KUALA LUMPUR WALKWAY AND CYCLE LANE DESIGN GUIDELINES

DEWAN BANDARAYA
KUALA LUMPUR

KUALA LUMPUR WALKWAY AND CYCLE LANE DESIGN GUIDELINES

DEWAN BANDARAYA KUALA LUMPUR

DECEMBER 2019

CONTENTS

Chapter 01

INTRODUCTION

1

1.1 Aims of Walkway and Cycle Lane Design Guidelines

To promote equitable use of road space

Streets are meant for all users – regardless of travel modes or physical abilities. Hence, this document ensures that pedestrians and cyclists are not forgotten, and they have their rightful place on the road space.

To guarantee unobstructed, safe passages

Pedestrians and cyclists are the most vulnerable among road users. Physical obstructions on pedestrian walkway and bicycle lane may present inherent danger to their wellbeing. Hence, this document promotes good design practices that guarantee safe passages for both pedestrians and cyclists alike.

To ensure conformance to global standards

KL is a world-renown destination among tourist, local and international, as well as expatriates who chose to call KL home. Conformance to global standards, including in the design of walkway and bicycle lane, will make KL a truly global city where safety and user-friendliness are inherent traits.

1.2 Strategies of this Design Guidelines

1

Existing local specifications must be maintained or improved upon

This document does not replace or supersede existing guidelines published by relevant authorities e.g. JKR, REAM, PLANMalaysia, etc. Rather, this document builds upon existing guidelines to aid the application of design standards within Kuala Lumpur.

2

Fill the gap of existing guidelines

This document fills the gaps that were not addressed adequately within the existing design and engineering literatures. Where still relevant, existing standards or guidelines will be maintained and replicated.

3

Road hierarchies are important, so do user priorities

Hierarchies of road users, as gazetted in the Kuala Lumpur Urban Design Guidelines (KLUDG), are strictly adhered to. Designs are made to enforce correct priority level among road users.

4

SAFETY first! Safety must be consciously designed to guarantee protection

In this design document, safety is not a by-product. Instead, safety is the ultimate aim of this design guidelines and is consciously incorporated in all design considerations.

5

Functions over forms

As pedestrian walkway and cycling lane are public facilities, they must first be designed to serve their purpose (i.e. functions). Aesthetics (i.e. forms) are just embellishment that will improve the quality of the facilities.

1.3 Standards and Guidelines for Walkways and Bicycle Lane Infrastructures

Standards and guidelines are critical to ensure that pedestrian and bicycle infrastructure developments in Kuala Lumpur follow best practices that guarantee comfortable, enjoyable and safe walking and cycling experiences. These standards and guidelines also serve as reference to developers and contractors during development design and planning, thus, ensuring conformance to established global practices.

BEST PRACTICES

In developing standards and design guidelines for walkways and cycling lanes in Kuala Lumpur, several world-class standards and guidelines were referred to, among them:

1. National Association of City Transportation Officials (NACTO)(2011). Urban Bikeway Design Guide. USA
2. Transport for London (TfL)(2010). Pedestrian Comfort Guidance. United Kingdom.
3. Global Designing Cities Initiatives (2016). Global Street Design Guide. USA.
4. Institute of Transportation Engineers (ITE)(1998). Design and Safety of Pedestrian Safety. USA.

In the process of developing this document, the following are among local standards and guidelines that were referenced:

1. JKR (1985). Standard Traffic Signs. Arahan Teknik (Jalan 2A/85). Jabatan Kerja Raya. Kuala Lumpur.
2. JKR (1985). Traffic Sign Application. Arahan Teknik (Jalan 2B/85). Jabatan Kerja Raya. Kuala Lumpur.
3. JKR (1986). A Guide to the Design of Cycle Track. Arahan Teknik (Jalan) 10/86. Jabatan Kerja Raya. Kuala Lumpur
4. JKR (1997). Basic Guidelines on Pedestrian Facilities. Nota Teknik Jalan 18/97. Jabatan Kerja Raya. Kuala Lumpur.
5. REAM (2004). Guidelines and Traffic Control and Management Devices. Part 4: Pavement Marking and Delineation. Road Engineers Association of Malaysia. Kuala Lumpur.

1.4 Protecting the Pedestrians and Cyclists

Guaranteeing safe passage from origin to the final destination is the fundamental right of pedestrians and cyclists, as much as other road users. In the survey conducted for this master plan, the respondents identified safety and security as the most important criteria in their decision to walk or cycle. It is not difficult to understand why they chose travel safety and security as pedestrians and cyclists often are not protected from motorised traffic and physical elements like potholes which may lead to serious physical injuries or even death. Hence, the first action in this master plan is to ensure that this fundamental right to safe passage is first established and guaranteed.

Passive protection of pedestrians and cyclists from bodily injuries is accomplished through two design strategies – (1) enforcing correct priority level of road users and (2) establishing an adequate physical separation among road users. Desirably, with this passive design strategies, walking and cycling can be adopted as the preferred travel mode of the people of Kuala Lumpur.

1.4.1 Priority Level of Road Users

In a civil society, the higher the level of vulnerability of a road user to injuries, the higher the level of priority is assigned to that user category. Based on this, pedestrians has the highest priority level as they are the most vulnerable among all road users, and followed by cyclists. Trucks and other commercial vehicles has the lowest priority. This categorisation of priority levels as endorsed in Kuala Lumpur Urban Design Guidelines is given in Figure 1.1.

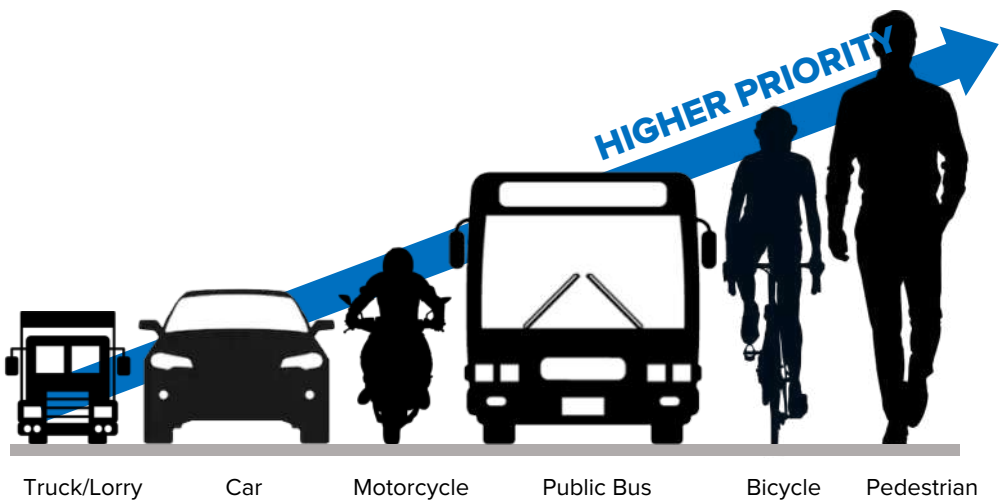


Figure 1.1: Hierarchy of Road Users Priority

1.4.2 Protected Zones

As pedestrians and cyclists are the most vulnerable to conflict with motorized traffic and physical objects, they must be protected through design and engineering standards.

A protected zone is defined as a space of 1.5 m wide × 2.5 m high that must be provided along the walkway and cycle lane to protect the pedestrians and cyclists, respectively (Figure 1.2).

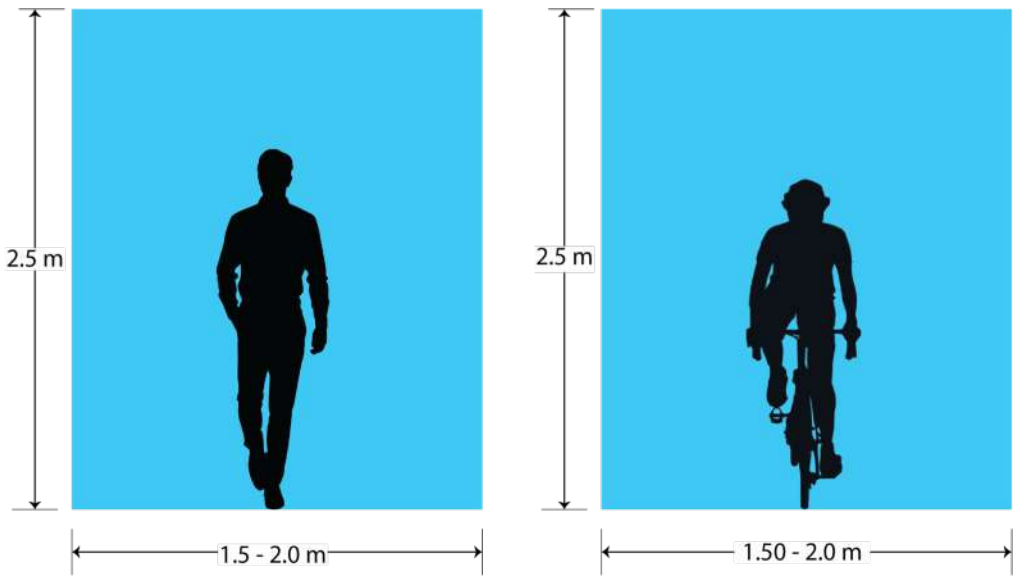


Figure 1.2: Protected Zones

If the minimum width is not attainable, then the width will extend to the full width of the facility. Within this protected zone, there shall not be any physical obstacles nor shall there be any potential conflict with motorised traffic that may hamper safe passage of pedestrians or cyclists.

1.4.3 Lateral and Spatial Separators

Once, the protected zones have been established, the safety of pedestrians and cyclists are further enhanced through the provision of lateral and spatial separation. The philosophy behind lateral separation is to establish exclusive zone to separate the non-motorized and motorized road users by using height differentiator. With this lateral separation, the probability of encroachment by other road users are minimized. In Figure 1.3, the lateral separation is achieved by having the pedestrian walkway and cycle lane at higher level than the carriageway. A minimum of 205 mm height is required for the lateral separation to safeguard the pedestrians and the cyclists from accidental encroachment by motorized vehicles.

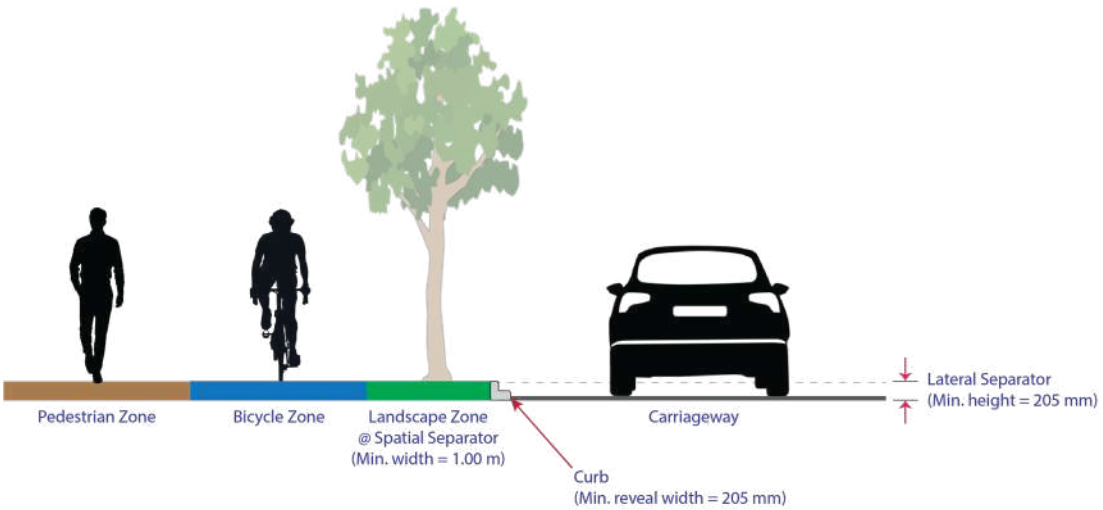


Figure 1.3: Lateral and Spatial Separators

The separation between non-motorised (i.e. pedestrians and cyclists) and the motorized traffics is further enhanced through the provision of a spatial separation. The combination of lateral and spatial separators brings the probability of illegal encroachment by motorised traffic even lower and can effectively absorb the impact of motorisation on non-motorised users. Figure 1.3 shows the landscape zone acting as a spatial separator between the motorized and the non-motorized traffics. Further, the buffer zone also acts as the space for placement of street furniture (e.g. signages, lamp posts, fire hydrant etc.), thus, freeing the pedestrian and bicycle zones from any obstacles.

The spatial separator has other uses than functioning as a buffer zone between motorized and non-motorized traffics. Where required, the buffer zone may be designed to also act as spaces for on-street parking of either motorcycles or cars. The on-street parking, indirectly, functions as a physical separator between the two different categories of road users.

1.4.4 Physical Separation

In locations where space is a major constraint, it might be impossible to provide a buffer zone to act as a spatial separator, thus compromising on the safety of the pedestrians and the cyclists. In this situation, the spatial separation may be replaced by erecting a non-climbable fence along the non-motorized zone as a form of physical separator between motorized and non-motorized traffics (Figure 1.4). To ensure its effectiveness, the non-climbable fence must have a minimum height of 1.0 m. This physical separator also acts as a barrier to prevent jaywalking among the unscrupulous pedestrians. However, where there are mid-block crossings, the physical separator may be disconnected to allow crossings of pedestrians. Notwithstanding this, a physical separator may be provided together with the spatial separator to maximize the safety level.

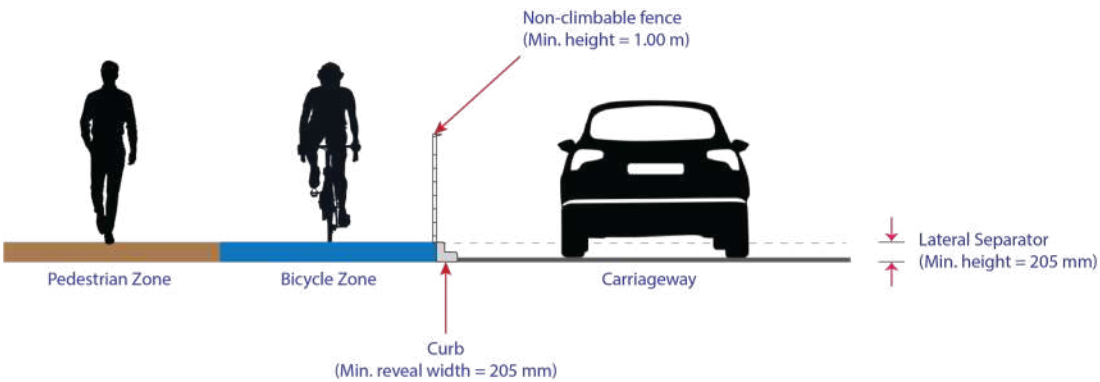


Figure 1.4: Non-climbable Fence as Physical Separator

BEST PRACTICES

The City of Utrecht in the Netherands practices clear seperation between motorised and non-motorised traffics. The use of lateral and spatial seperations are used wherever possible to provide safe and comfortable environment for both pedestrians and cyclists. Here, it can be seen that the buffer zone doubles-up as motorcycle parking area – making effective use of valuable spaces.

Chapter 02
SIGNAGES

2

2.1 Specifications

Currently, there are limited road symbols and signages that guide motorists and provide relevant information regarding pedestrians and cyclists movement on the road. The lack of appropriate signages for pedestrians and cyclists as compared to motorized traffic attach a seemingly higher importance to motorists rather than pedestrians and cyclists. This is a potential cause for Malaysians to consider motorized traffic to have higher priorities than pedestrian and bicycle traffic.

To reverse the misleading sense of priorities to motorists, several new road signages are proposed. These new road symbols and signages provide enhanced locational and situational awareness, not only to motorists but also, to pedestrians and cyclists.

2.1.1 Categories of Signages

The new road symbols and signages follow global standards and best practices. The adherence to global standards is important as Kuala Lumpur receives significant number international tourists and expatriates annually. These symbols and signages are divided into three (3) categories for easy referencing and future enhancements (refer to Table 2.1). Within the three categories, road symbols and signages have been created to regulate, warn and provide guidance and information to pedestrians, cyclists as well as motorists.

Table 2.1: Categories of signages and their purpose

Signage Category	Signage Category Code	Purpose
Regulatory	R	To notify road users of traffic rules and laws being enforced in a particular location or area
Warning	W	To caution and alert road users of possible conflicts or critical situations
Guidance	G	To provide locational and situational knowledge and information that are useful to road users

2.1.2 Placement of Signages

Unhindered and comfortable passages are the basic rights of pedestrians and cyclists. To guarantee such an environment within walkway and cycling lane, signages must be placed at safe distances and heights. A minimum lateral distance of 600 mm must be provided between pedestrian/cyclists from the outer dimension of the sign. Additionally, a minimum height of 2120 mm must be provided to ensure overhead clearance for both pedestrians and cyclists (Figure 2.1).

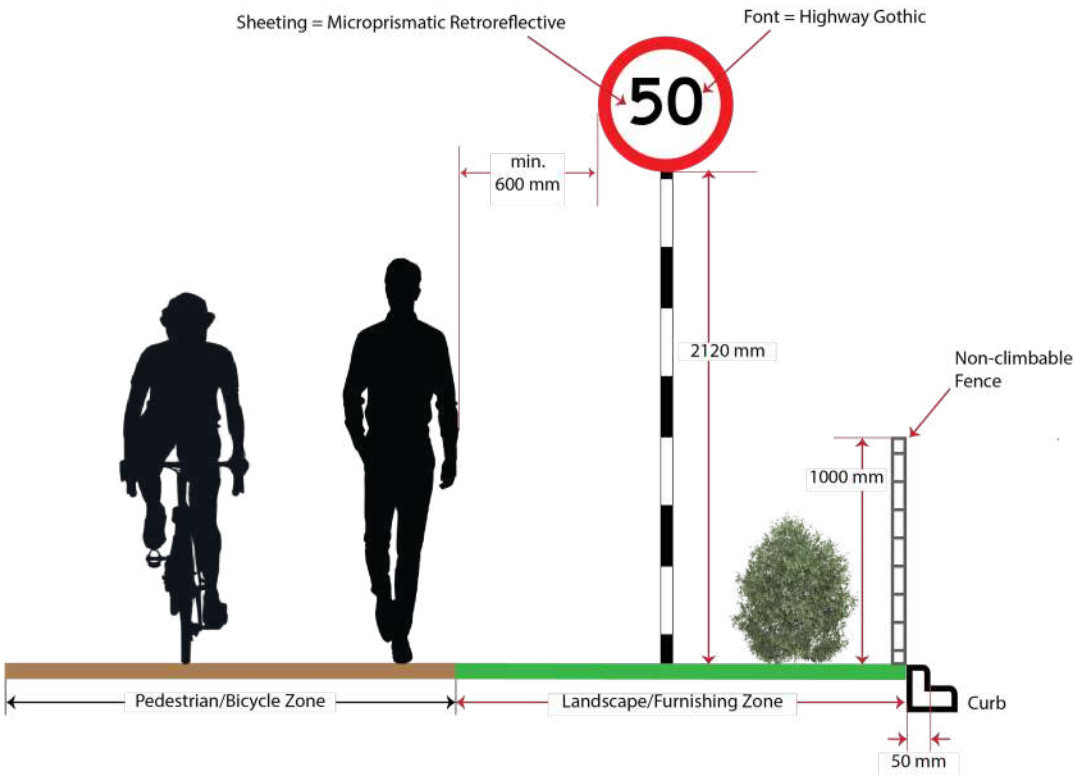


Figure 2.1: General Signage Specifications

If there is no lighting for the signage, the face of the signage must use Microprismatic Retroreflective sheeting to provide adequate luminance to the users during nighttime.

2.1.3 Typeface

Following the recommendation of the Federal Highway Administration (FHWA) of the United States of America and published in the Manual of the Uniform Traffic Control Devices (MUTCD), all traffic signages must use the Highway Gothic typeface.

The Highway Gothic typeface has been evaluated and proven through various studies to be superior in terms of clarity and legibility when read from a distance as well as during adverse weather condition. Figure 2.3 shows three examples of road signages with the Highway Gothic typeface.

Highway Gothic

ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz
1234567890

Figure 2.2: Characters and Digits of the Highway Gothic Typeface

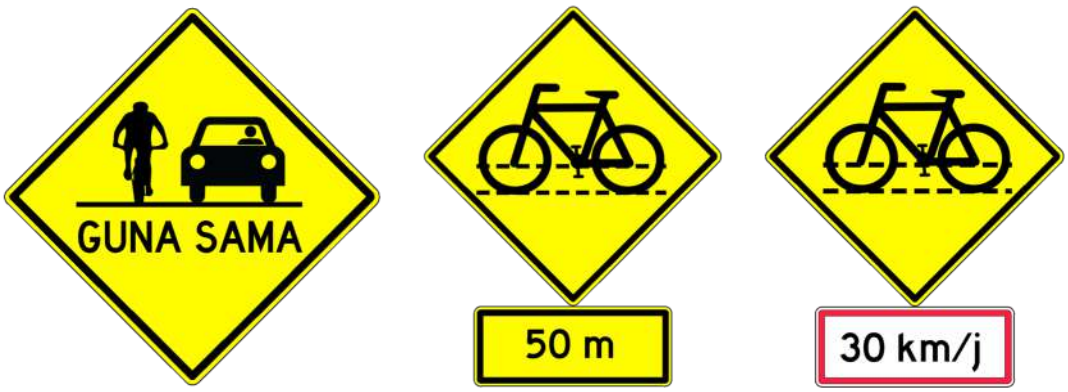


Figure 2.3: Examples of Signages using Highway Gothic Typeface

2.1.4 Colour Specification

Colours create meaning in traffic signages. Unfortunately, as there are no specific chromatic standards on the use of colours on traffic signages within existing local standards, users can see myriad of colours on Malaysian traffic signages.

To provide some form of standardization, Table 2.2 provides colour codes and their representation in the CMYK and RGB notations. The meaning of each of the colours are also provided for reference.

Table 2.2: Colour Specification

Colour	Meaning	CMYK RGB	Sample
Black	Regulation	C0 M0 Y0 K100 R0 G0 B0	
Blue	Recreational and cultural interest area guide	C100 M44 Y0 K0 R0 G121 B193	
Fluorescent Yellow	Pedestrian warning, bicycle warning, playground warning, school warning	C20 M0 Y100 K0 R215 G223 B33	
Green	Indicated movements permitted, direction guidance	C100 M0 Y91 K42 R0 G112 B60	
Orange	Temporary traffic control	C0 M40 Y90 K0 R250 G166 B52	
Red	Stop or prohibition	C100 M44 Y0 K0 R227 G24 B55	
White	Regulation	C0 M0 Y0 K0 R255 G255 B255	
Yellow	Warning	C0 M16 Y100 K0 R255 G210 B0	

(Source: Manual on Uniform Traffic Control Devices, FHWA, 2009)

2.1.5 Colour Schemes

Traffic signages have specific colour schemes, achieved through the combination of different colours. Each scheme conveys specific meaning. Thus, strict adherence to the colour schemes cannot be overemphasized as it guarantees consistency and standardization of meanings, thus avoiding confusion among road users.

