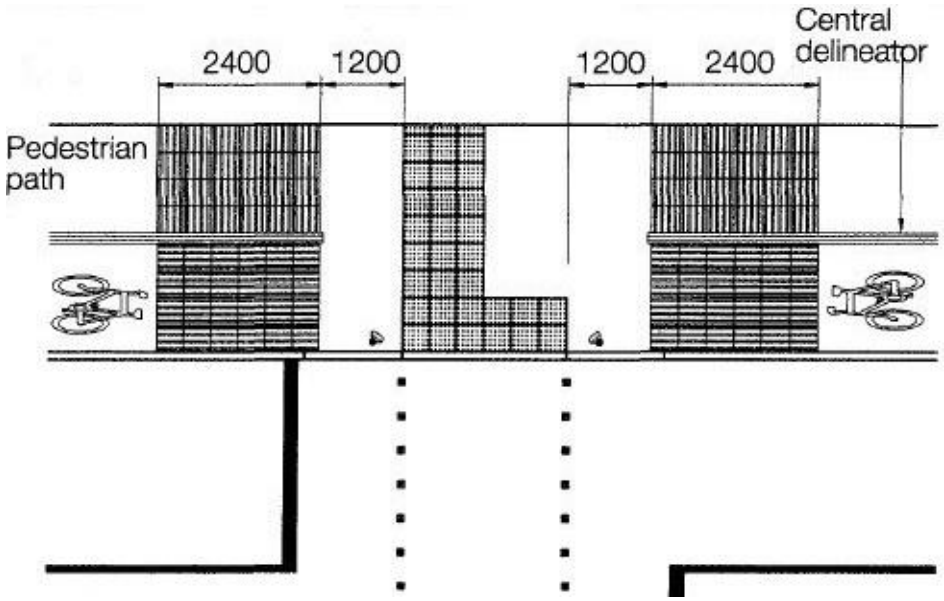
As main pedestrian crossing points shortcomings, it is remarkable the absence in of no dropped kerbs provided or dropped kerbs with inadequate width.

Some tactile paving used in crossing points during the route, need to be reviewed.

The following comments can be made in this part of the route about pedestrian crossing.

a) Sheet 01a

In many parts of the route, the footpath parallel to the cycle track joins with an uncontrolled crossing.
The solution should be the following (Guidance of the use of tactile paving surfaces, UK DETR Nov 98).



Example of solution of Controlled Crossing along a shared route

We extract an example of this type found during the route:

Controlled Crossing along shared route in Ballymun Road

Recommendations: The position of traffic signals have to be located max 500mm. from tactile paving edge to the centre line of the pole and 500mm. from the kerb edge.
It would be advisable not to cut the entire width of the bicycle lane so cyclists do not invade the footpath in a hazard area as the crossing points.

A narrow shared path can lead to conflict between vulnerable pedestrians and fast moving cyclists and should be avoided where possible. Full segregation should be considered with careful consideration of any resultant criss- crossing manoeuvres that may manifest from the implementation of full segregation of cyclists and pedestrians.
Maximum segregation should be considered as part of the design of the scheme,
The correct solutions for pedestrian crossing points can be checked in the article 5.3.5.
Some examples of pedestrian refuges in crossing points in this part of the route:

b) Sheet 01b

Controlled Crossing at Balbutcher Lane

Shortcomings: Tactile paving layout is pointing in the wrong direction, not to the central island and tactile paving should be considered if the island is intended to be an area to wait. Crossing time should be ensured.
Recommendation: Re-orientate the tactile paving. The 'dimples' on the tactile paving units should be aligned so as to guide vision impaired pedestrians directly to the other side of the crossing. An island refuge should be considered in the event a vulnerable pedestrian gets stuck there or ensure there's adequate crossing time.

Controlled Crossing at Junction Northwood Avenue with St. Mobhi Road

Shortcomings: Lack of red blister tactile paving in island of Refuge (<2m, wide);
Recommendation: 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.

Where the refuge is less than 2m depth - the surface should be laid across the full width, set back behind the kerb or 150mm from the edge of the carriageway (where the refuge is at

carriageway level) on both sides. (Guidance on the use of Tactile Paving Surfaces.DETR.UK)

Examples of controlled crossing where tiles without a textured surface are appreciated:

Crossing point Ballymun Main Street in Nursing Home. Front view

Crossing point Ballymun Main Street in Nursing Home. Side view

Shortcomings: Controlled crossing point with no adequate paving.
Recommendation: Installing red blister tactile paving for controlled crossing. Depth of 0.8 m. slabs), Gradient 1:12 max.

c) Sheet 02

Staggered Crossing Point in Ballymun Main Street-Balbutcher Lane

Shortcomings: Staggered crossing should be resolved in one stage as per the Design Project.
Recommendations: Red blister tactile paving is required for controlled crossings.

d) Sheet 04

Uncontrolled Crossing point at Shanliss Road

Shortcomings: Absence of tactile paving in uncontrolled crossing. Check also the distance between bollards to let people with mobility impairment to pass though comfortably (1.2 m.)
Recommendations: “Buff or grey” tactile paving. Depth of 1.2 m, gradient 1:12 max. Level difference of dished kerb: 6mm (max).

e) Sheet 04

Uncontrolled crossing point -Ballymun Library

Shortcomings: Absence of tactile paving in uncontrolled crossing.
Recommendations: “Buff or grey” tactile paving. Depth of 1.2 m, gradient 1:12 max. Level difference of dished kerb: 6mm (max).

Staggered crossing point in Ballymun Road- Glasnevin / Collins Avenue

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.
Recommendations: 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. Thus, the required crossing distance decreases and an adequate crossing time should be ensured.

Examples of absence of tactile paving surfaces found in the route:

f) Sheet 05

Crossing point of our Lady of Victories with Albert College Drive

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

g) Sheet 06

Uncontrolled Crossing point at Canice’s Road

Shortcomings: Uncontrolled crossing point without the correct tactile paving and deteriorated pavement.
Recommendations: “Buff or grey” tactile paving. The tactile surface should be installed to a depth of 1200mm. across the full width of the flush dropped kerb. The maximum gradient should not exceed 1 in 12 (8%), and where space allows, a gradient of 1:20 (5%) should be achieved. There should be no vertical upstand between the road surface and the kerb; a 6mm tolerance can be made but only on a bull nose kerb. Placing crossing point on the curve should be avoided.

Where an extensive area of the carriageway has been raised, it will not be appropriate to install the tactile surface along the full length. In those circumstances, the tactile surface should be limited to the 'crossing' area and the remaining raised carriageway either side of the tactile surface should maintain a level difference with the footway of at least 25mm high, or have a continuous physical barrier, for example: planters, railings. (Guidance of the use of tactile paving surfaces, UK DETR Nov 98).

2.2.6 Tactile Paving Surfaces

Along the route, it has been possible to observe the absence of many tactile surfaces in many of the crossings.

Any crossing locations within the proposed scheme shall be upgraded to provide the necessary tactile paving surfaces. Check chapter 5.3.6

Red tactile paving units only should be used at signal controlled crossings and zebra crossings to guide vision impaired people to the crossing point. The paving units should be laid in an L-shape.

In uncontrolled crossings, 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. In deciding relative priorities, discussions should be held with local groups representing both vision impaired and restricted mobility (such as wheelchair users) pedestrians.

2.2.7 Change in Level

There are no significant changes in level within the majority of this section of the scheme.
A guardrail necessary due to the high level difference is found in the west side of footpath in Ballymun Road, close to Sillogue Road.

a) Sheet 02

Examples of Change in level in access route of Ballymun Road

Recommendations: These are critical points that designers would need to be aware of and to ensure the guardrails are retained for safety or the level difference designed out.

2.2.8 Shared Spaces, Share Surfaces

There are not explicitly designated shared surfaces.
In the sections where cycle track and pedestrian path runs parallel, is recommended for the CBC project a vertical segregation from the cycle track to the footway.

2.2.9 Surface Material

a) Sheet 02

The existing surface along Ballymun Main Street comprises concrete setts in the footpath in pedestrian commercial areas. Certain sections of these footpaths have been subjected to patch repairs with asphalt, and may result in a hazard for people with mobility impairment.

Footpath in Ballymun Main Street - Coultry Road

Shortcomings: Some surfaces patched with other material in the pavement may interrupt the mobility line of people with disabilities.
Recommendations: These surfaces should be levelled.

b) Sheet 05

Pavement of a controlled crossing in St. Pappin road

Shortcomings: Deteriorating pavement in a controlled crossing point patched with asphalt. The repairs or the placement of posts on the footpath, often force to break the pavement and these end up being repaired by patching with other materials. It can difficult the correct maneuver of users of wheelchair or vision impairment.
Recommendations: Renovate and level the surface of the footpath.

c) Sheet 06

Cracked Footpath at Canice's Road

d) Sheet 07a

Shortcomings: It can often be seen how the roots of trees have lifted the concrete pavement from the footpaths causing differences in levels and the consequent stagnation of water and areas with different levels. The leaves of fallen trees can be a hazard for people who have difficulty moving. This makes the floor wet and slippery.
Recommendations: It should be restored concrete slabs with proper expansion joint. It should be recommended to surround trees with a suitable protection enclosure that warn people with visual impairment of the existence of trees.

It is observed that some of the footpaths are deteriorated. Fractured concrete slabs can cause differences in level and hazard for the comfortable transition of people with disabilities.
The footpaths should be homogenous in surface material and ensure that all surfaces are firm, hard and slip-resistant.

2.2.10 Street Furniture

Some aspects of street furniture were recorded during the walking audit of this section of the scheme:
Lighting and electricity poles have been generally located on the front of footpaths. Junction boxes where generally located to the back of footpaths.

As general, these elements should be placed in straight lines. Where lighting columns define the main zone of street furniture, other objects such as bollards, traffic signs and post boxes should follow this line.

There is an absence of benches. It would be advisable to incorporate these urban elements in the sections to provide resting places along the route. The recommended maximum distances without rest can be checked in Table 15 (5.6.6.) of this report.

a) Sheet 03

Bollards in uncontrolled crossing point -Shanliss road

Recommendations: Bollards are sparsely placed during this part of the Route. They should be used for restricting vehicular access and with a minimum spacing of 1.2 m. between them and should be correctly placed on the tactile paving for allow enough width for people with mobility impairment.

b) Sheet 04

Planter box in junction of Glasnevin Avenue

Shortcomings: Some planter boxes are placed in the middle of the footpath being a hazard for pedestrians with movement difficulties when in the access route.
Recommendations: Urban furniture should be arranged in such a way that, it does not hinder the easiest and most logical itinerary for people with reduced mobility.

c) Sheet 05

Bus Stop in Ballymun Road and St. Pappin Road

Shortcomings: Some litterbins have been placed in bus stop that constitute an obstacle especially for people with mobility impairment, or make manoeuvrability difficult.
Recommendations: A minimum width of 1200mm. should be guaranteed for a correct mobility of wheelchair users.

d) Sheet 07a

Street furniture in a triangular refuge island. St. Mobhi road and Griffith Avenue

Shortcomings: The placement of urban elements in the logical and desire line of wheelchair users or people with mobility impairment can be a hazard inside refuge islands.
Recommendations: Free the logical itinerary of movement, without obstacles.

2.2.11 Bus Stop Design

The following comments can be extracted from the existing route:

a) Sheet 01a

Bus Stop at Ballymun Road

Shortcomings: Possible interference between pedestrians and cyclists
Recommendation: Consider the island bus stop option when possible.

Access to some island bus stop is poor, particularly for mobility and visually impaired pedestrians. Pedestrians are forced to cross a two-way cycle track without any visual aid, such as buff tactile paving to indicate the crossing.

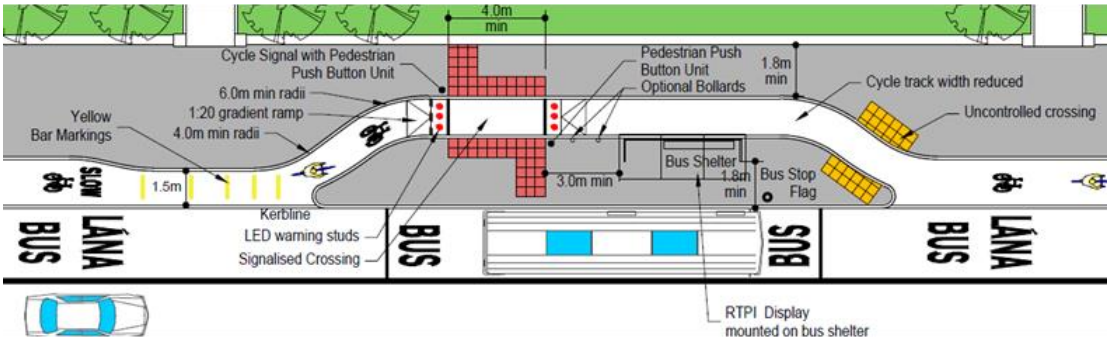
There are going to be cases where a cycle track passes behind a bus stop. It shall be considered a Bus stop bypass solution allowing pedestrians to wait for a bus while cyclists do not have to dodge into traffic around parked buses.

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



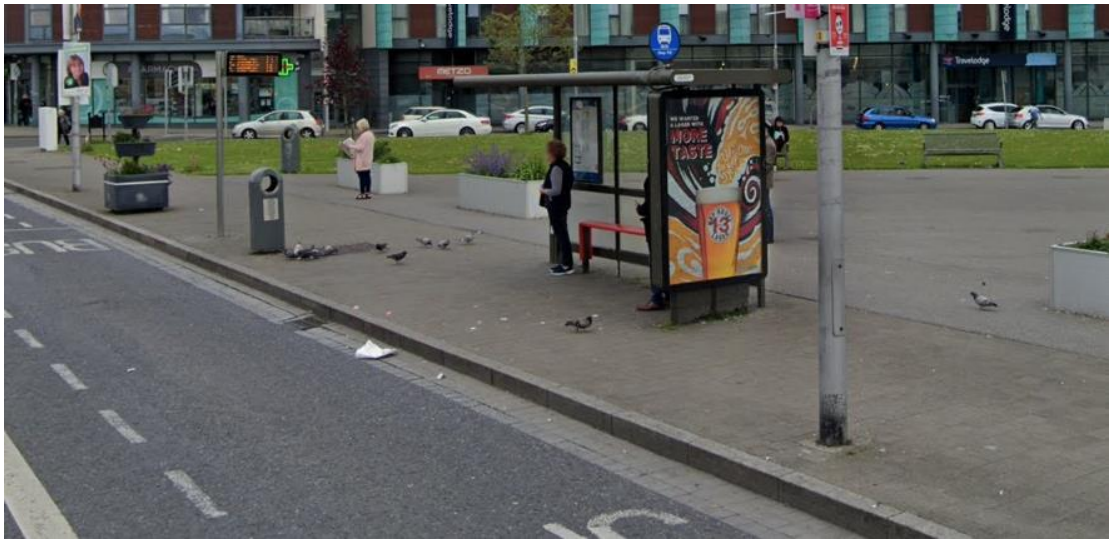
Island Bus Stop Option as the preferred bus stop option

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.

b) Sheet 01b

Bus Stop in Ballymun street

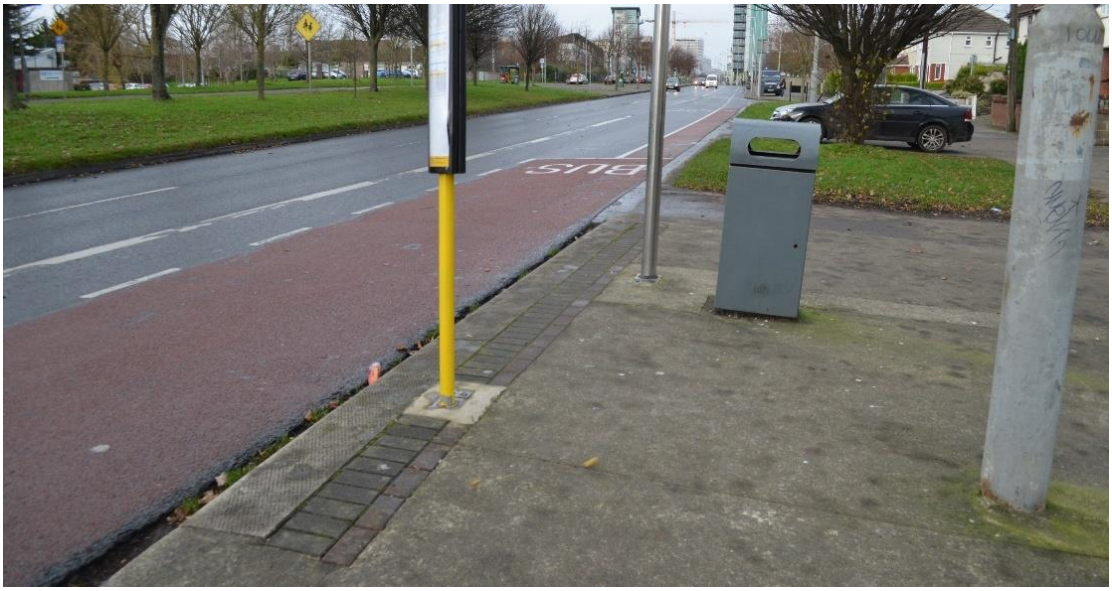
Shortcomings: Inappropriate edge kerb in Bus Stop and lack of textured surface.
Recommendations: An easy access kerb (Kassel kerbs) should be incorporated.



Bus Stop in Shangan Road

Shortcomings: Inappropriate edge kerb in Bus Stop
Recommendations: An easy access kerb (Kassel kerb) should be incorporated with appropriate height and textured surface. They should contrast in colour with the footpath.
The optimum kerb height at a bus stop to cater for these persons should be around 180mm.

c) Sheet 04



Bus Stop in Shanliss Road

Shortcomings: The location of the street furniture narrows the width of the path possibly causing a constraint to passing wheelchair users or buggies.
Recommendations: The pole location should be reviewed. It narrows the width of the path possibly causing a constraint to passing wheelchair users or buggies, or may coincide with the location of the bus door.

d) Sheet 05

Bus stop in St. Pappin

Shortcomings: The shelter and litterbins are too close to allow the enough travel access for mobility impaired pedestrians.
Recommendations: Location of litterbin should be reconsidered. The bus stop location should guarantee a 1.2m clear width in front of them.

Bus stop in Ballymun Road close to St. Pappin

Shortcomings: Pavement in area o bus access to the kerb edge cracked and drainage point patched with asphalt.
Recommendations: The surfaces of the carriageway in the boundary of the bus stop should be repaired and the height of the “Kassel kerbs” of 180mm should be ensured to accommodate low-floor buses and their kneeling suspension.

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

3. SECTION 2 — ST. MOBHI ROAD, BOTANIC ROAD, PROSPECT ROAD AND PHIBSBOROUGH ROAD FROM GRIFFITH AVENUE TO WESTERN WAY: 3 KM LONG – ALONG ST. MOBHI ROAD, BOTANIC ROAD, PROSPECT ROAD AND PHIBSBOROUGH ROAD

3.1 Description of the Route

3.1.1 St. Mobhi Road

A northbound Bus Gate will be provided at the northern end of St. Mobhi Road to provide appropriate priority for bus services where no bus lane is provided in the northbound direction. The existing 3-lane road layout will be retained with the southbound bus lane and two traffic lanes. In the northbound direction buses will share the traffic lane which will cater for local access traffic during bus gate operating hours.

Segregated cycling facilities will be provided generally with a 1.25m wide cycle track in both directions behind the existing lines of mature trees, all of which will be maintained. There will be localised pinch-points where the cycle tracks will require some narrowing at trees to protect the root systems.

On the eastern side of the road where there is a cluster of schools and sports clubs, there will be land acquisition and widening for a 2-way cycle track of 2.5m and a 2.5m footpath behind the tree line to cater for the increased flow of pedestrians and cyclists.

In the section between St. Mobhi Drive and Botanic Avenue, the road will be widened towards the western side to accommodate segregated cycle tracks while maintaining the existing parking in front of houses without driveways. This arrangement requires the removal of some of the 5 trees located on the western side, and these will be replaced with new trees.

Traffic access to St. Mobhi Road from St. Mobhi Drive will be prohibited so as to reduce traffic flows along the narrow street where there is regular on-street parking that causes obstruction for two-way movements.

3.1.2 Botanic Road to Hart's Corner

On Botanic Road south of the junction with St. Mobhi Road, there is a narrow section of street where bus lanes cannot be accommodated. Instead, bus priority will be provided by signal controls at the upstream approach to this section. To ensure a continuous cycle route though this section segregated cycle tracks will be provided as an upgrade of the existing advisory cycle lanes. Once Botanic Road becomes wider at the former print-works bus lanes will be provided in both directions.

At Hart's Corner where Botanic Road intersects Prospect Way, the Finglas Section joins the Ballymun Section. The existing traffic system consists of a set of three one-way streets to circulate the traffic around Hart's Corner. Northbound traffic runs along the western side on the southern end of Finglas Road, which will be widened for bus lanes on both corridors before they branch at the corner of Prospect Way.

Southbound traffic travels along Prospect Road on the eastern side of the one-way system, where there is an existing bus lane. On this section one traffic lane will be removed to insert a segregated 3m wide 2-way cycle track that provides continuity to cycling route at Royal Canal Bank. This 2-way cycle track will continue along Prospect Way until Finglas Road, where the cycle traffic is divided with Toucan crossings to separate directions.

