

Technical direction

For traffic and transport practitioners

POLICY – GUIDELINES - ADVICE



Transport
Roads & Traffic
Authority

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Supersedes/Amends TDT 2001/04a

TDT 2001/
04b

USE OF TRAFFIC CALMING DEVICES AS PEDESTRIAN CROSSINGS

INTRODUCTION

This Technical Direction supersedes Technical Direction 2001/04a - *Use of Traffic Calming Devices as Pedestrian Crossings*.

This technical direction applies to all traffic calming devices. Not all traffic calming devices are applicable for use as pedestrian crossings.

BACKGROUND

The following four devices are traffic calming devices commonly used on local roads as part of a traffic calming scheme:

1. Watts profile (segment of a circle) road humps, see Figure 1.
2. Flat top road humps, both mid-block and at intersections, see Figure 2 (mid-block example).
3. Perimeter treatments, continuous footpath treatments, raised or flush, with or without contrasting paving material, see Figure 3 (flush example).
4. Flush mid-block treatments, with or without contrasting paving material, no figure included, but similar to Figure 3 (but obviously at a mid-block location).

For safety reasons a pedestrian crossing must not be provided on Watts profile road humps. If pedestrian crossing signs and markings (zebra markings) exist, they must be removed.

The objectives of these four devices include:

- Acting as a visual and tactile cue that different driving conditions apply.
- Discouraging through traffic.
- Reducing speed and traffic volume.
- Improving road safety.
- Improving local amenity.

Distribution List:

Director, Infrastructure Services; Director, Commercial Services; Director, NSW Centre for Road Safety; Traffic Management and Road Safety staff; and Councils.

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Amendment: Updated to include reference to and alignment with TDs 2013/05 and 2014/003.

Approved: W Wilson, A/Principal Manager Policy, Research and Legislation / October 2014.

I (19 pages)

Where the location of one of these devices coincides with a pedestrian desire line or a pedestrian crossing opportunity, the traffic calming function and the pedestrian crossing function may be combined if justified. For examples of a pedestrian crossing on a:

- Flat top road hump, see Figure 4.
- Perimeter treatment, see Figure 5.

In 10 km/h sign posted shared zones continuous footpath treatments are an appropriate perimeter treatment to consider for traffic calming combined with pedestrian desire lines. In shared zones this treatment is a continuation of the footpath parallel with the main street, at grade, without colour or texture change, across side street intersections. They are not marked as pedestrian crossings. Continuous footpath treatments must consider specific criteria. For complete details refer to TDT 2013/05.

As shared zones are a pedestrian priority environment there should not be any requirement for pedestrian crossings and pedestrian fencing. For complete details of shared zone refer to TTD 2014/003.

Note: Figures 4 & 5 refer to drawing T000713. This drawing is provided as Figure 6.

Some of these devices are not signed and marked for pedestrians. Pedestrians perceive all these devices, whether signed and marked or not, as crossings on which they have priority over vehicles. Likewise motorists perceive the absence of pedestrian crossing signs and markings at these devices as giving them priority over pedestrians. As a result at some devices without pedestrian crossing signs and markings, legend (text based) or diagrammatic (pictorial) signs with similar meaning to PEDESTRIAN GIVE WAY TO MOTORISTS are erected. These signs are non-standard and do not have any legal status. RTA **does not authorise** the use of these signs.

In accordance with the definition in the NSW Road Rules 2008, any of these devices without pedestrian crossings signs and markings (zebra crossings) are not pedestrian crossings as such.

DEVICES SERVING TRAFFIC CALMING FUNCTION ONLY

Except in shared zones, where devices serve the traffic calming function only, adequate measures must be undertaken to ensure that pedestrians do not perceive and use it as a pedestrian crossing. In shared zones there should not be any requirement for pedestrian crossings and pedestrian fencing.