Table 2.3 shows the application of combining colour specifications to create different colour schemes, each having a specific application and/or meaning.

Table 2.3: Colour Schemes

Colour Scheme	Application/Meaning
Red on White background (or, vice versa)	▪ Prohibitive ▪ Warning for extreme danger
White on Blue background	▪ Mandatory ▪ Directive (destination and distance) ▪ Inform on general services.
White on Green background	▪ Inform on river names ▪ Inform on historical or cultural interest areas
Yellow on Dark Green background	▪ Inform on recreational areas
Black on White background	▪ Prohibitive for some cases ▪ Inform on town names
Black on Yellow background	▪ Warning
Black on Orange background	▪ Temporary
Red on Blue background	▪ Prohibitive for some cases

(Source: Manual on Uniform Traffic Control Devices, FHWA, 2009)

2.1.6 Shapes of Signages

Traffic signages comes in different shapes. Combined with colours, shapes enhances as well as emphasizes meaning of the signages. Table 2.3 provides the guidance on the choice of shapes to convey specific meaning to the road users.

Table 2.3: Shape Specifications for Traffic Signages

Shapes	Meaning	Size
Octagon	Stop	Width = 600 mm (min), 900 mm (other)
Equilateral Triangle	Yield	Width = 600 mm (min), 750 mm (normal)
Circle	Advance Warning	Dia. = 600 mm (min), 750 mm (normal)
Pentagon (pointed up, square bottom)	School Advance Warning	
Diamond	Warning	Width = 400 mm (min), 600 mm (normal)
Rectangle (including square)	Regulatory	Depends

(Source: Manual on Uniform Traffic Control Devices, FHWA, 2009)

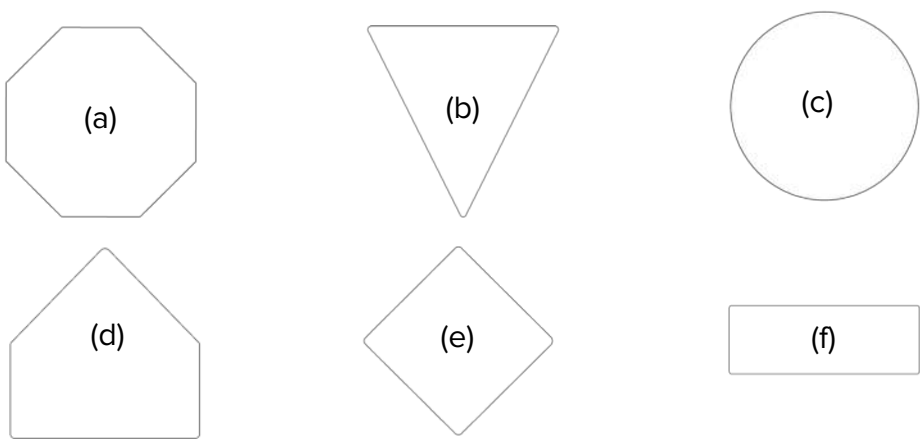


Figure 2.4: Shapes used in Traffic Signages – (a) octagon, (b) equilateral triangle, (c) circle, (d) pentagon pointed-upward, (e) diamond and (f) rectangle

2.2 Regulatory Signages

Regulatory signages are meant to inform road users of enforced road traffic law or regulations that must be abided at all time. Table 2.4 lists the regulatory signages:

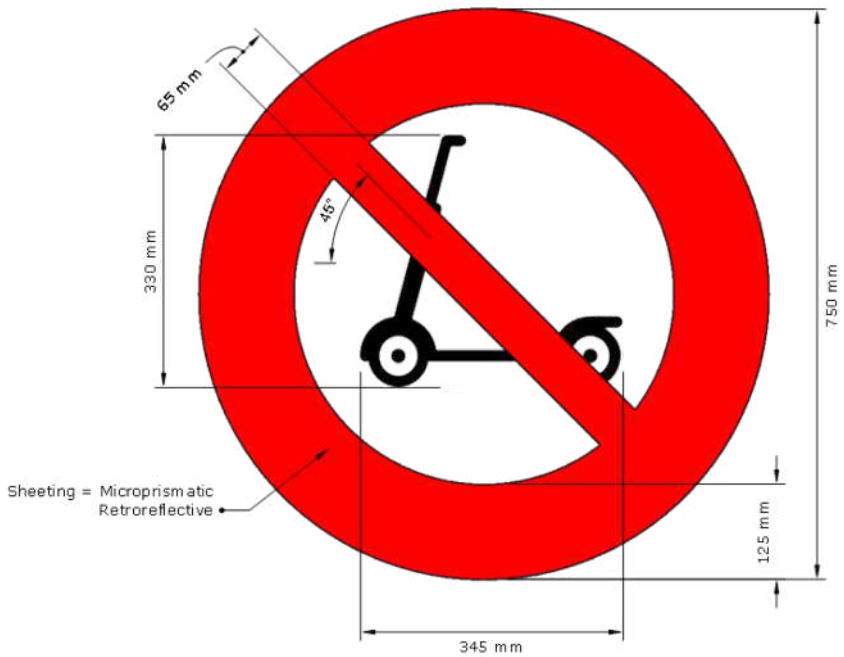
Table 2.4: List of Regulatory Signages

Code	Title	Description
R1.0	Bicycle Prohibited	Bicycles are not permitted to park within or enter into within an area/facility
R2.0	E-Scooter and PMD Prohibited	E-Scooter and Personal Mobility Devices (PMD)(e.g. hoverboard, skateboard, etc.) are not permitted to park within or enter into an area/facility

2.2.1 Bicycle Prohibited (R1-0)

Code	R1-0
Title	Bicycle Prohibited
Target User(s)	Cyclists
Description	Bicycles are not permitted to park within or enter into an area or facility as there might be potential conflict with other road users e.g. pedestrians.
Shape	Circle
Colour Scheme	▪ Red border on White background ▪ Black symbol
Placement	▪ On carriageway ▪ On pedestrian walkway ▪ Building areas ▪ Parks and recreational areas ▪ Any other places where bicycles are not permitted

2.2.2 E-Scooter and PMD Prohibited (R2-0)



Code	R2-0
Title	E-Scooter and PMD Prohibited
Target User(s)	E-Scooter and Personal Mobility Devices (PMD) users
Description	E-Scooter and other Personal Mobility Devices (PMD)(e.g. hoverboard, skateboard, etc.) are not permitted to park or enter within an area/facility.
Shape	Circle
Colour Scheme	▪ Red border on White background ▪ Black symbol
Placement	▪ On carriageway ▪ On pedestrian walkway ▪ Building areas ▪ Parks and recreational areas ▪ Any other places where these mobility devices are not permitted

2.3 Warning Signages

Warning signages alert and notify motorists of potential conflicts which may be risky and hazardous to the pedestrians and/or cyclists. As these warning signages are mostly targeted at motorists, they are normally placed along the carriageway. Table 2.5 lists the warning signages and their meaning:

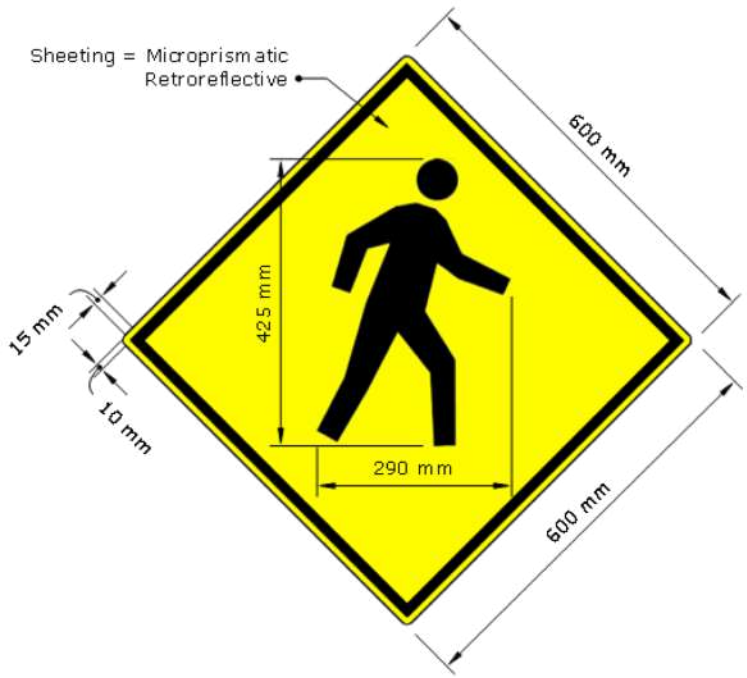
Table 2.5: Warning Signages

Code	Title	Description
W1-0	Pedestrian Zone	Warning motorists that they are in area with pedestrians movements and activities
W1-1	Pedestrian Crossing Zone	Warning motorists of pedestrian crossing movement ahead.
W1-2	Distance to Pedestrian Crossing	Alerting motorists that they are approaching a pedestrian crossing facility within the notified distance.
W1-3	Pedestrian Crossing Here	Alerting motorists that pedestrian crossing movement is at this point and priority is given to pedestrians.
W1-4	Speed Limit at Pedestrian Crossing	Reminding motorists of the enforced speed limit at the pedestrian crossing zone.
W2-0	Bicycle Zone	Cautioning motorists that there are bicycle movements and activities in the area
W2-1	Bicycle Crossing	Warning motorists of bicycle crossing movement resulting in potential conflict.
W2-2	Distance to Bicycle Crossing	Alerting motorists that they are approaching a bicycle crossing facility within the notified distance.
W2-3	Bicycle Crossing Here	Alerting motorists that bicycle crossing movement is at this point and priority is given to cyclists.
W2-4	Speed Limit at Bicycle Crossing	Reminding motorists of the enforced speed limit at the bicycle crossing zone.

Table 2.5: Warning Signages (*continued*)

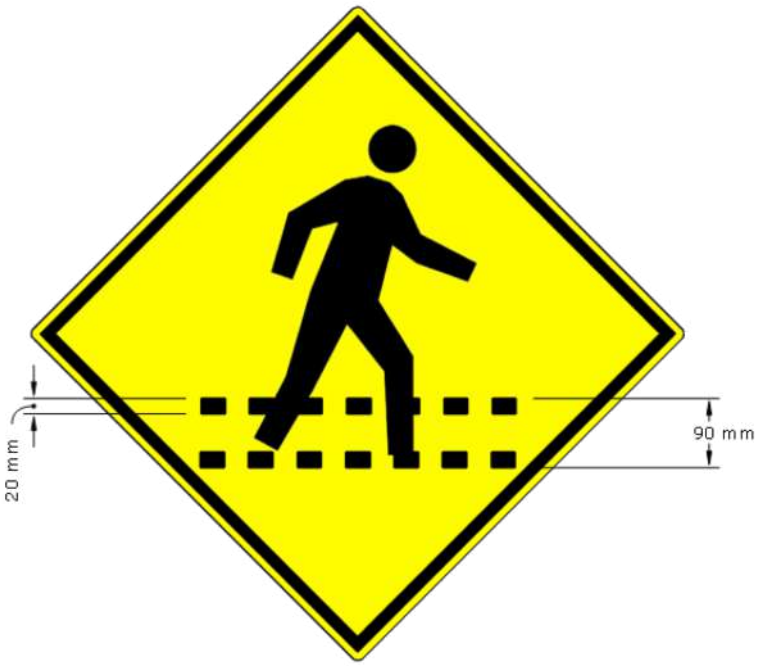
Code	Title	Description
W3-0	Bicycle-Car Shared Lane	To warn motorists that the lane next to the curb is shared between bicycle and motorised vehicles.
W3-1	Bicycle-Car Shared Lane with Priority Notice	To alert motorists that priority should be given to cyclists along the entire bicycle-car shared lane.
W3-2	Bicycle-Car Shared Lane with No Stopping Sign	To remind motorists that stopping of vehicles along the shared lane is prohibited and will be enforced.
W4-0	School Zone	To warn motorists that they are entering a school zone where there will school children present.
W4-1	Speed Limit at School Zone	Reminding motorists of the enforced speed limit at the school zone.

2.3.1 Pedestrian Zone (W1-0)



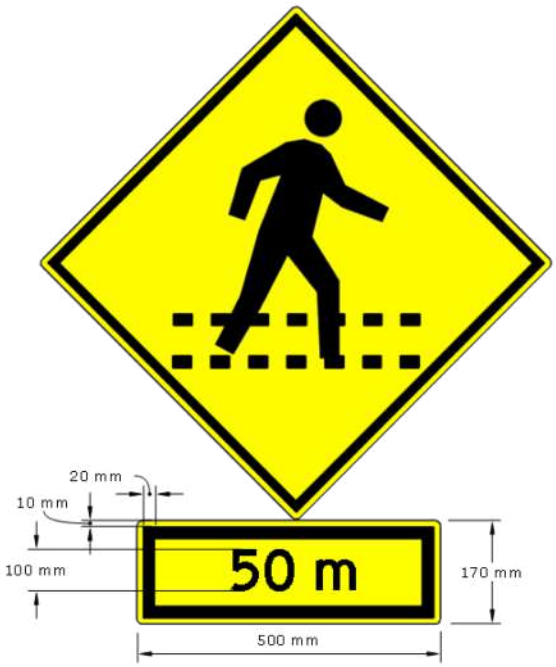
Code	W1-0
Title	Pedestrian Zone
Target User(s)	Motorists
Description	Provides warning to motorists and other road users of pedestrian movements and activities in the area. Potential conflicts with pedestrians might be present. Motorists are advised to exercise extreme caution! This is the base sign for pedestrian warning signages.
Shape	Diamond
Colour Scheme	▪ Black border on Yellow/Fluorescent Yellow background ▪ Black symbol
Placement	On curb facing the motorists

2.3.2 Pedestrian Crossing Zone (W1-1)



Code	W1-1
Title	Pedestrian Crossing Zone
Target User(s)	Motorists
Description	Provides warning to motorists that they are entering a pedestrian crossing zone and there will be potential conflicts with pedestrians. Extreme caution is required!
Shape	Diamond
Colour Scheme	▪ Black border on Yellow/Fluorescent Yellow background ▪ Black symbol
Placement	On curb facing the motorists

2.3.3 Distance to Pedestrian Crossing (W1-2)

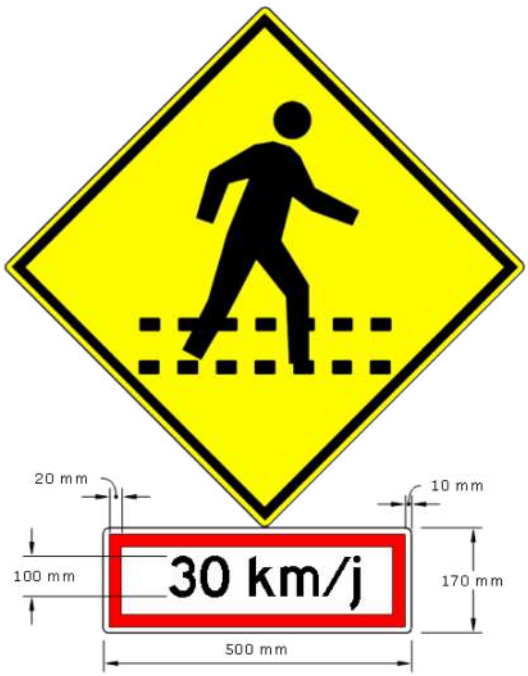


Code	W1-2
Title	Distance to Pedestrian Crossing
Target User(s)	Motorists
Description	Alerting motorists that they are approaching a pedestrian crossing facility within 50 m.
Application	The motorists are informed that the location of the pedestrian crossing facility (e.g. zebra crossing) is 50 m ahead. Extreme caution is required.
Shape	Diamond and Rectangle
Colour Scheme	▪ Black border on Yellow/Fluorescent Yellow background for diamond ▪ Black border on Yellow/Fluorescent Yellow background for rectangle ▪ Black symbol and letter
Placement	On curb facing the motorists 50 m from the pedestrian crossing

2.3.4 Pedestrian Crossing Here (W1-3)

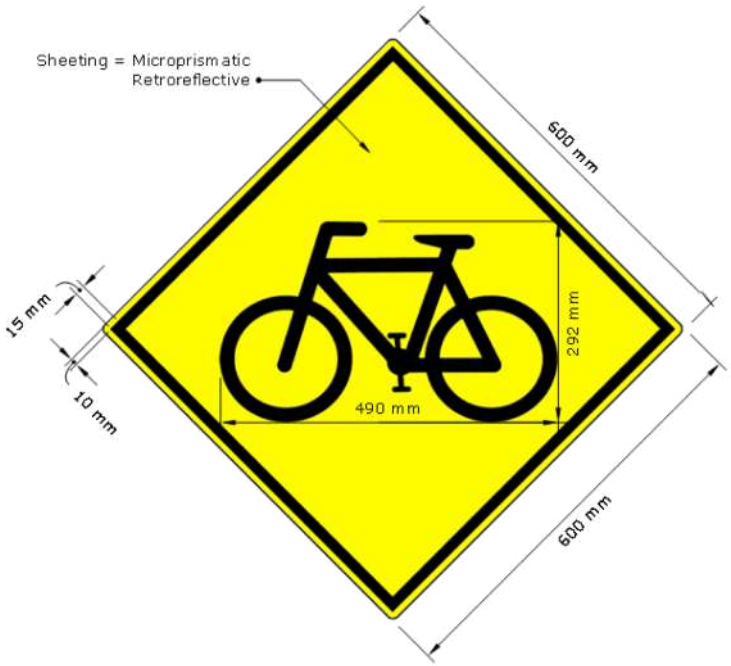
Code	W1-3
Title	Pedestrian Crossing Here
Target User(s)	Motorists
Description	Alerting motorists that pedestrian crossing movement is at this point and priority is given to pedestrians. Extreme caution is required.
Shape	Diamond and Rectangle
Colour Scheme	▪ Black border on Yellow/Fluorescent Yellow background for diamond ▪ Black border on Yellow/Fluorescent Yellow background for rectangle ▪ Black symbol
Placement	On curb facing the motorists

2.3.5 Speed Limit at Pedestrian Crossing Zone (W1-4)



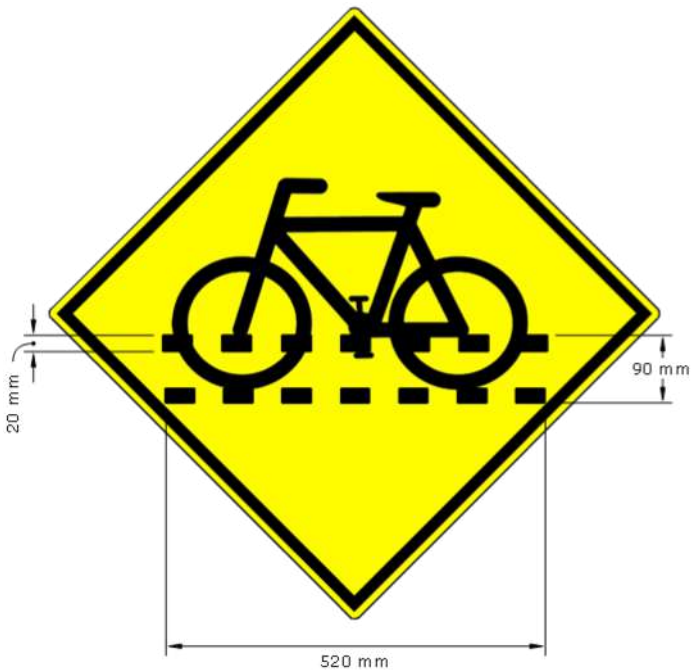
Code	W1-4
Title	Speed Limit at Pedestrian Crossing Zone
Target User(s)	Motorists
Description	Warn motorists of the enforced speed limit within a pedestrian crossing zone. Extreme caution is required, and priority is given to the pedestrian.
Shape	Diamond and Rectangle
Colour Scheme	▪ Black border on Yellow/Fluorescent Yellow background for diamond ▪ Red border on White background for the rectangle ▪ Black symbol and letter
Placement	On curb facing the motorists

2.3.6 Bicycle Zone (W2-0)



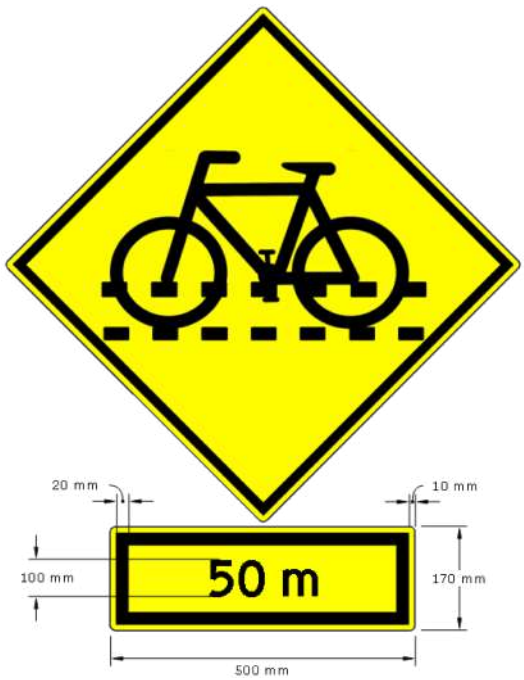
Code	W2-0
Title	Bicycle Zone
Target User(s)	Motorists
Description	To warn motorists that they are entering a bicycle zone – an area where there are bicycle movements and activities. Potential conflicts with bicycles might be present. Motorists are advised to exercise extreme caution!
Shape	Diamond
Colour Scheme	▪ Black border on Yellow/Fluorescent Yellow background ▪ Black symbol
Placement	On curb facing the motorists

2.3.7 Bicycle Crossing Zone (W2-1)



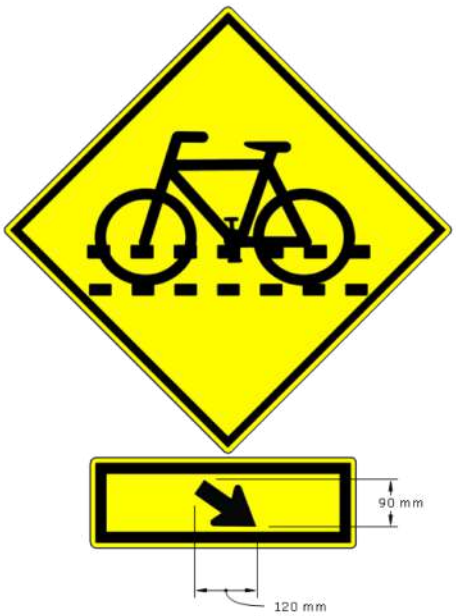
Code	W2-1
Title	Bicycle Crossing Zone
Target User(s)	Motorists
Description	The motorists are reminded that they are entering bicycle crossing zone. Bicycle crossing movement ahead.
Shape	Diamond
Colour Scheme	▪ Black border on Yellow/Fluorescent Yellow background for diamond ▪ Black symbol
Placement	On curb facing the motorists