3.1.3 Hart's Corner to Doyle's Corner

South of Hart's Corner on Prospect Road to the Royal Canal at Cross Guns Bridge, the existing road layout will be retained with a bus lane and a general traffic lane in both directions. Cycle traffic will run along the 2-way cycle track on the eastern side of the street, with 2 new bridges to cross railway cuttings to the north and south of Whitworth Road. At this point the north-south cycle route will connect to the National Cycle Route N2 at the Royal Canal Greenway.

On Cross Guns Bridge the existing footpath on the western side is too narrow at only 1.6m wide. This will be widened to 4m to provide appropriate capacity for large numbers of pedestrians that will be drawn to and from the railway station just to the north that is proposed as part of both the DART+ West project for the east-west railway line, and for the MetroLink north-south railway in tunnel underneath. To widen this footpath it is proposed to omit a short section of the southbound bus lane on the eastern side of the bridge, and to manage bus priority through the signal junction at Whitworth Road.

From Cross Guns Bridge at the Whitworth Road junction southward through Phibsborough the existing street is too narrow to accommodate segregated facilities for both buses and cyclists. Instead, cycle traffic will be diverted onto a parallel route, through quiet streets along Royal Canal Bank, which was formed when a former canal was infilled. The radial cycle route will depart from the bus corridor at the Royal Canal to follow a separate parallel route along Royal Canal Bank 100m to the east of Phibsborough Road. The cycle route will intersect North Circular Road to the east of Doyle's Corner.

Along the core bus corridor on Phibsborough Road south of the Royal Canal there are existing bus lanes in places, and these will be extended to be continuous in both directions through to Doyle's Corner at the junction with North Circular Road. This will require some road widening into the car park at Phibsborough Shopping Centre on the western side of the street.

On Phibsborough Road to Connaught Street, the configuration of a bus lane and a general traffic lane will be maintained in each direction. The centre right turn lane will be partially converted to a central green median with additional street trees.

Between Connaught Street and Doyle's Corner at the North Circular Road, it is proposed to widen the street on the western side to introduce an additional southbound bus lane to complement the existing northbound bus lane. This will also increase the public footpath area in front of Phibsborough Shopping Centre, taking part of the existing car park.

Bus Stop No.186 on the eastern side of Prospect Road will be expanded to a double bay to cater for significant interchange movements at the future Railway and Metro Station of Glasnevin. Similar provision is expected to be provided as part of the MetroLink project at the station forecourt on the western side for the northbound bus services.

3.1.4 Royal Canal Bank Cycle Route

The proposed cycle route toward the city will share with the Royal Canal Greenway over a short length of 50m east of Cross Guns Bridge. It will then cross over the Royal Canal on a new steel arch pedestrian and cycle bridge, which is provided with ramps to elevate the crossing for the required navigation clearance over the canal.

Heading southward from the Royal Canal the cycle route will largely avail of the existing quiet street along Royal Canal Bank. In the section behind Mountjoy Prison, a short length of southbound cycle track will be constructed along the edge of the open green space where the existing street is too narrow for cyclists and contra-flow traffic

The cycle route will pass around the eastern side of Phibsborough library and will then cross underneath North Circular Road where a new bridge will be provided. At this point, historically there was a stone arch bridge, Blaquiere's Bridge, on North Circular Road where it crossed the former Royal Canal Broadstone Branch Line. The bridge was removed after the canal became disused and was filled in to form what is now the linear park of Royal Canal Bank. It is proposed to reinstate the former crossing under North Circular Road to enable the north-south cycle route to pass through without the climb and delay of a traffic

Figure 3-1: Proposed footbridge for Royal Canal Crossing

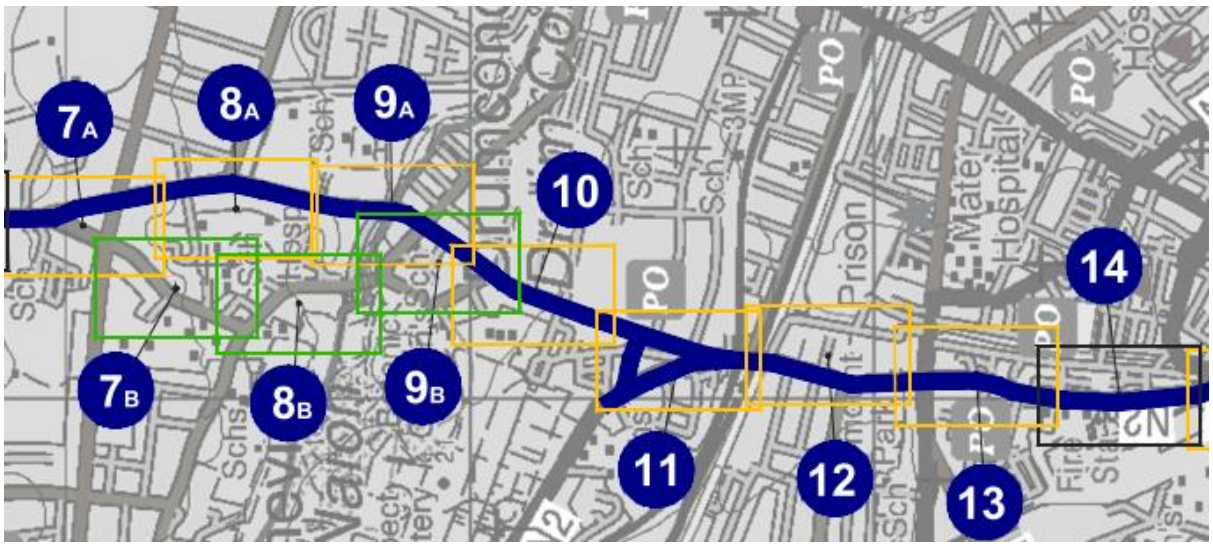
signal crossing. This keeps the integrity and continuity of the former canal route and link the southern part of the linear park through to the Phibsborough Library on the northern side. This creates an opportunity to create a Public space with reinstated trees and footpaths as is shown in Figure 3.5. An access ramp will be provided to replace the existing set of steps that links North Circular Road to Royal Canal Bank on the southern side.

3.1.5 Doyle's Corner to Western Way

From Doyle's corner to Western way the road layout will keep the existing kerbs in position with a bus lane and a traffic lane in both directions. The only exceptions are at two localised narrow sections of street:

- In front of St. Peter's Court, 130m south of Doyle's Corner, over a short section of 40m, where there will be a gap in the northbound bus lane and signal controlled bus priority will be provided.
- Just north of Western Way the section between retaining walls at Royal Canal Terrace, where the northbound lane will be omitted over a length of 90m and signal controlled bus priority will be provided.

Additional signal-controlled pedestrian crossings will be provided at various locations along Phibsborough Road to make it easier to cross the busy street at regular intervals. A toucan crossing will be provided at Phibsborough Fire Station to enable cyclists to link from the Royal Canal Bank cycle route via a laneway, and to connect onwards to Monck Place and the neighbourhood to the west of Phibsborough Road.
A small public space will be provided at the triangular area of disused ground adjacent to the Broadstone Station at the southern end of Royal Canal Terrace on the western side of the street.
South of North Circular Road the cycle route follows along Royal Canal Bank, which requires no alteration of the existing local access vehicle circulation. Cyclists heading towards the city centre can branch off at Geraldine Street to connect via Berkley Road and Blessington Street towards O'Connell Street. At the end of Royal Canal Bank, the route crosses Western Way and turns west to meet the core bus corridor again at Broadstone
.



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 of car parking along this part of the route. Most of them are disposed on-street (parallel) where accessible car parking spaces have not been considered.

Where accessible parking bays are proposed, these should be a minimum of 3.6m in width and 7m in length with the appropriate ropped kerb and tactile paving in accordance with the requirements of the Building Regulations TGD Part M.

Where parallel parking spaces are provided alongside a cycle track a buffer must be provided to allow space for opening car doors. This buffer should be a minimum of 0.75m in width.

a) Sheet 09a

Car parking bays provision in St. Mobhi Road - Botanic Avenue

b) Sheet 12

There is a provision of an accessible car parking bay in Prospect Road, junction with Lindsay Grove.

Accessible car parking bay in Prospect Road.

Recommendations: Off Street Parking Space (Perpendicular) should be 2400mm wide x 4800 mm long, with a recommended 1200mm clear access zone to both sides and the end of the space.
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.

c) Sheet 13

In the commercial area of Phibsborough shopping centre, two accessible parking spaces have been located:

Accessible car parking at Phibsborough Shopping Centre.

Recommendations: These spaces should have proper road markings and signage.
In On–Street bays should be dimensioned 3600 mm wide x 7000mm in length (Building Regulations TGD Part M).

A cycle lane is proposed in the path of Royal Canal Bank and there is an accessible car parking bay in Phibsboro Library:

Accessible car parking at Library View Villas.

Recommendations: If this bay is required by particular patrons, they should be relocated closer to the area of need.

3.2.2 Access Routes-General

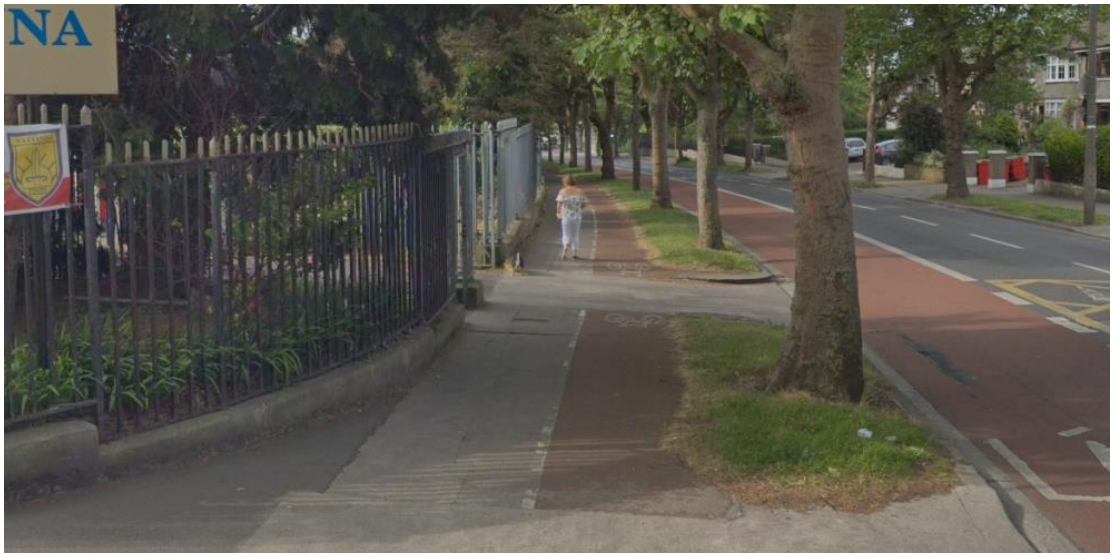
a) Sheet 07a

The footpath at this part in St. Mobhi Road combines a concrete laid footpath with scattered trees and cycle track in the same lane as buses, and two lanes for general traffic. This part is wider than 2m in the existing situation, and permit wheelchair users to move comfortably.

Footpath in Ballymun Road

Recommendations: In the design where a segregated path is proposed, designers should take in to account to maintain this width.

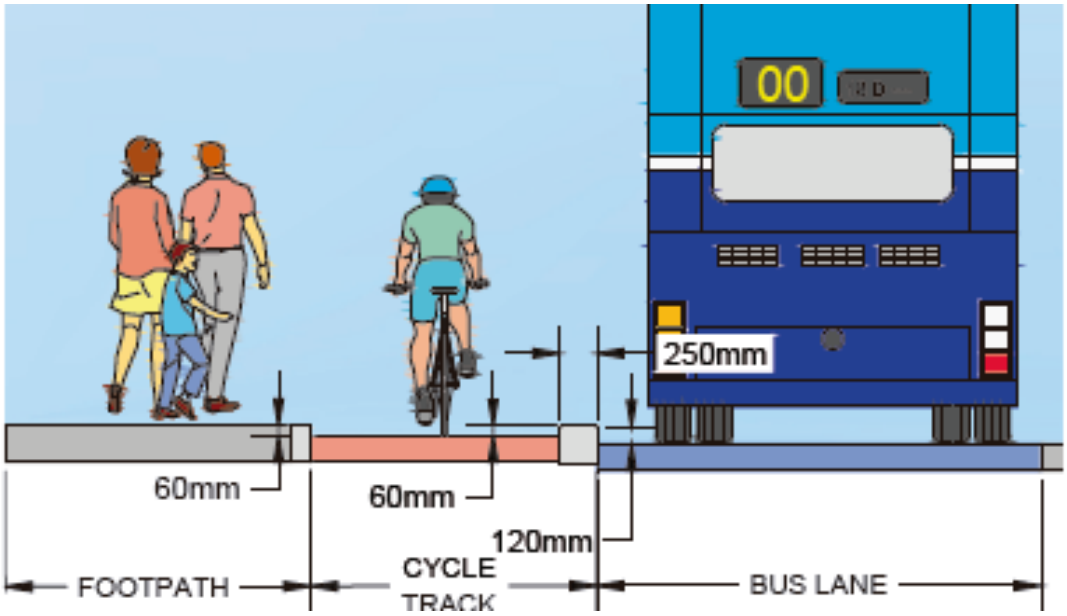
b) Sheet 08a



Footpath at the entrance of Home Farm football club, in St. Mobhi Road.

Recommendations : It should be convenient than the width of the pedestrian footpath should strive for a minimum clear width of 2000 mm, and a minimum 1500 mm clear width where existing obstacles cannot be removed.

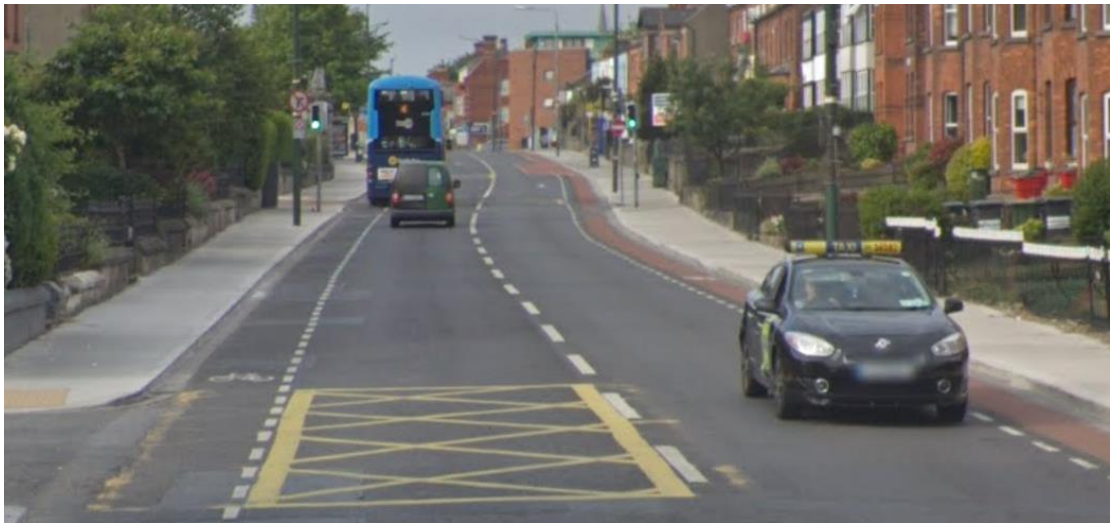
Where existing trees constrain the route, the footpath clear width may be reduced to 1200mm only over a maximum distance of 2000 mm.
The 'optimum cross-section' developed for the CBC project consists of raised adjacent cycle tracks, providing vertical segregation from the carriageway to the cycle track and vertical segregation from the cycle track to the footway.



Preferred CBC Cycle facility segregation

c) Sheet 10

The scheme of footpath changes from Farfield Road. In the existing situation the cycle track is in level with the carriageway. The footpath becomes narrower.



Footpath in Botanic Road

Recommendations: In design, it must be taken into account that the location of urban elements can reduce the width.

d) Sheet 12

After the junction with Whitworth Road, the scheme in Phibsborough Road transforms in a carriageway with bus and traffic lanes in both directions and the cycle is proposed to be diverted by the royal canal bank.

Footpath in Royal Canal Bank

Shortcomings: Insufficient footpath width to accommodate pedestrian flows and mobility of impaired people.
Recommendations: Reconsider position of lamp post and footpath width.

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. In other points, the badly construction of this slopes can provoke an inappropriate drainage and make the mobility of disabled people difficult.

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 allow not placing ramps or guardrails due to the scarce gradient.

3.2.5 Pedestrian Crossing Points

As in the previous section of the route, there are crossing points in the scheme with no dropped kerbs provided. It should be reviewed the width of these dished kerbs in such a way that wheelchair users and pushchairs can navigate the crossings comfortably.
Some crossing points do not have tactile paving.

The correct solutions for pedestrian crossing points can be checked in the article 5.3.5

In this Accessibility Audit Report, we extract some examples that we have found:

a) Sheet 07a

Uncontrolled Crossing point in a side road. Access road to DCU Sports grounds

Shortcomings: Uncontrolled crossing point in a side road without the correct tactile paving.
Recommendations: “Buff or grey” tactile paving. Depth of 1.2 m.; gradient 1:12 max. Level difference of dished kerb: 6mm. (max).

In the junction of St. Mobhi Road and Ballymun road is proposed a toucan crossing.

Intersection of St. Mobhi Road and Ballymun road.

Shortcomings: The gradient of the red blister tactile paving should be revised.
Recommendations: Pavement should be ramped perpendicular to the road with a recommended gradient of 1:20 (5%), where practicable, but not exceeding 1 in 12 (8,33%).

The refuge island in the junction of Ballymun Road and Griffith Avenue do not presents a tactile paving surface. In the design, a toucan crossing is proposed.

Uncontrolled crossing point. Griffith Avenue with Ballymun Road

Shortcomings: A refuge island with no tactile paving surface provided. It is observed the lack of an appropriate dished kerb.
Recommendations: 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).
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.

Intersection of Ballymun road and Griffith Avenue

Shortcomings: The tactile paving stem of the controlled crossing has been patched with asphalt

Recommendations: The surface should be repaired and installed red blister tactile slabs in the L-shaped stem.

b) Sheet 08a

Image 1. Uncontrolled crossing point in St. Mobhi-Stella Avenue.

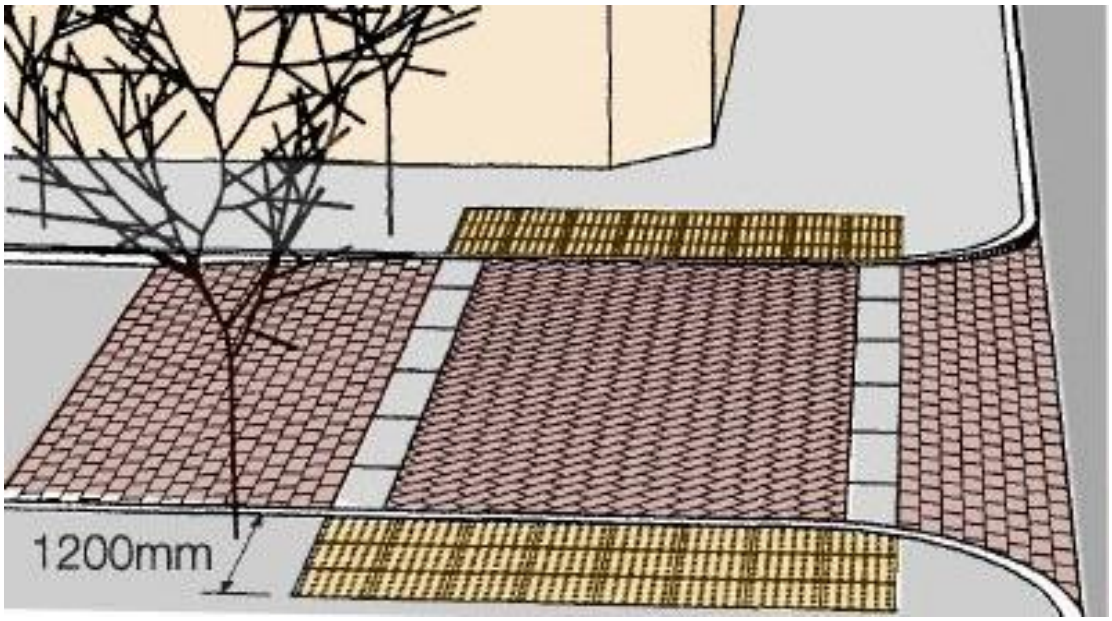
Shortcomings: Uncontrolled crossing point without the correct tactile paving. This can cause a hazard for visually impaired users being misdirected by the orientation of the kerb.
Recommendations: The tactile surface should be installed to a depth of 1200mm.
across the full width of the flush dropped kerb. A “Buff or grey” tactile paving for uncontrolled crossing points should be provided. Gradient 1:12 max. Level difference of 6mm.maximum.

Some examples of side road carriageway raised to the level of the footpath:

Uncontrolled crossing at side road junction. St. Mobhi Boithirin

Uncontrolled crossing at side road junction. Home Farm Road

Shortcomings: Level difference edge kerb and carriageway greater than 6mm.
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.



Layout of blister tactile paving at a side road junction where the side road carriageway has been raised to the level of a footway.

Some examples of a junction between a shared route and a carriageway:

Junction of Mobhi Road with side road to Whitehall college of Further Education

Recommendations: When a cycle lane adjacent to a pedestrian footpath in a shared route, and cross in a junction with a carriageway or a side road, tactile surfaces should be provided to indicate the start/end of the route.
At the flush dropped kerb it will be necessary to provide the blister surface to a depth of 1200mm, and this should be laid across the full width of the crossing point. The tactile surface should be located about 1200 mm. from the blister surface.