In the case of flat top road humps and flush mid-block treatments, these devices must:

- Not be located on a pedestrian desire line.
- Not include a pram ramp or pedestrian refuge.
- Have the pedestrian footpath physically separated by pedestrian barriers (use fences or landscaping as appropriate).
- Include appropriate warning signs together with advisory speed signs as necessary to warn road users.
- Not have any perception of pedestrian priority.

Where devices cannot meet these requirements, for example because they include pram ramps or are located on a pedestrian desire line, i.e. most perimeter treatments at intersections, they must be treated as though they serve both traffic calming and a pedestrian crossing function. See the following section, *Devices serving both traffic calming and pedestrian crossing functions*.

DEVICES SERVING BOTH TRAFFIC CALMING AND PEDESTRIAN CROSSING FUNCTIONS

Existing installations

Where an existing device (as at May 1998) serves both traffic calming and pedestrian crossing functions, a risk analysis must be undertaken to:

- Determine the risk associated with traffic calming device which may be used as a pedestrian crossing; and,
- Determine the most appropriate remedial measures (including consideration of continuous footpath treatments and implementation of 10 km/h shared zones).

Where it is appropriate to install a pedestrian crossing, RTA requirements for the installation of a pedestrian crossing are waived. The alternative is to:

- Remove the device.
- Relocate the device so it complies with this technical direction.

New installations

The location must conform to RTA's requirements for a traffic calming device as well as for a pedestrian crossing.

ACTION

Use this *technical direction* to:

- Review all existing traffic calming devices, evaluate as described above and remove, relocate or take remedial action as necessary.
- Ensure that all new traffic calming devices are designed and installed in accordance with the above principles.
- Ensure that all signs and markings used at these devices are in accordance with RTA's requirements.
- Ensure that pedestrian crossings are not provided on Watts profile road humps. If pedestrian crossing signs and markings (zebra markings) exist, they must be removed.
- Check the risk associated with traffic calming devices which are also used as pedestrian crossings.
- Prioritise the various traffic calming devices according to their risk levels.
- Establish a program of remedial works.
- Install the necessary street furniture.

RISK MANAGEMENT PROFORMA

To assist this process, a step by step Risk Analysis (see Attachment 1) has been developed. Practitioners should be guided by their experience, expertise and site knowledge particularly when considering devices not covered by this technical direction.

NSW ROAD RULES

If a pedestrian crossing is the preferred installation it must comply with the NSW Road Rules 2008 particularly *rules 81, 82, 172 and 173*.

NOTES:

- (i) The terminology used for traffic calming devices is as per the Australian Standard, AS 1742.13, 2009, *Manual of uniform traffic control devices – Local area traffic management*.

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- (ii) This technical direction does not apply to pedestrian refuges or kerb blisters used as stand alone devices.
- (iii) This technical direction does not apply to a "shared zone" implemented under the:
- *Road Transport Act 2013 (Part 5.3, Division 2)*
 - *NSW Road Rules 2008, rule 24.*
 - *Technical Direction Design and implementation of shared zones including provision for parking TTD 2014/003 (July 2014)*

SUPERSEDED DOCUMENTATION

Many examples of traffic calming devices intended also for pedestrian use contained in RTA's *Sharing the Main Street*, Federal Office of Road Safety's (FORS) *Towards Traffic Calming* and Section 7 of RTA's *Guide to Traffic Facilities* (1988) are now superseded.

UPDATES

To ensure that this *Technical Direction* and any related guidelines remain current and relevant, minor updates may be made from time to time. Any updates may be obtained from the RTA website using the Traffic & Transport Policies & Guidelines Register which can be found at:

www.rta.nsw.gov.au/doingbusinesswithus/guidelines/documentregister/index.html

Printed copies of this *Technical Direction* are uncontrolled, therefore the Register should always be checked prior to using this *Technical Direction* or any related guidelines.