2.3.8 Distance to Bicycle Crossing (W2-2)



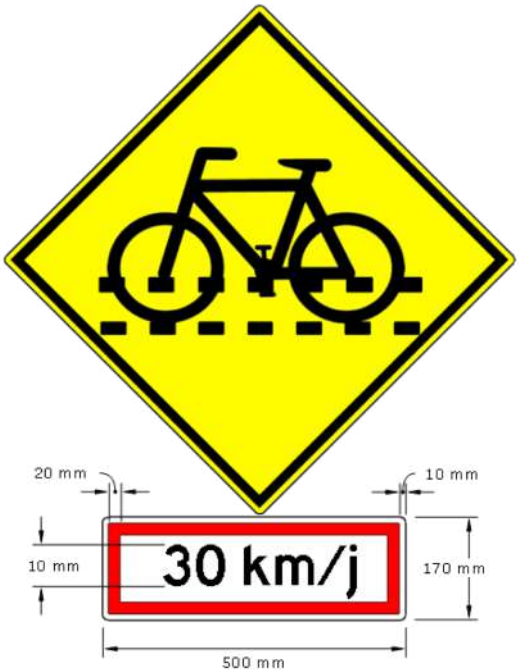
Code	W2-2
Title	Distance to Bicycle Crossing
Target User(s)	Motorists
Description	The motorists are informed that the location of the bicycle crossing facility (e.g. zebra crossing) is 50 m ahead. Extreme caution is required.
Shape	Diamond and Rectangle
Colour Scheme	▪ Black border on Yellow/Fluorescent Yellow background for diamond ▪ Black border on Yellow/Fluorescent Yellow background for rectangle ▪ Black symbol and letter
Placement	On curb facing the motorists 50 m from the bicycle crossing

2.3.9 Bicycle Crossing Here (W2-3)



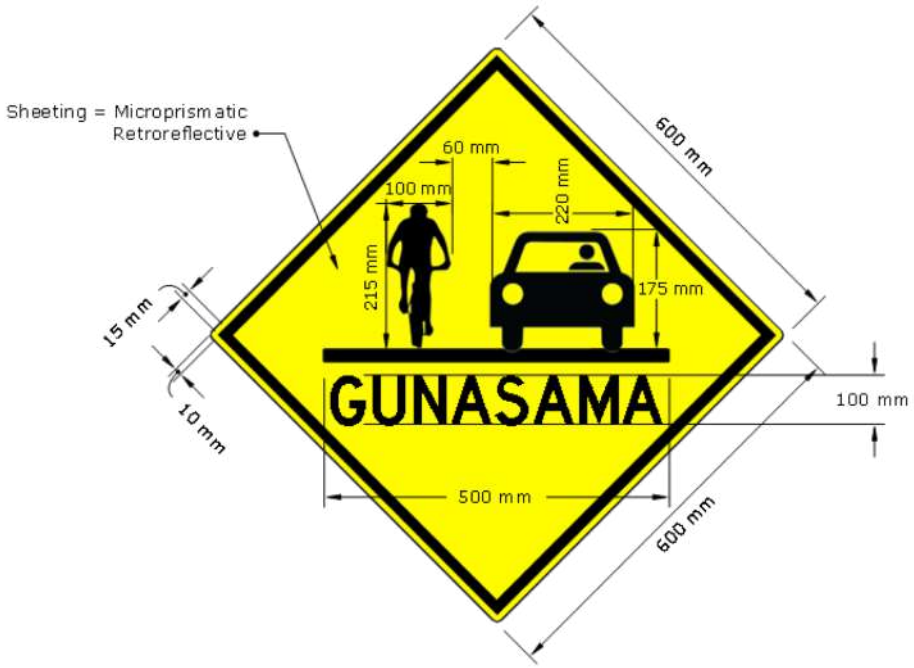
Code	W2-3
Title	Bicycle Crossing Here
Target User(s)	Motorists
Description	Alerting motorists that bicycle crossing movement is at this point and priority is given to pedestrians.
Application	The motorists are informed that the location of the bicycle crossing facility (e.g. zebra crossing) is at this location. Extreme caution is required, and priority is given to the bicycle.
Shape	Diamond and Rectangle
Colour Scheme	▪ Black border on Yellow/Fluorescent Yellow background for diamond ▪ Black border on Yellow/Fluorescent Yellow background for rectangle ▪ Black symbol
Placement	On curb facing the motorists

2.3.10 Speed Limit at Bicycle Crossing Zone (W2.4)



Code	W2.4
Title	Speed Limit at Bicycle Crossing Zone
Target User(s)	Motorists
Description	Warn motorists of the enforced speed limit within a bicycle crossing zone.
Application	The motorists are reminded of the speed limit at the bicycle crossing zone. Extreme caution is required, and priority is given to the bicycle.
Shape	Diamond and Rectangle
Colour Scheme	▪ Black border on Yellow/Fluorescent Yellow background for diamond ▪ Red border on White background for the rectangle. ▪ Black symbol and letter
Placement	On curb facing the motorists

2.3.11 Bicycle-Car Shared Lane (W3-0)



Code	W3-0
Title	Bicycle-Car Shared Lane
Target User(s)	Motorists and Cyclists
Description	Used on carriageway where the leftmost lane is a shared facility between cyclists and motor vehicles. However, the cyclists have priority of movement and have right-of-way. This is the base signage for shared-lane signages.
Shape	Diamond
Colour Scheme	▪ Black border on Yellow/Fluorescent Yellow background ▪ Black symbol and letter
Placement	On curb facing the motorists

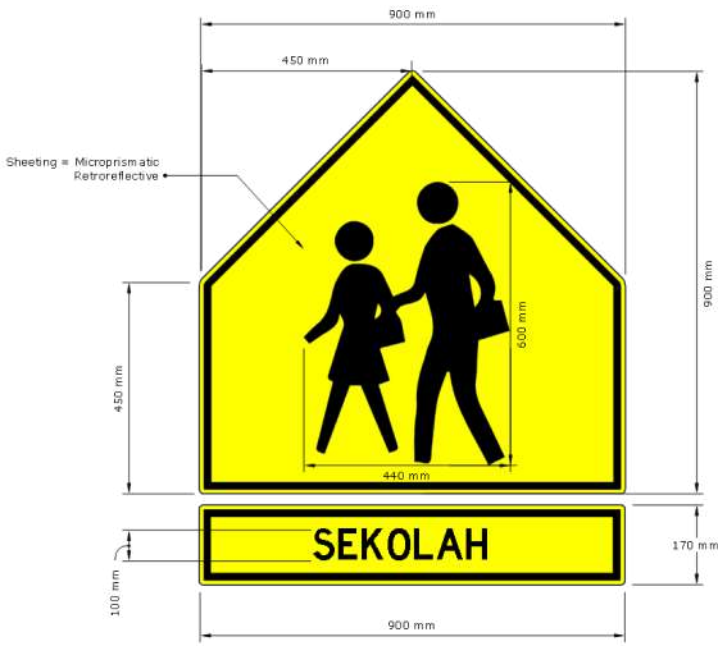
2.3.12 Bicycle-Car Shared Lane with Priority Notice (W3-1)

Code	W3-1
Title	Bicycle-Car Shared Lane with Priority Notice
Target User(s)	Motorists and Cyclists
Description	The leftmost lane is a shared facility between cyclists and motor vehicles and priority of movement should be given to the cyclists.
Application	To warn road users that the leftmost lane is a shared facility for cyclists and motor vehicles. Along this lane, the cyclists have priority of movement and have right-of-way.
Shape	Diamond and Rectangle
Colour Scheme	▪ Black border on Yellow/Fluorescent Yellow background for diamond ▪ Black border on Yellow/Fluorescent Yellow background for rectangle ▪ Black symbol and letter
Placement	On curb facing the motorists

2.3.13 Bicycle-Car Shared Lane with No Stopping Sign (W3-2)

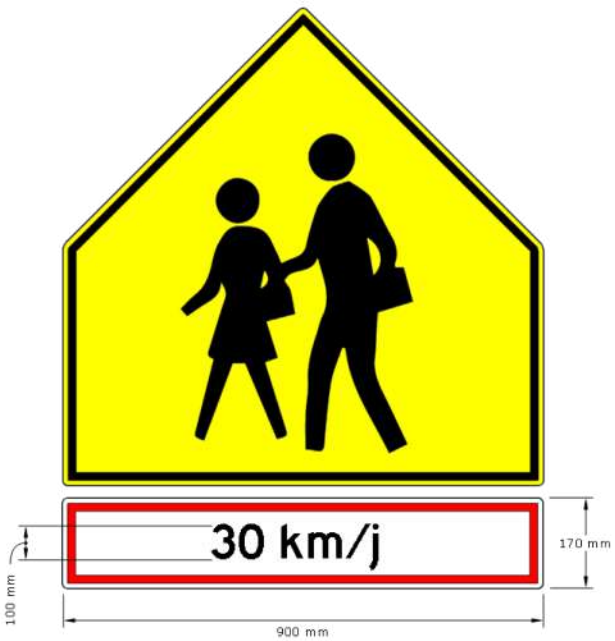
Code	W3-2
Title	Bicycle-Car Shared Lane with No Stopping Sign
Target User(s)	Motorists and Cyclists
Description	Warn road users that the leftmost lane is a shared facility between cyclists and motor vehicles. Also, motorists are prohibited to stop or park their vehicles along this lane at all time. Stopped or parked vehicles pose safety hazard to cyclists.
Shape	Diamond and Circle
Colour Scheme	▪ Black border on Yellow/Fluorescent Yellow background for diamond ▪ Red border on Blue background for circle ▪ Black symbol and letter
Placement	On curb facing the motorists

2.3.14 School Zone (W4-0)



Code	W4-0
Title	School Zone
Target User(s)	Motorists and Cyclists
Description	To warn road users that they are entering a school zone where there will be school children movements. Hence, road users must exercise extreme caution. Also, there will be specific regulations that are enforced within this zone (e.g. speed limit)
Shape	Pointed upward pentagon and rectangle
Colour Scheme	▪ Black border on Yellow/Fluorescent Yellow background for pentagon ▪ Black border on Yellow/Fluorescent Yellow background for rectangle ▪ Black symbol and letter
Placement	On curb facing the motorists on all roads leading to a school

2.3.15 School Zone with Speed Limit (W4-1)



Code	W4-1
Title	School Zone with Speed Limit
Target User(s)	Motorists and Cyclists
Description	Warn road users that, within the school zone, there is an enforced speed limit of 30 km/h. Road users are also advised to exercise extreme caution when entering the school zone as there are school children movements.
Shape	Pentagon (pointed-up) and Rectangle
Colour Scheme	▪ Black border on Yellow/Fluorescent Yellow background for pointed-upward pentagon ▪ Red border on white background for rectangle ▪ Black symbol and letter
Placement	On curb facing the motorists on all roads leading to a school

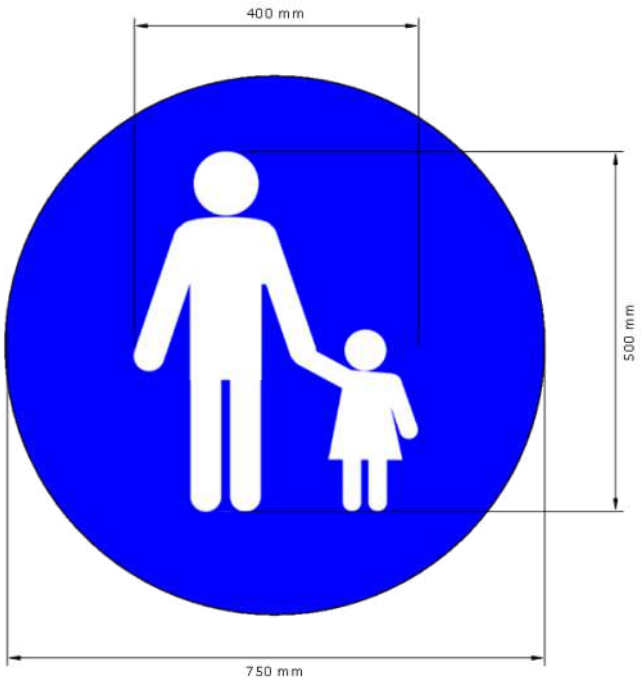
2.4 Guidance Signages

Warning signages alert and notify motorists of potential conflicts which may be risky and hazardous to the pedestrians and/or cyclists. As these warning signages are mostly targeted at motorists, they are normally placed along the carriageway. Table 2.6 lists the warning signages and their applications:

Table 2.4: List of Regulatory Signages

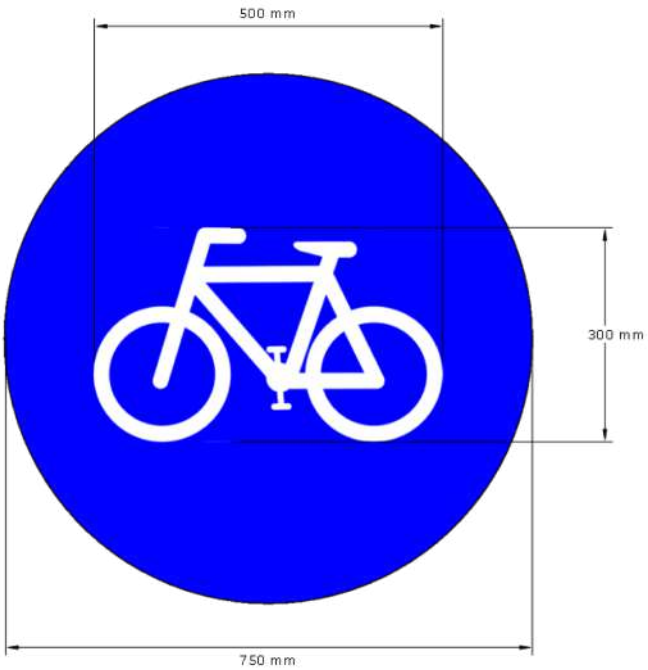
Code	Title	Description
G1-0	Dedicated Pedestrian Walkway	Denote facility where only pedestrians are allowed. Bicycles and other vehicles are prohibited
G2-0	Dedicated Cycling Lane	Facility dedicated to the use of bicycles and other personal mobility devices (e.g. e-scooter)
G3-0	Dedicated Pedestrian Walkway and Cycling Lane	A shared facility where both pedestrians and cyclists have their own dedicated lane separated by a marker.
G4-0	Shared Pedestrian and Bicycle Lane	A facility where both pedestrians and cyclists share a common lane.
G4-1	Shared Pedestrian and Bicycle Lane with Priority Notice	Within a shared facility for pedestrians and bicycles, the pedestrians have priority of movement and the cyclists must give way.
G5-0	Bicycle Parking Area	A facility for bicycle parking. Parking of other personal mobility devices (e.g. e-scooters) are also allowed here.

2.4.1 Dedicated Pedestrian Walkway (G1-0)



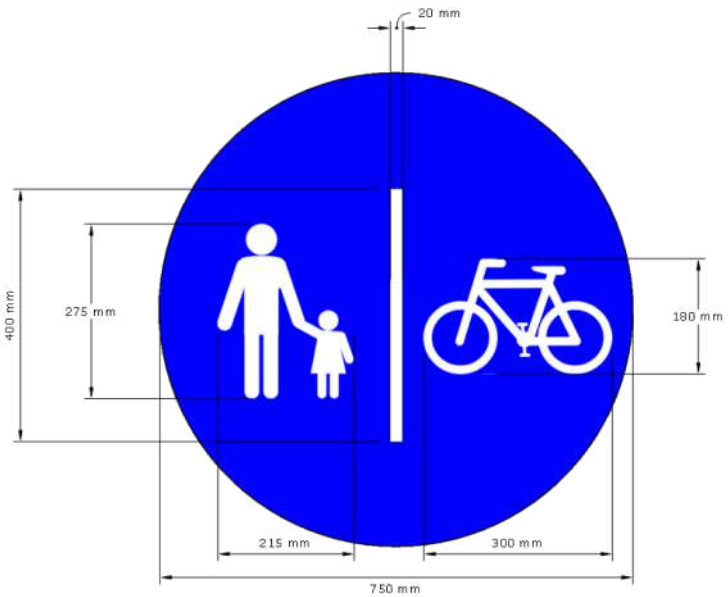
Code	G1-0
Title	Dedicated Pedestrian Walkway
Target User(s)	All road users
Description	Denote facility where only pedestrians are allowed. Bicycles, personal mobility devices (PMD)(e.g. e-scooter, hoverboard, etc.) and other vehicles, motorised and non-motorised, are prohibited from entering and using the facility.
Shape	Circle
Colour Scheme	▪ Blue background for circle ▪ White symbol
Placement	On the pedestrian walkway, closest to the curb, facing both direction of pedestrian movements. Placed at the start of the facility and at every 200 m interval after that.

2.4.2 Dedicated Bicycle Lane (G2-0)



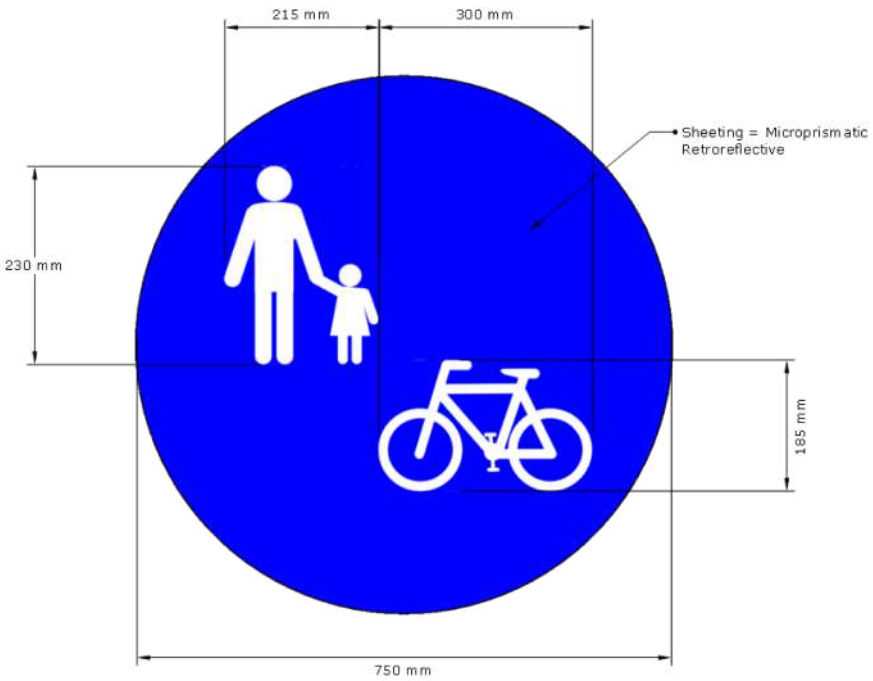
Code	G2-0
Title	Dedicated Bicycle Lane
Target User(s)	All road users
Description	Inform road users this facility is dedicated for the sole use of bicycles and personal mobility devices e.g. e-scooter. Other forms of mobility, including pedestrians, are not permitted on this facility all the time.
Shape	Circle
Colour Scheme	▪ Blue background for circle ▪ White symbol
Placement	On the bicycle lane, closest to the curb, facing both direction of pedestrian movements. Placed at the start of the facility and at every 200 m interval after that.

2.4.3 Dedicated Pedestrian Walkway and Bicycle Lane (G3-0)



Code	G3-0
Title	Dedicated Pedestrian Walkway and Bicycle Lane
Target User(s)	All road users
Description	To guide both pedestrians and cyclists that a dedicated walkway and a dedicated bicycle lane is available and they are separated by a marker. Pedestrians should not enter the bicycle lane and vice versa.
Shape	Circle
Colour Scheme	▪ Blue background for circle ▪ White symbol
Placement	On the facility, closest to the curb. Placed at the start of the facility and at every 200 m interval after that.

2.4.4 Shared Pedestrian and Bicycle Lane (G4-0)

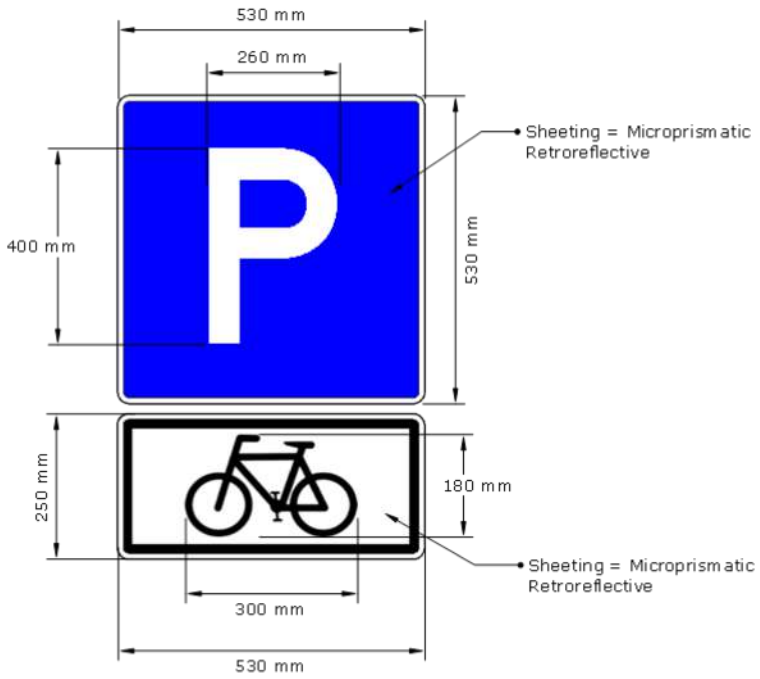


Code	G4-0
Title	Shared Pedestrian and Bicycle Lane
Target User(s)	All road users
Description	A facility where both pedestrians and cyclists share a common lane. Pedestrians have higher priority and cyclists must always give way to pedestrians.
Application	To inform users that the facility is shared by both pedestrians and bicycles. Both pedestrians and cyclists must be aware of the other's presence.
Shape	Circle
Colour Scheme	▪ Blue background for circle ▪ White symbol
Placement	On the facility, closest to the curb. Placed at the start of the facility and at every 200 m interval after that.

2.4.5 Shared Pedestrian and Bicycle Lane with Priority Notice (G4-1)

Code	G4-1
Title	Shared Pedestrian and Bicycle Lane
Target User(s)	All road users
Description	To inform users that the facility is shared by both pedestrians and bicycles. Within this shared facility, the pedestrians have higher priority and cyclists must always give way to pedestrians.
Shape	Circle and Rectangle
Colour Scheme	▪ Blue background for circle ▪ Black border on Yellow/Fluorescent Yellow for rectangle ▪ White symbol and black letter
Placement	On the facility, closest to the curb. Placed at the start of the facility and at every 200 m interval after that.