Junction of Mobhi Road and Mobhi Drive

Shortcomings: Absence of tactile paving in uncontrolled crossing point at a side road.
Recommendations: “Buff or grey” tactile paving. The tactile surface should be installed to a depth of 1200mm. across the full width of the flush dropped kerb. The maximum gradient

should not exceed 1 in 12 (8%), and where space allows, a gradient of 1:20 (5%) should be achieved.

c) Sheet 10

More examples of pedestrian crossing points with no tactile paving:

Junction -St. Mobhi Grove

Shortcomings: Absence of tactile paving in an Uncontrolled crossing point.
Recommendations: Provide “Buff or grey” tactile paving. Depth of 1.2 m, gradient 1:12 max. Level difference of dished kerb: 6mm (max).

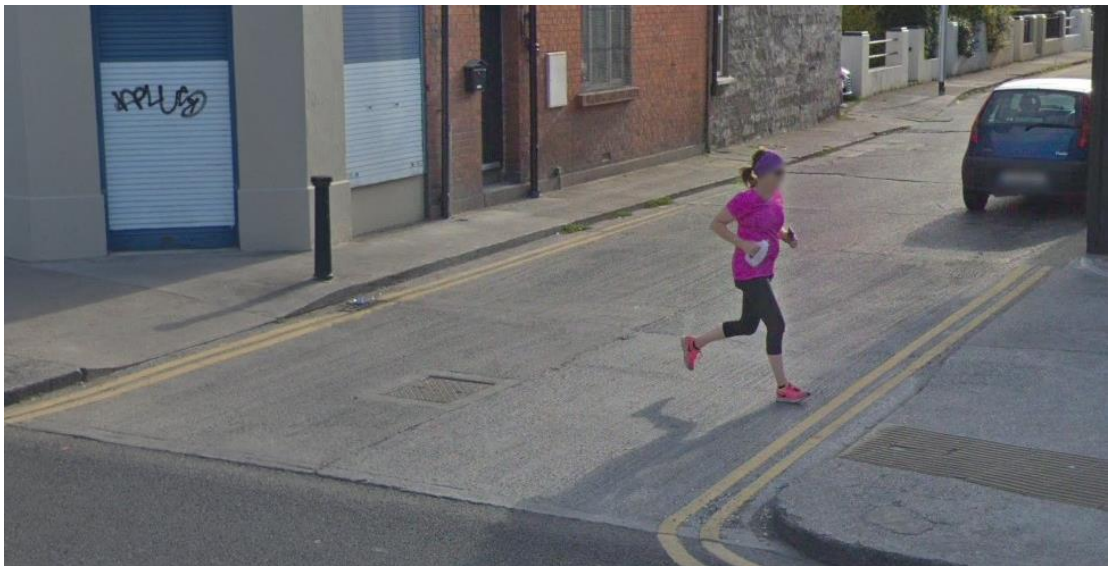
d) Sheet 11

Crossing point in Lindsay Grove

Shortcomings: Wrong interpretation of tactile paving in an uncontrolled crossing.

Recommendations: An adequate tactile paving should indicate with its surface the proximity of a crossing, at the end of the corduroy slabs.
Provide the adequate “Buff or grey” blister tactile paving. Depth of 1.2 m (in-line), gradient 1:12 max. Level difference of dished kerb: 6mm (max). . The central kerb should be flush with the carriageway surface.

e) Sheet 12



Junction - Lindsay Grove

Shortcomings: Absence of tactile paving in an Uncontrolled crossing point.
Recommendations: “Buff or grey” tactile paving should be provided. Depth of 1.2 m, gradient 1:12 max. Level difference of dished kerb: 6mm (max).

Staggered crossing point- Connaught Street

Shortcomings: The narrow width and location of traffic signals and guardrails in this staggered crossing point give the impression that vulnerable pedestrian may get stuck. It is usual to have difficulties using audible signals in this type of crossing.

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.

Junction – Royal Canal Bank

Recommendations: At in-line uncontrolled crossings, the tactile surface should be installed to a depth of 1200mm (three slabs) across the full width of the flush dropped kerb.

f) Sheet 13

In this part of the route there are also examples of uncontrolled crossing points that are not well resolved in the junction with side roads.

As examples:

Junction Phibsborough Road with Devery's Road

Shortcomings: Absence of tactile paving in a side road.

Recommendations: A tactile surface: “buff” or grey should be installed. However this locations need to be prioritised and discussions should be held with local groups representing both vision impaired and restricted mobility

Other examples of uncontrolled crossing at a side road in this part of the scheme:

Uncontrolled crossing point in a side road at Phibsborough with Western Union

Shortcomings: Cracked pavement in the carriageway of a side road and absence of tactile paving.
Recommendations: A tactile surface “buff” or grey should be installed.

Side Road at St. Peter’s court

Shortcomings: Absence of tactile paving in a side road.
Recommendations: A tactile surface: “buff” or grey should be installed. The location of traffic signals should guarantee the minimum width of 1200mm. for people with mobility impairment.

Some examples at a side road junction where the side road carriageway has been raised to the level of the footpath:

Junction Phibsborough Ave- Phibsborough road

Shortcomings: Absence of tactile paving in a side road and dished kerbs. High upstand.
Recommendations: Where side road entry treatments provide an uncontrolled crossing facility they should be treated as for an in-line uncontrolled crossing. Check 5.3.5.1 for dimensions.

Junction Phibsborough Road - Monck Place

Recommendations: Provide “Buff or grey” tactile paving for uncontrolled crossing points and ensure recommended 1200 mm. (in line with pedestrian travel). Provide dished kerb with a gradient 1:12 max and with a 6mm tolerance on a bull nose kerb.

Crossing Points. Royal Canal Court.

Shortcomings: Upstand > 25mm high. It is note the absence of tactile paving.
Recommendations: A blister surface “buff” of grey for uncontrolled crossing (in-line) and dished kerbs should be provided to warn to visually impaired people.

3.2.6 Tactile Paving Surfaces

Some crossing locations within the proposed scheme shall be upgraded to provide the necessary tactile paving surfaces.

A significant number of uncontrolled crossings do not have tactile paving and dished kerbs as we saw in the previous chapter for Pedestrian crossing points. Tactile pavings 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.

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 having to develop external ramps or external steps

a) Sheet 13

In a specified point is noticeable a change of level, as is the case in Phibsborough Road where exists a change in level of footpath and access route for housing in royal canal terrace. A new underpass for cycle route and pedestrians is proposed under North Circular Road.

Royal Canal Bank-North Circular Road

Recommendations: Designers should take into account accessibility measures for people with disabilities. Check chapter 5.4 for changes in level.
Tactile warning surface (400mm.min) at the start/ends of the stair should be considered and a continuous handrail on each side of flights

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

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.

Some examples of this deteriorated paving are:

a) Sheet 07a

Mobhi Road and Griffith Avenue

Shortcoming: Uneven paving in a controlled crossing point. The dished kerb is erroneously placed in the carriageway causing cracks and level differences that pose a risk to wheelchair users.
Recommendation: there should be no vertical upstand between the road surface and the kerb; a 6mm tolerance can be made but only on a bull nose kerb.

b) Sheet 12

Munster Street with Phibsborough road

Shortcomings: Some parts of footpaths have been subjected to patch repairs with asphalt with may result in a hazard for people with mobility impairment. Recommendations: Special care must be taken in crossing areas with tactile pavement, as they give information of hazards for people with disabilities and also other trip hazards such as kerb upstands, sunken chamber covers, cracked or loose paving.

Other examples with the footpath surface cracked:

Footpath in Royal Canal Bank

Shortcomings: Uneven surfaces, cracked paths.
Recommendations: Concrete surface should be repaired.

Footpath in Villa Bank

Shortcomings: Uneven surfaces, cracked paths and loose elements pose a hazard to mobility of impaired people.
Recommendations: Consider a level and homogenous footpath pavement. Avoid gaps and vertical deviations between paving slabs greater than 5 mm.
Regular and effective maintenance should prevent or replace cracked and uneven paving slabs and those with loose joints.

3.2.10 Street Furniture

a) Sheet 10

Street furniture in footpath of Botanic road

Shortcomings: Stainless steel bollards may potentially lead to glare in bright sunshine and may not be sufficiently contrasted in colour with the pavement to alert visually impaired pedestrians of their presence.
Recommendations: Bollards, if used, should be a minimum of 1000mm in height, 200mm in width, and contrast in colour and tone with the background .The use of and need for the extent of bollards should be reviewed, and only used where there is an overwhelming reason to do so.

Botanic road and Cliftonville Road

Shortcomings: The location of the street furniture on the footpath is blocking the free width of passage for people with disabilities.
Recommendations: It will be especially important to place adequately street furniture where the footpaths are narrow. (MIN: 1.20 m). The pole location should be reviewed. It narrows the width of the path possibly causing a constraint to passing wheelchair users or buggies, or may coincide with the location of the bus door.

b) Sheet 12

Phibsborough Road and Devery's Lane

Shortcomings: Bollards linked with chains.
Recommendation: Bollards should not be linked with a chain or rope, and should be a minimum of 1200mm apart. It should be advisable, where possible, removing them and using strategically placed street furniture or landscaping instead.

c) Sheet 14

Another example of a narrow footpath with street poles:

Street Furniture-Royal Canal Bank.

Shortcomings: Narrow footpath with street poles.
Recommendation: 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, litter bins, seats, etc, should be located at or beyond the boundaries of the access route. (Technical Guidance Document M).
The width can reduce to 1200 mm. on short constricted sections of an access route.

3.2.11 Bus Stop Design

Some examples of Bus Stop found in this part of the route are:

a) Sheet 08a

Bus Stop in St. Mobhi road and Home Farm Road

Shortcomings: Reduced pick-up point. Cracked footpath in the access area for buses in the carriageway
Recommendations: Pavement in the access area of buses should be repaired to provide an adequate height (180mm recommended) of the kerb.
Location of poles and litterbins should guarantee an adequate space for the mobility of disabled people.

Bus Stop in St. Mobhi road and St Mobhi Boithirin

Shortcomings: Check enough space for bus manoeuvre. Reduced pick-up point.

Recommendations: An ease access for buses should be provided in order to manoeuvre the entry/exit platforms right up to the kerbside. The kerbside bus stop should be supported with textured surface, height fixed and curved profile. Where possible a passenger shelter should be placed.

Bus Stop in St. Mobhi road in front of CLG NA Fianna

Shortcomings: There is an interference of the bus stop with the shared route.
Recommendations: An alternative system should be implemented. Island bus option as preferred, with tactile paving for the crossing of pedestrians and people with mobility impairment.

b) Sheet 10

The street furniture around bus stops must be carefully considered. It is easy to become cluttered. This can cause shortcomings for wheelchair and pushchair users and people with visual impairment.
Litterbins, Service information, lighting, resting facilities have to be studied their location, or better to be incorporated into passenger shelter structure.

Bus Stop St. Mobhi Road -Botanic Road

Shortcomings: Lack of correct kerb and disposal of street furniture. The location of the street furniture narrows the width of the path possibly causing a constraint to passing wheelchair users or buggies.
Recommendations: 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.
The location of the bus stop should be such that there should be 1.2m clear width in front of them.

Bus Stop Botanic Road - Fairfield Road

Shortcomings: Street furniture obstructing one side of the travel for disabled people and wheelchair users.
Recommendations: The provision of traffic signals and street furniture should be taken into account to facilitate the manoeuvre of the person with disabilities.

c) Sheet 11

Bus Stop at Prospect Way

Shortcomings: The shelter has been placed in such a way that it does not allow a correct visibility of the buses and prevents easy access for people with disabilities.
Recommendations: The location of the passenger shelter should be appropriate and provide good visibility for buses. For the design proposal an island bus option would be the preferred with controlled/ or uncontrolled crossing between footpath and cycle track.

Other examples of street furniture located in the bus stop:

Botanic Road Lindsay Road

Shortcoming: A litterbin does not allow the correct access to the bus stop in one of the sides.
Recommendation: A clear width of at least 1.2 m should be ensured with no interruption of street furniture.

d) Sheet 13

Bus Stop at Phibsborough road

Shortcomings: Lack of correct kerb and textured surface.
Recommendations: A “Kassel Kerb” should be provided. Kerbs also should be supported with textured surface for people with visual impairments orientation Take into account height fixed to suit kneeling suspension of 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.

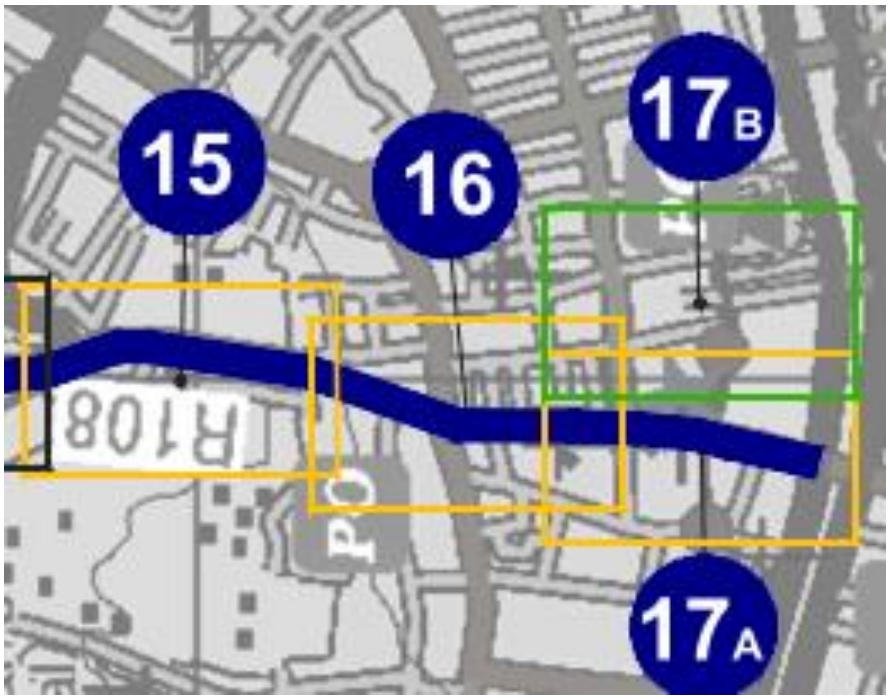
4. SECTION 4 – CONSTITUTION HILL AND CHURCH STREET TO ARRAN QUAY

4.1 Description of the Route

At Constitution Hill, the street layout will be widened slightly on the western side for a bus lane and traffic lane per direction alongside a 2-way segregated cycle track in the front of King's Inns Park on the eastern side from Western way to Coleraine Street. An additional northbound cycle track is provided in the opposite side, whose alignment varies through the retained line of trees.
The core bus corridor follows along Church Street Upper keeping the bus lanes alongside the traffic lanes as far as the junction with North King's Street. Cycle tracks will be provided alongside the bus lanes over this section as far as the junction with Ormond Quay and Arran Quay. Some short gaps in the bus lanes will be necessary due to the varying width of the existing street.

Markets Cycle Route
From Coleraine Street southwards an additional cycle route will divert from the bus corridor to follow quiet streets through the Markets Area to Ormond Quay on the River Liffey. This route can link with a continuation southward across the River Liffey at Winetavern Street as part of the further development of the cycle route network in the city centre

Sections considered in this part of the route are:



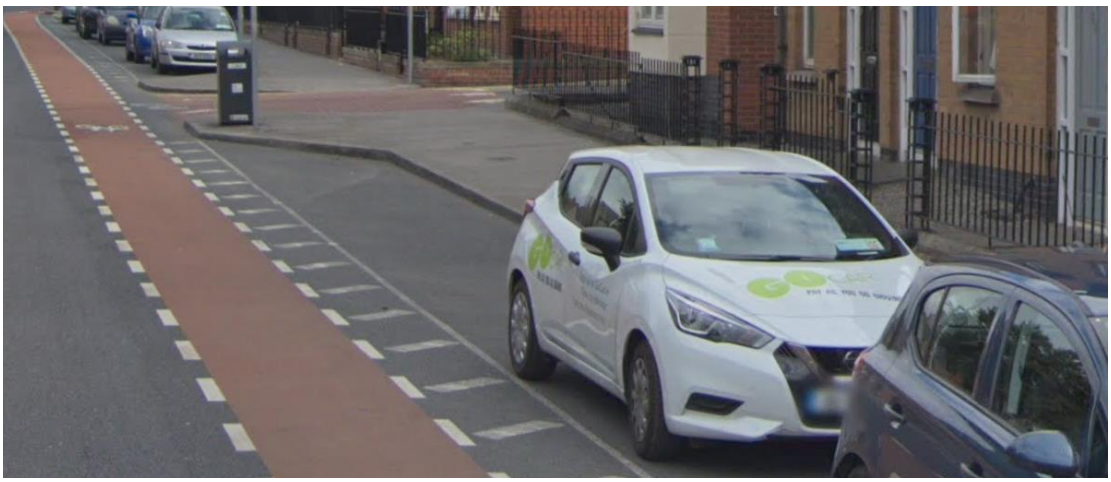
4.2 Problem Identification

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 03 we can hardly find parking bays for people with disabilities.
The sum of the parking spaces reservations provided in Phibsborough Road between Kings Inn Street and King's Inns Court exceeds of 15 units.

a) Sheet 14



Car parking in Phibsborough Road.

Recommendations: It is recommended an accessible parking bay in the relation of 1:15 and a proper location should be found.
Where accessible parking bays are proposed, these should be a minimum of 3.6m in width and 7m in length with the appropriate dropped kerb and tactile paving in accordance with the requirements of the Building Regulations TGD Part M.

Two disabled parking bays are located at the end of Coleraine Street on front of Coleraine House.

b) Sheet 16

Accessible car parking in Coleraine Street

Recommendations: In the design proposed a cycle track will join at this point. A suitable spot should be found for their relocation in the scheme.It shall be demarcated to conform to the requirements of Department of Transport's Traffic Signs Manual.

4.2.2 Access Routes-General

a) Sheet 14

In this part of the route form Kings Inn Street to Whites Lane North, through Phisborough Road the footpath maintains wider than 2 meters in the existing situation. In the proposal of Design maintains both lines of traffic and bus lanes. The cycle track is diverted by the royal canal bank.

A special point at this part is in the area of the Royal canal terrace. The footpath in the west side maintains at level with the carriageway. In the east side due to the change of level, the footpath is separated with a wall from the carriageway.

Footpath in Phibsborough Road-Canal Terrace

Recommendations: Designers should take into account in the renewal of the route in order to comply with the measures for the disabled people in access routes and level changes.

b) Sheet 15

Footpath in Kings Inns Park. Constitution Hill Road.

Shortcomings: The footpath in the east side of Constitution Hill is reduced in some parts due to the location of lamp posts and traffic signals.
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.

4.2.3 Access Routes-Drainage

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

a) Sheet 14

Side road in White lane

In Phibsborough road, the crossfall in the section of the footpath due to the side road of White Lane Street can suppose a hazard for its gradient.
Recommendations: The complete sections if footpath should be constructed in their place with minimum cross fall gradients of 1:50.

b) Sheet 15

Drainage in Constitution Hill

Shortcomings: The position of the drains can cause slopes on the footpath that can make difficult the mobility of disabled people.
Recommendations: Drainage gratings should be positioned beyond the boundaries of the access route. Where this is not feasible they should be flush with the surrounding surface. It is important to minimise the risk of trapping canes or wheelchair wheels. (Technical Guidance Document M)

4.2.4 Access Routes-Guardrails

a) Sheet 15

External Stair -Broadstone Old Train Station-Phibsborough Road

Guardrails in external stairs for accessing to Broadstone Old Train Station are observed in Phibsborough road.
Recommendations: Accessibility measures should be incorporated. Check chapter 5.4. for changes in levels.

4.2.5 Pedestrian Crossing Points

a) Sheet 14

Uncontrolled crossing point in King's Inns Court

Shortcomings: Uncontrolled crossing point at a side road junction. It is noted the absence of the correct tactile paving.
Recommendations: "Buff or grey" tactile paving. Depth of 1.2 m, gradient 1:12 max. Level difference of dished kerb: 6mm (max). Width of the central kerb should be extended as the width of travel.

More examples of uncontrolled crossing points at side road, where proper tactile paving should be recommendable to be incorporated, are the following:

Side road- Fire Station in Phibsborough road

Shortcomings: Absence of tactile paving in uncontrolled crossing point at a side road.

Recommendations: “Buff or grey” tactile paving. The tactile surface should be installed to a depth of 1200mm. across the full width of the flush dropped kerb. The maximum gradient should not exceed 1 in 12 (8%), and where space allows, a gradient of 1:20 (5%) should be achieved.

Side road in the access of Royal Canal Terrace

Shortcomings: Uncontrolled crossing point in a side road without the correct tactile paving.
Recommendations: “Buff or grey” tactile paving. Depth of 1.2 m.; gradient 1:12 max. Level difference of dished kerb: 6mm. (max).

Side Road-King’s Inns

Shortcomings: Uncontrolled crossing point in a side road without the correct tactile paving.
Recommendations: “Buff or grey” tactile paving. Depth of 1.2 m.; gradient 1:12 max. Level difference of dished kerb: 6mm. (max).

b) Sheet 15

Crossing point with pedestrian refuge island-Western Way-Constitution Hill

Shortcomings: Lack of red blister tactile paving in island of Refuge (<2m, wide);
Recommendation: 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 intended as an area for pedestrians to wait.

During the walking audit in this part of the route have been observed some uncontrolled crossings with the absence of tactile paving and dropped kerbs.

