FOOTPATH DESIGN SPECIFICATION

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1. SCOPE

1.1 Purpose

The purpose of this standard is to provide guidelines to designers, consulting engineers, planners, and developers of footpath infrastructure for pedestrian and cyclist use to be constructed within the City of Karratha.

1.2 Applicable Standards

The installation, materials and workmanship shall comply with all relevant current Australian Standards, Codes and Regulations and all reference codes and Standards listed in the prefaces to those standards and codes.

Where Australian Standards and Codes do not exist the appropriate International Standard or Codes shall apply. Request an instruction from the City for amendments to Standards, Codes or Regulations that come into effect during the works and affect the works of the contract.

Document	Title
AS 1289 Suite	Methods of testing soils for engineering purposes
AS 1428.1	Design for access and mobility – Part 1: General requirements for access – New building work
AS 1428.4.1	Design for access and mobility – Part 4.1: Means to assist the orientation of people with vision impairment – Tactile ground surface indicators
AS 1742.9	Manual of uniform traffic control devices – Part 9: Bicycle facilities
AS 1743	Road signs - Specifications
AS 2700	Colour standards for general purposes
AS 2870	Residential slabs and footings
AS 3727.1	Pavements – Part 1: Residential
AS/NZS 4671	Steel for the reinforcement of concrete
AS/NZS 4455.2	Concrete masonry units – Part 2: Paving units.
AGRD06A-17	Austroads Guide to Road Design – Part 6A: Paths for Walking and Cycling
CCAA T48	Cement Concrete & Aggregates Australia – Guide to Industrial Floors and Pavements
CKS-100	City of Karratha – General Concrete Supply & Installation Specification

CKS-300	City of Karratha – Vehicle Crossover Specification
MRWA 9831-5649	Main Roads WA – Standard Drawing – Ramp and Grab Rail Details
MRWA Spec 501	Pavements
MRWA Spec 606	Main Roads WA – Tactile Ground Surface Indicators

1.3 Definitions

Term	Description
Basecourse	A layer of material placed on top of the subbase, below the surface course. Typically, crushed rock or gravel.
Construction Joint	A joint which divides a concrete pavement into suitable lengths and widths for construction purposes
Control Joint	A joint used to control drying shrinkage cracking in a pavement
Expansion Joint	A joint used to allow thermal movement of a concrete pavement
Isolation Joint	A joint which isolates the pavement from other structures
Light vehicle	A vehicle, when fully loaded, has a gross vehicle mass less than 3t
Subbase	A layer of pavement placed directly on the subgrade, located below the base course.
Subgrade	The natural surface upon which a pavement is built

2. DESIGN REQUIREMENTS

2.1 Design Criteria

Footpaths shall be designed as shared pedestrian and cyclist pathways.

The design of footpaths for the City of Karratha shall comply with *AS 3727.1:2016* as a minimum.

Footpath pavements shall be designed using *AS 3727.1* requirements for “Pedestrians and Light Vehicles” allowing for vehicle loads up to 3t. Crossovers and driveways are to be constructed in accordance with the *City’s Crossover Specification*.

Footpaths shall be located within road reserves, and the footpath edge shall be offset 0.5m away from property boundaries, kerbing and any other permanent structures. Any gaps less than 0.5m will not be accepted unless the footpaths are constructed against the back of the kerbs. Offsets of the footpath edge from the road are to be determined on case-by-case basis by the Designer.

Horizontal Curvature for Shared-Paths

The minimum horizontal radii for shared-paths are shown in Table below:

Table 1: Minimum Radii for Shared-Paths

Design Speed (km/h)	Minimum Radius (m)
20	10
30	25
40	50

50	94

A vertical clearance of 2.5m between the pathway and overhead obstacles such as signs, trees and buildings is required in accordance with *AS 1742.2:2009 Clause D2.3.5*.

2.2 Pavement Material & Concrete Thickness

Footpath pavement material shall consist of concrete material only. The requirement on thickness and reinforcement is outlined in Table 1.

Concrete shall be supplied in accordance with the City's *CKS-100 General Concrete Supply & Installation Specification* (32MPa).

Footpaths anticipating vehicle traffic shall be reinforced with SL82 mesh complying with *AS/NZS 4671*.