2.4.6 Bicycle Parking Area (G5-0)



Code	G5-0
Title	Bicycle Parking Area
Target User(s)	Cyclists
Description	Bicycle parking is allowed only at location where this signage is posted. Parking of other personal mobility devices (e.g. e-scooter) are also allowed at this location. Bicycle parking is not allowed outside this facility.
Shape	Square and Rectangle
Colour Scheme	▪ White border on Blue background for square ▪ Black border on White background for rectangle ▪ White letter and black symbol
Placement	At exact location where parking of bicycle (and other personal mobility devices) is allowed.

Chapter 03

PEDESTRIAN WALKWAY AND BICYCLE LANE

3

3.1 General

3.1.1 Installation Guidelines

To ensure consistent walking and cycling experience that guarantees safety and comfort, a set of street design guidelines was developed. The guidelines serve to promote compliance and conformance to quality infrastructure development that meet the needs of the intended users. Hence, this action provides guidance to planners and engineers to design and plan walkways and bicycle lanes for a variety of roadway specifications.

The installation of walkways and cycling lanes varies by the type of land uses and roadway functional classification. Table 3.1 guides planners in identifying the type of installation that should be provided, for both new streets and for retrofitting existing streets. Table 3.1 will also be used later for developing design standards.

Table 3.1: Installation guidelines for walkways and bicycle lane based on land use classifications

Land Use/Roadway Functional Classification/ Dwelling Units	New Streets	Existing Streets
Commercial and Industrial (all streets)	Dedicated walkway and cycling lanes on both sides with clear physical and spatial separation between non-motorized and motorized traffic	Every effort to retrofit to include dedicated walkways and cycling lanes on both sides, where they do not exist
Residential (Major arterials)	Dedicated walkway and cycling lanes on both sides with clear physical separation between non-motorized and motorized traffic	Every effort to retrofit to include dedicated walkways and cycling lanes on both sides, where they do not exist
Residential (Collectors)	Dedicated walkway on both sides with physical separation from motorized traffic. Cycling lanes may be on the street but adequate protection must be provided to prevent conflict with motorized traffic.	Every effort to retrofit to include dedicated walkways and cycling lanes on both sides, where they do not exist
Residential (Local Streets - More than 4 units per acre)	Shared walkways and cycling lanes on both sides. The shared facility must be physically separated from the motorized traffic.	Prefer shared walkways and cycling lanes on both sides; requires at least one side.
1 – 4 units per acre	Shared walkways and cycling lanes on both sides. The shared facility may be on the street with motorized traffic. However, a clear demarcation of space must be provided.	Shared walkways and cycling lanes on one side. A shoulder of at least 1.5 m is required on the side where the shared facility is not provided.
Less than 1 unit per acre	Shared walkways and cycling lanes on one side. Shoulder of at least 1.5 m on both sides required	At least 1.5 m (6 ft.) shoulder on both sides required

3.1.2 Standard Dimensions

In designing pedestrian walkways and bicycle lanes, the physical dimension of the road users and vehicles must be taken into consideration. However, road users and vehicles come in various physical dimension – shapes, sizes and conditions. For example, a male pedestrian can vary in their height and width. Similarly, wheelchair users come in a range of width depending on their wheelchair size. Failure to consider these physical dimensions may lead to movement conflicts, injuries and other safety issues.

To optimize the utilization of finite resources (e.g. road space), it is not possible to consider all the range of values for these dimensions. Hence, a representative model to represent each type of road users and vehicles must be created and used as reference model in the engineering design of roadways, walkways and bicycle lanes. These reference models are the standard models and they have standard dimensions.

Figure 3.1 shows the different types of road users and vehicles, and their standard dimensions. Each design proposed in this guideline will be based on these standard dimension to ensure full user compatibility and usability.

As for wheelchair user, the standard dimension will be used specifically to ensure that all walkways in Kuala Lumpur are disabled-friendly. This means that wheelchair users should not only move on the walkway, but also be able to turn around.

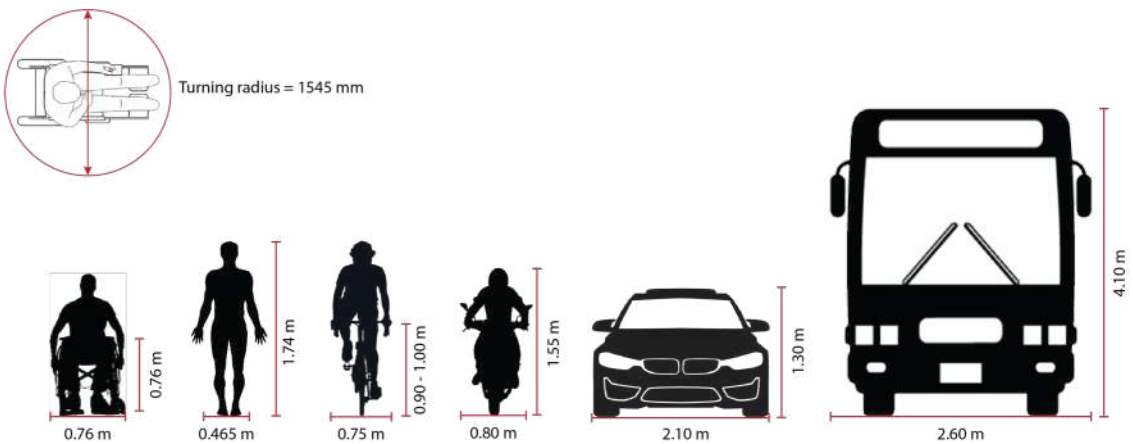


Figure 3.1: Standard Dimension for Different Type of Road Users

3.2 Design Specifications

3.2.1 Installation Guidelines

To be practical for designers and implementors, this guideline relies on the common practices of using Right-of-Way (ROW) specifications as the basis. In legal term, the ROW is defined as the boundary limit of land accessible by the public. In road engineering, ROW is defined as the width of road space inclusive of the shoulder.

The specifications for ROW in Kuala Lumpur is given in Table 3.2. These ROW specifications are the basis for the proposed design schemes for pedestrian walkway and bicycle lane in Table 3.3.

Table 3.2: ROW Specifications in Kuala Lumpur (with examples)

REAM Code	ROW	Speed Limit (km/h)	No. of Lanes	Lane Width (m)	Median (m)	Example Road
U6	132' (40 m)	80–100	6	3.35	2.5 - 4.5	Jalan Genting Kelang Jalan Ipoh Jalan Gombak
U5	100' (30 m)	60–90	6	3.35	2.5 - 4.5	Jalan Duta Jalan Semarak Jalan Segambut
U4	80' (24 m)	50–80	4	3.20 - 3.35	2.5 - 4.5	Jalan Raja Muda Abdul Aziz (No Median)
U3	66' (20 m)	40–60	4	3.00 - 3.35	x	Jalan Kia Peng Jalan Stonor
U2	50' (15 m)	30–50	2	3.00 - 3.35	x	Jalan Berangan Jalan Madge (Commercial Area)
U1	40' (12 m)	30–40	2	3.00 - 3.35	x	Neighbourhood streets

Source: Department of Infrastructure Planning, DBKL (2019)

Table 3.3: ROW-based Design Specifications

Design Code	Figure No.	REAM Code	Standard Name	ROW	Speed Limit	No. Lanes per Direction	Lane Width	Median Width	Marginal Strip Width	Curb Reveal	Dedicated Walkway Width	Dedicated Bike Lane Width	Shared Walkway + Bike Lane Width	Buffer Width (Furnishing + Landscape)
DU6-1	Fig. 3-2	U6	Lebuhraya (Avenue)	132 ft./40 m	60 km/h	3	3.35 m	4.50 m	0.50 m	0.205 m	3.000 m	2.000 m	×	1.495 m
DU6-2	Fig. 3-3	U6	Lebuhraya (Avenue)	132 ft./40 m	60 km/h	3	3.35 m	2.50 m	0.50 m	0.205 m	3.000 m	2.000 m	×	2.495 m
DU5-1	Fig. 3-4	U5	Persiaran (Drive)	100 ft./30 m	60 km/h	3	3.35 m	4.50 m	0.50 m	0.205 m	×	×	1.495 m	0.000 m
DU5-2	Fig. 3-5	U5	Persiaran (Drive)	100 ft./30 m	60 km/h	3	3.35 m	2.50 m	0.50 m	0.205 m	×	×	2.495 m	0.000 m
DU5-3	Fig. 3-6	U5	Persiaran (Drive)	100 ft./30 m	60 km/h	4 (one-way)	3.35 m	×	0.50 m	0.205 m	6.595 m	3.000 m	×	3.000 m
DU4-1	Fig. 3-7	U4	Jalan (Road)	80 ft./24 m	50 km/h	2	3.35 m	2.50 m	0.25 m	0.205 m	×	×	2.345 m	1.000 m
DU4-2	Fig. 3-8	U4	Jalan (Road)	80 ft./24 m	50 km/h	2	3.20 m	2.50 m	0.25 m	0.205 m	×	×	2.500 m	1.145 m
DU4-3	Fig. 3-9	U4	Jalan (Road)	80 ft./24 m	50 km/h	2	3.20 m	0.30 m	0.25 m	0.205 m	×	×	2.745 m	2.000 m
DU4-4	Fig. 3-10	U4	Jalan (Road)	80 ft./24 m	50 km/h	4 (one-way)	3.20 m	×	0.25 m	0.205 m	×	×	3.145 m	2.000 m
DU3-1	Fig. 3-11	U3	Lebuh (Street)	66 ft./20 m	40 km/h	2	3.35 m	×	0.25 m	0.205 m	×	×	2.845 m	0.000 m
DU3-2	Fig. 3-12	U3	Lebuh (Street)	66 ft./20 m	40 km/h	2	3.00 m	×	0.25 m	0.205 m	×	×	2.545 m	1.000 m
DU3-3	Fig. 3-13	U3	Lebuh (Street)	66 ft./20 m	40 km/h	2 (one-way)	3.35 m	×	0.25 m	0.205 m	×	×	3.195 m	3.000 m
DU3-4	Fig. 3-14	U3	Lebuh (Street)	66 ft./20 m	40 km/h	2 (one-way)	3.00 m	×	0.25 m	0.205 m	×	×	3.545 m	3.000 m
DU2-1	Fig. 3-15	U2	Laluan (Way)	50 ft./15 m	30 km/h	1	3.35 m	×	0.25 m	0.205 m	×	×	2.500 m	1.195 m
DU2-2	Fig. 3-16	U2	Laluan (Way)	50 ft./15 m	30 km/h	1	3.00 m	×	0.25 m	0.205 m	×	×	2.500 m	1.545 m
DU2-3	Fig. 3-17	U2	Laluan (Way)	50 ft./15 m	30 km/h	1	3.00 m	×	0.25 m	0.205 m	×	×	3.590 m	3.000 m (R) 1.500 m (L)
DU1-1	Fig. 3-18	U1	Lorong (Lane)	40 ft./12 m	30 km/h	1	3.35 m	×	0.25 m	0.205 m	×	×	2.195 m	0.000 m
DU1-2	Fig. 3-19	U1	Lorong (Lane)	40 ft./12 m	30 km/h	1	3.00 m	×	0.25 m	0.205 m	×	×	1.545 m	1.000 m
DU1-3	Fig. 3-20		Lorong (Lane)	40 ft./12 m	30 km/h	1	3.00 m	×	0.25 m	0.205 m	×	×	2.090 m	1.500 m (R) 1.500 m (L)

BEST PRACTICES

Dedicated Non-Motorized Lane, Conpenhagen

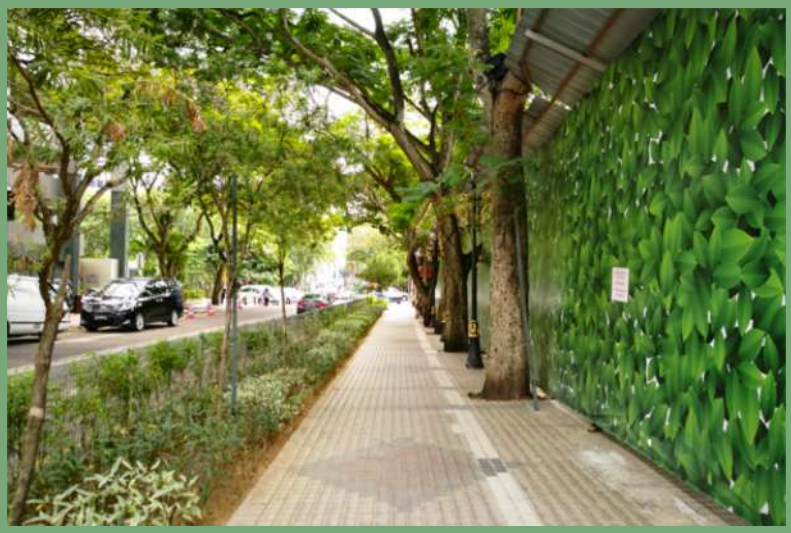
Copenhagen cares! The city spares no effort to ensure safety and comfort of its who chose to walk and ride bicycles. Everywhere in the city, dedicated walkways and cycling lanes can be found from the busiest of streets to local neighbourhood roads.

Each user is given their own right-of-way separated by clear physical demarcation in the form of stones paving – ensuring durability and low maintenance. Not only that the lanes – walkway, cycling and traffic – are separated, their separation are also staggered at different height.

This utmost consideration to safety and comfort are what make Copenhagen the best cycling city in the world.

BEST PRACTICES

Dedicated Walkway, Kampung Bahru, Kuala Lumpur



Kuala Lumpur cares too! With beautiful and carefully selected plants, dedicated walkways in Kampung Bahru (top pic.) and Jalan Raja Laut (bottom pic.) invites people of Kuala Lumpur to enjoy walking and the landscapes.

The potted plants along Kampung Bahru's walkways disguises as a natural spatial and physical barriers. As for Jalan Raja Laut, the non-climbable fence is expertly covered with shrubs to soften the hard elements. Regardless of the approach, both are effective in separating the pedestrians from the motorized traffic, thus, enhancing the perceived safety of the pedestrians – one of the major concerns of people in Kuala Lumpur.

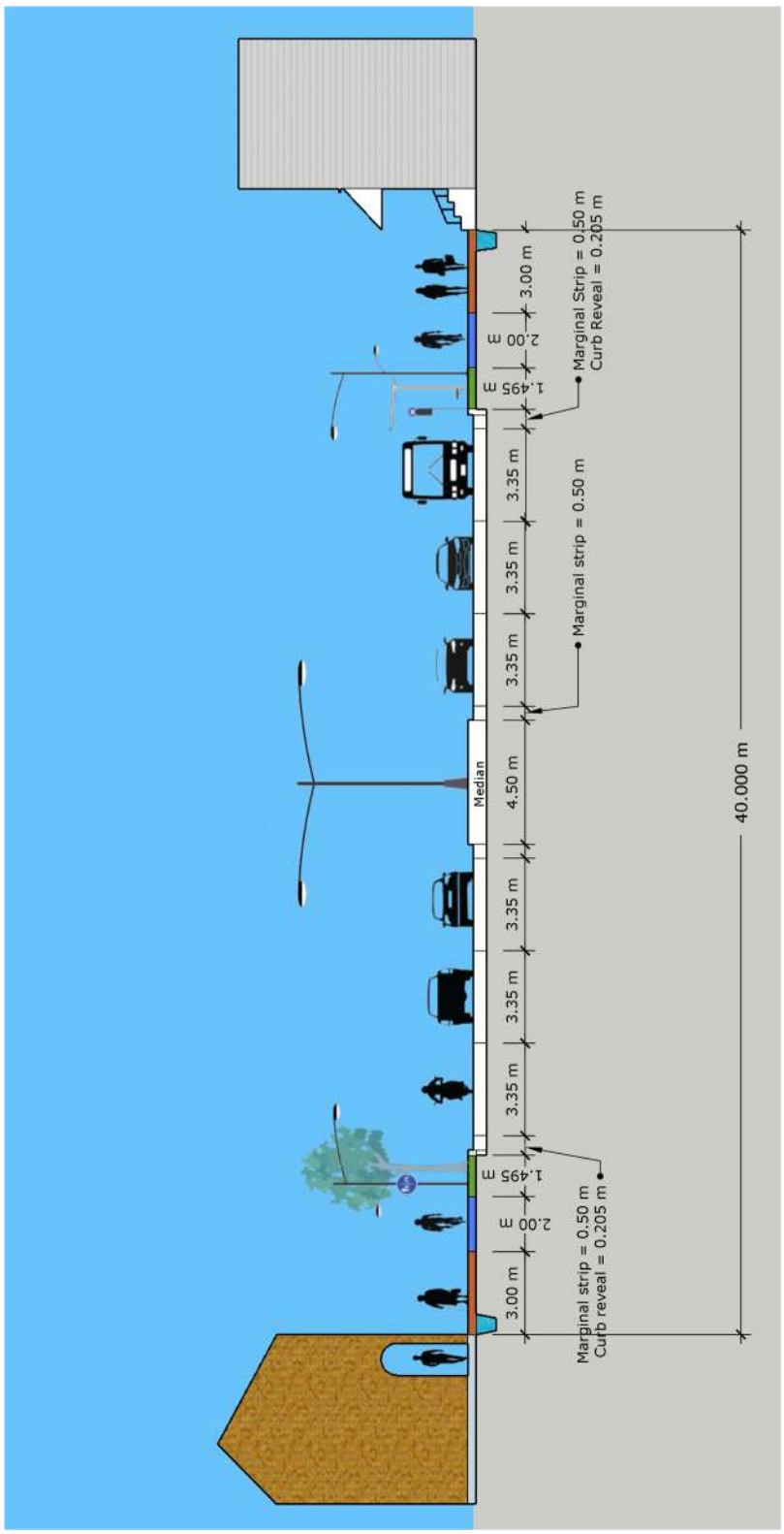


Figure 3.2: Design DU6-1 for ROW U6 = 132 ft./40 m (60 km/h)

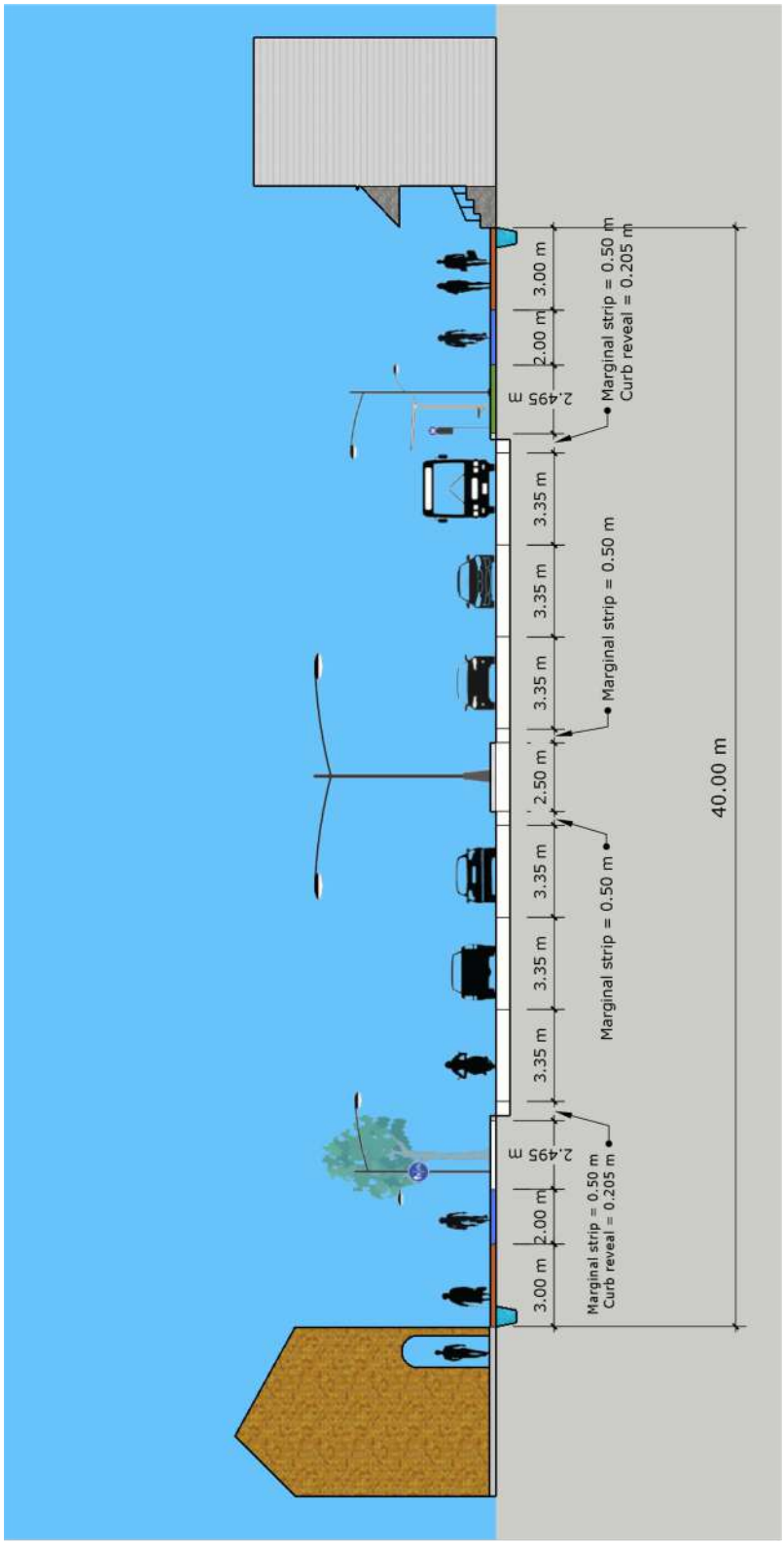


Figure 3.3: Design DU6-2 for ROW U6 = 132 ft./40 m (60 km/h)