Uncontrolled crossings are generally used in areas where a formal (controlled) pedestrian crossing cannot be justified. The surface should be buff or such a colour (other than red) as provides a contrast with the surrounding surface.

However, 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. 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 in uncontrolled crossings, should be provided at the following locations where new works are being constructed:

- raised entry treatments
- speed tables
- traffic islands
- dished crossings
- dished crossings at traffic signals without a pedestrian stage

(Chapter 13.Traffic Management Guidelines. DTO.2003)

Some examples of crossing points that should be updated are the following:

Uncontrolled crossing, Crossing point in Catherine Lane

Shortcomings: Absence of tactile paving in an in-line uncontrolled crossing.
Recommendations: “Buff or grey” tactile paving. The tactile surface should be installed to a depth of 1200mm across the full width of the flush dropped kerb, gradient 1:12 max. Level difference of dished kerb: 6mm (max).

Uncontrolled crossing in Stirrup Lane

Shortcomings: Absence of tactile paving in uncontrolled crossing.
Recommendations: “Buff or grey” tactile paving. Depth of 1.2 m, gradient 1:12 max. Level difference of dished kerb: 6mm (max).

Uncontrolled crossing in New Street North

Shortcomings: Absence of tactile paving in uncontrolled crossing.
Recommendations: “Buff or grey” tactile paving. Depth of 1.2 m, gradient 1:12 max. Level difference of dished kerb: 6mm (max).

Uncontrolled crossing point –Nicholas Ave

Shortcomings: Absence of tactile paving in uncontrolled crossing.
Recommendations: “Buff or grey” tactile paving. Depth of 1.2 m, gradient 1:12 max. Level difference of dished kerb: 6mm (max).

Uncontrolled crossing in Coleraine Street - Lisburn street. A cycle track is proposed.

Shortcomings: Absence of tactile paving in uncontrolled crossing.
Recommendations: “Buff or grey” tactile paving. Depth of 1.2 m, gradient 1:12 max. Level difference of dished kerb: 6mm (max).

More examples of controlled and uncontrolled crossings in this part of the route are:

Anne St-King St N to Linenhall St.

The controlled crossing will be updated to pedestrian crossing and toucan crossing Anne St with King St N to Linenhall St.

c) Sheet 17a

Uncontrolled crossing point at Hammond Lane

Shortcomings: Absence of tactile paving in uncontrolled crossing.
Recommendations: “Buff or grey” tactile paving. Depth of 1.2 m, gradient 1:12 max. Level difference of dished kerb: 6mm (max). It is also recommended not to install the crossing point in the curve of the footpath.

Controlled crossing point Father Matthew Square-St. Mary of the Angels

Recommendations: The tactile paving units should be laid in an L-shape to the back of the footway to intercept people who might otherwise walk past the facility. The stem should be 1200mm (3 slabs) wide.

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.
Chapter 13. Traffic Management Guidelines. DTO.2003

Uncontrolled crossing in Church Avenue west

Shortcomings: Absence of tactile paving in uncontrolled crossing.
Recommendations: “Buff or grey” tactile paving. Depth of 1.2 m, gradient 1:12 max. Level difference of dished kerb: 6mm (max).

Uncontrolled crossing point in Mary’s lane

Shortcomings: Absence of tactile paving in uncontrolled crossing.
Recommendations: “Buff or grey” tactile paving. Depth of 1.2 m, gradient 1:12 max. Level difference of dished kerb: 6mm (max).

Uncontrolled crossing-LUAS Church Street-Intersection with Chancery Street

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 of dished kerb: 6mm (max). . For on street platform edges lozenge tactile flag paving should be incorporated for warning users where Tram schemes’ platform edges begin.

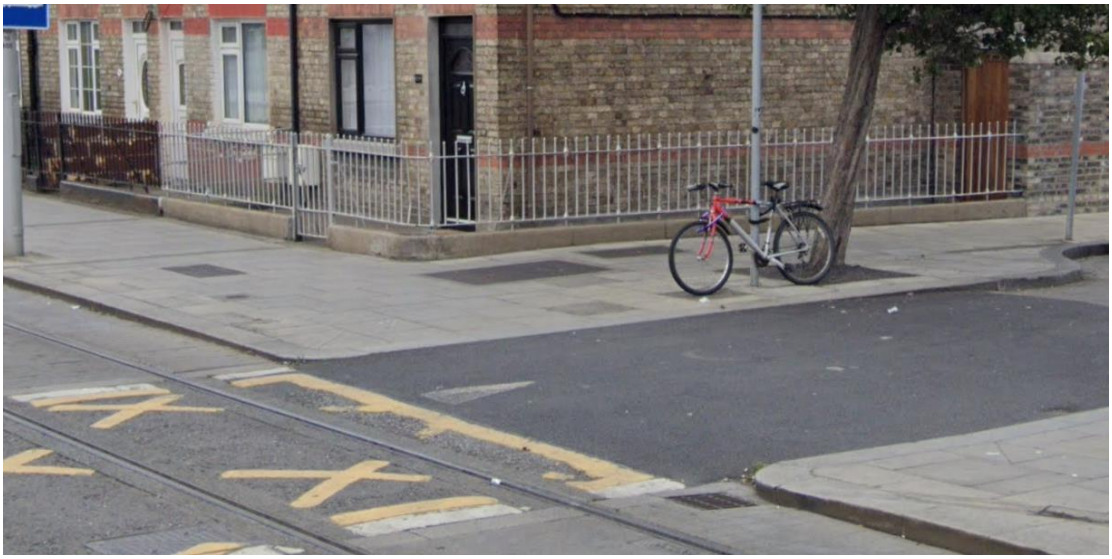
Uncontrolled crossing point-Church Street-Hammond Lane

Shortcomings: Absence of tactile paving in uncontrolled crossing.
Recommendations: “Buff or grey” tactile paving. Depth of 1.2 m, gradient 1:12 max. Level difference of dished kerb: 6mm (max).

Arran Quay Triangular refuge island with Church Street

Shortcomings: Red Blister tactile paving should not be obstructed by traffic signals and let comfortable travel in the desire line for people with mobility impairment. Paving surface in the existing situation needs to be repaired.
Recommendations: In the Design Project is proposed an island refuge with no staggered crossing. It should be considered than vulnerable pedestrian can get stuck because of the width and urban elements inside. It is recommended to ensure an adequate crossing time.
At signal controlled crossings, audible bleepers emitting a pulsed tone are normally used during the pedestrian green period. "Bleep and sweep" crossings produce separate distinctive tones and the audible range is restricted to minimise any potential confusion. A Braille tactile diagram should be provided.

d) Sheet 17b



Uncontrolled Crossing point in Chancery Street

Recommendations: A future cycle track is considered in Ormond Street crossing tram rails in Chancery Street. Corduroy tactile paving for cyclist and platform edge warning surface for impaired pedestrians should be required.

4.2.6 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).

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.

4.2.7 Change in Level

a) Sheet 14

Phibsborough road-Royal canal terrace

Parallel to Phibsborough road and in front of the royal canal terrace, a footpath separated by a masonry wall from the carriageway serves to accessto the low-rise housing.
Recommendations: Designers will have to take into account in the renewal of the route a correct disposition of protective barrier.

b) Sheet 17a

Change in level in Church Street-May Lane and Mary's Lane

An external ramp and a stair are provided in the route to access private buildings in Church Street- May Lane and Mary's Lane.
Recommendations: Warning tactile paving should comply with the criteria of chapter 5.4. Change in level.
Tactile hazard warning surfaces should be incorporated at both the top and bottom landings. A corduroy tactile warning surface should be provided. (Technical Guidance Document M. 1.1.3.5 Stepped access routes)

4.2.8 Shared Spaces, Share Surfaces

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

4.2.9 Surface Material

The existing surfaces material in Church Street used to be in situ concrete although there exist areas combined with cobbles and concrete slabs. As examples:
There are also cases where the concrete pavement is cracked or broken. This can pose a hazard to the mobility of impaired people.

a) Sheet 17a

Footpath close to Hammond Lane

Shortcomings: Uneven surfaces, cracked paths and loose elements pose a hazard to mobility of impaired people.
Recommendations: Consider a level and homogenous footpath pavement. Avoid gaps and vertical deviations between paving slabs greater than 5 mm.
Regular and effective maintenance should prevent or replace cracked and uneven paving slabs and those with loose joints.

Pavement raised in Church Street close to Capuchin Friary

Shortcomings: The roots of the trees have raised the pavement of the footpath making the surface uneven.
Recommendation: It should be restored concrete slabs. It should be recommended to surround trees with a suitable protection enclosure that warn people with visual impairment of the existence of trees.
A minimum pitch of 1200mm must be guaranteed. When the clear width of an access route is constricted, such as by existing trees or walls. Proper maintenance should be considered especially on large trees that can break the pavement.

4.2.10 Street Furniture

a) Sheet 14

Phibsborough –Monk Place

Shortcomings: Planter box obstructing the footpath.

Recommendations: In sections where the width of passage on the footpath is not very large, the position of planter boxes should be taken into consideration so as not to obstruct the passage of wheelchair users (1200 mm. MIN)

b) Sheet 16

Lamp post Church Street-Brunswick St N

Shortcomings: Lighting column in the middle of the footpath.
Recommendations: Street furniture, such as lighting columns, signposts, litter bins, seats, etc, should be located at or beyond the boundaries of the access route. (Technical Guidance Document M. 1.1.3.1.d Access routes)

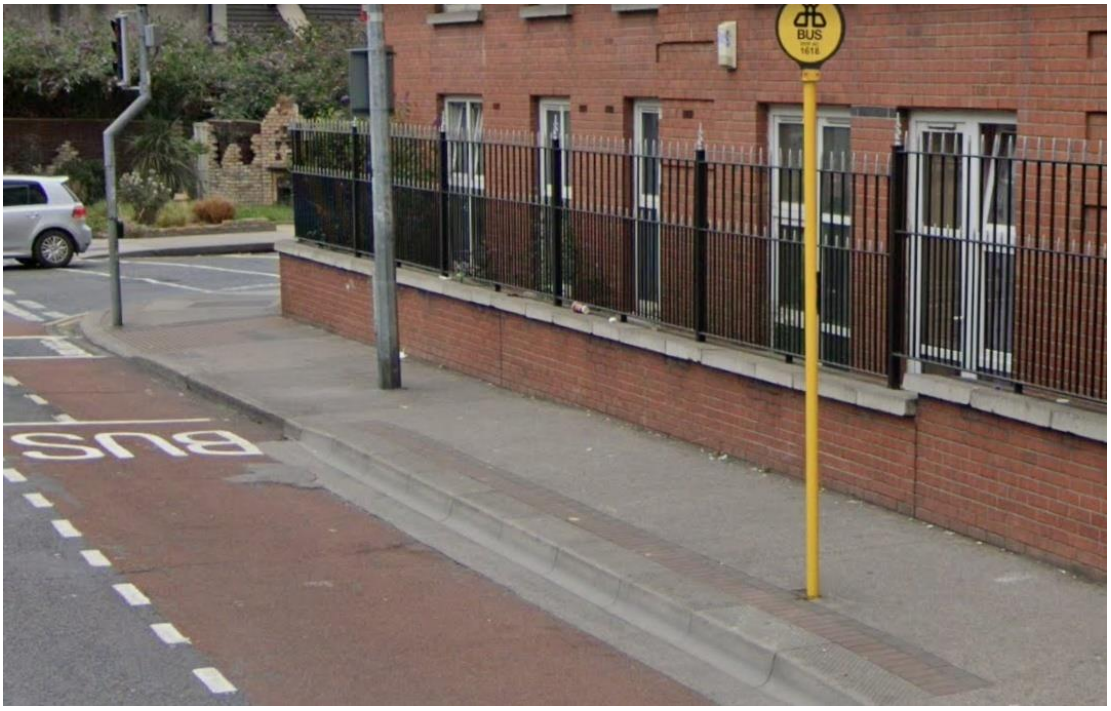
4.2.11 Bus Stop Design

a) Sheet 14

Bus Stop in front of Fire Station in Phibsborough Rd

Shortcomings deteriorated pavement of carriageway in approaching edge.
Recommendation: Maintaining good pavement at the junction of the carriageway and footpath is important to suit kneeling suspension of modern buses.

b) Sheet 16



Bus Stop Church Street-Brunswick Street North

Recommendation: The optimal height of the kerb at a bus stop to serve disabled people should be around 180mm. All new bus stops and improvements to existing ones should be designed at this point. Bus stops should be designed to accommodate the current generation of low-floor buses.
When possible, it is recommended to provide a convenient drop-off and pick-up facilities for people with disabilities at bus stations.

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

5. SCHEME WIDE ACCESIBILITY 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-Street (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.

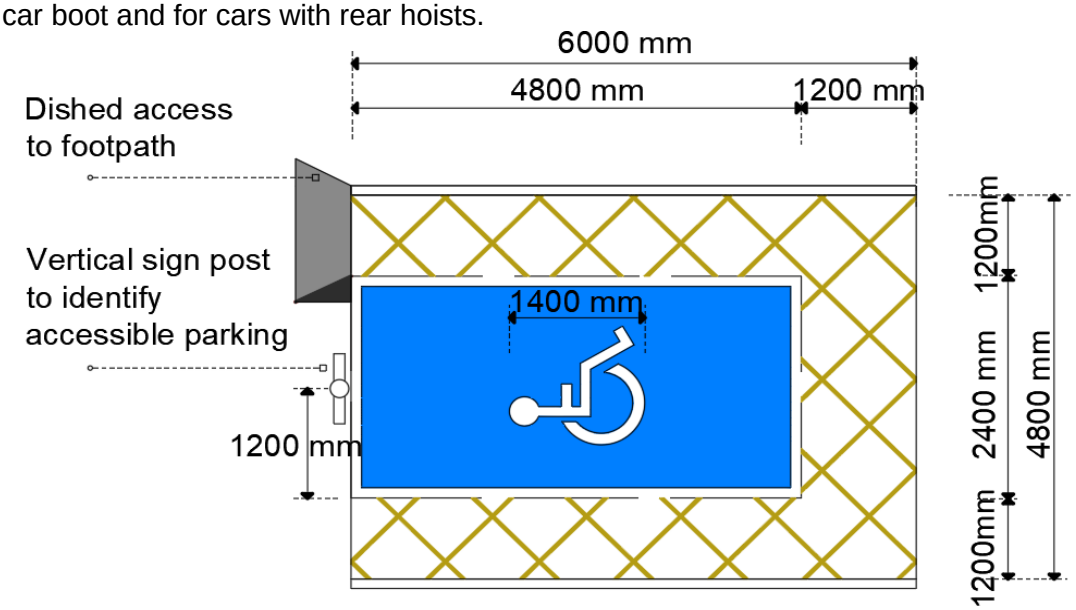


Figure 1. Example of Perpendicular parking. Cars and small vans

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.

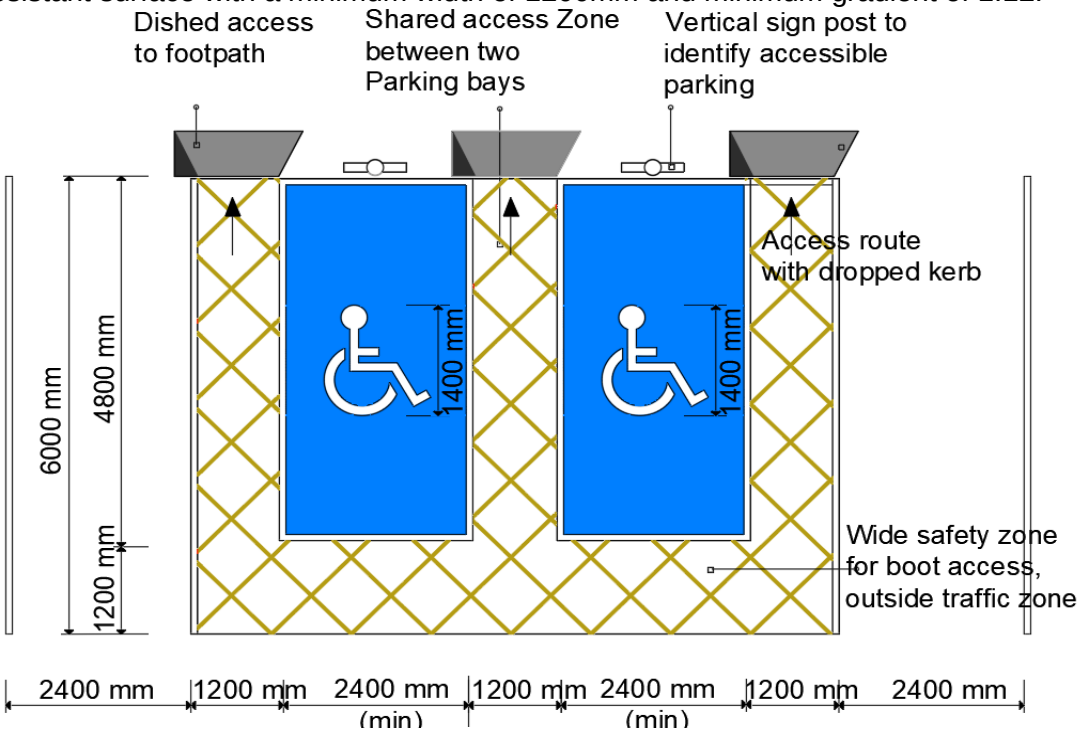


Figure 2. Accessible parking showing shared access zone

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.

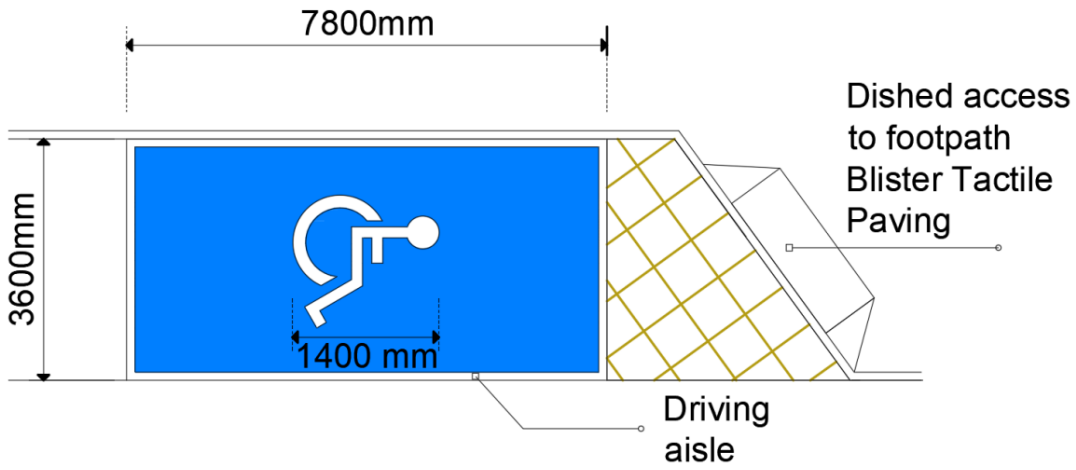


Figure 3. Example of Parallel parking

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 l**ighting**. 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.

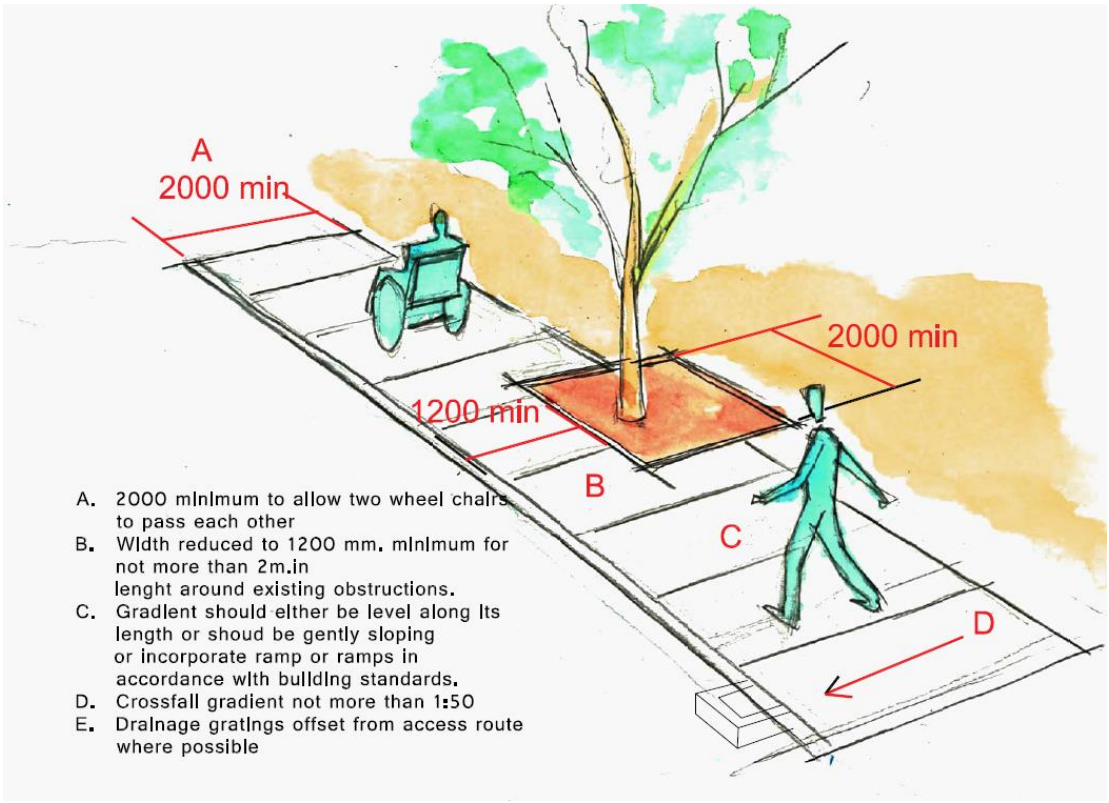


Figure 5. Urban environment pavement layout

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**.