Table 2: Concrete Footpath Thickness & Reinforcement requirements (in accordance with AS 3727.1:2016 Table 5.2 and CKS-100)

Traffic / Application	Minimum Thickness of Concrete (mm)	Reinforcement
Pedestrians Only	100	Unreinforced
Pedestrians and Light Vehicles For footpaths adjacent to on-street parking.	100	SL82
Pedestrians and Commercial Vehicles For footpaths designed for commercial vehicle access (i.e., for maintenance purposes)	150	SL82

Concrete shall be cured and protected from traffic for a minimum of 7 days (*AS 3727.1:2016 Clause 5.2 (e)*).

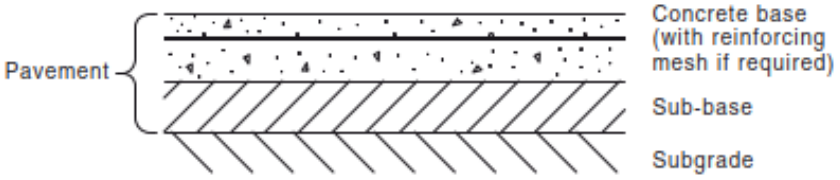

Figure 1: Cross-section of (AS 3727.1:2016 Figure 5.1).

Reinforcement cover requirements are as per Table 2.

Table 3: Reinforcement Cover Requirements (in accordance with AS 3727.1:2016 Clause 5.3.2 (b) & Fig 5.4.2)

Location	Reinforcement Cover (mm)
Top surface of the pavement	30
To the slab edge or a formed joint	40
Weakened plane control joint	50

2.3 Subgrade

The sub-grade shall be evenly graded and free of rocks, organic matter and any other deleterious material. The sub-grade shall be compacted to provide even compaction to 150mm (minimum) depth. Compaction shall be not less than 95 per cent of maximum dry density when measured in accordance with AS 1289.

AS 3727.1 provides simplified guidelines for pavement design to be located on subgrades on well-drained sites complying with *AS 3727.1 Clauses 1.1, 3.4, 4.1 and 4.2.*

The subgrade must be geotechnically investigated to *AS 1726:2017*, classified in accordance with *AS 2870* and *AS 3727.1*, and tested to the relevant *AS 1289* standard, including California Bearing Ratio to *AS 1289.6.1*.

The existing subgrade shall be prepared as follows:

Subgrade levels should be prepared to the levels in accordance with the design drawings to achieve the final finished levels. Loose soil or soil containing organic materials shall be removed. Any stormwater, sewer pipes, and other services under the proposed pavement shall be protected from damage during construction.

A City of Karratha civil engineer shall approve a footpath design and nominate if subgrade improvements are required on a case-by-case basis based on the site classification, regardless the type of traffic.

If subgrades require improvement, they should be improved to achieve the following quality. The moisture content of the subgrade and fill shall be adjusted to ensure adequate compaction. The subgrade shall be compacted to 95% MMDD. Local soft spots shall be rectified to achieve levels of strength and stiffness similar to the remainder of the subgrade. Backfill for service trenches shall be compacted in layers no greater than 200mm to provide levels of strength and stiffness similar to the subgrade.

2.4 Subb*ase*

Subbase materials shall be *MRWA Spec 501.09* Crushed Rock Base Subbase or equivalent material complying with *MRWA Spec 501 Table 501.06* (Minimum CBR 30%), 100mm thick, compacted to 95% Maximum Modified Dry Density in accordance with *AS 1289.5.1.1*. Subbase thickness less than 100mm is acceptable however limited to paths with pedestrian only traffic.

Subbase thicknesses are recommended in accordance with Table 4.

Table 4: Required subbase thicknesses (CCAA T48 for light vehicles & commercial loading)

Traffic	Subgrade Classification (USCS)	Subgrade Rating (Typical CBR %)	Required Subbase Thickness (mm)
Pedestrians only	All	All	[1]50 - 100
Pedestrian pram ramp locations	All	All	100
Light Vehicles Commercial Vehicles	GW GP GM GC SW SP	Good (10% or more)	100
Light Vehicles Commercial Vehicles	SM SC ML CL MH CH	Medium (3% to 10%)	150
Light Vehicles	OL OH	Poor (3% or less)	200

Commercial Vehicles	PT		

[1]50mm thickness only applies to *recycled crushed concrete* material.

2.5 Footpath Width

Footpath width shall be in accordance with Table 5.