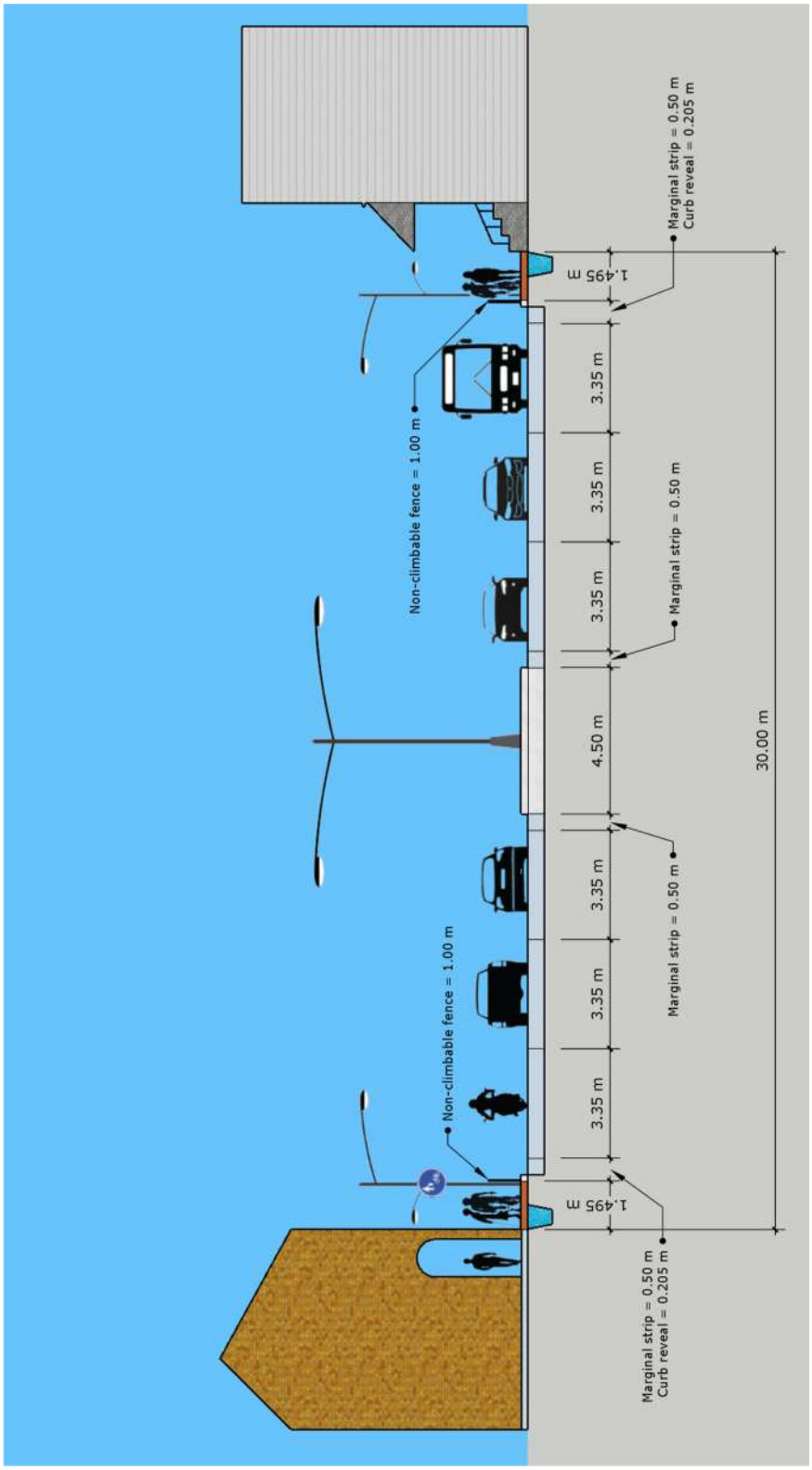


Figure 3.4: Design DU5-1 for ROW U5 = 100 ft./30 m (60 km/h)

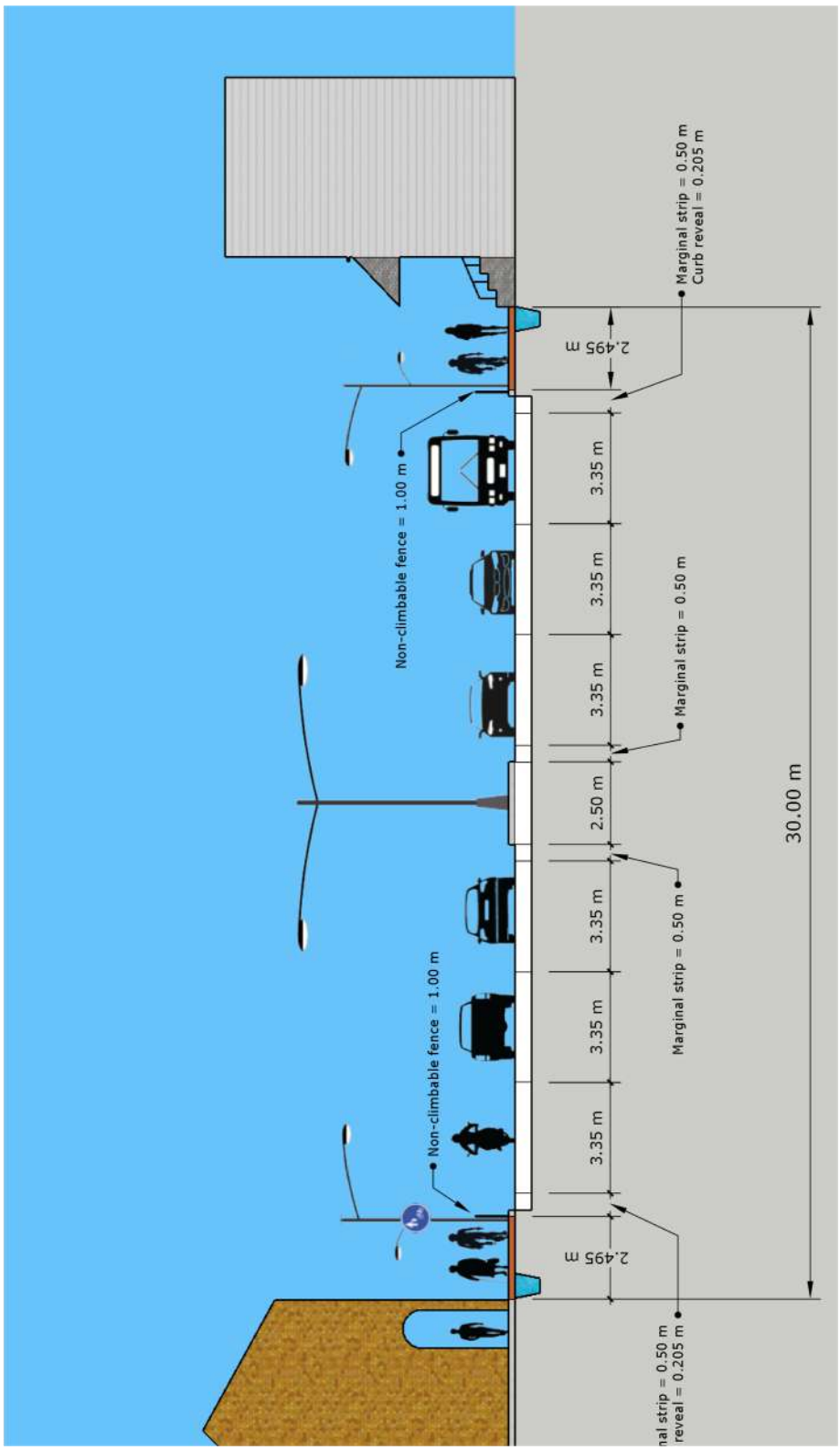


Figure 3.5: Design DU5-2 for ROW U5 = 100 ft./30 m (60 km/h)

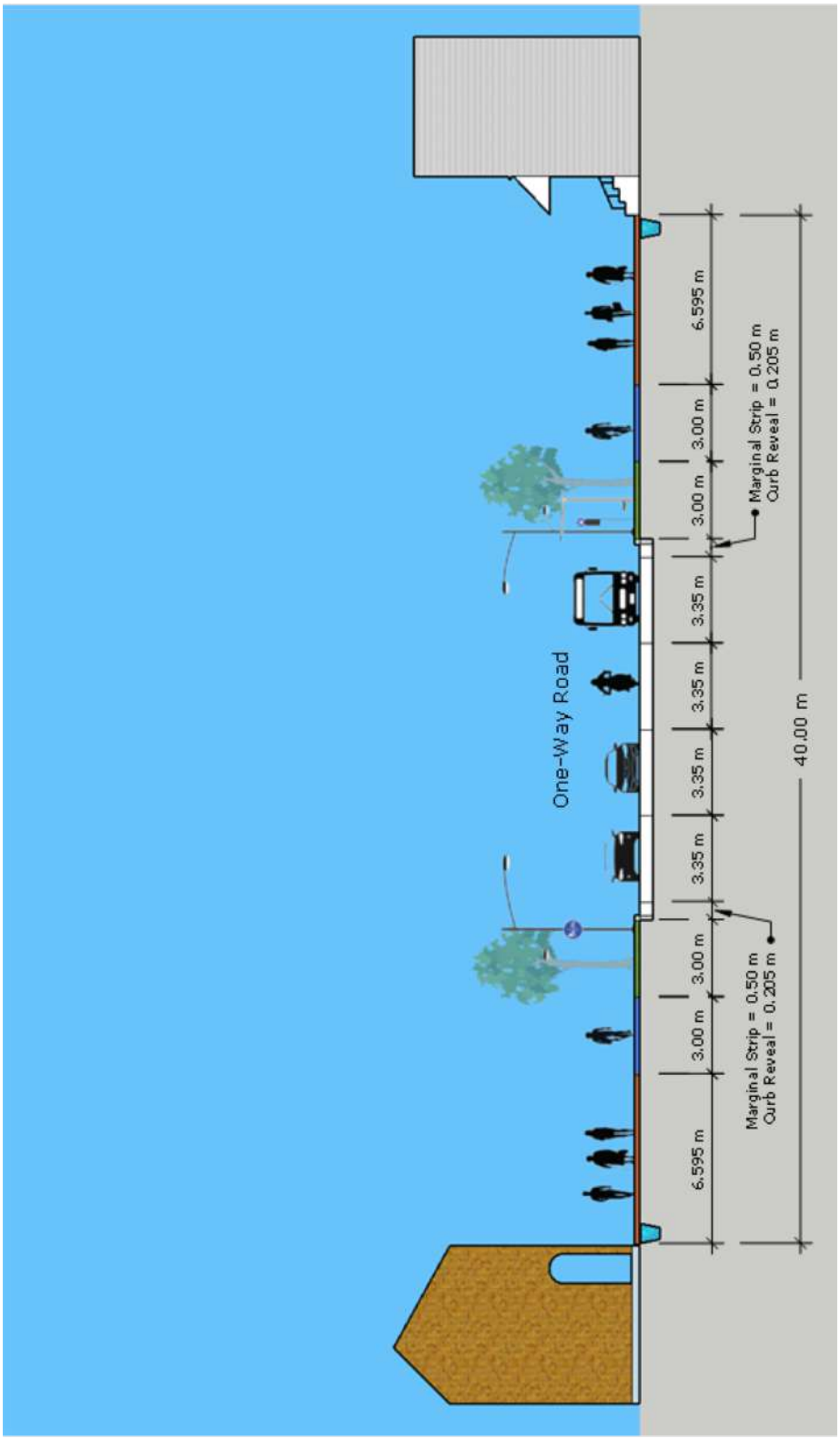


Figure 3.6: Design DU5-3 for ROW U5 = 100 ft./30 m (60 km/h)

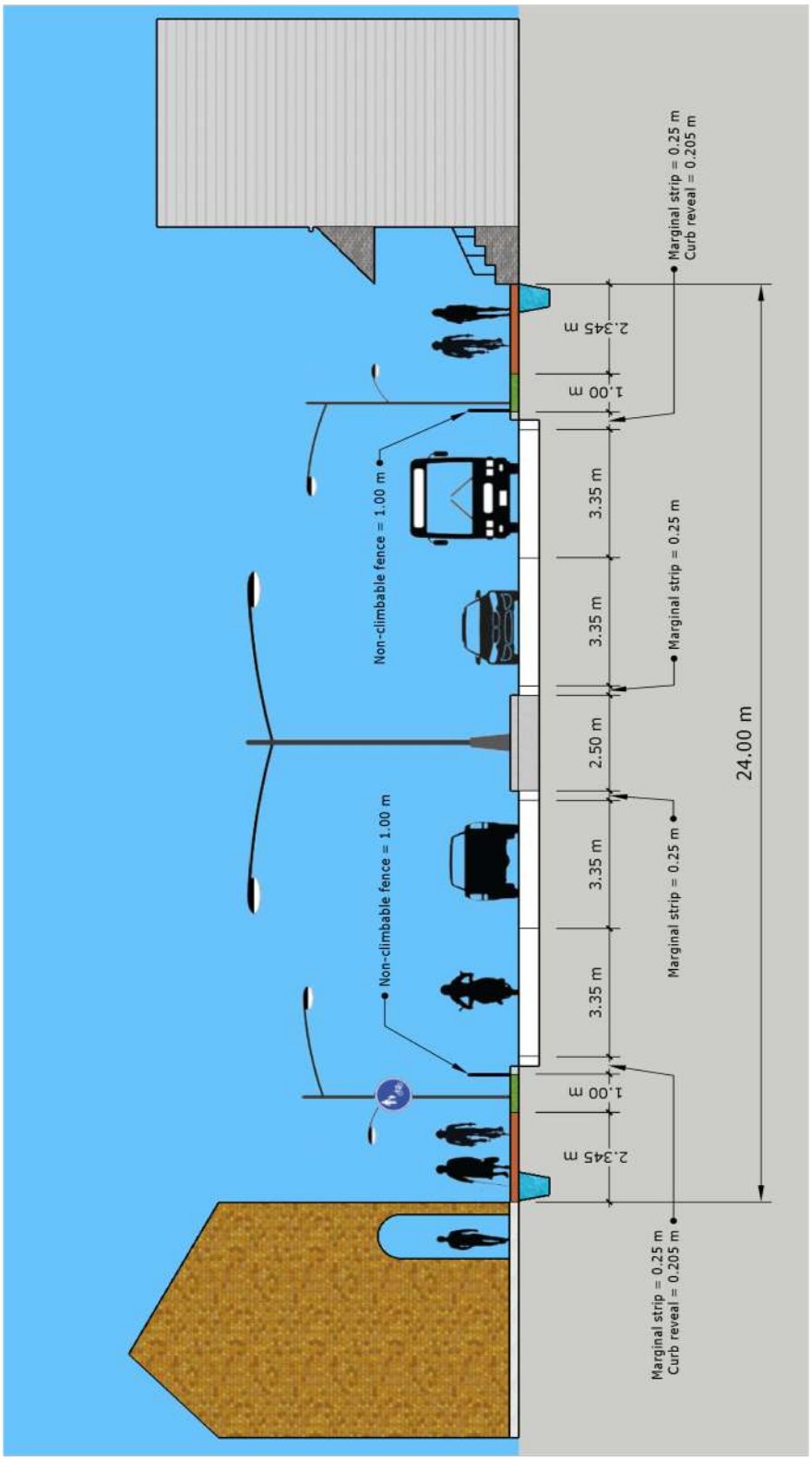


Figure 3.7: Design DU4-1 for ROW U4 = 80 ft./24 m (50 km/h)

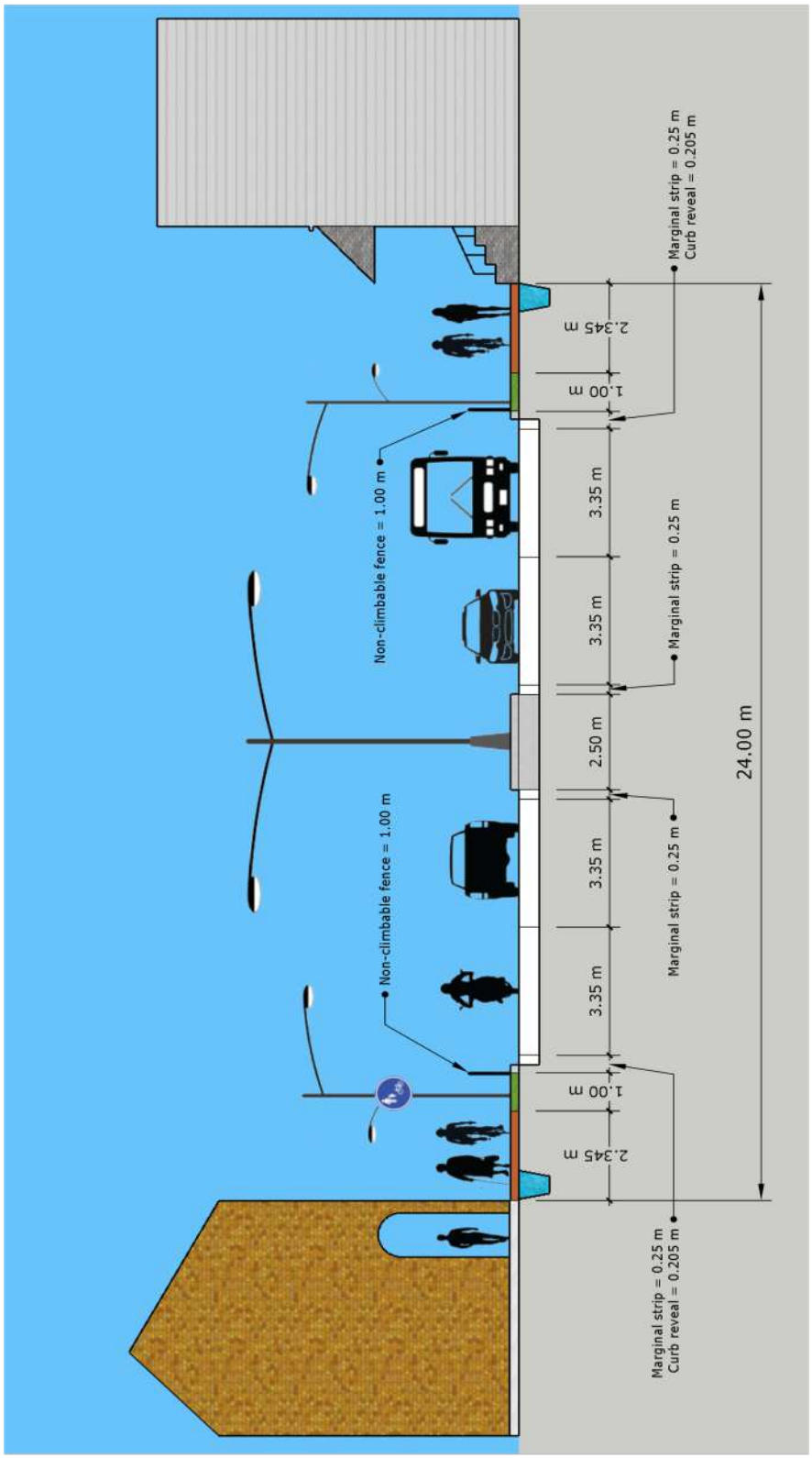


Figure 3.8: Design DU4-2 for ROW U4 = 80 ft./24 m (50 km/h)

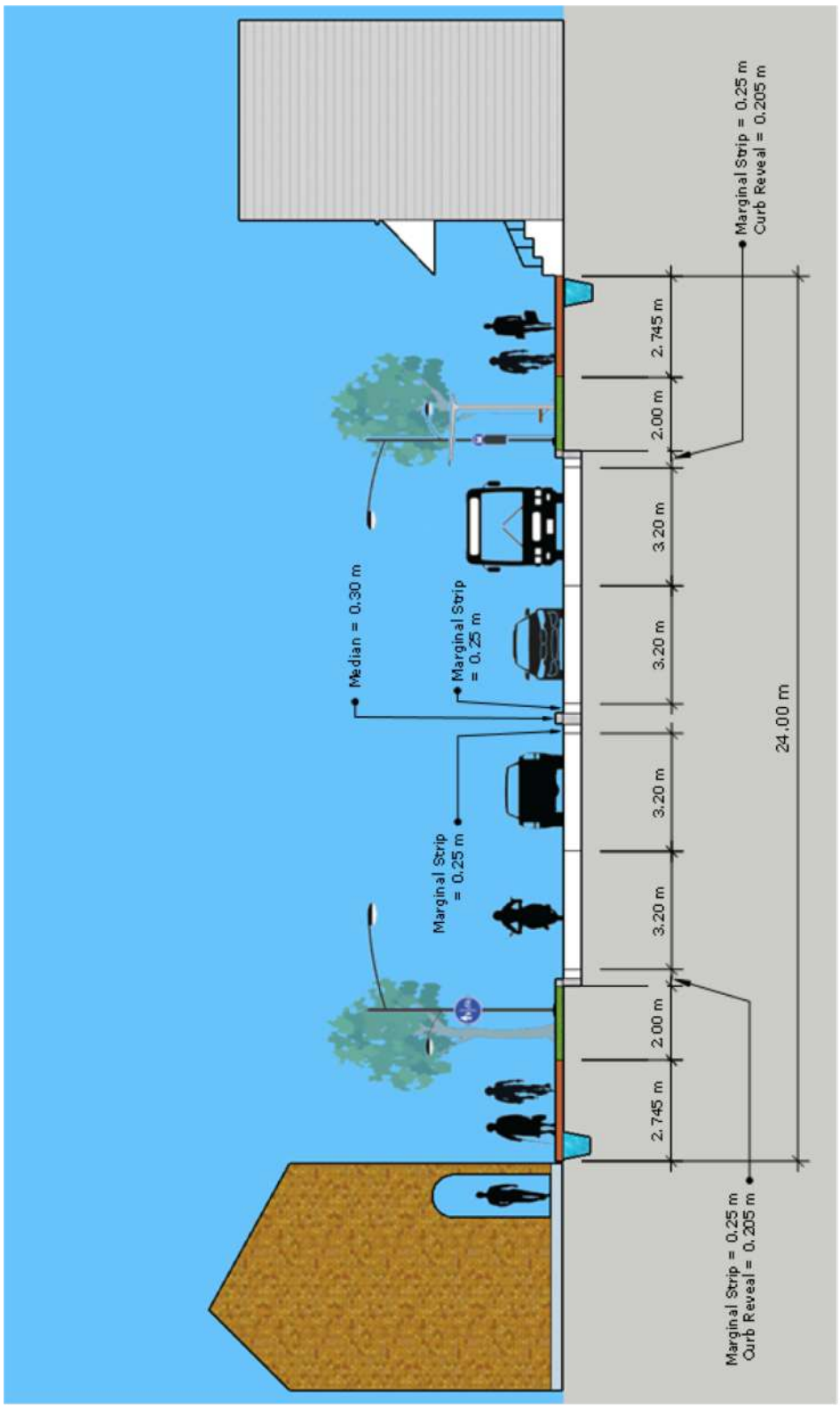


Figure 3.9: Design DU4-3 for ROW U4 = 80 ft./24 m (50 km/h)