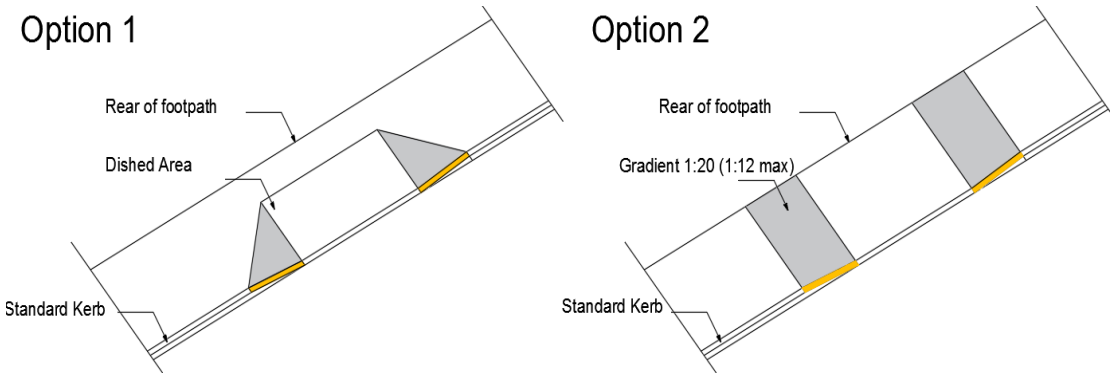


Figure 7. Dished Kerb Options

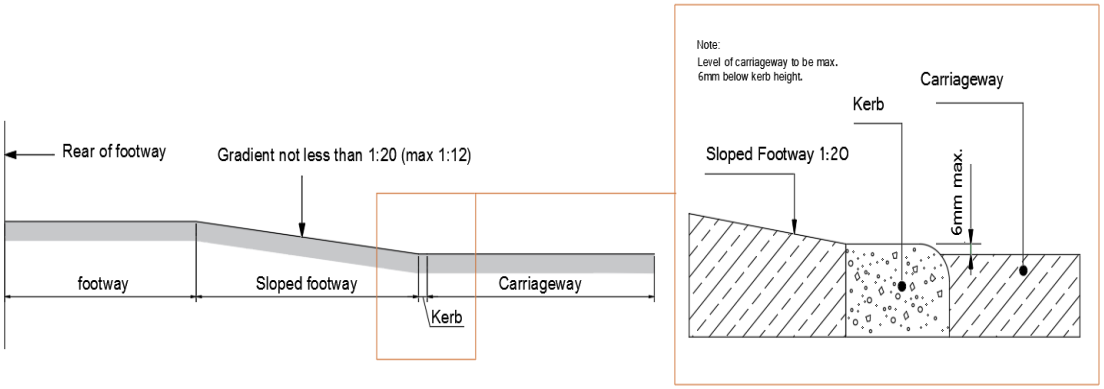


Figure 8. Dished Kerb Section Detail

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.

Uncontrolled Crossing. In Line

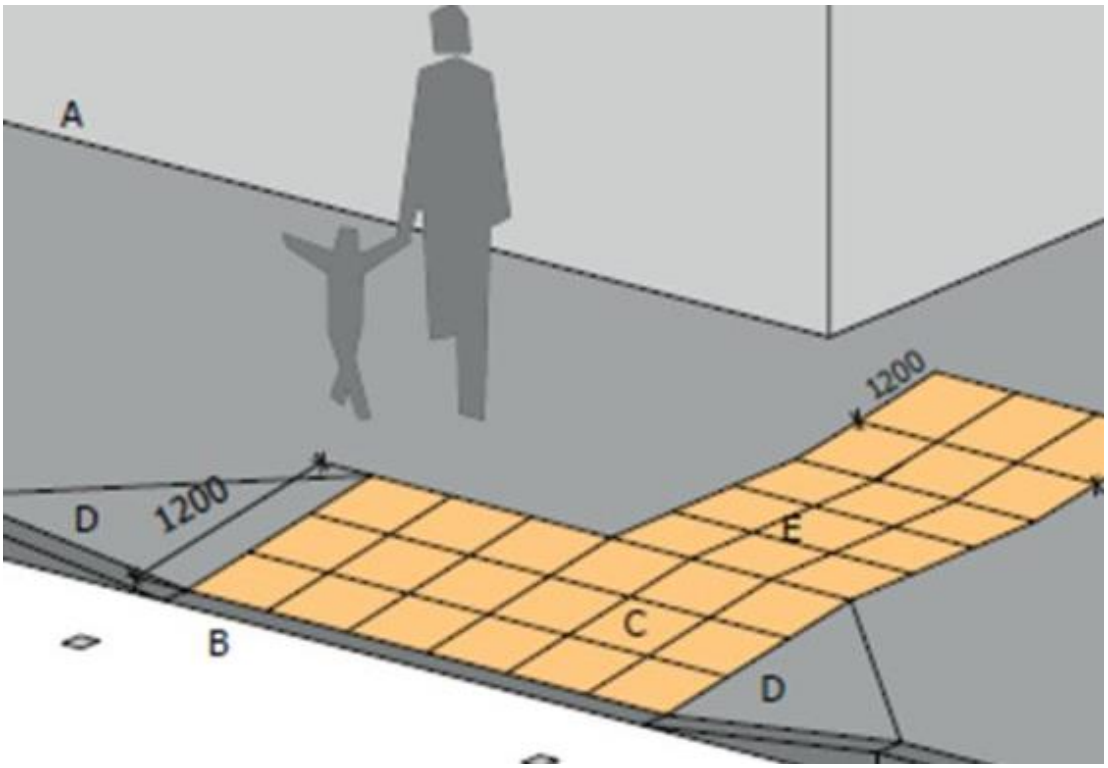


Figure 9. Uncontrolled Crossing. In line

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

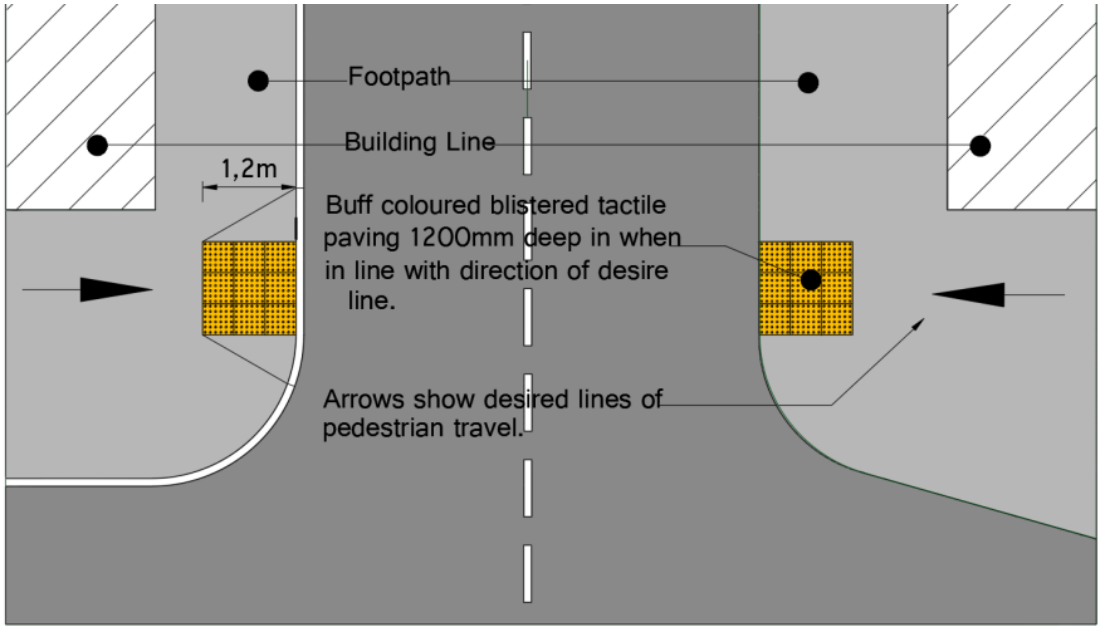


Figure 10. Uncontrolled Crossing. Direct Line of travel

Uncontrolled Crossing. Not In Direct Line

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

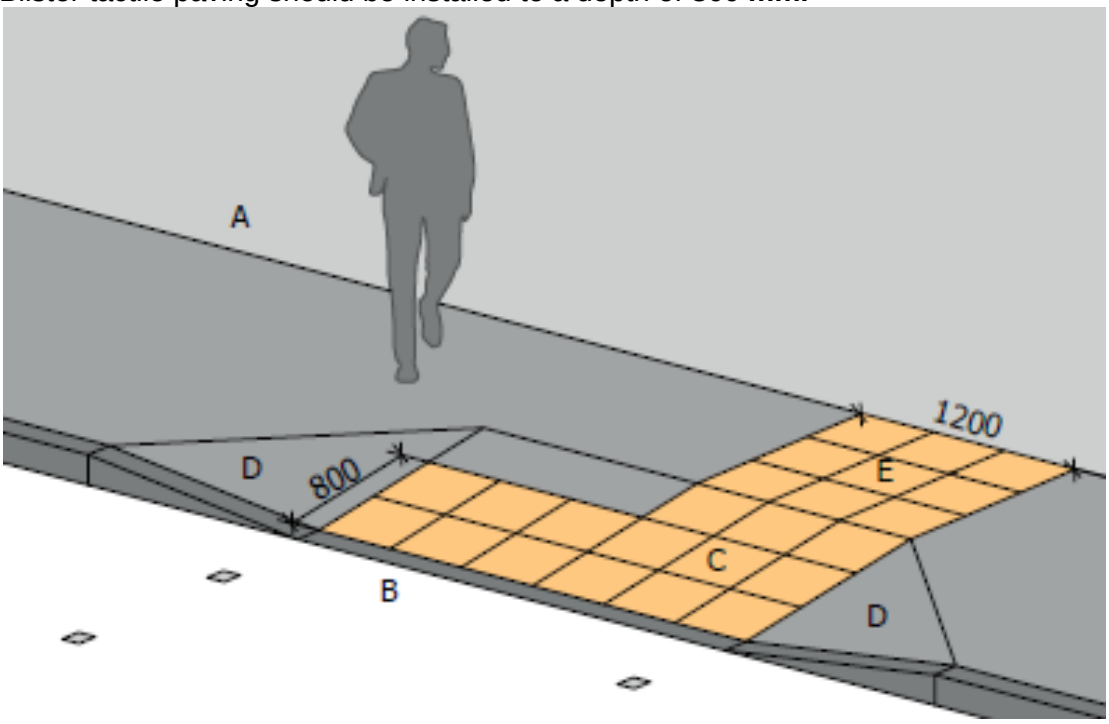


Figure 11. Uncontrolled Crossing at Side Road

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

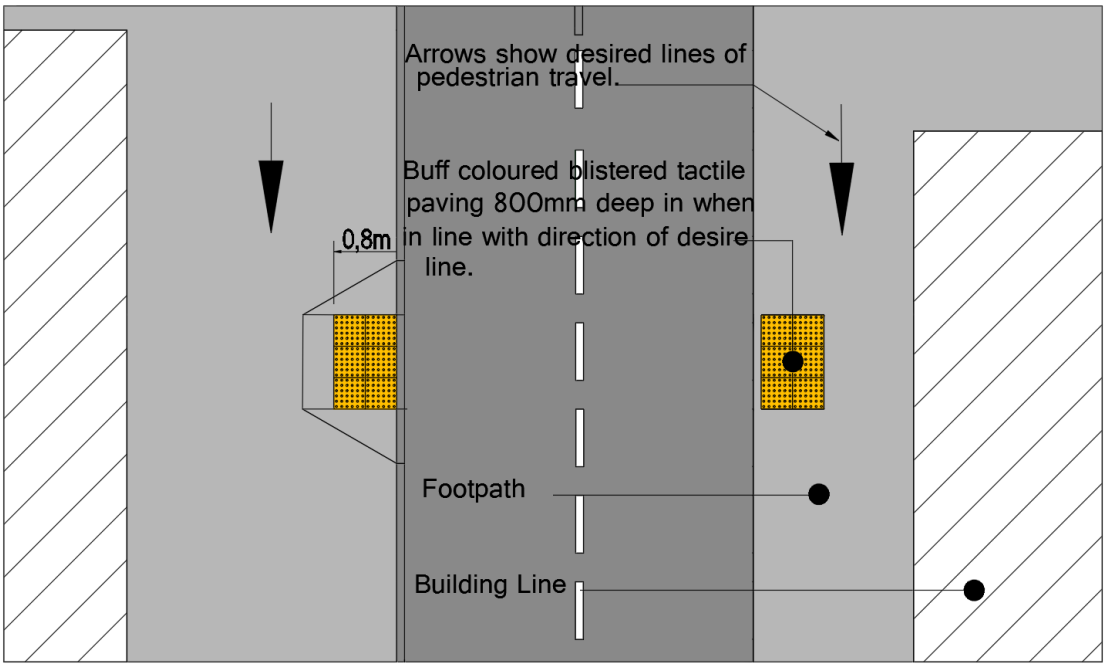


Figure 12. Uncontrolled Crossing. Not in Direct Line of Travel

Uncontrolled Crossing at Angled Junction

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

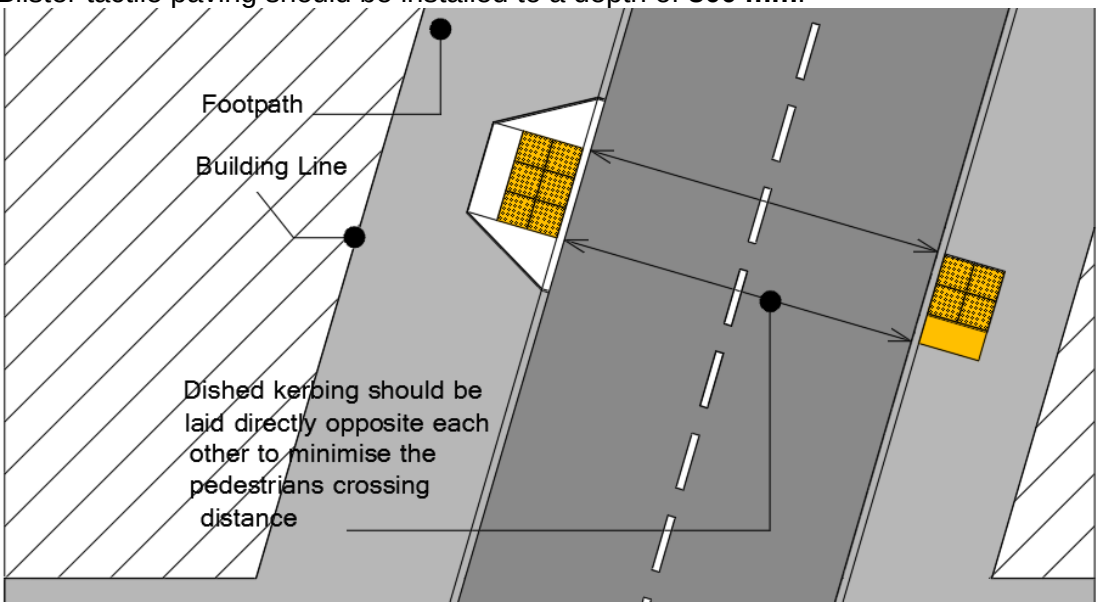


Figure 13. Uncontrolled Crossing. Angled Union

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.

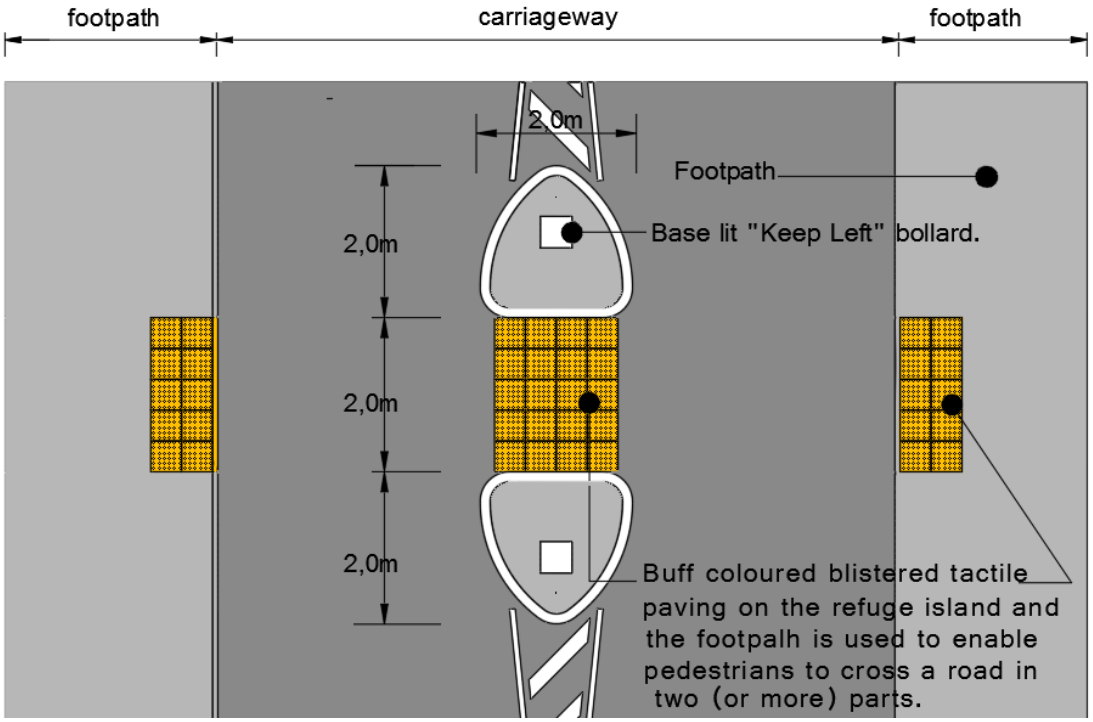


Figure 14. Uncontrolled Crossing. Island of Refuge.

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.

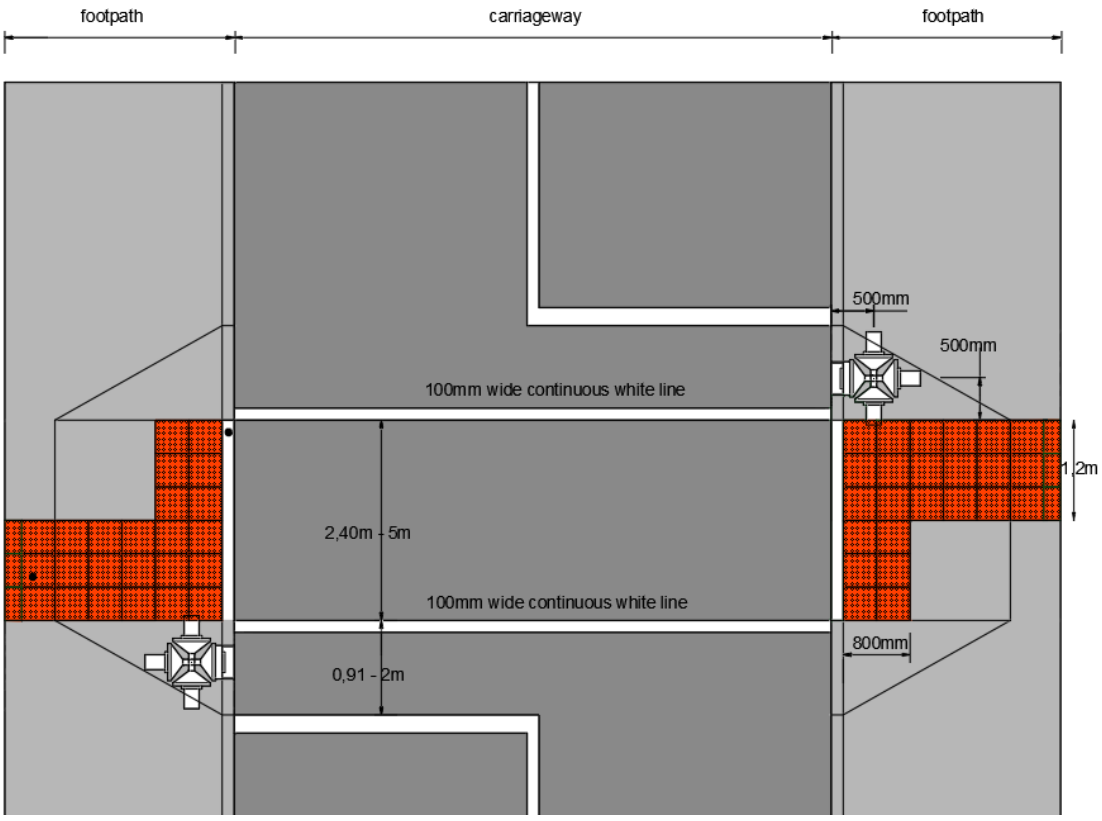


Figure 15. Controlled Crossing. Not in Direct Line of Travel

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 with a minimum of 150 mm. wide around the tactile surface.