Table 5: Minimum Footpath Width (Extract from AGRD6A Appendix A)

Footpath Width (m)	Application & Usage	Typical Roads adjacent to footpath (Speed Limit)
2.0	Local access, low use	Neighbourhood (50km/hr) Local Streets
2.5	Commuting (20km/h cycling), regular use	Main (70km/hr+) Sub-Main (70km/hr) Linkage (60km/hr) Inter-Suburb (50-60km/hr)

2.6 Joints

For construction tolerances, joints shall have a maximum gap of 12mm and a change in level no greater than 2.0mm (in accordance with *AS1428.1:2021 Clause 4.2*) to provide a suitable surface for cyclists.

Table 6: Joint Requirements

Joint Type	Maximum Joint Spacing (m)	Reference
Contraction Joint for unreinforced concrete	2.0	AS 3727.1:2016 Table 5.2
Contraction Joint	2.0	AS 3727.1:2016 Clause 5.4.2 & 5.4.8 Saw cut to a minimum depth of 20mm (1/4 the thickness of the pavement)
Expansion Joint	6 (every 3rd joint).	AS 3727.1:2016 Clause 5.4.4
Construction Joint	If or as required per design	AS 3727.1:2016 Clause 5.4.5
Isolation Joint	As required for footpaths adjacent to buildings, kerbs, rigid structures, drainage pits and access holes.	AS 3727.1:2016 Clause 5.4.3

2.6.1 Expansion Joints

Expansion joints are installed at 6m centres and at all changes in direction. They shall be full depth joints, 12mm wide and filled with Bitumen Impregnated Compressible Filler or similar approved material. The joint filler material shall be such that when it is subjected to compression in hot weather, no material is extruded. The following materials are approved by the City:

- Nonporite – Bitumen impregnated by cold solvent process.
- Expandite – Flexicell

Other expansion joint fillers may be approved such as lock joints. Expansion joints shall be installed where the pathway abuts kerbing, utility service structures, drainage pits and/or existing crossovers. Expansion joints are to coincide with kerb joints and vice versa where possible. Refer drawing KSD/JC/001.

2.6.2 Contraction Joints

Contraction joints shall be constructed every 2m centres. The joint shall be made in plastic concrete by depressing an approved grooving tool into the surface of the pavement at the time of placement to a depth of 1/4 of the pavement thickness. The contraction joint shall be aligned at 90° to the pavement alignment and provide a vertical plane of weakness through the pavement.

Contraction joints are to coincide with kerb joints and vice versa where possible. Refer drawing KSD/JC/001.

2.6.3 Edge Treatment

Edges of the footpath shall be polished smooth and rounded using an edger of radius 10 millimetres. Edges shall be free from irregularities of alignment and/or level. Edges of the dual use path shall retain the non-slip broom finish surface and shall not be rounded.

2.6.4 Longitudinal Gradient

- The maximum allowable longitudinal gradient is 1:20.

- Paths steeper than 1:20 are classified as ramps and will require handrails. Ramps require handrails between 865mm to 1000mm high on either side of the path.
- Landings are required based on footpath gradients. Refer to Table 7 below.

Table 7: Spacing of landings (refer to AS 1428.1:2021)

Classification	Longitudinal Gradient	Maximum spacing of Landings (m)
Walkway	Less than 1:20	-
Walkway/Ramp	1:20	15
Ramp	1:14	9

Footpaths shall have a crossfall between 1:40 and 1:50 to achieve drainage. Crossfalls between 1:50 and 1:100 is permitted, provided longitudinal gradients allow for sufficient drainage.

- 900mm offset from either side of the footpath shall be graded to suit the footpath surface level and direction of drainage.
- Guardrails are required if there is a risk of personnel injuries or falls near steep drops adjacent to the pathway.

3. ACCESSIBILITY

3.1 Kerb Ramps

Paths are to have kerb ramps at crossing points complying with *AS1428.1:2021 Clause 7.7*:

- Gradient to be less than 1:8; maximum rise of 190mm and maximum length of 1520mm.
- Refer to the *City's footpath standard drawing* for more information

Alternative kerb ramp arrangements are provided in *AS1428.1* for narrow footpaths and locations with restricted space.