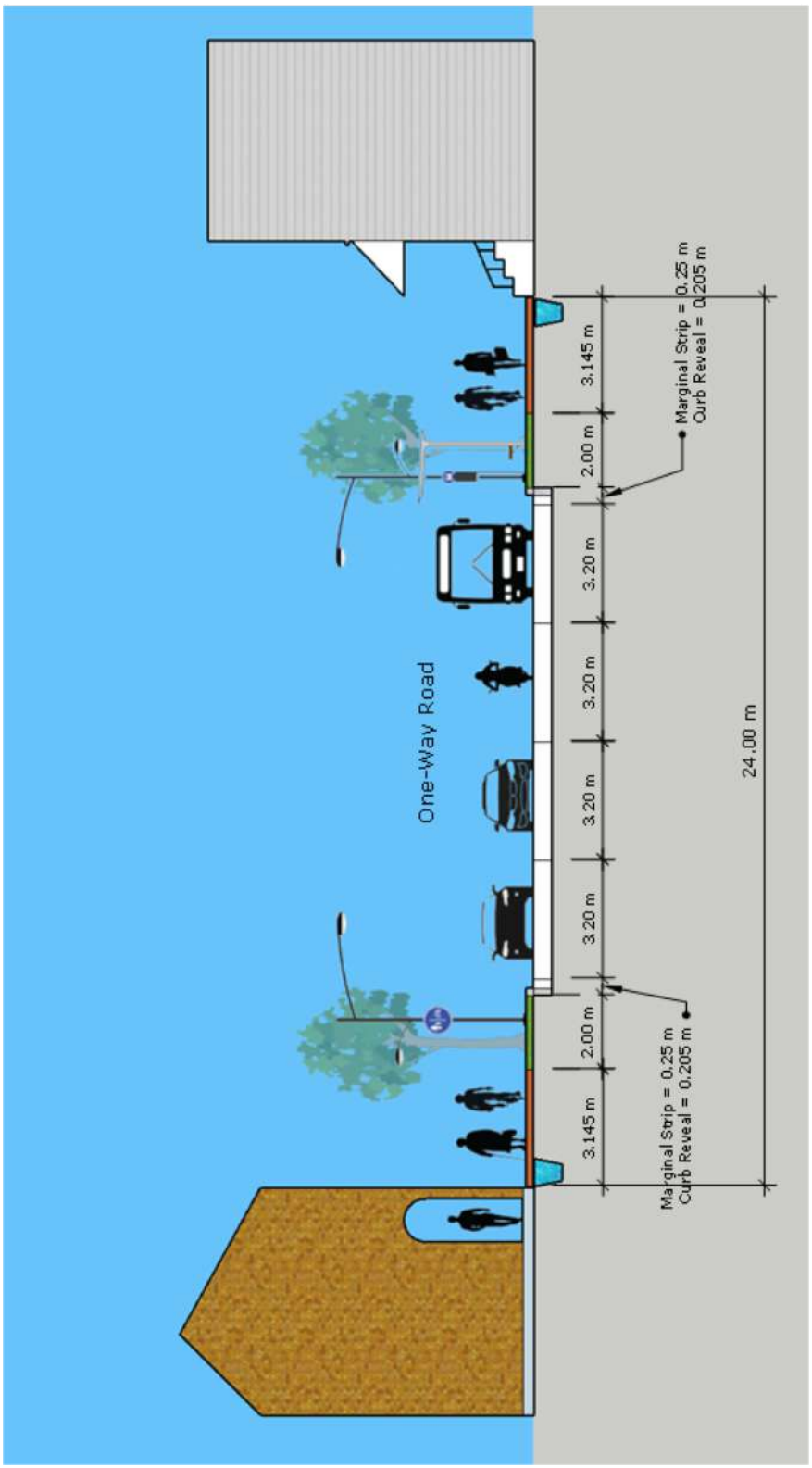


Figure 3.10: Design DU4-4 for ROW U4 = 80 ft./24 m (50 km/h)

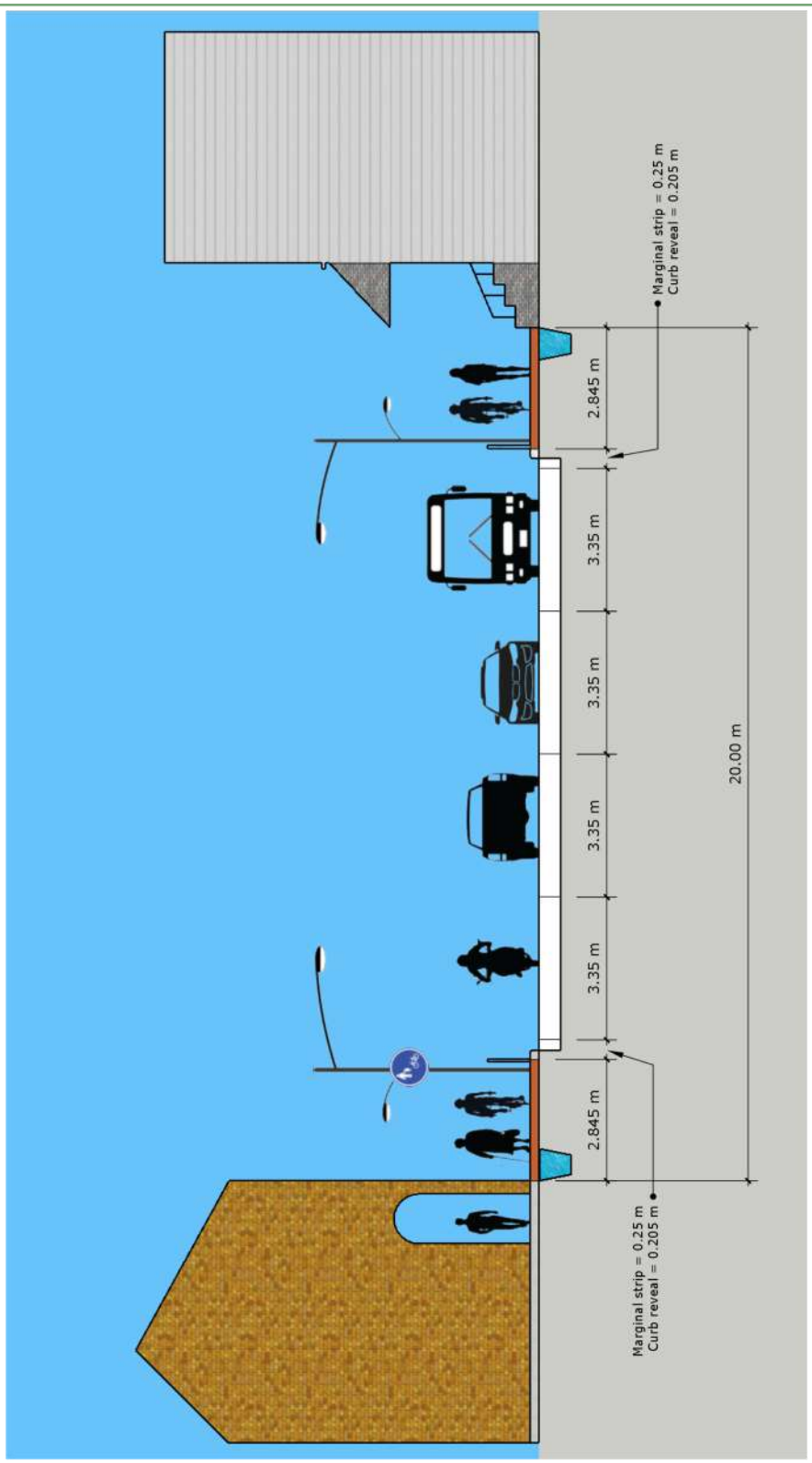


Figure 3.11: Design DU3-1 for ROW U3 = 66 ft./20 m (40 km/h)0

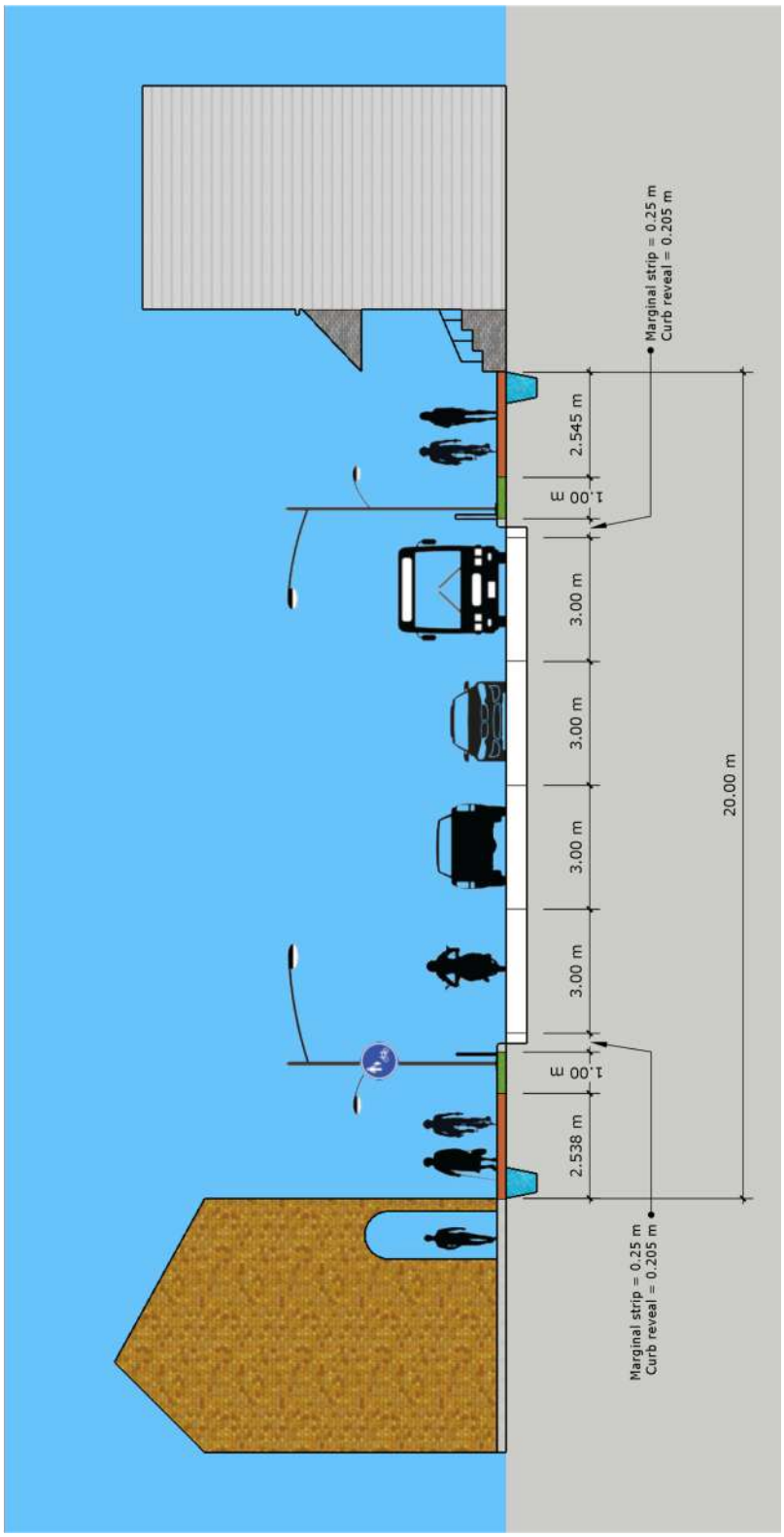


Figure 3.12: Design DU3-2 for ROW U3 = 66 ft./20 m (40 km/h)

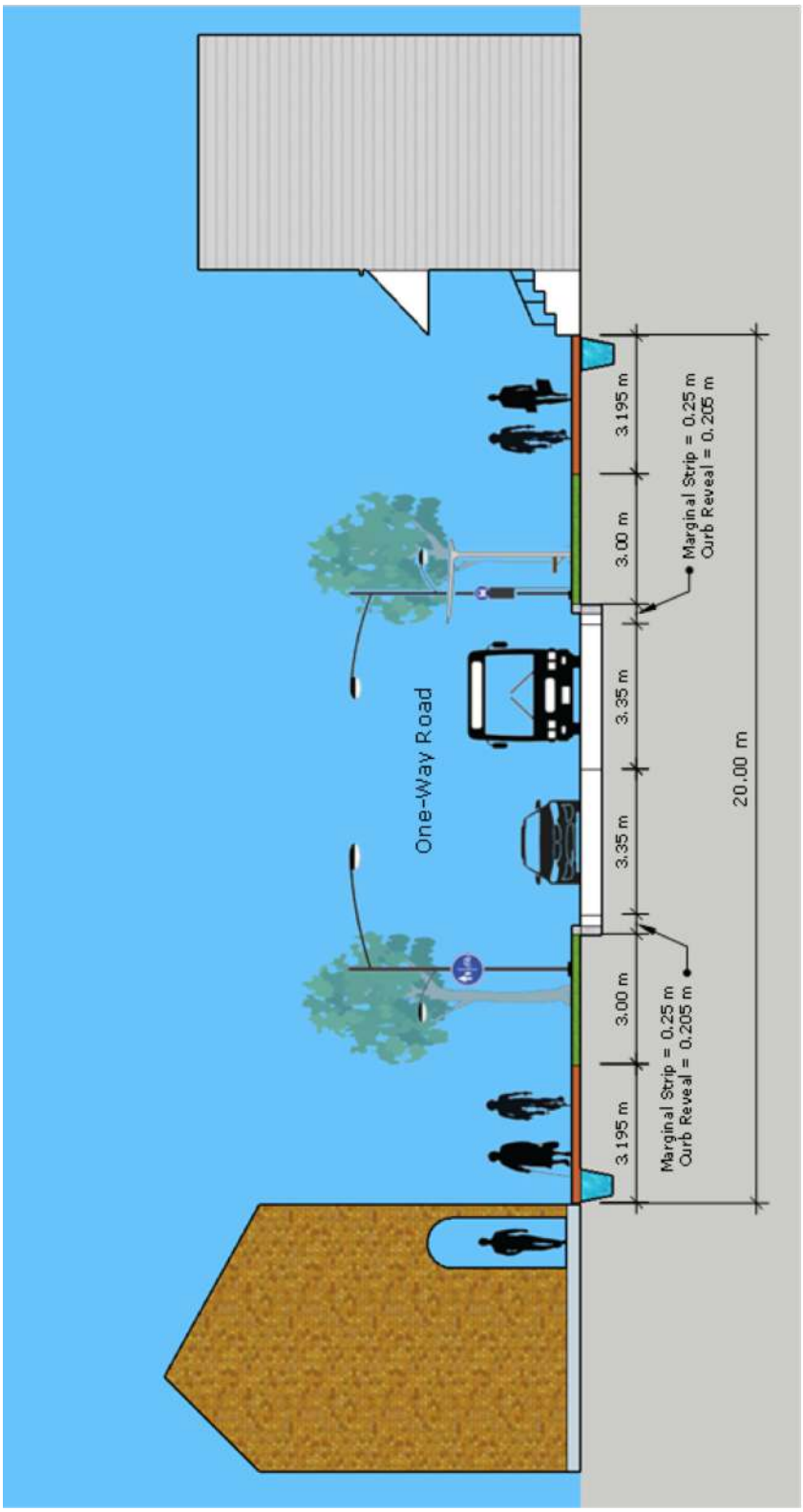


Figure 3.13: Design DU3-3 for ROW U3 = 66 ft./20 m (40 km/h)

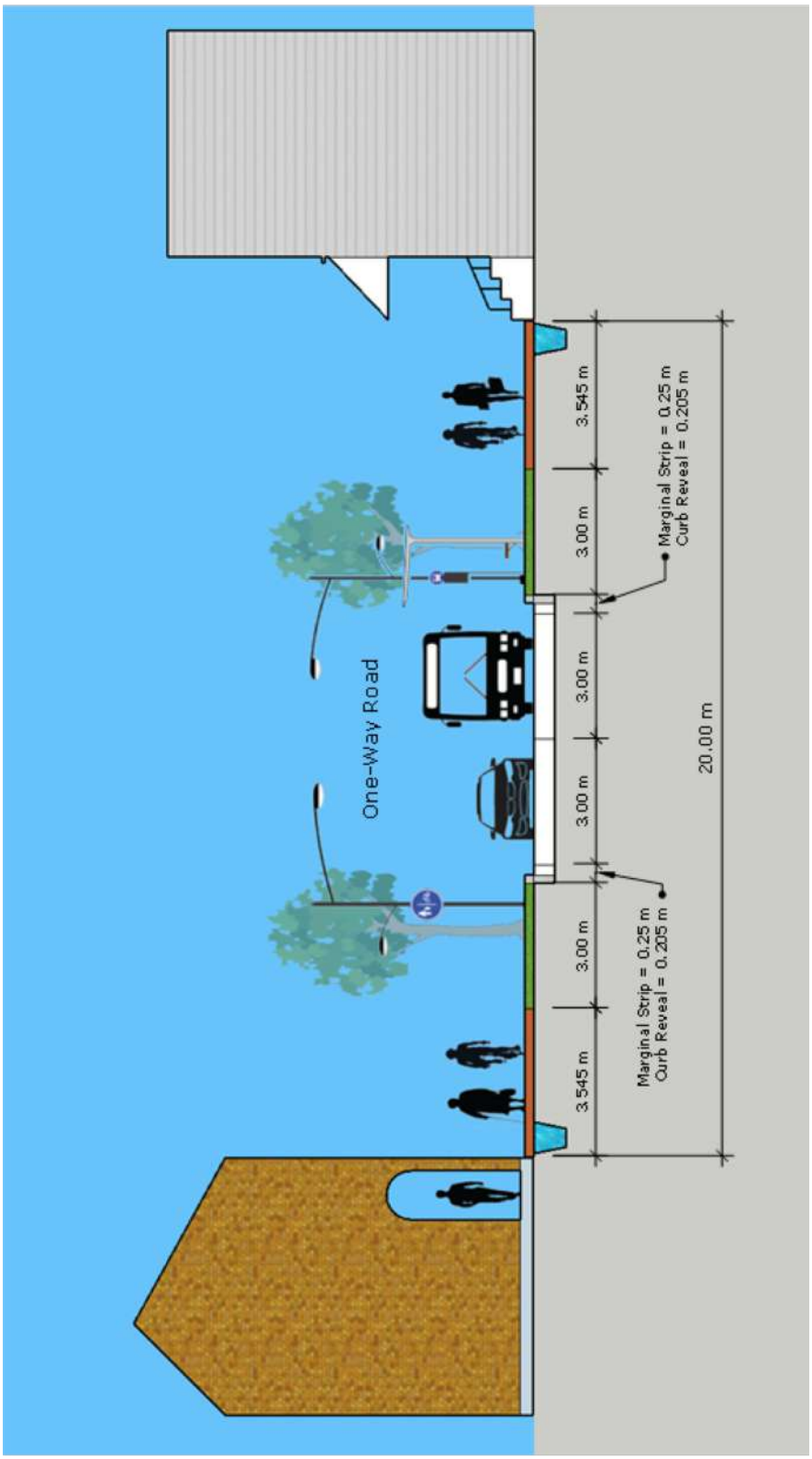


Figure 3.14: Design DU3-4 for ROW U3 = 66 ft./20 m (40 km/h)

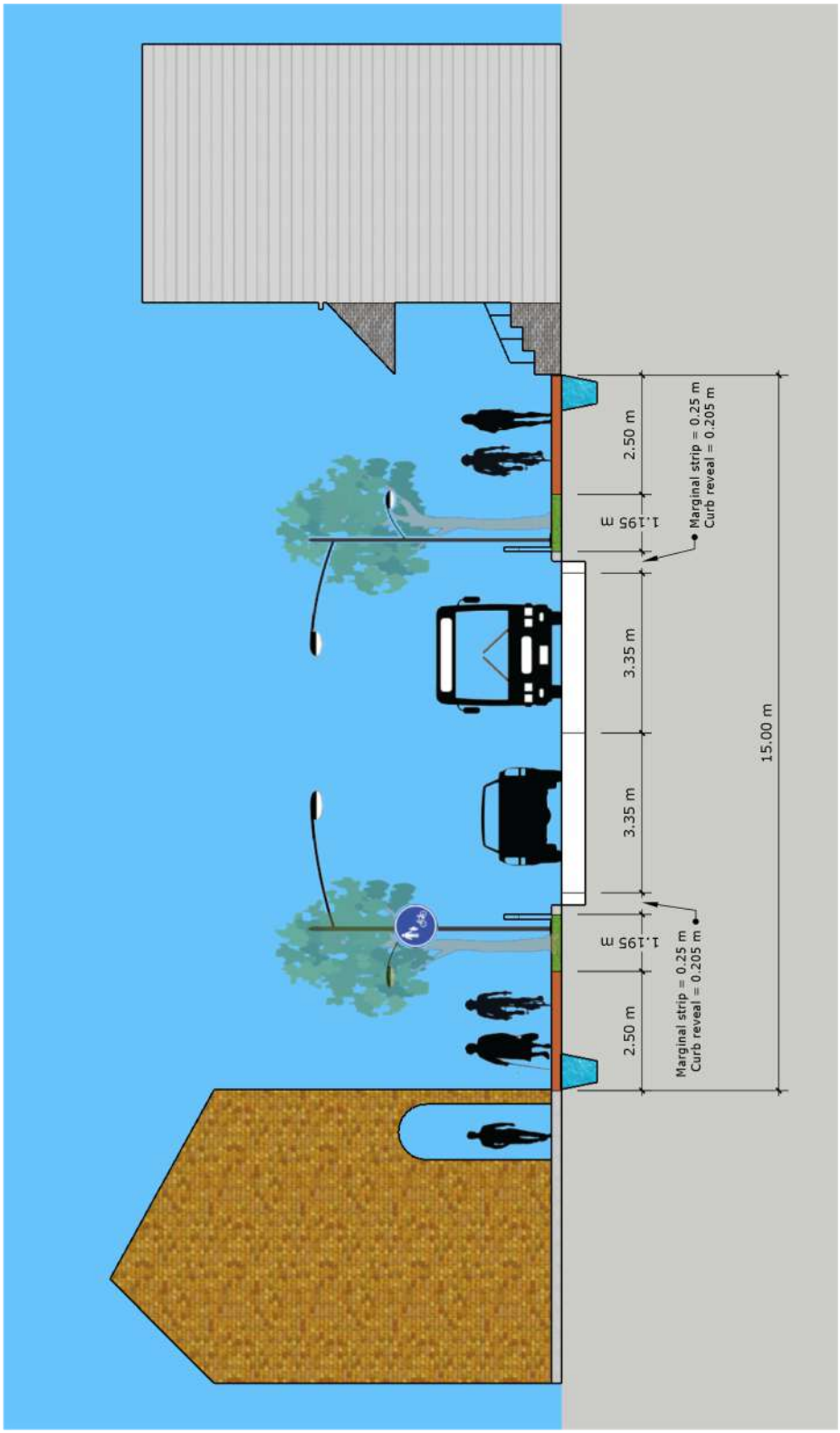


Figure 3.15: Design DU2-1 for ROW U2 = 50 ft./15 m (30 km/h)