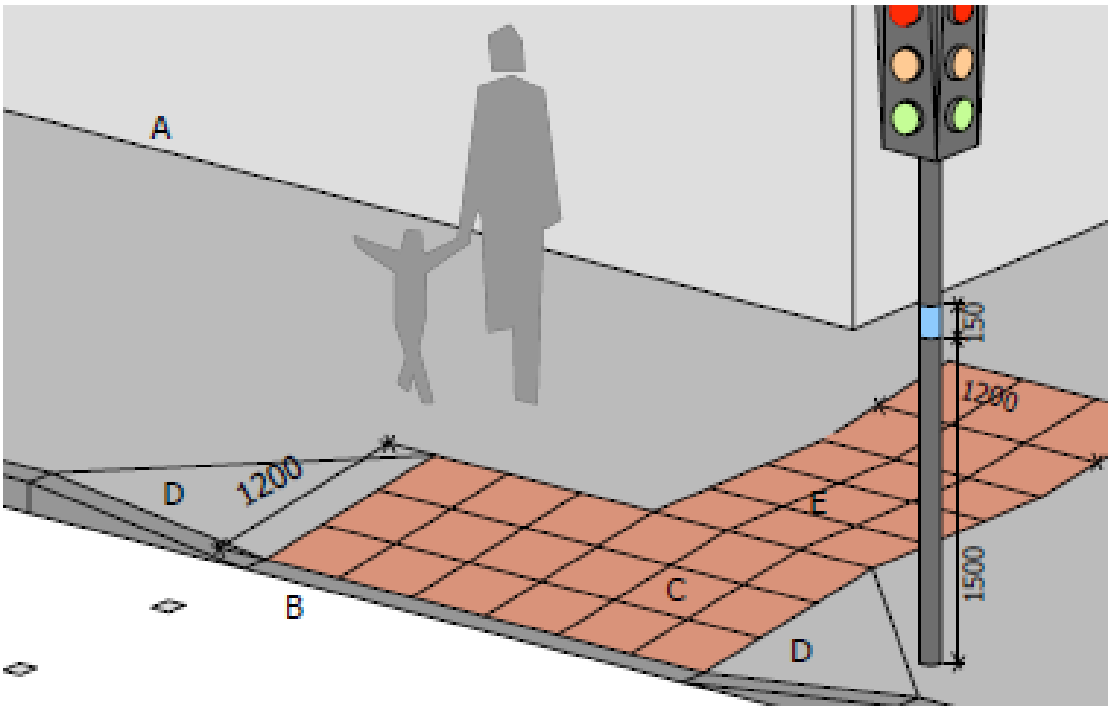


Figure 16. Controlled Crossing. In Direct Line of Travel

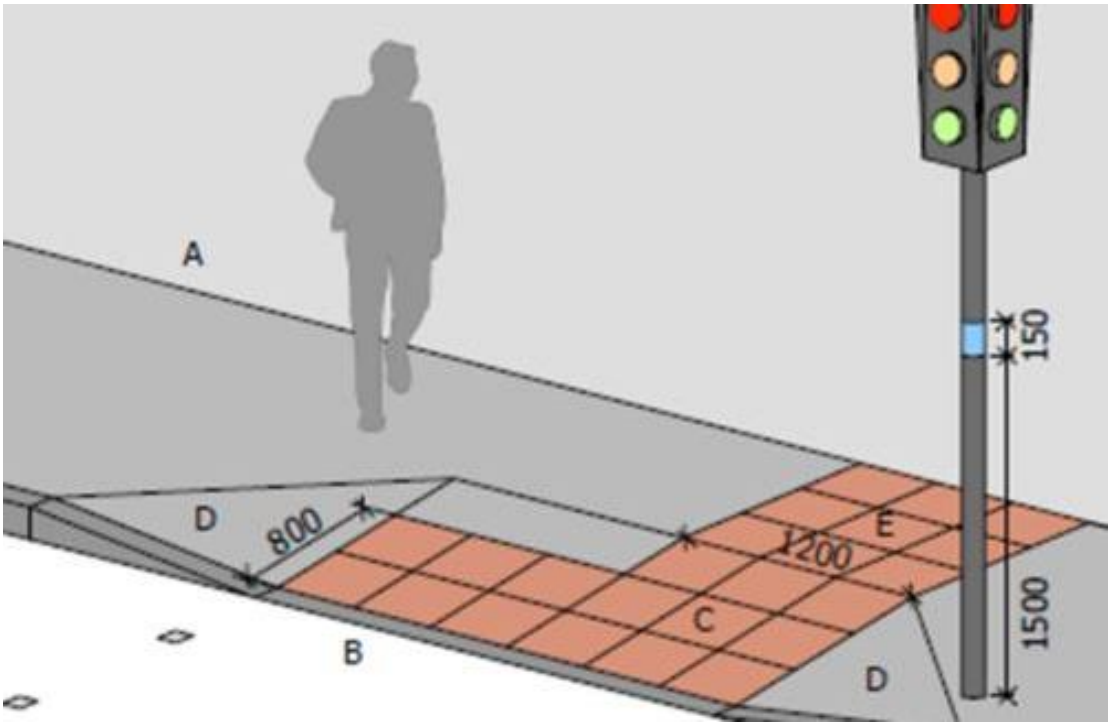


Figure 17. Controlled Crossing. Not in Direct Line of Travel

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 signasiled crosssing

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.**

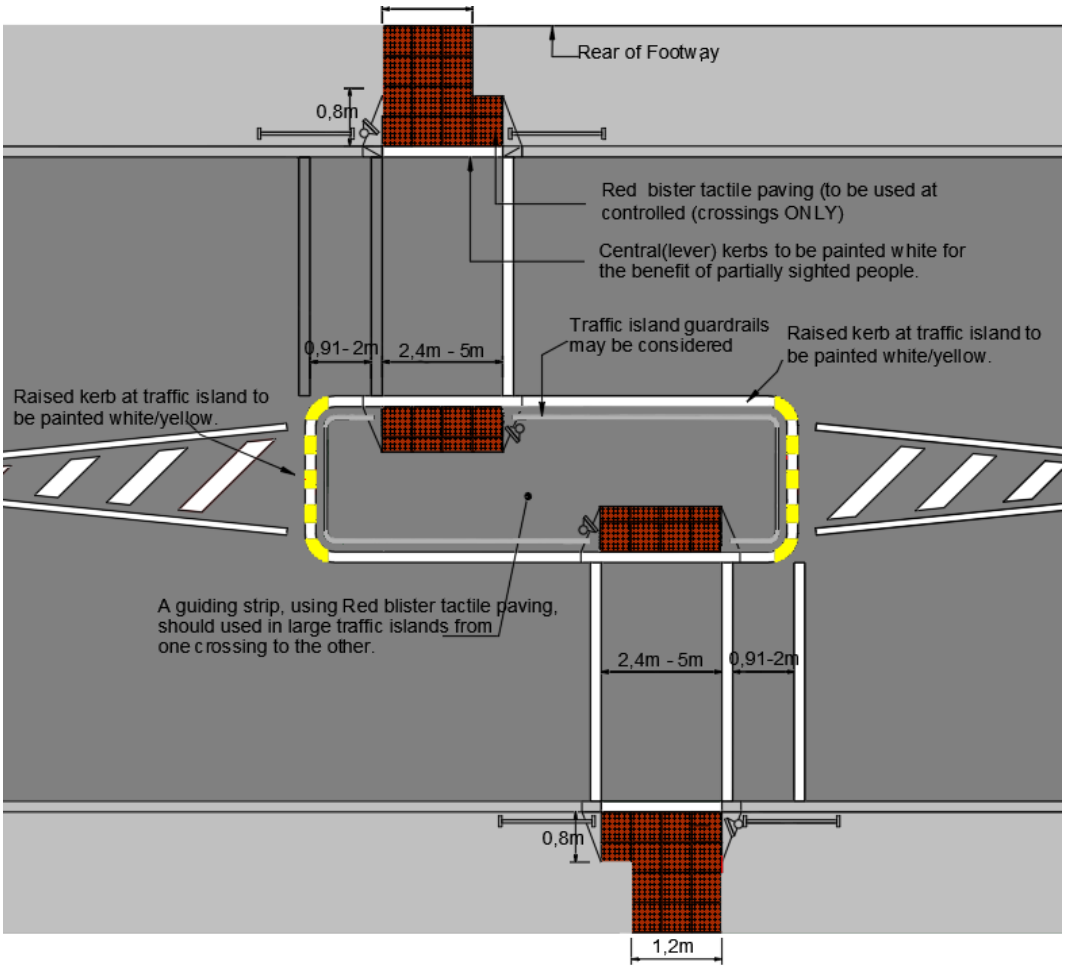


Figure 18. Controlled Crossing. Staggered Signalized Crossing

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.

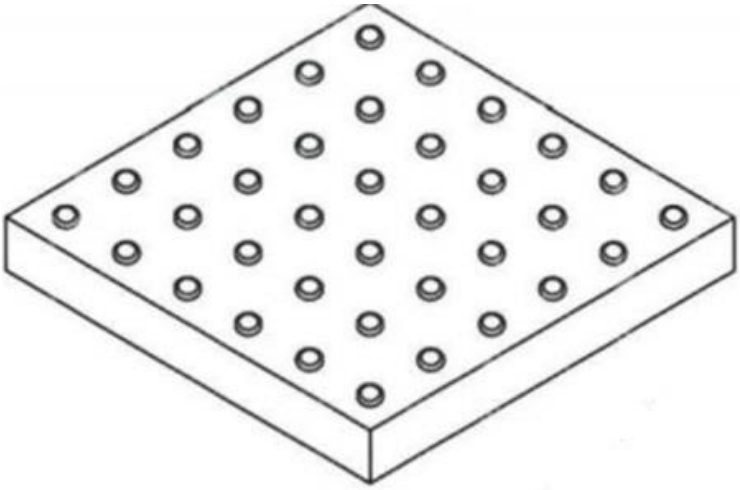
Use tactile paving consistently and strictly in accordance with detailed recommendations.
Use blister tactile surfacing to highlight the **absence of a kerb**.
Use **red blister** surfaces at **controlled crossings.**
Use **buff blister** surfaces at **uncontrolled crossings.**
Use **corduroy hazard** 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

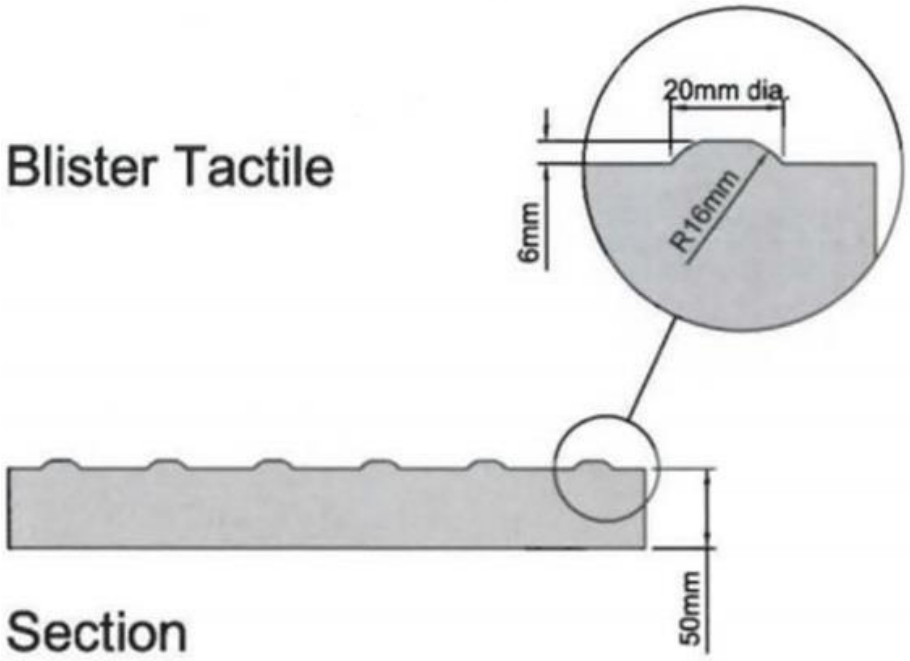


Figure 19. Blister tactile paving tile and studs dimensions.

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.

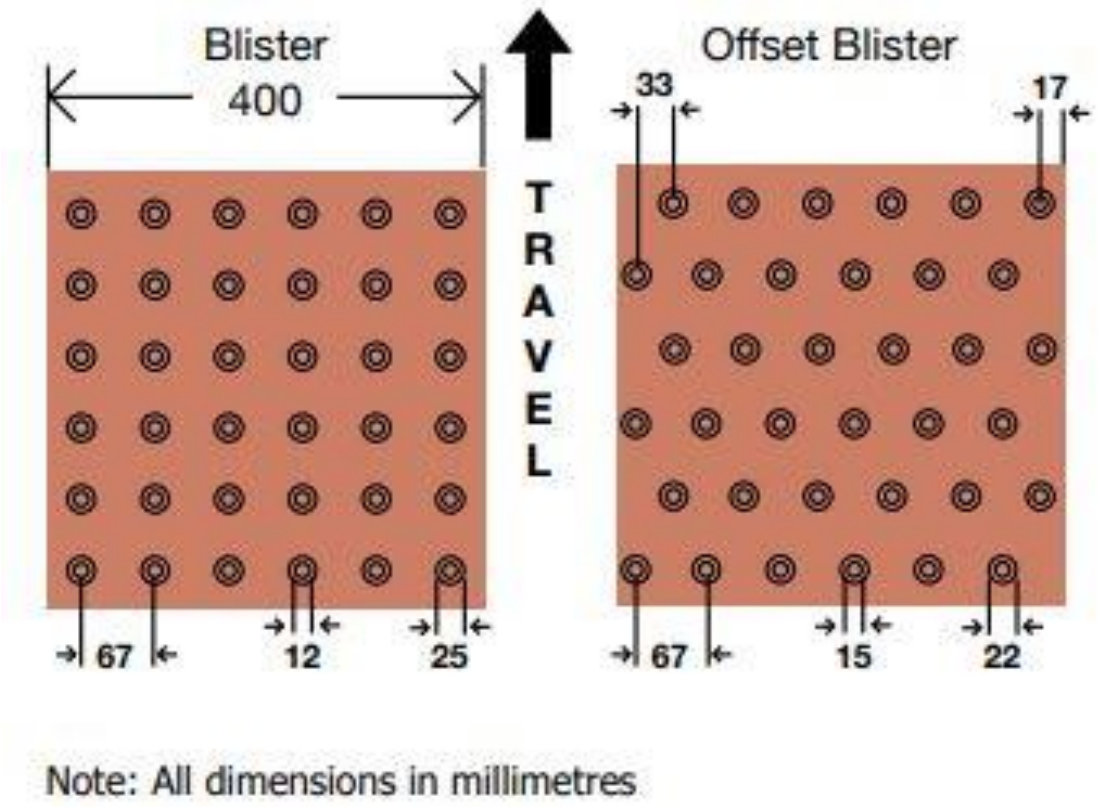


Figure 20. Red blister surface at controlled crossing and offset blister

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.

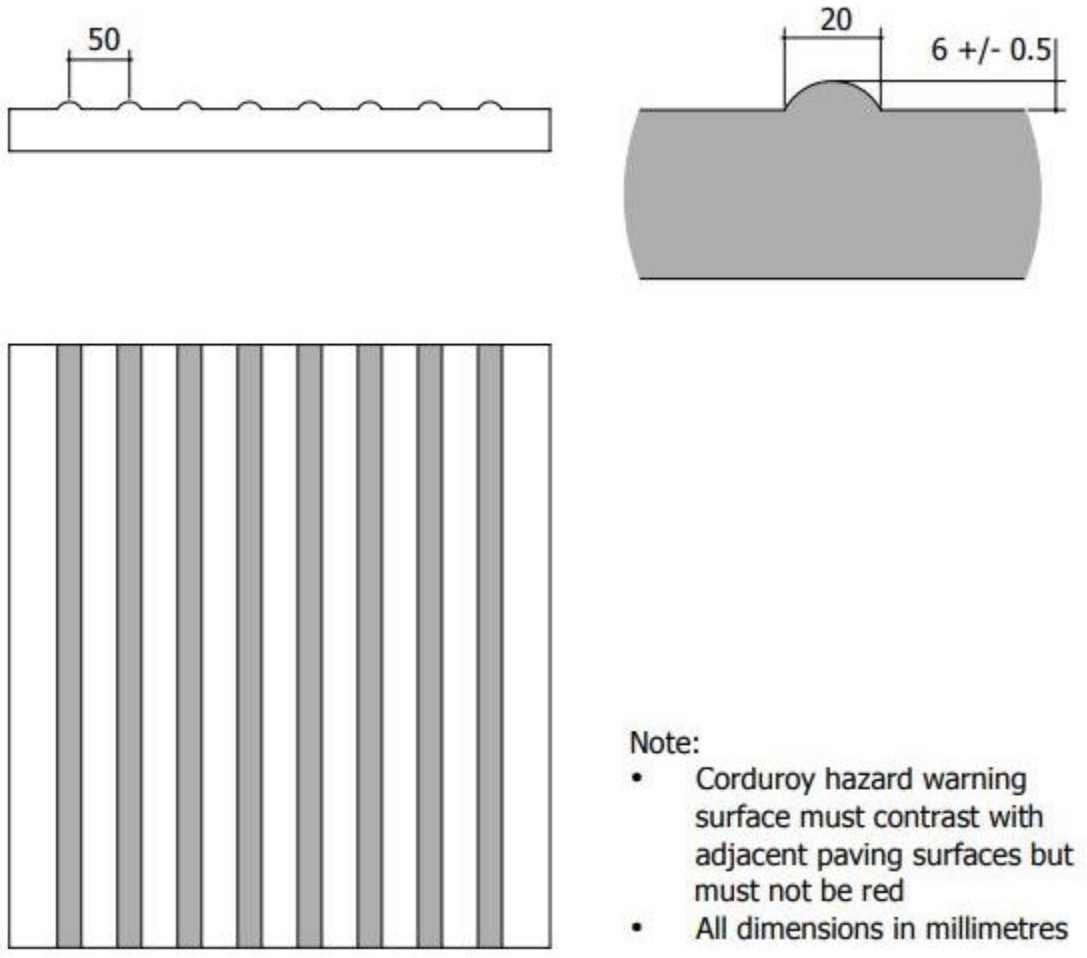


Figure 21. Corduroy tactile paving tile and raised bars dimensions.

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.

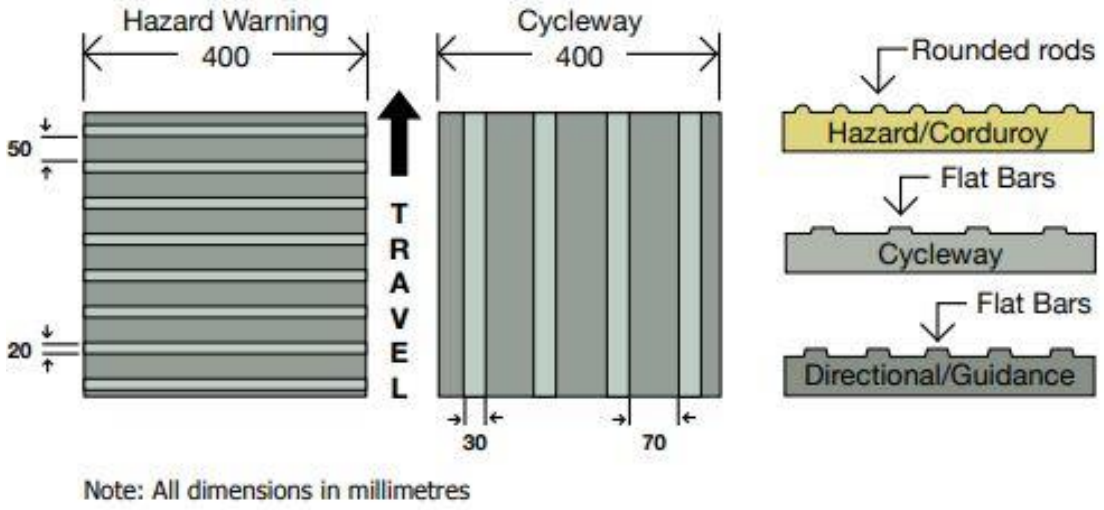


Figure 22. Examples of hazard warning and cycle way paving

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.