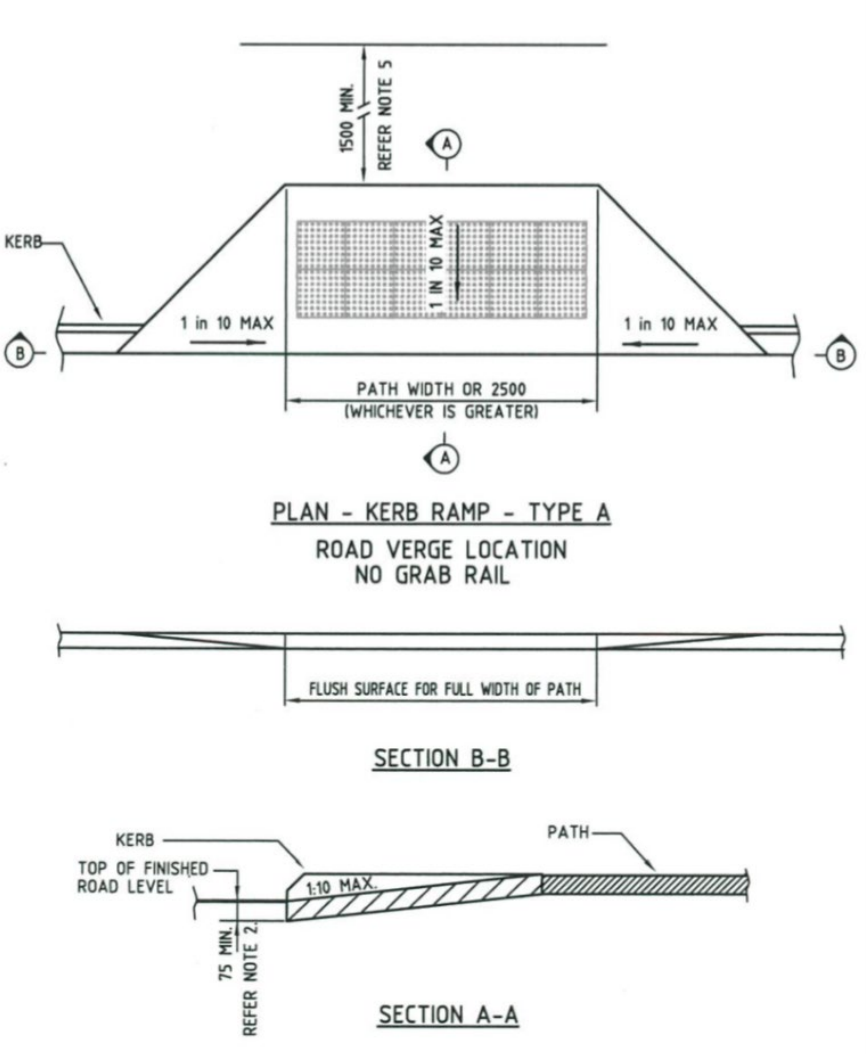

Figure 2: Kerb Ramp Design - (MRWA 9831-5649-3 Type A)

3.2 Tactile Ground Surface Indicators

Tactile Ground Surface Indicators (TGSIs) are required on footpaths located within the City Centre (between Balmoral Rd and Searipple Rd) and commercial centres to warn pedestrians with visual impairment of road hazards. TGSIs are required at the following locations:

- At kerb ramps further than 3m from a property line or for kerb ramps outside of the gradient range of 1:8 to 1:8.5.
- On footpaths that are not separated from roadways by changes in grade.
- On footpaths crossing roads where motorist's vision is limited (*AS1428.4.1 Figure C12*).
- At bus stops (*AS1428.4.1 Figure 3.4*).
- As directed by the Principal.

TGSIs should be designed in accordance with *AS1428.4.1*. TGSIs shall be:

- Pavers complying with *AS/NZS 4455.2*:2005 Adhesive TGSIs are not permitted unless directed by the Principal.
- Full width of ramp; minimum 2000mm width.

- 600mm to 800mm long.
- Set back 300mm from the road edge.
- Colour, either R52 Terracotta, Y14 Golden Yellow or N61 Black.
- The colour of the raised circular indicators shall be the same colour as the TGSI (known as integrated TGSIs)
- Minimum slip resistance rating of R11
- A luminous reflectance value complying with Table 7 to achieve sufficient contrast

Table 8: [1]Luminance Values of TGSI that comply with AS/NZS 1428.4.1

Condition	Required TGSI Luminous Reflectance Value (LRV %)
Dry	24 or less 87 or greater
Wet	12 or less 56 or greater

[1]The above requirement is based on integrated TGSIs achieving a luminance contrast of at least 30% in accordance with AS 1428.4.1 Clause 2.2 (b) (i), assuming MRWA Spec 606 for LRV values of concrete Dry: 48%, Wet: 28.9%)

- Refer to the City's footpath details drawing for more information

3.3 Holding Rails

Holding rails (also known as grab rails) are U-shaped rails providing support for cyclists to hold onto whilst awaiting a gap in traffic to cross the roads. Holding rails shall only be provided at busy crossings where it is likely cyclists will be required to stop and wait (as per recommendations from *AGRD06A-17*). The requirement for Holding rails shall be assessed on an as-required basis, taking into consideration the frequency of cyclist use, accident hotspots, grade of road, visibility and traffic demand.