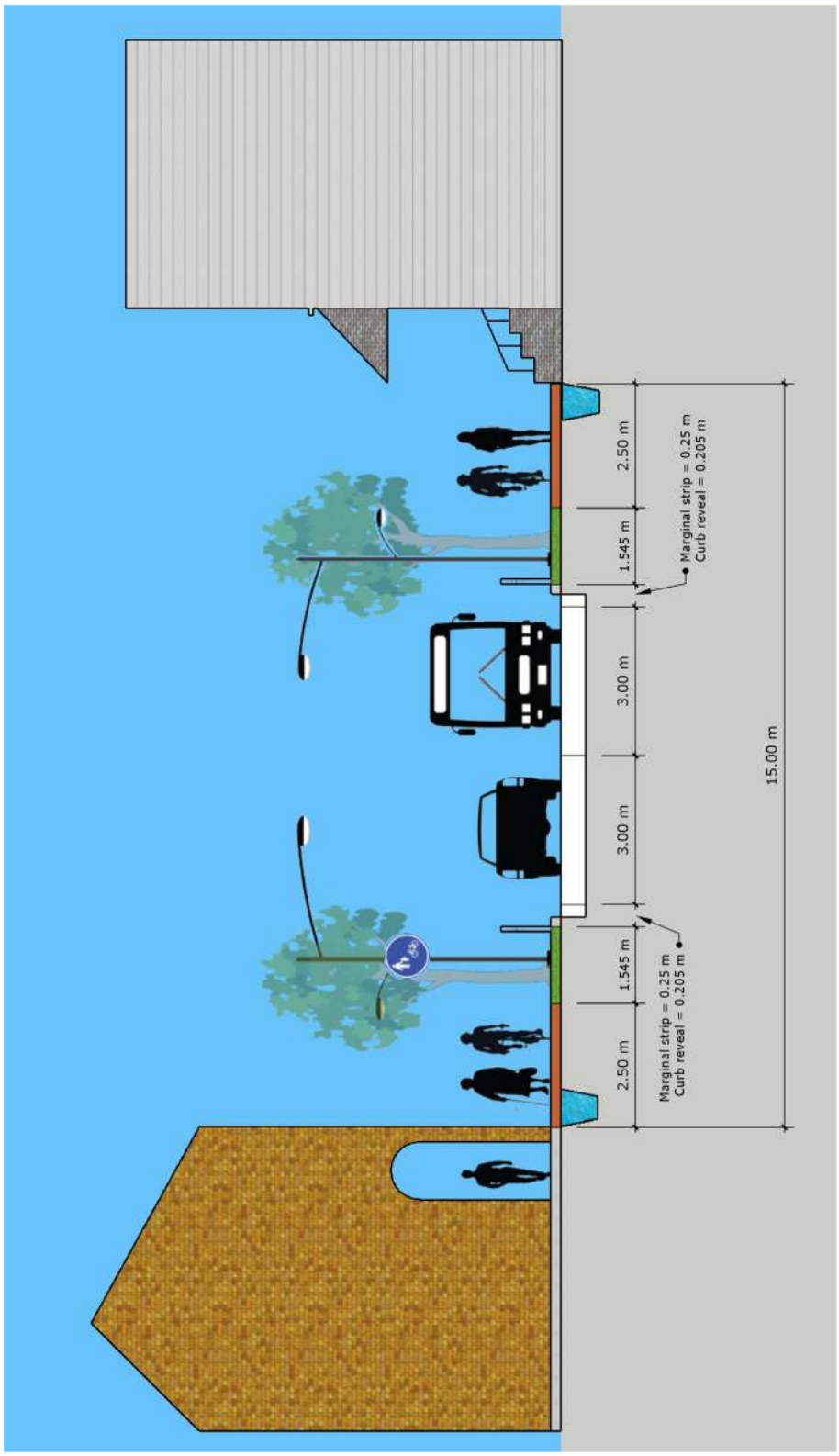


Figure 3.16: Design DU2-2 for ROW U2 = 50 ft./15 m (30 km/h)

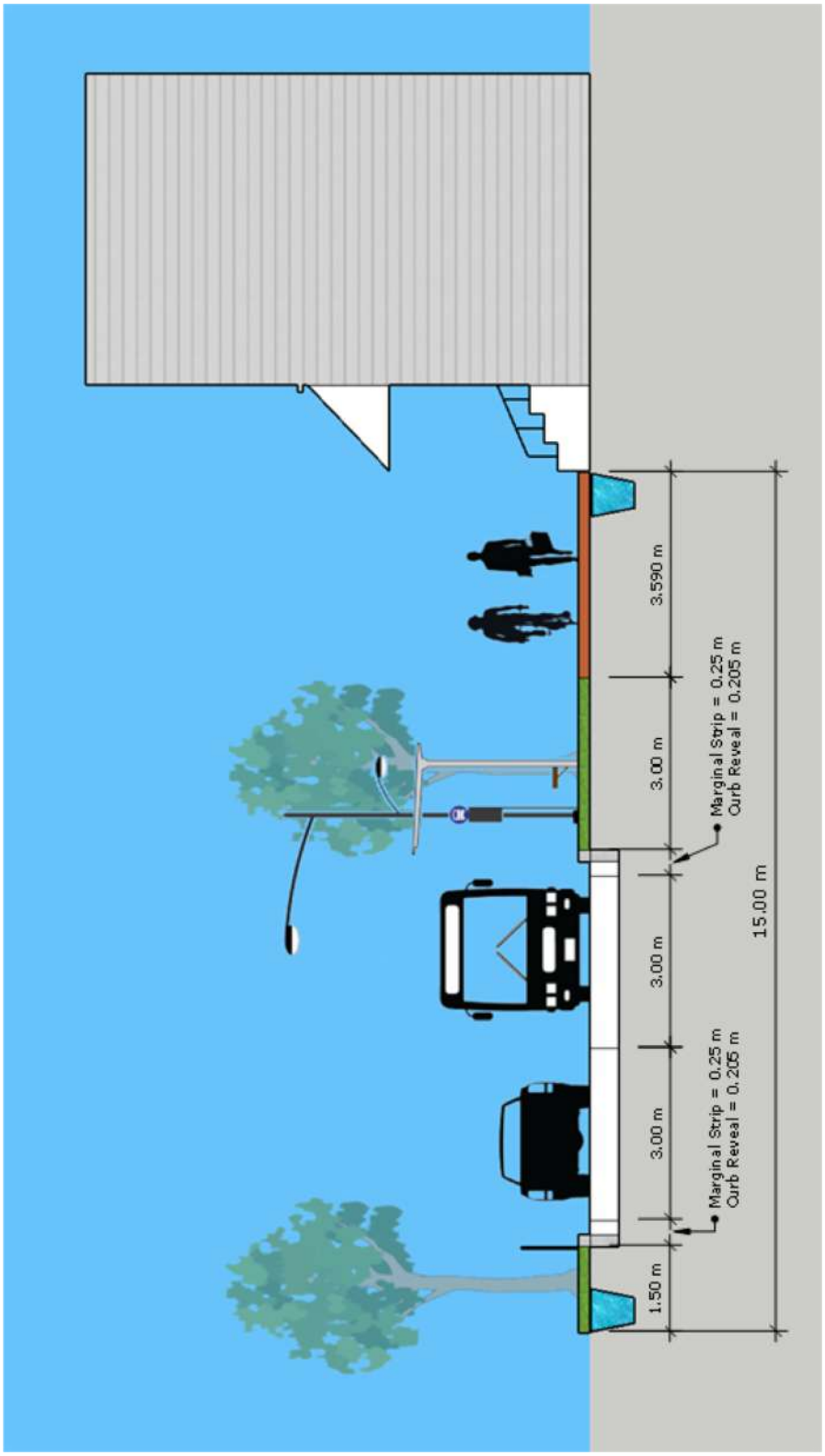


Figure 3.17: Design DU2-3 for ROW U2 = 50 ft./15 m (30 km/h)

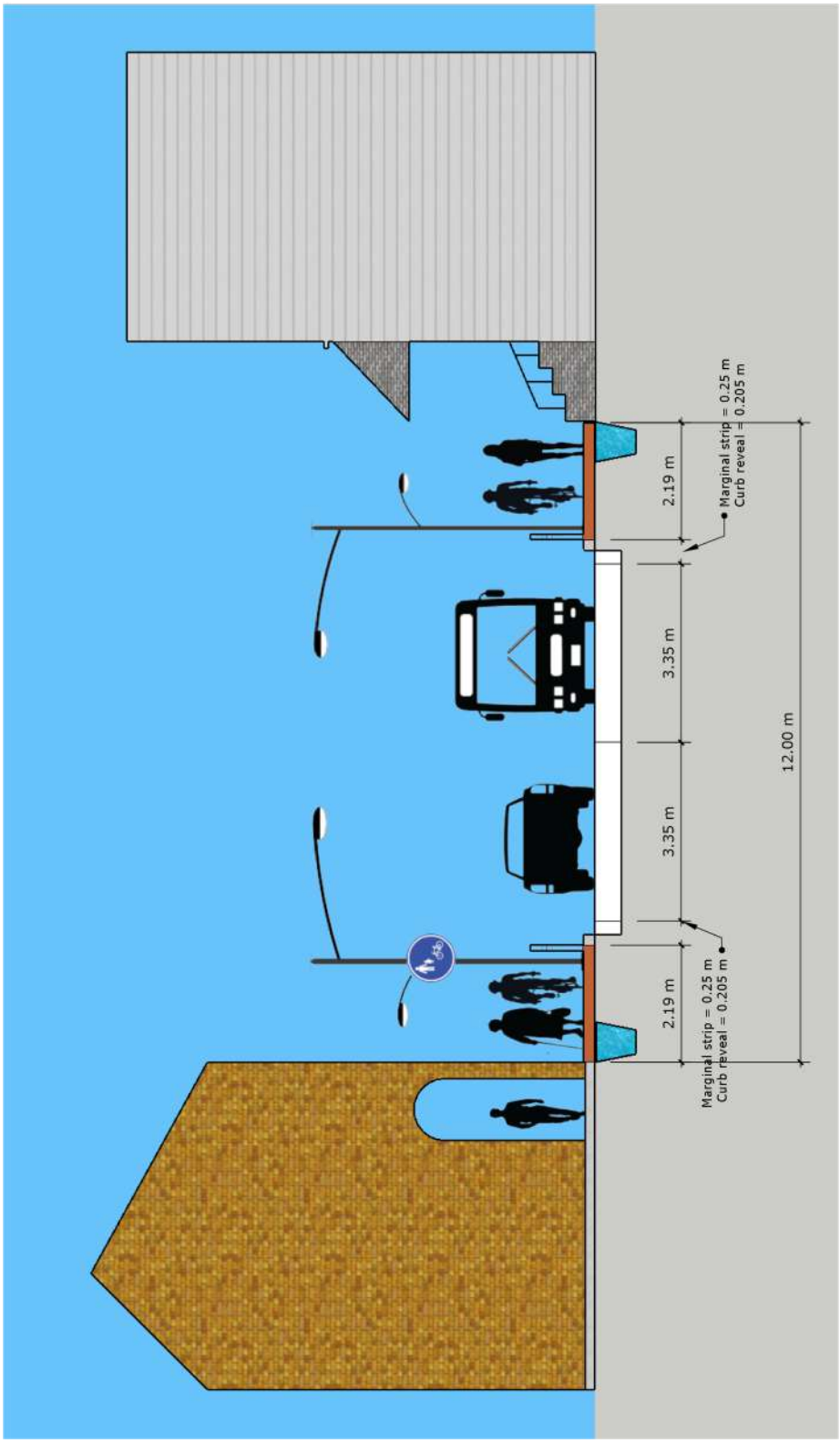


Figure 3.18: Design DU1-1 for ROW U1 = 40 ft./12 m (30 km/h)

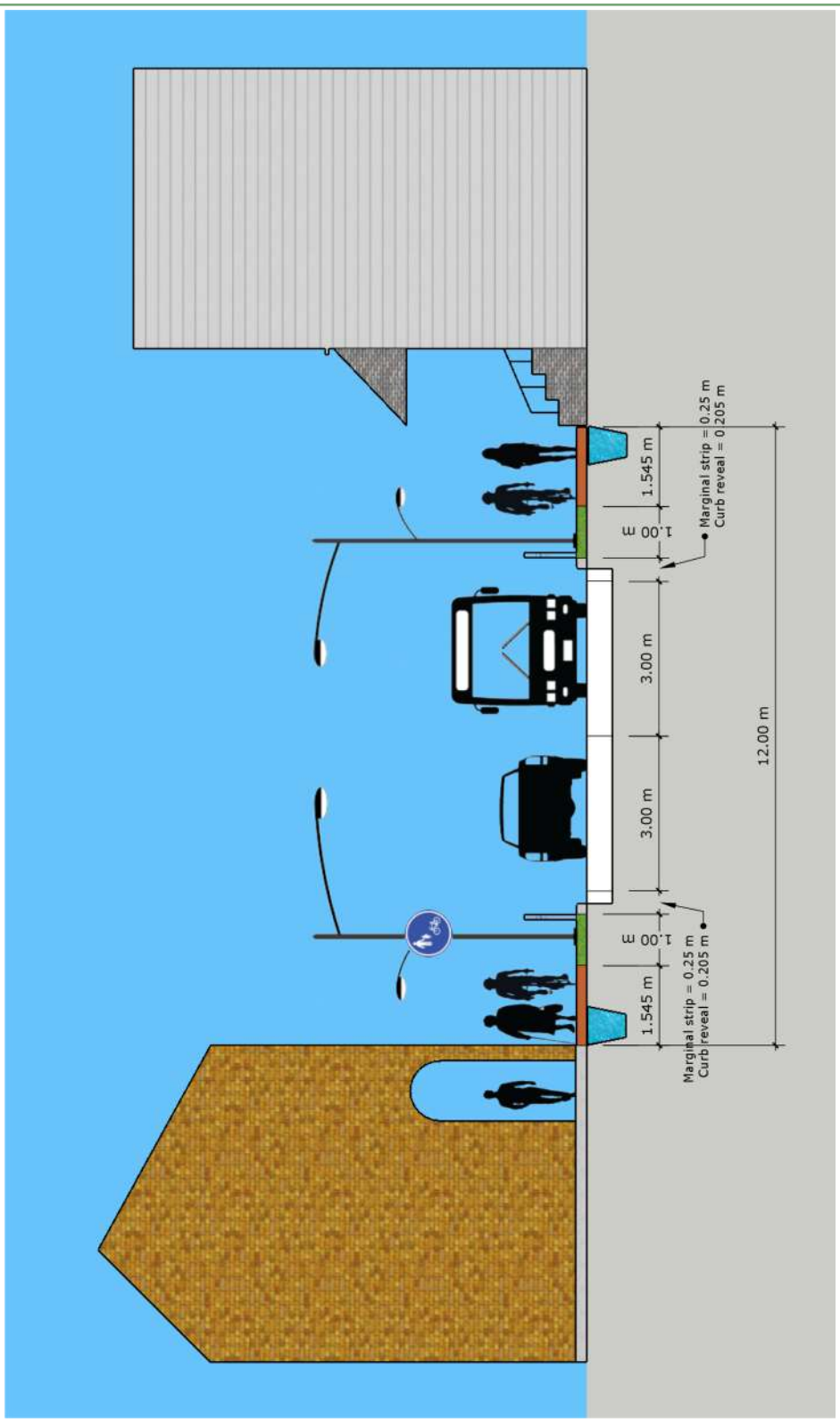


Figure 3.19: Design DU1-2 for ROW U1 = 40 ft./12 m (30 km/h)

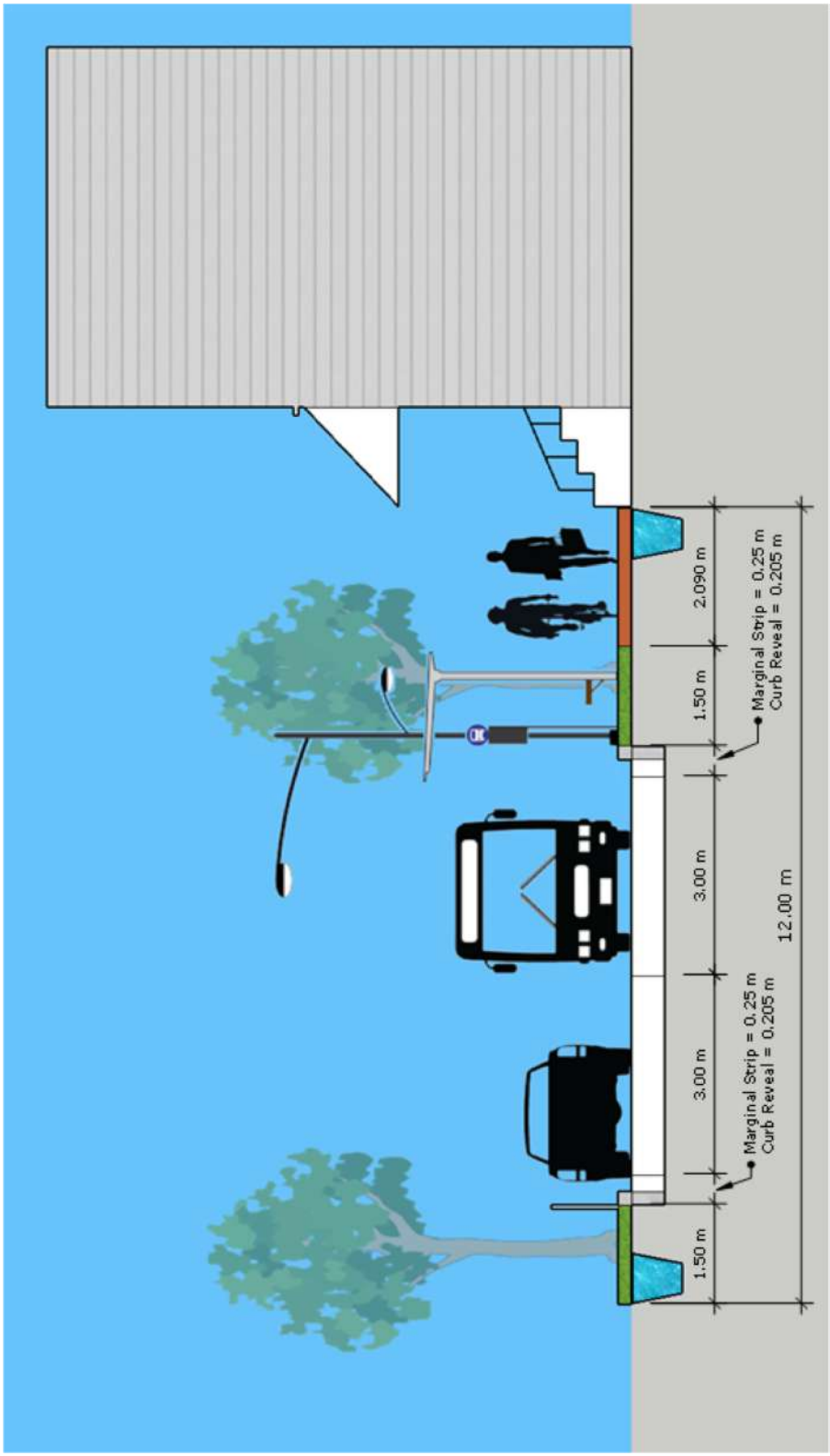


Figure 3.20: Design DU1-3 for ROW U1 = 40 ft./12 m (30 km/h)

Chapter 04
CROSSINGS

4

4.1 General

4.1.1 Risk of Accidents

As the most vulnerable of the road users, pedestrians and cyclists are constantly exposed to the risk of accidents. Some of these risks may be related to the physical environment of the walkway and cycling lane e.g. uneven and slippery surfaces, broken tiles, protruding tree roots, unkempt tree branches, incorrectly placed street furniture, etc. Nonetheless, most dangerous risks come from the potential conflict with motorized vehicles. Nowhere is this risk of conflict with motorized vehicles at is higher than when the pedestrians or cyclists are attempting to cross the carriageway. At these crossings, pedestrians and cyclists will leave their protected environment of the walkway and the cycling lane and embark into an environment of speeding vehicles and unruly drivers.

The risks of accidents at the crossings may be categorised into:

1. the behaviour of the pedestrians/cyclists themselves,
2. the behaviour of drivers, and
3. the physical facility.

To ensure a safe environment for crossings to pedestrians and cyclists, all the above three categories must be tackled effectively. Table 4.1 provides a list of potential causes of accident for each of the three categories of crossing risks listed above:

Table 4.1: Causes of accidents at crossings

Pedestrians/Cyclists	Drivers of Vehicles	Physical Facility
Jaywalking	Ignorance on the meaning of road markings	Unclear and confusing road markings
Failure to detect oncoming vehicles	Failure to detect existence of road signages	Absence of appropriate signages
	Failure to adhere to traffic rules dictated by road signages	Lack of appropriate signalization
	Failure to follow traffic signalization	Breakdown of signalization
	Failure to stop at appropriate distance	Landscaping elements prohibit clear visual detection of pedestrians/cyclists

4.1.2 Sight Distance

A proper sight distance is critical to ensure drivers have adequate reaction time to stop their vehicles on-time before reaching the point of conflict with the pedestrians and/or cyclists.

For the purpose of this guideline, there are two types of sight distance that must be considered, which are:

1. **Stopping Sight Distance**, the length required to enable a vehicle travelling at or near the design speed to stop before reaching an object (e.g. pedestrians/cyclists) in its path.

2. **Decision Sight Distance**, the distance required for a driver to detect an unexpected hazard (e.g. pedestrians/cyclists) and to select appropriate speed or path to avoid this hazard.

The specification of these two types of sight distance are given in Table 4.2. For urban roads, the specifications for design speed between 30 – 60 km/h are of interest (as highlighted in the shaded rows of Table 4.2). It follows that, for urban roads, the minimum stopping distance must at least be 85 m as longer stopping distance is better. And, if worst condition scenario is considered, a minimum sight distance of approximately 100 m is then required.

Table 4.2: Specification for sight distance at different design speed

Design Speed (km/h)	Min. Stopping Sight Distance (Flat surface, 0% gradient) (m)	Min. Stopping Sight Distance (Passenger Car, Worst Condition = 9% Downgrade, Wet) (m)	Decision Sight Distance (Passenger Car, Avoidance Manoeuvre B, stop on urban road with Brake Reaction Time, t = 9.1 s) (m)
120	250	304	470
110	220	262	420
100	185	223	370
90	160	187	325
80	130	154	280
70	105	124	235
60	85	97	195
50	65	74	155
40	50	53	Not Available
30	35	35	Not Available

Source: JKR (2015). A Guide on Geometric Design of Roads (Table 4.1, p. 32; Table 4.2, p. 33.; and Table 4.3, p. 35)

4.1.3 Application of Sight Distance

The determination of a minimum sight distance of 100 m in the previous section dictates that there must also be a visual clearance of 100 m at the site. This visual clearance guarantees drivers that there will be no sight obstruction within 100 m of the crossing facility – regardless of whether the crossing is located at mid-block or at an intersection.

Figure 4.1 shows how a combination of road signages and traffic calming features (i.e. speed breaker and hump) are used in the design of a crossing – in this case, a mid-block, unsignalized crossing – for a 2-way, 2-lane carriageway.

Figure 4.1 shows that there are no sight obstruction within 100 m thus providing a minimum of 100 m of visual clearance. Figure 4.1 also shows the placement of the traffic signages at different locations to convey different traffic warnings to the drivers. For the meaning of each of these traffic signages, please refer to Section 2 – Signages.