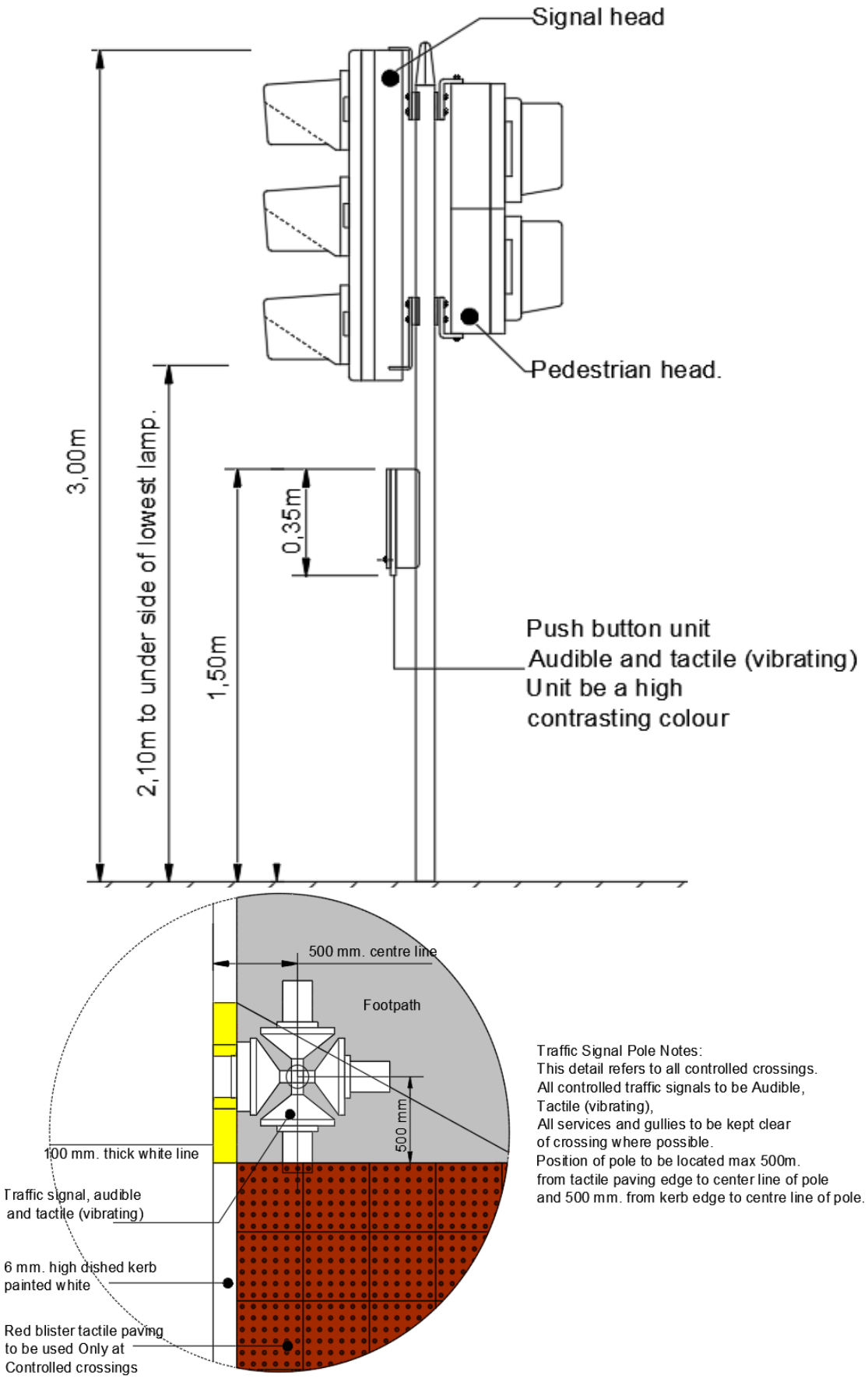


Figure 23. Plan and Elevation of traffic Signal

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.**

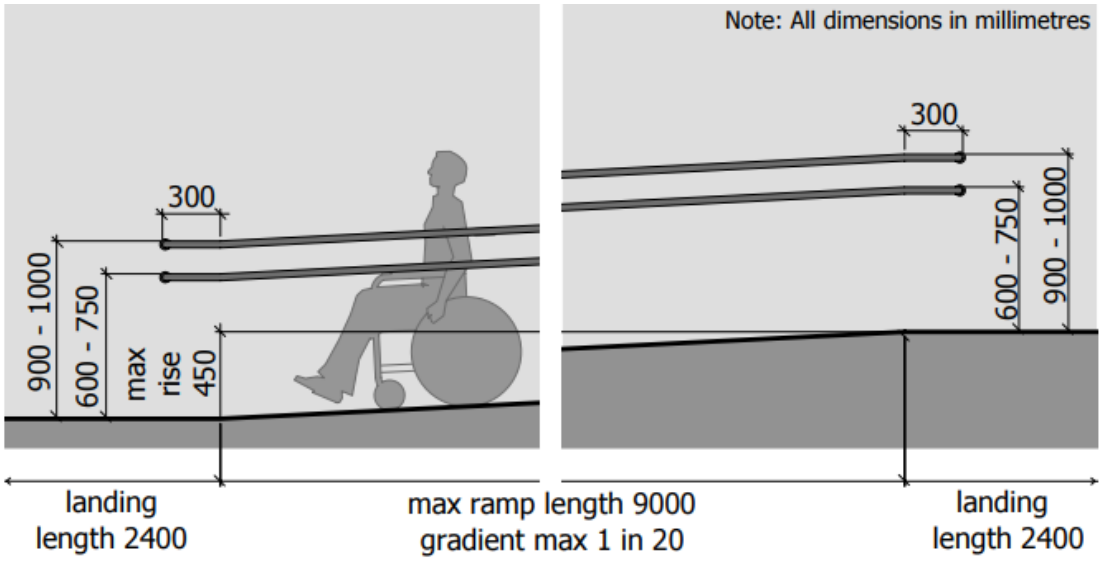


Figure 25. Examples of external ramp

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 lodgement 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

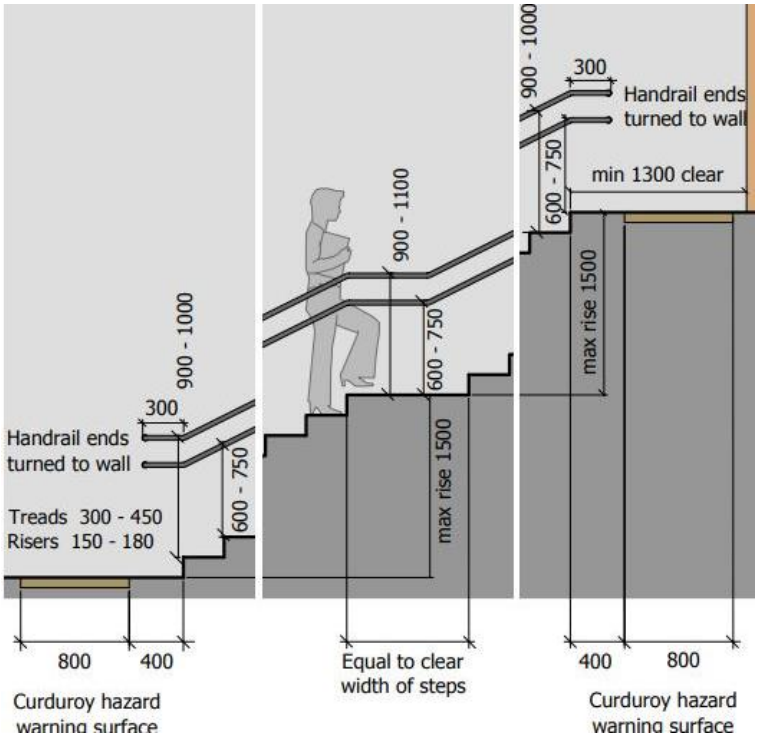


Figure 25. Examples of external steps

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 a 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. Bus stop islands, whether proposed or being retained, 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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- Shared Space Full Report. National Disability Authority.
- Design Manual for Urban Roads and Streets. (2013) Department of Transport, Tourism and Sport.
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- Bus Stop Design Guide. Road Service Transportation Unit. UK

APPENDIX A
DRAWINGS

MAP 01A

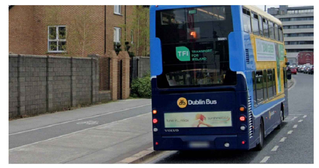
0 5.0 10.0 20.0 30.0 40.0 50.0m

BAR SCALE

SEGREGATED CYCLING FACILITY
(HORIZONTAL) WITH NO CLEAR SEGREGATION

NORTHWOOD

AN UNIQUE STAGE IN
CENTRAL REFUGE ISLAND IN
THE DESIGN PROPOSED



POSSIBLE INTERFERENCE BETWEEN
PEDESTRIANS AND CYCLISTS:
CONSIDER THE ISLAND BUS STOP OPTION,
WHEN POSSIBLE

ST. MARGARETS ROAD

PROPOSED SCHEME

Tie in to existing

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

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Project Title: BUSCONNECTS INFRASTRUCTURE DUBLIN

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MAP 01B

0 5.0 10.0 20.0 30.0 40.0 50.0m

BAR SCALE

STAGGERED CROSSING
REVIEWED IN DESIGN PROJECT
TO RESOLVE IN AN UNIQUE STAGE..

SANTRY AVENUE

SANTRY CROSS

BALBUTCHER LANE

CONTROLLED CROSSING.
NO RED BLISTER TACTILE PAVING PROVIDED.

TACTILE PAVING LAYOUT IS POINTING IN THE WRONG DIRECTION NOT TO THE CENTRAL ISLAND.
AND TACTILE PAVING SHOULD BE CONSIDERED IF ISLAND IS INTENDED TO BE AN AREA OF WAITING.
CROSSING TIME SHOULD BE ENSURED.

FOOTPATH USED BY CARS AS A CAR PARKING.
ADEQUATE AND STRATEGICALLY DISPOSITION
OF STREET FURNITURE OR LANDSCAPING

BUS STOP. KASSEL KERB RECOMMENDED.
APPROPIATE
HEIGTH OF KERB AND TEXTURED SURFACE.

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MAP 02

STAGGERED CROSSING SHOULD BE RESOLVED IN ONE STAGE.
RED BLISTER TACTILE PAVING REQUIRED FOR CONTROLLED CROSSINGS.

PATCH REPAIRS IN THE FOOTPATH.
REPLACE TO PROVIDE A SMOOTH FINISH ALONG THE FOOTPATH

COULTRY ROAD

SHANGAN ROAD

ACCESSIBLE CAR PARKING SPACES.
THESE PARKING BAYS ARE REMOVED IN DESIGN PROJECT.
A SUITABLE SPOT SHOULD BE CONSIDERED.

RED BLISTER TACTILE PAVING REQUIRED FOR CONTROLLED CROSSINGS.

BALLYMUN CIVIC CENTRE

BALLYMUN MAIN STREET

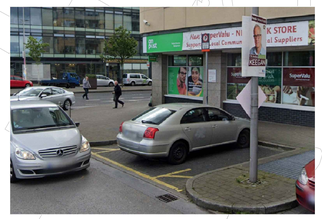
BALLYMUN CAR PARK

SILLOGE ROAD

STAGGERED CROSSING SHOULD BE RESOLVED IN ONE STAGE.
RED BLISTER TACTILE PAVING REQUIRED FOR CONTROLLED CROSSINGS.

BALBUTCHER LANE

GUARDRAILS IN RAMP. DESIGNERS SHOULD MAINTAIN FOR PEDESTRIAN PROTECTION IN THE CHANGE IN LEVEL



ACCESSIBLE CAR PARKING. NO DISHED KERB PROVIDED.

0 5.0 10.0 20.0 30.0 40.0 50.0m

BAR SCALE

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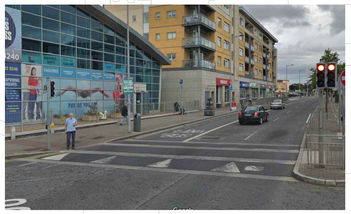

CONTROLLED CROSSING POINT. RED BLISTER TACTILE PAVING SHOULD BE PROVIDED: IN CENTRAL ISLAND. STAGGERED CROSSING TO BE REVIEWED.

CONTROLLED CROSSING POINT. RED BLISTER TACTILE PAVING SHOULD BE PROVIDED: IN CENTRAL ISLAND. STAGGERED CROSSING TO BE REVIEWED.

CONTROLLED CROSSING POINT. RED BLISTER TACTILE PAVING SHOULD BE PROVIDED: 0.8m. (2 SLABS). CHECK IF CENTRAL GUARDRAIL IS NECESSARY. (IT IS IN DIRECT LINE OF TRAVEL)

KASELL KERB TO BE PROVIDED AND TEXTURED SURFACE IN KERB EDGE.

PROVIDE BUFF OR GREY TACTILE PAVING. 1200mm. FOR UNCONTROLLED CROSSING AND DISHED KERB.

BALLYMUN CIVIC CENTRE

TRINITY COMPREHENSIVE SECONDARY SCHOOL

SHANLISS ROAD

SILLOGE ROAD

GATEWAY AVENUE

GATEWAY CRESCENT

CHECK DIMENSIONS IN ACCESSIBLE CAR PARKING

UNCONTROLLED CROSSING POINT. BUFF OR GREY TACTILE PAVING SHOULD BE PROVIDED: 3 SLABS.

PROVIDE DISHED KERB. ACCESSIBLE CAR PARKING

KASELL KERB TO BE PROVIDED AND TEXTURED SURFACE IN KERB EDGE.

0 5.0 10.0 20.0 30.0 40.0 50.0m

BAR SCALE

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MAP 04

UNCONTROLLED CROSSING.
ABSENCE OF TACTILE PAVING AND
DISTANCE BETWEEN BOLLARDS TO BE 1.20m.

POLE LOCATION SHOULD BE REVIEWED. IT NARROWS THE WIDTH OF THE PATH POSSIBLY CAUSING A CONSTRAINT TO PASSING WHEELCHAIR USERS OR BUGGIES, OR MAY COINCIDE WITH THE LOCATION OF THE BUS DOOR.

STAGGERED CROSSING POINT.
TO BE REVIEWED.
SOLUTION OF A FULL-WIDTH
CROSSING IN ONE STAGE.

STAGGERED CROSSING POINT.
TO BE REVIEWED.
SOLUTION OF A FULL-WIDTH
CROSSING IN ONE STAGE.

ACCESSIBLE CAR PARKING (ON LINE) AT BALLYMUN
LIBRARY.7M LONG AND PREFERABLY 3.6M WIDE.

UNCONTROLLED CROSSING POINT. BUFF OR
GREY TACTILE PAVING SHOULD BE PROVIDED:
AVOID A SOLUTION IN THE CURVE OF THE FOOTPATH

PLANTER BOX IN JUNCTION SHOULD BE RELOCATED
AND NOT TO INTERFER THE DIRECT LINE
OF TRAVEL OF DISABLED PEOPLE

SHANLISS

BALLYMUN LIBRARY

ROAD

COLLINS AVENUE

GLASNEVIN AVENUE

0 5.0 10.0 20.0 30.0 40.0 50.0m

BAR SCALE

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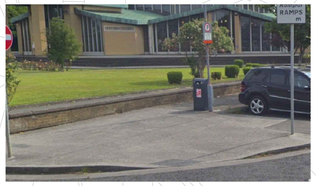
MAP 05



UNCONTROLLED CROSSING POINT.
BUFF OR GREY" TACTILE P SHOULD BE CONSIDERED .
DEPTH OF 1.2 M, GRADIENT 1:12 MAX.
LEVEL DIFFERENCE OF DISHED KERB: 6MM.

DETERIORATING PAVEMENT IN A CONTROLLED
CROSSING POINT PATCHED WITH ASPHALT.
RENOVATE AND LEVEL THE SURFACE OF THE FOOTPATH.
COMPLETE THE L-SHAPE TO THE REAR OF FOOTPATH

STREET FURNITURE BLOCKING
ACCESS TO BUS STOP IN ONE SIDE.
CONSIDER A WIDTH CLEAR OF
1.20 m FOR MOVEMENT OF DISABLED PEOPLE

CHURCH OF OUR LADY OF VICTORIES

ALBERT COLLEGE DRIVE

BALLYMUN ROAD

ST PAPPIN ROAD

ACCESSIBLE CAR PARKING AT ST.PAPPIN ROAD.
CHECK DIMENSIONS, SIGNALLING AND DROPPED KERB

PAVEMENT IN AREA O BUS ACCESS
TO THE KERB EDGE SHOULD BE REPAIRED.
DRAINAGE POINT PATCHED WITH ASPHALT.
HEIGHT OF KASSEL KERB 180mm TO ACCOMODATE
MODERN BUSES

0 5.0 10.0 20.0 30.0 40.0 50.0m

BAR SCALE

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MAP 06

CAR PARKING AREA WITH NO ACCESSIBLE UNITS.
1 ACCESSIBLE CAR PARKING BAY SHOULD BE
PROVIDED AT LEAST 5% OF THE TOTAL OF PARKING SPACES.
IWA RECOMMENDS 1 ACCESSIBLE UNIT PER 15 PARKING SPACES.

CRACKED FOOTPATH. VERTICAL DEVIATIONS
HIGHER THAN 5mm DUE TO THE ROOTS OF TREES.
PAVEMENT SHOULD BE REPAIRED AND FOOTPATH TO BE MAINTAIN
WITH NO FALLEN LEAVES. SLIPPERY SURFACE.

UNCONTROLLED CROSSING POINT.
BUFF OR GREY" TACTILE P SHOULD BE CONSIDERED .
DEPTH OF 1.2 M, GRADIENT 1:12 MAX.
LEVEL DIFFERENCE OF DISHED KERB: 6MM.

0 5.0 10.0 20.0 30.0 40.0 50.0m

BAR SCALE

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MAP 07

CONTROLLED CROSSING. PAVEMENT OF THE CARRIAGEWAY SHOULD BE REVIEWED. VERTICAL DEVIATIONS POSE A RISK FOR DISABLED PEOPLE.

CONTROLLED CROSSING POINT.
EXCESSIVE GRADIENT IN DISHED TACTILE SURFACE.
RECOMMENDED GRADIENT 1:20 AND NO STEPPER THAN 1:12.

HAMPSTEAD AVENUE

THE RISE

ST. MOBHI ROAD

GRIFFITH AVENUE

BALLYMUN ROAD

DCU SPORTSGROUNDS

GLASNEVIN TENNIS CLUB

UNCONTROLLED CROSSING AT A SIDE ROAD.BUFF OR GRAY TACTILE PAVING TO BE PROVIDED AND DISHED KERBS

A CONTROLLED CROSSING POINT SHOULD BE PROVIDED WITH ITS PROPER RED BLISTER TACTILE PAVING AND DISHED KERBS. LOCATE ELEMENTS FOR PROTECTION IN REFUGE ISLAND.

THE TACTILE PAVING STEM OF THE CONTROLLED CROSSING HAS BEEN PATCHED WITH ASPHALT.
THE SURFACE SHOULD BE REPAIRED AND INSTALLED RED BLISTER TACTILE SLABS

0 5.0 10.0 20.0 30.0 40.0 50.0m

BAR SCALE

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MAP 08

UNCONTROLLED CROSSING POINT.
BUFF OR GREY" TACTILE P SHOULD BE CONSIDERED .
DEPTH OF 1.2 M, GRADIENT 1:12 MAX.
LEVEL DIFFERENCE OF DISHED KERB: 6MM.

UNCONTROLLED CROSSING POINT.
IT SHOULD BE TRATED AS FOR AN
IN LINE UNCONTROLLED
CROSSING. 1.20 m. WITDH (3 SLABS)

UNCONTROLLED CROSSING OF A SHARED ROUTE.
CORDUROY TACTILE SURFACE SHOULD BE INSTALLED
FOR A DEPTH OF 2400MM ON EITHER SIDE OF THE JUNCTION. FOR
PEDESTRIANS (PERPENDICULAR) AND CYCLISTS (PARALLEL),
TO INDICATE THE START/END OF THE ROUTE.
A BLISTER SURFACE OF 1200 mm DEPTH. SHOULD BE LAID ACROSS
THE FULL WIDTH OF THE CROSSING POINT

STELLA AVENUE

HOME FARM ROAD

CLG NA FIANNA

ST MOBHI ROAD

ST. MOBHI ROAD

UNCONTROLLED CROSSING POINT.
IT SHOULD BE TRATED AS FOR AN
IN LINE UNCONTROLLED
CROSSING. 1.20 m. WITDH (3 SLABS)

ST. MOBHI BOITHRIN

PAVEMENT IN THE ACCESS AREA OF BUSES, SHOULD
BE REPAIRED TO PROVIDE AN ADEQUATE HEIGHT OF
KNEELING FOR BUSES. LOCATION OF POLES AND LITTERBINS
SHOULD GUARANTEE AN ADEQUATE SPACE FOR DISABLED PEOPLE.

REDUCED LENGTH OF THE PICK
UP POINT OF BUS STOP.

THERE IS A INTERFERENCE OF THE BUS STOP WITH
THE SHARED ROUTE. AN ALTERNATIVE SYSTEM SHOULD BE
IMPLEMENTED. ISLAND BUS OPTION AS PREFERRED WITH
TACTILE PAVING FOR THE CROSSING OF PEDESTRIANS AND
PEOPLE WITH MOBILITY IMPAIRMENT.

0 5.0 10.0 20.0 30.0 40.0 50.0m

BAR SCALE

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 3: BALLYMUN TO CITY CENTRE ACCESSIBILITY AUDIT

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MAP 10

BOTANIC AVENUE

ST MOBHI GROVE

DANESWELL ROAD

Ward Bdy

ST MOBHI

Bank

FAIRFIELD ROAD

CLIFTONVILLE ROAD

ROAD

MARGUERITE

BOTANIC ROAD

BOTANIC VILLAS

Car Park

CLIFTONVILLE ROAD

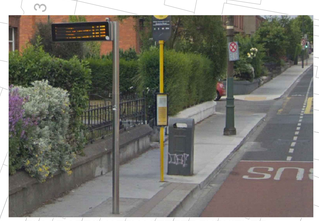
MARGUERITE ROAD

ST TERESA'S ROAD

30kph TRAFFIC CALMING ZONE

FOOTPATH USED BY CARS AS CAR PARKING.
CHECK CORRECT DISPOSITION OF PROTECTIVE ELEMENTS
SUCH AS STREET FURNITURE, LANDSCAPING.

UNCONTROLLED CROSSING POINT AT A SIDE ROAD.
BUFF OR GREY" TACTILE P SHOULD BE CONSIDERED .
DEPTH OF 1.2 M, GRADIENT 1:12 MAX.
LEVEL DIFFERENCE OF DISHED KERB: 6MM.