Holding rails shall comply with *MRWA Standard Drawing 9831-5649*.

Holding rails shall be designed with the following criteria:

- 900mm height above ground level
- Minimum set back 300mm from road edge, maximum 600mm
- Located on the approach side of a kerb ramp
- Located at median strip cut throughs:
- No grab rail at median strip cut throughs less than 1.2m wide
- 0.6m long grab rails at median strip cut throughs 1.2m to 2.0m wide
- 0.9m long grab rails at median strip cut throughs greater than 2.0m

Note - Median strip cut throughs are only required for roads greater than 4.5m wide.

3.4 Driveway And Crossover Interface

Where a driveway or crossover crosses a footpath/shared path, the driveway profile shall match the path to emphasise that the path has the right of way. For this reason, the path must be constructed in a continuous manner across all residential driveways, maintaining path crossfall and material in preference to the crossover construction. Therefore, the crossover must be designed to match path levels (where applicable).

3.5 Signage & Markings

Footpath signage and markings shall be in accordance with *AS 1742.9:2018* and *AS 1743*.

Standard pavement markings have been provided in Figure 3, Figure 4, and Figure 5 below. Markings shall be painted *AS 2700* G21 Jade Green. Pavement markings in *AS 2700* Black N61 are also permitted for emergency vehicles crossing over footpaths.

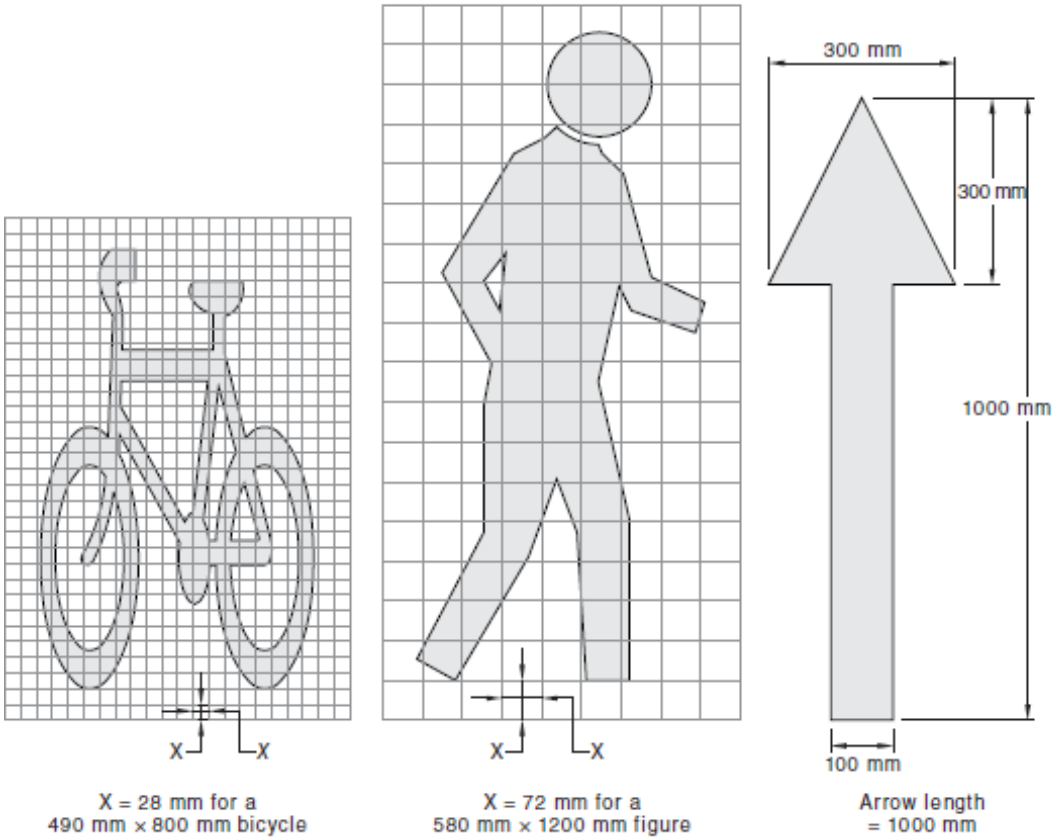

Figure 3: Standard footpath markings (Extract from AS 1742.9:2018 Figure 3.1)