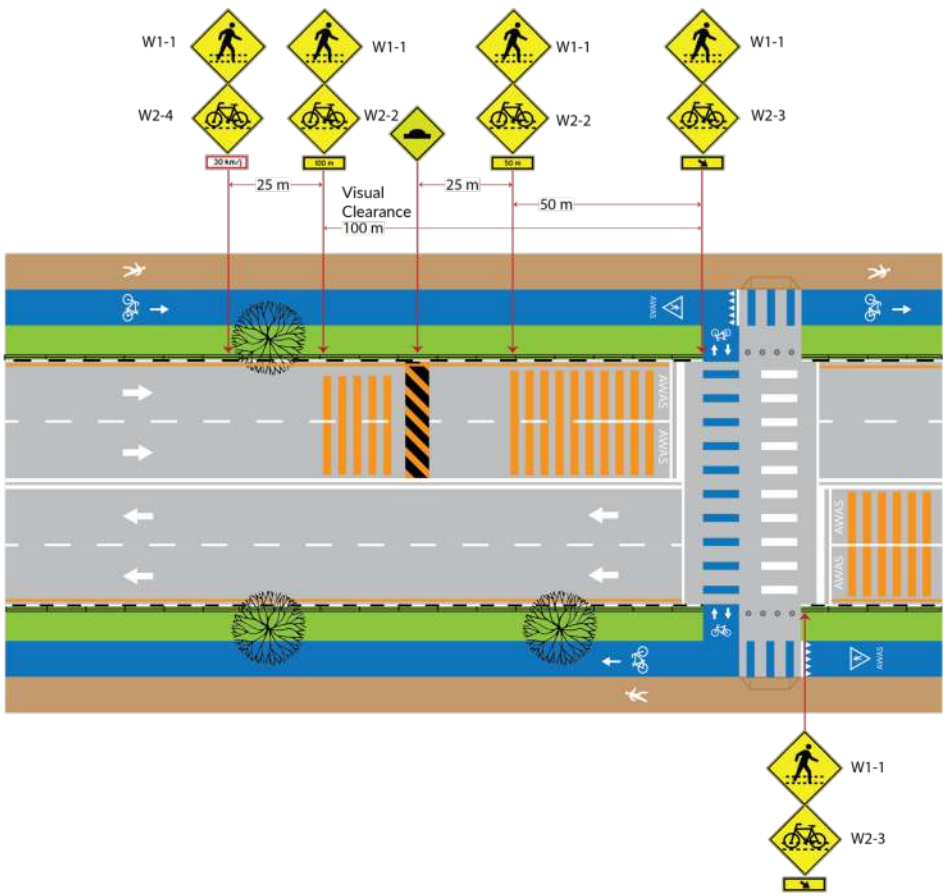


Figure 4.1: Design of crossing with the application of traffic signages and sight distance

4.1.4 Width and Colour of Crossing

The width of crossing is determined by the width of the pedestrian walkway to ensure adequate storage/waiting capacity as well as the Level of Service (LOS) of the crossing. If WC is the width of crossing and WS is the width of the walkway, then WC should be greater than or equal to WS:

$$WC \geq WS \qquad (4.1)$$

As for the colour of the crossing, only WHITE marking is allowed for at-grade crossings regardless of whether the crossing is signalized or unsignalized – for both mid-block and intersection crossings. However, where the crossing facility involves a raised crossing, e.g. table-top or flat-top crossing, then, a different rule will apply as will be discussed in later section.

Figure 4.2 provides a schematic design for an at-grade, unsignalized, mid-block crossing.

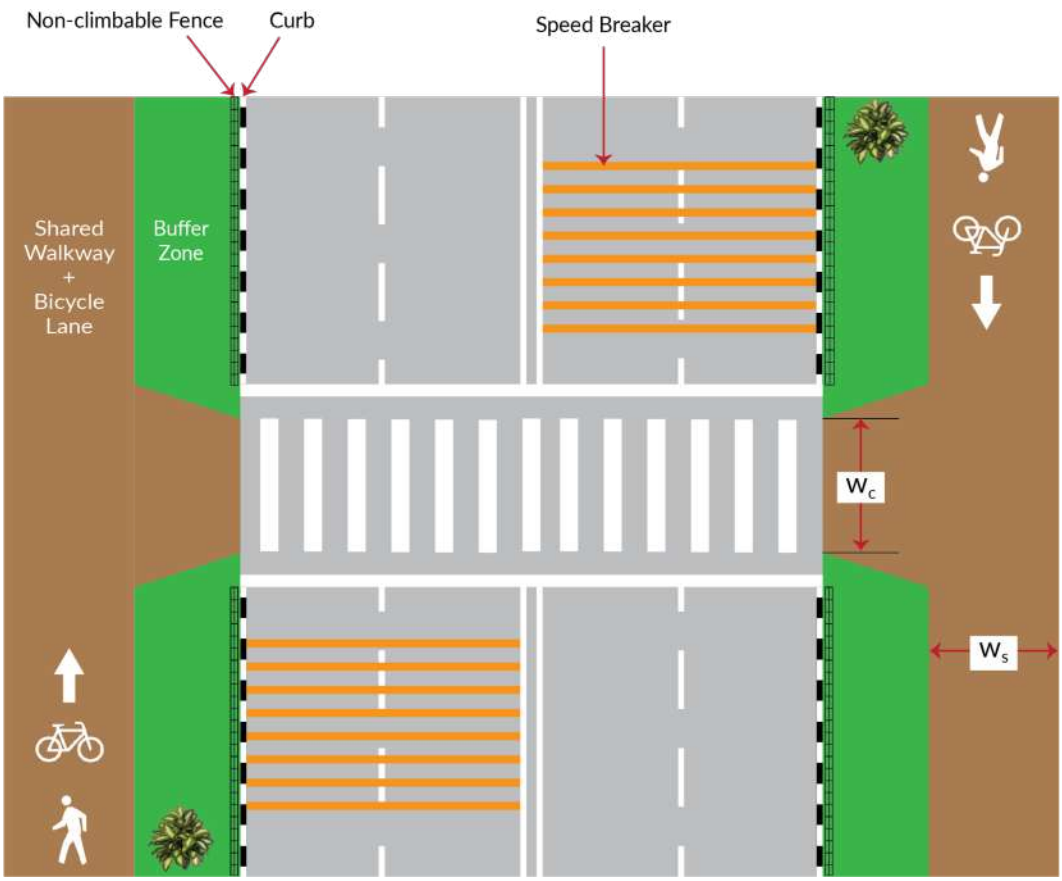


Figure 4.2: Width and Colour of Crossing

Photo 4.1: A signalized, at-grade crossing at an intersection in Copenhagen, Denmark

Photo 4.2: An aerial view of an unsignalized, at-grade crossing in Seoul, South Korea

4.1.5 Raised Crossing

Raised crossing (a.k.a. table-top or flat-top crossing) is a preferred crossing type for secondary urban road having low-volume, low-speed traffic. Typically, this would include U1 – U3 roads in the urban road context (refer Table 3.2). For these urban roads, raised crossing as in Figure 4.3 and Figure 4.4 can be applied:

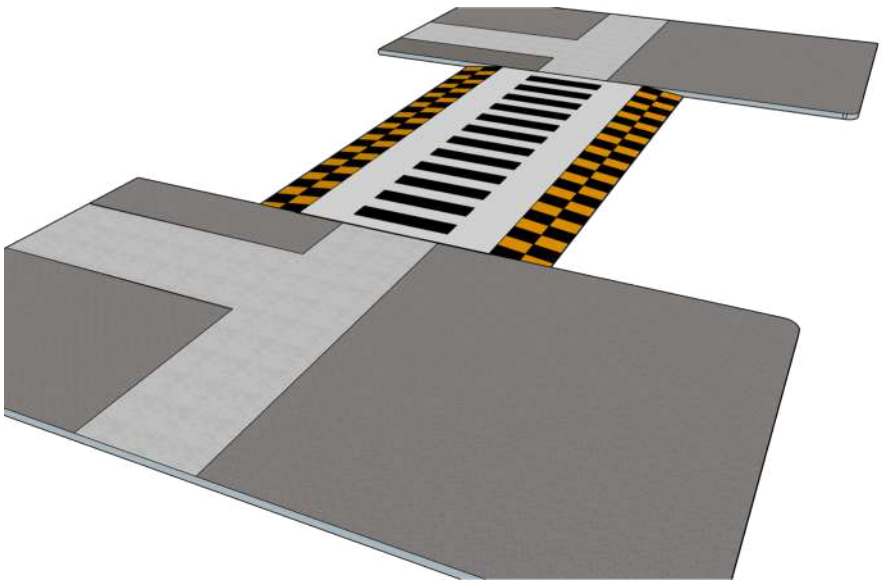


Figure 4.3 A 3-D view of a raised crossing

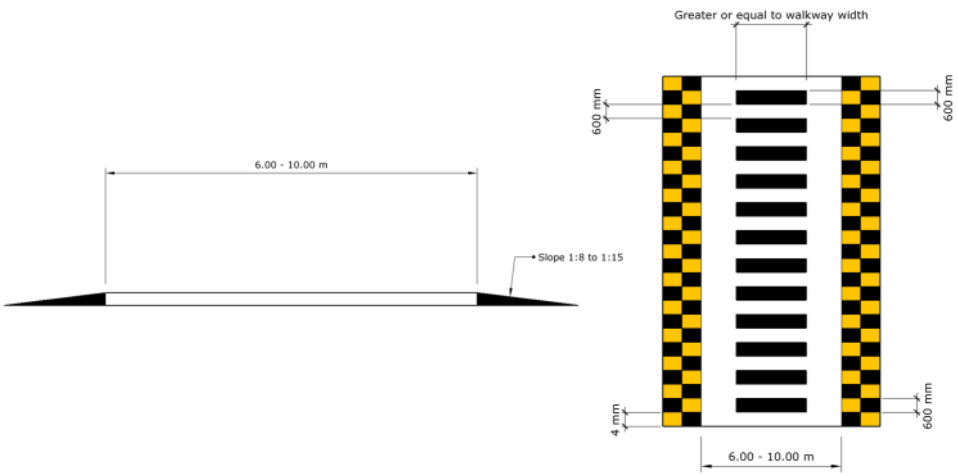


Figure 4.4 Dimensions of a raised crossing

Source: JKR (1997). Nota Teknik Jalan 18/97. Kuala Lumpur. (Figure 4b)

4.1.6 Apparatus at Crossings

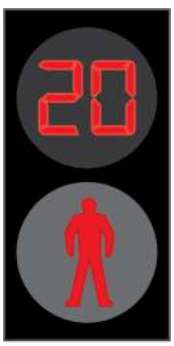
The choice of crossing apparatus must be appropriate to commensurate with the demand of pedestrian and bicycle traffic volumes. A more complex system is required for higher-class urban roads (based on U1 – U6 urban road hierarchy) as compared to lower-class, low-speed urban roads. The latter would normally have lower traffic volume – both motorized and non-motorized traffic.

Table 4.3: Crossing category and apparatus matrix by urban road hierarchy

Crossing Category	Design	ROW	Type	Apparatus				
				Signalization	Timer	Audible Alarm	Bi-directional Lane	Refuge Island
Primary	U6 U5	≥ 100 ft./30 m	At-grade	Control with actuation and timing	✓ Count-down on red, Count down on green	✓	✓	✓ With guard rail
Secondary	U4	80 ft./24 m	At-grade	Control with actuation and timing	✓ Count-down on red	✓	×	×
Tertiary	U3	66 ft./20 m	Raised (Table-Top type)	Control with actuation	×	×	×	×
Local	U2 U1	50 ft./15 m 40 ft./12 m	Raised (Table-Top type)	Sign	×	×	×	×

Figure 4.5 shows the crossing signals with countdown-on-green and countdown-on-red indicators which would enhance user experience when walking and crossing the road.

(a) Countdown on Green
(Indicates crossing time left before signal turns RED)



(b) Countdown on Red
(Indicates waiting time left before signal turns GREEN)

Figure 4.5 Crossing signals indicators – (a) Countdown-on-Green and (b) Countdown-on-Red

Chapter 05
SAFETY

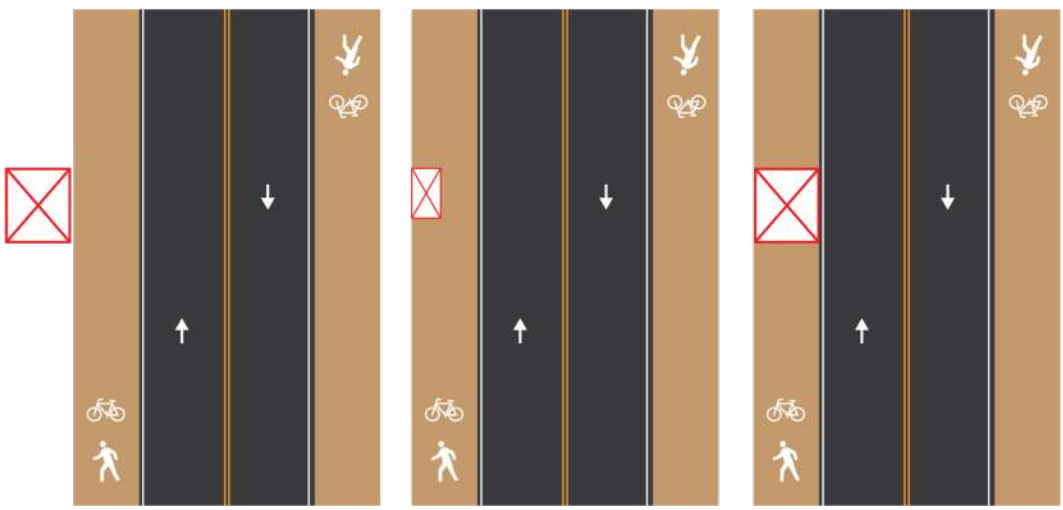
5

5.1 Construction Sites

5.1.1 Types of Obstructions

Constructions sites present a special category of hazards to pedestrians and cyclists alike. Though these construction sites may not involve high volume, high-speed moving vehicles, they nonetheless pose safety risks to pedestrians and cyclists. The risks that the construction sites present may be in the form of falling construction debris as well as movement (entry and exit) of heavy vehicles. Hence, conscious design effort must be considered to remove any barriers and obstructions created by these sites to guarantee safe passages of pedestrians and cyclists.

Figure 4.6 shows the different types of obstructions that may be present at construction sites:



a. Abutting b. Partial c. Total

Figure 4.6 Types of obstructions at construction sites – (a) abutting, (b) partial and (c) total obstructions.

For each of the type of obstructions, a special remedial action must be put in-place, albeit a temporary one (for the duration of the construction until completion). Next section will outline the remedial actions to be taken to mitigate the safety risks and hazards posed by these construction sites.

5.1.2 Abutting Obstruction

For abutting obstruction of pedestrian walkway and/or bicycle lane, a temporary cover must be provided along the entire length of the abutting construction site. The minimum width of this cover must be equal or greater than the width of the walkway. This cover will protect users from potential hazards of falling debris regardless of whether safety net is used on the construction sites or not.

Figure 4.7 shows the specification and dimensions of walkway cover. Photo 4.3 shows an example of walkway cover in Copenhagen, Denmark along a construction site.

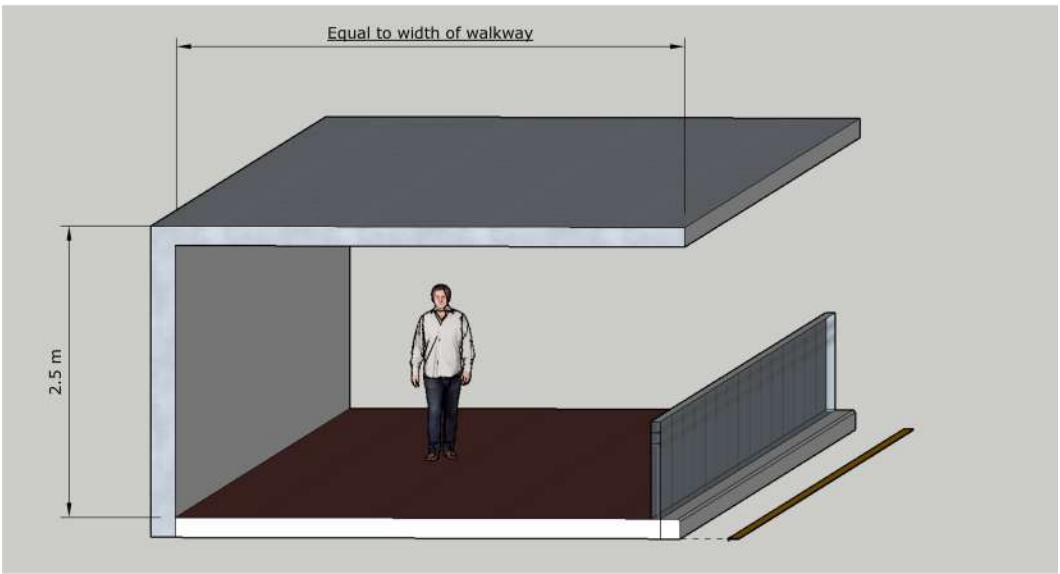


Figure 4.7 Schematic diagram of safety cover over walkway/bicycle lane

Photo 4.3: Cover over walkway at construction site in Copenhagen, Denmark

5.1.3 Partial and Total Obstructions

When there is PARTIAL or TOTAL obstruction of the walkway, the pedestrians or cyclists may have to encroach the carriageway to continue their journey. This resulted in conflict between motorised and non-motorised traffic.

Hence, for protection, concrete blocks MUST be used to provide temporary barrier segregating the motorised and non-motorised traffic (see Figure 4.8). The dimension and specification of the concrete barrier are given in Figure 4.9.

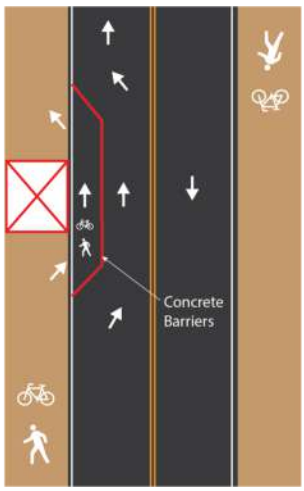


Figure 4.8 Re-alignment of pedestrian and bicycle traffic using concrete barriers as protection mechanism

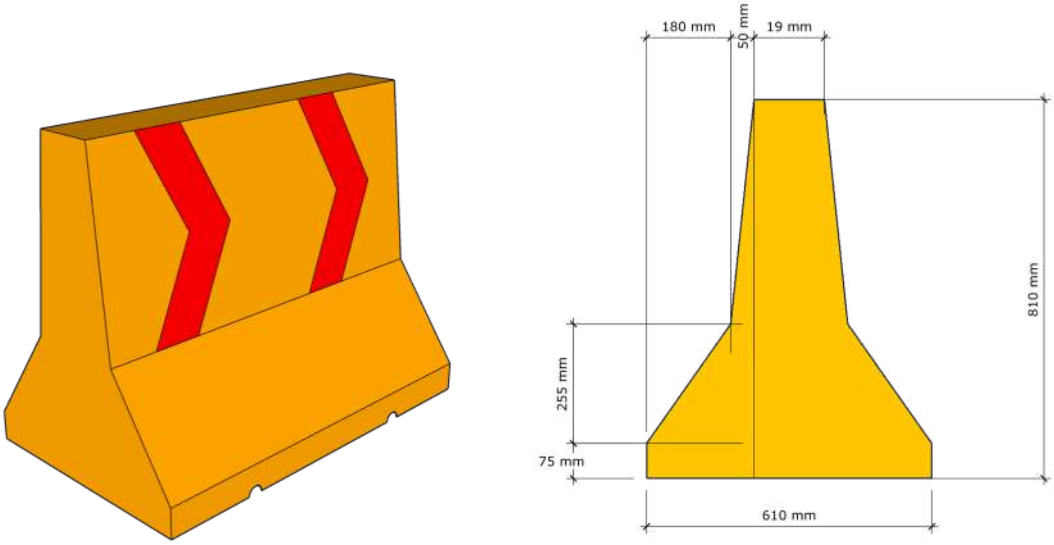


Figure 4.9 Dimensions of concrete block as barrier to protect pedestrians and cyclists

5.2 Drainage or Stormwater Cover

Drainage/stormwater cover must be oriented such that the grates are perpendicular to the direction of movement. Photo 4.4 shows an example where the drainage/stormwater cover is incorrectly placed.

When the grate orientation is parallel to the direction of travel, the drainage cover poses as hazard for people on wheel chair, the visually impaired who uses stick for guidance, as well as cyclists who share the same facility with pedestrians. A correct orientation of the cover is shown in Figure 4.10.

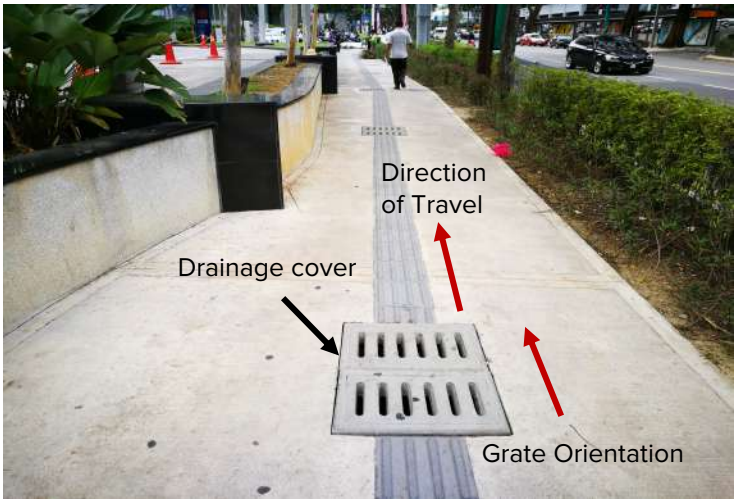


Photo 4.4: Example of incorrect placement of drainage/stormwater cover

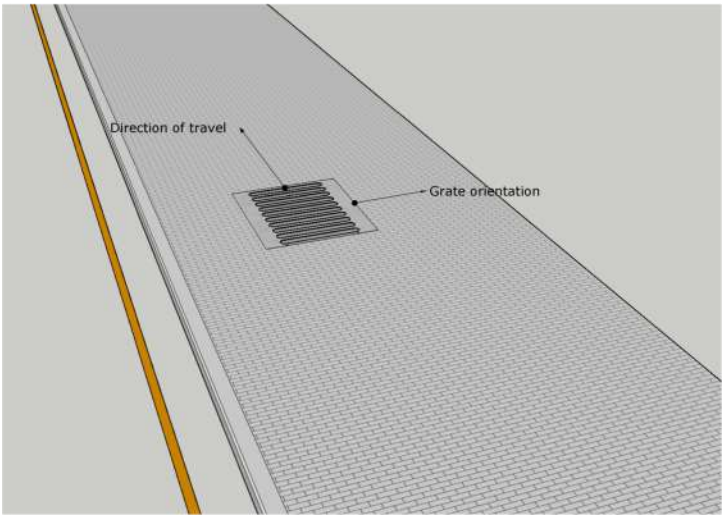


Figure 4.10 Proper placement of drainage/stormwater cover

DEWAN BANDARAYA KUALA LUMPUR