PLACE ADEQUATELY STREET FURNITURE
WHERE THE FOOTPATHS ARE NARROW.
(MIN: 1.20 M).
THE POLE LOCATION SHOULD BE REVIEWED.

BUS STOP. KASSEL KERB RECCOMENDED.
CLEAR WIDTH OF 1.20m. SHOULD BE
ADVISABLE IN FRONT OF THE SHELTER
FOR CORRECT TRANSTION OF MOBILITY
IMPAIRED PEOPLE

0 5.0 10.0 20.0 30.0 40.0 50.0m

BAR SCALE

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0 5.0 10.0 20.0 30.0 40.0 50.0m

BAR SCALE

MAP 11

MARGUERITE ROAD

ST TERESAS ROAD

BOTANIC ROAD

CHECK DISTANCE OF FOOTPATH
IS WIDER THAN 1.20m .

CORDUROY TACTILE PAVING GUIDING TO
AN UNCONTROLLED CROSSING POINT:
THE END OF THE FOOTPATH IS NOT ADVERTISED
WITH TACTILE PAVING

CONTROLLED CROSSING IS PROPOSED IN NEW DESIGN.
TACTILE PAVINGS SHOULD BE PROVIDED AND DISHED KERBS.

IONA ROAD

LINDSAY ROAD

SHELTER IS PLACED IN SUCH POSITION THAT
THERE IS NO GOOD VISIBILITY FOR BUSES
AND PEOPLE WAITING. CORRECT LOCATION
OF THE SHELTER SHOUD BE REVISED.
KASSEL KERB TO BE INCORPORATED.
FOR THE DESIGN PROPOSAL A ISLAND BUS OPTION
WOULD BE THE PREFERRED.
WITH CONTROLLED/ OR UNCONTROLLED CROSSING
BETWEEN FOOTPATH AND CYCLE TRACK

PROSPECT AVENUE

PROSPECT WAY

PROPOSED SCHEME
Finglas to
Phibsborough CBC

THE POSITION OF THE PLANTER BOX IN THE
REFUGE ISLAND SHOULD BE REVIEWED BECAUSE
IT IS IN THE LINE OF MOVEMENT OF PEDESTRIAN AND
PEOPLE WIT MOBILITY IMPAIRMENT. STREET FURNITURE
SHOULD BE INSTALLED ALSO AS A PROTECTIVE ELEMENT
CLOSE TO BOUNDARIES.

UNCONTROLLED CROSSING POINT .
NO DISHED KERBS AND TACTILE PAVING. A BUFF OR
GREY TACTILE PAVING SHOULD BE PROVIDED
WITH A WIDTH OF 1.2 m. (3 SLABS)

CRACKED FOOTPATH IN THE TRANSITION WITH THE
COMMERCIAL AREA SHOULD BE REPAIRED AND
DIFFERENTIATED OF THE CARRIAGEWAY

DALCASSIAN DOWNS

DE COURCY SQUARE

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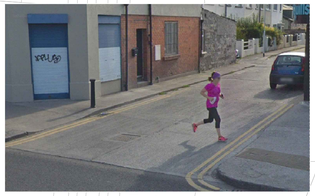
0 5.0 10.0 20.0 30.0 40.0 50.0m

BAR SCALE

MAP 12



UNCONTROLLED CROSSING POINT AT A SIDE ROAD.
BUFF OR GREY" TACTILE P SHOULD BE CONSIDERED
DEPTH OF 1.2 M, GRADIENT 1:12 MAX.
LEVEL DIFFERENCE OF DISHED KERB: 6MM.

IM. 93. CRACKED PAVING IN THE FOOTPATH. VERTICAL
DEVIATIONS OF MORE THAN 5MM. SHOULD BE AVOIDED.

LIGHTING COLUMN IN THE MIDDLE OF THE PATH.
MINIMUM WIDTH OF 1500MM.WHEN OBSTACLES
CANNOT BE REMOVED. AND 1200MM ONLY OVER
A MAXIMUN DISTANCE OF 2000M.
OTHER LOCATION OF THE POLE
AND WIDTH OF THE PATH SHOULD BE CONSIDERED

UNCONTROLLED CROSSING POINT AT A SIDE ROAD.
BUFF OR GREY" TACTILE P SHOULD BE CONSIDERED
DEPTH OF 1.2 M, GRADIENT 1:12 MAX.
LEVEL DIFFERENCE OF DISHED KERB: 6MM.

CHAINS BETWEEN BOLLARDS TO BE AVOIDED

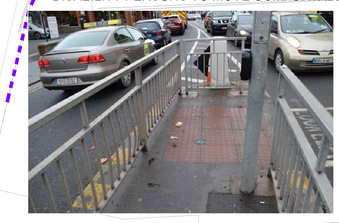
.
ACCESSIBLE CAR PARKING.PERPENDICULAR.
CHECK DIMENSIONS AND MARKS,
AND BOLLARDS WITH
CHAINS SHOULD BE AVOIDED:

UNCONTROLLED CROSSING POINT
DEPTH OF 1.2 m. (3 SLABS).
SHOULD BE PROVIDED.

UNCONTROLLED CROSSING POINT WITH A
PATCH REPAIRS OVER DISHED CROSSING.
SLABS OF TACTILE PAVING
SHOULD BE LOCATED INSTEAD:

STAGGERED CROSSING POINT.
THE PEOPLE CAN GET STUCK.
THE WIDTH IS MINIMUM IN A HAZARD POINT:
OTHER OPTION OF CROSSINGS SHOULD BE
CONSIDERED.

REDUCED WITDH IN CROSSING AND LIMITATED
BY GUARDRAILS AND TRAFFIC SIGNALS. OTHER TYPE
OF CROSSING OR ENOUGH WIDTH SHOULD BE
ENSURED FOR
DISABILITY PERSONS TO MOVE COMFORTABLY



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MAP 13

MAP 13

DETERIORATING PAVING IN FOOTPATH THAT HAS PATCHED WITH ASPHALT. CONCRETE SLABS SHOULD BE REPLACED AND GET A FIRM, HARD AND SLIP-RESISTANT SURFACE.

CHANGE IN LEVEL. NO ACCESSIBLE PASS.
A NEW UNDERPASS FOR CYCLE ROUTE AND PEDESTRIANS IS PROPOSED.
TACTILE WARNING SURFACE (400MM.MIN) AT THE START/END OF THE STAIR SHOULD BE CONSIDERED AND A CONTINUOUS HANDRAIL ON EACH SIDE OF FLIGHTS. AN ALTERNATIVE ROUTE SHOULD BE ENSURED.

0 5.0 10.0 20.0 30.0 40.0 50.0m

BAR SCALE

NORTH CIRCULAR ROAD

ROYAL CANAL BANK

ON STREET-ACCESSIBLE CAR PARKING. DIMENSIONS AND SIGNALS MARKS TO BE REVIEWD.
DIMENSIONS OF 3.6 x 7 m. AS PER TGD-M.

CROSSING POINT AT SIDE ROAD.
CHECK VERTICAL DEVIATIONS INFERIOR TO 5 MM. ENSURE A NON-SLIPPERY PAVEMENT.

UNCONTROLLED CROSSING POINT AT A SIDE ROAD.
NO DISHED KERBS AND TACTILE PAVING. A BUFF OR GREY TACTILE PAVING SHOULD BE PROVIDED WITH A WIDTH OF 1.2 m. (3 SLABS)

ST PETERS COURT

PHIBSBOROUGH ROAD

UNCONTROLLED CROSSING POINT
WITH ABSENCE OF TACTILE PAVING AND DETERIORATED PAVING IN THE SIDE ROAD.
SURFACES SHOULD BE RENOVATED

BUS STOP.
KASSEL KERB SHOULD BE PROVIDED.
ENSURE AN ADEQUATE HEIGHT FIXED TO SUIT KNEELING SUSPENSION OF BUSES.
TEXTURED SURFACE ON THE EDGE SHOULD BE PROVIDED

PHIBSBOROUGH SHOPPING CENTRE

PHIBSBOROUGH

UNCONTROLLED CROSSING POINT
AT A SIDE ROAD.
BUFF OR GREY" TACTILE P SHOULD BE CONSIDERED .
DEPTH OF 1.2 M, GRADIENT 1:12 MAX.
LEVEL DIFFERENCE OF DISHED KERB: 6MM.

MONCK PLACE

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MAP 14

STREET FURNITURE IN FOOTPATH: A
MINIMUM WIDTH OF 1200 mm. SHOULD BE ENSURE
IN A DISTANCE OF 2000m.
LOCATION OF POLES AND LIGHTING
COLUMNS SHOULD BE RECONSIDERED.
BACK OF THE FOOTPATH OR EDGE BOUNDARY.

BLESSINGTON
STREET
BASIN

ROYAL CANAL BANK

BLESSINGTON STREET PA

CROSSING POINT AT SIDE ROAD.
CHECK VERTICAL DEVIATIONS INFERIOR TO
5 MM. ENSURE A NON-SLIPPERY PAVEMENT.

ROYAL CANAL BANK

KINGS INN
STREET

UNCONTROLLED CROSSING POINT AT A SIDE ROAD.
BUFF OR GREY" TACTILE SHOULD BE CONSIDERED .
DEPTH OF 1.2 M, GRADIENT 1:12 MAX.
LEVEL DIFFERENCE OF DISHED KERB: 6MM.

BOTHAR BHAILE
PHIB

KING'S INNS
COURT

EXCESSIVE GRADIENT AT SIDE ROAD
CROSSING WITH THE FOOTPATH.
A GRADIENT OF 1:50 MAX.
SHOULD BE ENSURED

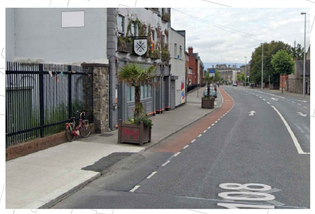
WHITE'S LANE
NORTH

PHIBSBOROUGH ROAD

ROYAL CANAL TERRACE

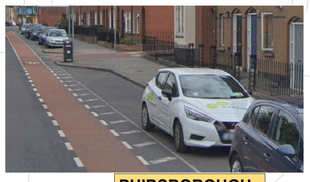
MONCK
PLACE

PLANTER BOX IN THE MIDDLE OF THE PATH.
MINIMUM WIDTH OF 1500MM.WHEN OBSTACLES
CANNOT BE REMOVED. AND 1200MM ONLY OVER
A MAXIMUN DISTANCE OF 2000M.
OTHER LOCATION OF THE POLE
AND WIDTH OF THE PATH SHOULD BE CONSIDERED



ALL
SAINTS
CHURCH

CAR PARKING. NO ACCESIBLE SPACE
PROVISION HAS BEEN PROVIDED.
AS PER IWA. 1 ACCESIBLE
PARKING BAY FOR EVER 15 STANDARD BAYS.



PHIBSBOROUGH
FIRE STATION

DETERIORATED PAVEMENT OF
CARRIAGEWAY IN APPROACHING EDGE.
MAINTAINING GOOD PAVEMENT AT THE
JUNCTION OF THE CARRIAGEWAY AND
FOOTPATH IS IMPORTANT TO SUIT
KNEELING SUSPENSION OF MODERN
BUSES

MCGOWAN'S

BROADSTONE
BUS DEPOT

0 5.0 10.0 20.0 30.0 40.0 50.0m

BAR SCALE

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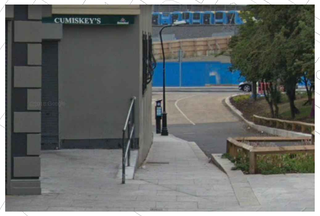
MAP 15



FOR GRADIENT < 1:20 AS PER TGD PART M
IT SHOUL BE CONSIDERED AS A RAMPED
FOOTPATH. HANDRAILS SHOULD BE PROVIDED.

DOMINICK STREET

THE L-SHAPE OF THE RED BLISTER TACTILE
PAVING IN THE CONTROLLED CROSSING POINT SHOULD
BE CONTINUOUS TO THE REAR OF THE FOOTPATH
TO FACILITATE PEOPLE WITH VISUAL IMPAIRMENT
A CORRECT ORIENTATION

LUAS LINE

WESTERN WAY

KINGS INN PARK

FOOTPATH SHOULD BE FLUSHED WITH THE SIDE ROAD.
VERTICAL DEVIATIONS NO HIGHER THAN 5mm. A DISHED
KERB SHOULD BE PROVIDED

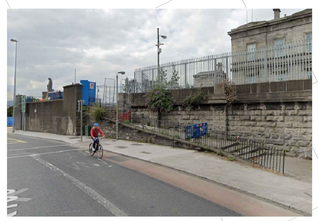
FOOTPATH INTERRUPTED BY CARS PARKED.
PROTECTIVE ELEMENTS SHOULD BE CONSIDERER
TO ALLOW PEOPLE WITH MOBILITY IMPAIRMENT TO PASS
IN A MINIMUM WITDH OF 1500MM WHEN OBSTACLES CAN
NOT BE REMOVED.

BROADSTONE GATE

CONSTITUTION HILL

PREBEND STREET

CHANGE IN LEVEL ADJACENT TO THE
FOOTPATH. GUARDRAILS TO BE RENOVATED
AND PROVIDE TACTILE PAVING TO WARN THE
START OF A EXTERIOR STAIR



DRAINAGE SYSTEM IS COINCIDENT WITH THE
FOOTPATH.CHECK GRADIENTS AND LOCATION
TO AVOID THE SURFACE TO BE SLIPPERY AND
ACCUMULATION OF WATER.

DUBLIN BUS DEPOT

0 5.0 10.0 20.0 30.0 40.0 50.0m

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MAP 16

UNCONTROLLED CROSSING. A DISHED KERB AND "BUFF" OR GREY TACTILE PAVING SHOULD BE CONSIDERED .
DEPTH OF 1.2 M, GRADIENT 1:12 MAX.
LEVEL DIFFERENCE OF DISHED KERB: 6MM

IN THE DESIGN PROPOSED A CYCLE TRACK WILL JOIN AT THIS POINT.
A SUITABLE SPOT SHOULD BE FOUND FOR THEIR RELOCATION IN THE SCHEME.
AS PER THE REQUIREMENTS OF DEPARTMENT OF TRANSPORT'S TRAFFIC SIGNS MANUAL.

UNCONTROLLED CROSSING. A DISHED KERB AND "BUFF" OR GREY TACTILE PAVING SHOULD BE CONSIDERED .
DEPTH OF 1.2 M, GRADIENT 1:12 MAX.
LEVEL DIFFERENCE OF DISHED KERB: 6MM

IN THE DESIGN PROPOSED, THE FOOTPATH IN THE CORNER BECOMES WIDER. STAGGERED CROSSINGS POINT IS RECOMMENDED WHEN POSSIBLE TO BE REMOVED.
A DIRECT CROSSING SHOULD BE COMFORTABLE AND AVOID PEOPLE TO GET STUCK. FOLLOW MEASURES OF ACCESSIBILITY FOR THE NEW CROSSING PROPOSED.(RED BLISTER TACTILE PAVING, DISHED KERBS, AUDIBLE SIGNALS, ETC.)

AN ALTERNATIVE LOCATION OF THE SIGNAL POLE SHOULD BE CONSIDERED. REDUCED WIDTH OH FOOTPATH < 1.20m.

DETERIORATING PAVEMENT
IN UNCONTROLLED CROSSING POINT.
DISHED KERB TO BE PROVIDED AND "BUFF" OR GREY TACTILE PAVING.

UNCONTROLLED CROSSING. A DISHED KERB AND "BUFF" OR GREY TACTILE PAVING SHOULD BE CONSIDERED .
DEPTH OF 1.2 M, GRADIENT 1:12 MAX.
LEVEL DIFFERENCE OF DISHED KERB: 6MM

STREET FURNITURE IN FOOTPATH: A MINIMUM WIDTH OF 1200 mm. SHOULD BE ENSURE IN A DISTANCE OF 2000m.
LOCATION OF POLES AND LIGHTING COLUMNS SHOULD BE RECONSIDERED.
BACK OF THE FOOTPATH OR EDGE BOUNDARY

IN CONTROLLED CROSSING THE FULL WIDTH OF THE DROPPED KERB SHOULD BE A MINIMUM OF 2.4 M.
AND THE STEM OF THE PAVING SHOULD BE EXTENDED TO THE BACK OF THE FOOTWAY TO INTERCEPT PEOPLE WHO MIGHT OTHERWISE WALK PAST THE FACILITY.
(CHAPTER 13. TRAFFIC MANAGEMENT GUIDELINES.DTO 2003)

DETERIORATING PAVEMENT
IN UNCONTROLLED CROSSING POINT.
DISHED KERB TO BE PROVIDED AND "BUFF" OR GREY TACTILE PAVING.

TACTILE HAZARD WARNING SURFACES SHOULD BE INCORPORATED
AT BOTH THE TOP AND BOTTOM LANDINGS.
A CORDUROY TACTILE WARNING SURFACE SHOULD BE PROVIDED. TGD M

0 5.0 10.0 20.0 30.0 40.0 50.0m

BAR SCALE

COLERAINE STREET
CHURCH STREET UPPER
CATHERINE LANE NORTH
BRUNSWICK STREET NORTH
KINGS STREET NORTH
NEW STREET NORTH
STIRRUP LANE
CHURCH TERRACE
NICHOLAS AVENUE

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MAP 17A

CRACKED PAVEMENT IN FOOTPATH BY THE ROOTS OF THE TREE. PAVEMENT SHOULD BE REPLACED AND CONSIDER TO USE MATERIALS FOR REINFORCE THE CONCRETE AROUND TREES WITH BIG TRUNKS.

IN CONTROLLED CROSSING THE FULL WIDTH OF THE DROPPED KERB SHOULD BE A MINIMUM OF 2.4 M. CHAMBER AND INSPECTION COVERS SHOULD BE LOCATED OUTSIDE THE CROSSING. (CHAPTER 13. TRAFFIC MANAGEMENT GUIDELINES.DTO 2003)

UNCONTROLLED CROSSING. A DISHED KERB AND "BUFF" OR GREY TACTILE PAVING SHOULD BE CONSIDERED . DEPTH OF 1.2 M, GRADIENT 1:12 MAX. LEVEL DIFFERENCE OF DISHED KERB: 6MM. DISTANCE BETWEEN BOLLARDS >1.20M.

THE STEM OF THE TACTILE SURFACE SHOULD EXTEND TO THE BACK OF THE FOOTWAY IN CONTROLLED CROSSING POINTS

UNCONTROLLED CROSSING. A DISHED KERB AND "BUFF" OR GREY TACTILE PAVING SHOULD BE CONSIDERED . DEPTH OF 1.2 M, GRADIENT 1:12 MAX. LEVEL DIFFERENCE OF DISHED KERB: 6MM

REFUGE ISLAND WITH A COMPLICATED MANEUVER FOR PEOPLE WITH MOBILITY IMPAIRMENT DUE TO THE REDUCED SPACE BETWEEN GUARDRAILS AND TRAFFIC SIGNALS. THE CONTROLLED CROSSING SHOULD BE UPDATED FOR A COMFORTABLE CROSSING WHERE PEDESTRIAN DO NOT GET STUCK.

FATHER MATTHEW SQUARE

CHURCH AVENUE WEST

MARY'S LANE

CHURCH STREET

CHANCERY STREET

MORGAN PLACE

INNS QUAY

CAPUCHIN FRIARY

MAY LANE

ST. MICHANS CHURCH

HAMMOND LANE

LAW LIBRARY BUILDING

PROPOSED SCHEME

Tie in to existing

FATHER MATHEW BRIDGE

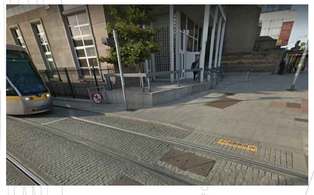
ARAN QUAY

CHANGE IN LEVEL ADJACENT TO THE FOOTPATH. TACTILE PAVING (CORDUROY) SHOULD BE PROVIDED TO WARN THE START/ END OF A EXTERIOR STAIR.

IM. 145

IN CONTROLLED CROSSING THE FULL WIDTH OF THE DROPPED KERB SHOULD BE A MINIMUM OF 2.4 M.

UNCONTROLLED CROSSING WITH LUAS WITH NO TACTILE PAVING AND PLATFORM EDGE (ON STREET) SHOULD BE CONSDIERED WITH A WARNING SURFACE FOR VISUALLY IMPAIRED PEOPLE.



THE CRACKED PAVEMENT IN THE FOOTPATH SHOUL BE REPAIRED AND VERTICAL DEVIATIONS OF MORE THAN 5MM. TO BE AVOIDED.

THE STEM OF THE TACTILE SURFACE SHOULD EXTEND TO THE BACK OF THE FOOTWAY IN CONTROLLED CROSSING POINTS. BEETWEEN STREET FURNITURE IS VERY UNCOMFORTABLE. NEW LOCATION SHOULD BE CONSIDERED.

0 5.0 10.0 20.0 30.0 40.0 50.0m

BAR SCALE

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

Date	Scale	Drawn	Checked	Approved
JUNE 2020	1:500 @ A1 1:1000 @ A3	FBH	MRG	EFD

Project Code	Originator Code	QMS Code
BCID	----	

Project Title: BUSCONNECTS INFRASTRUCTURE DUBLIN

Drawing Title: ROUTE 3: BALLYMUN TO CITY CENTRE ACCESSIBILITY AUDIT

Drawing File Reference	Sheet Number	Status	Rev
0003-BALLYMUN-2	17A of 18	S0	P01

DO NOT SCALE USE FIGURED DIMENSIONS ONLY

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