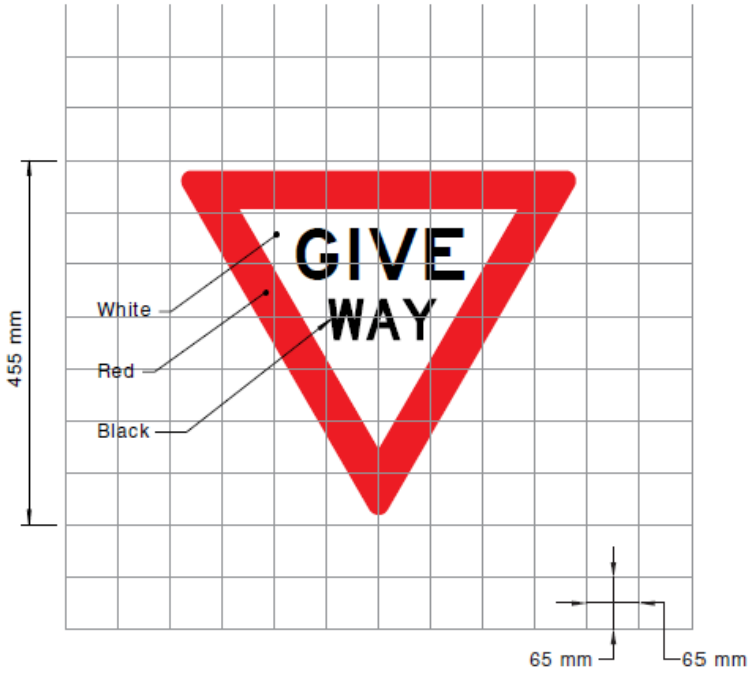

Figure 4: Give way pavement marking for paths (Extract from AS 1742.9 Figure 3.2(1))

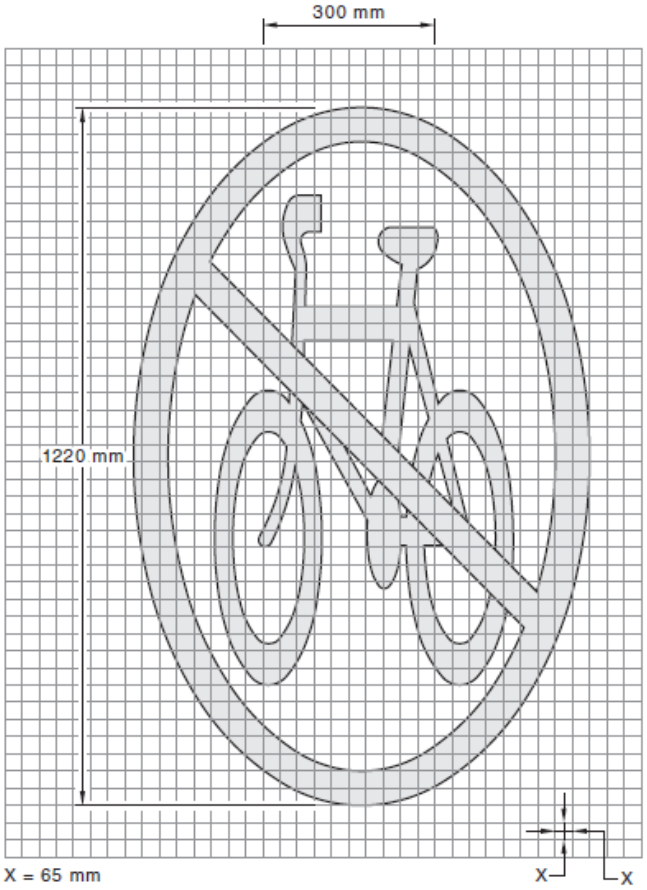

Figure 5: Standard Bicycle pavement markings – (Extract from AS 1742.9 Figure 3.2(2))

Standard signage has been provided for footpaths in Figures 6 and 7.

Figure 6: Shared Path Sign - AS 1742.9 R8-2

Figure 7: Bicycle/Pedestrian Warning Sign - AS 1742.9 W6-9 and W8-23

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