Approved by:

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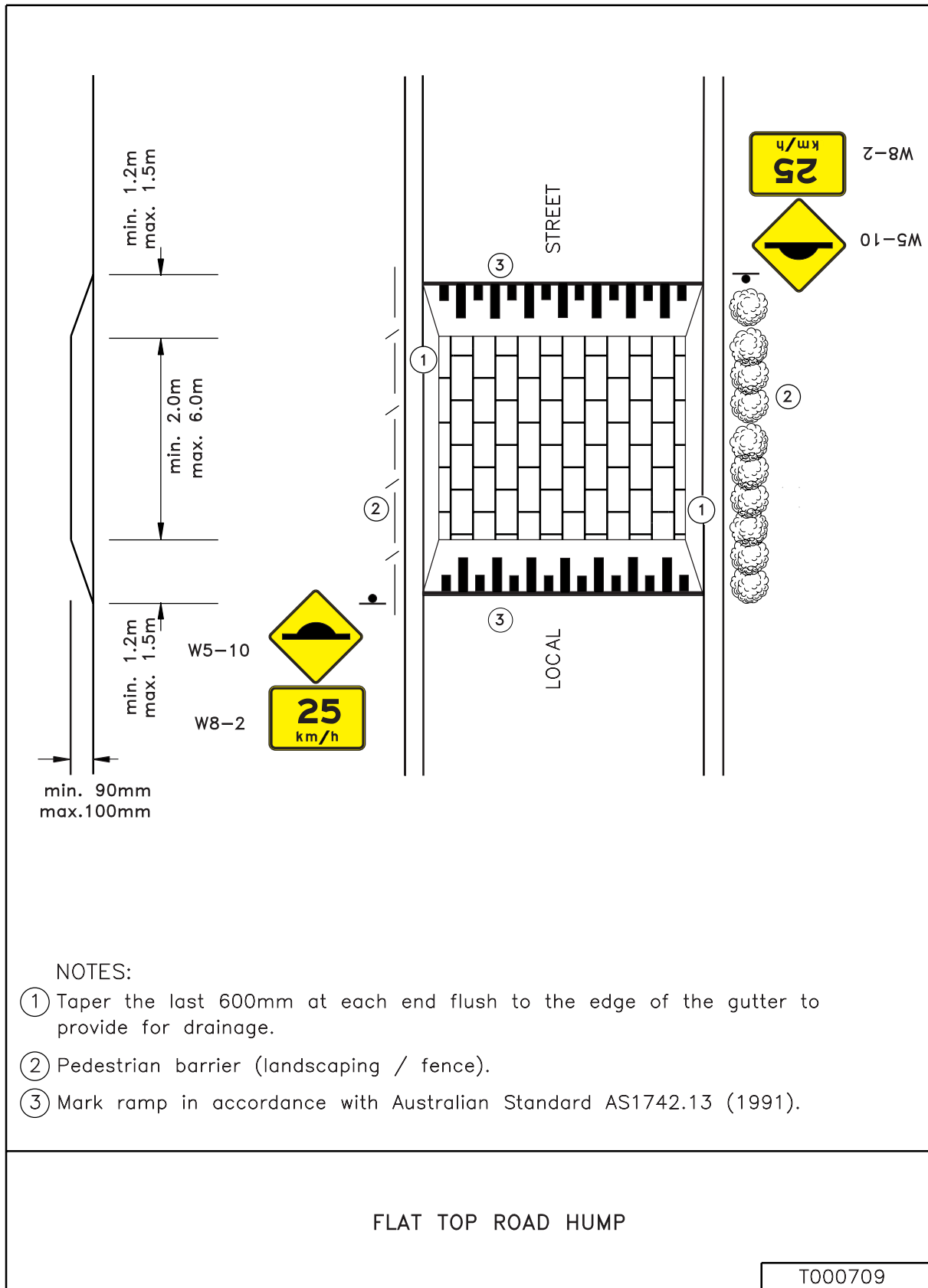
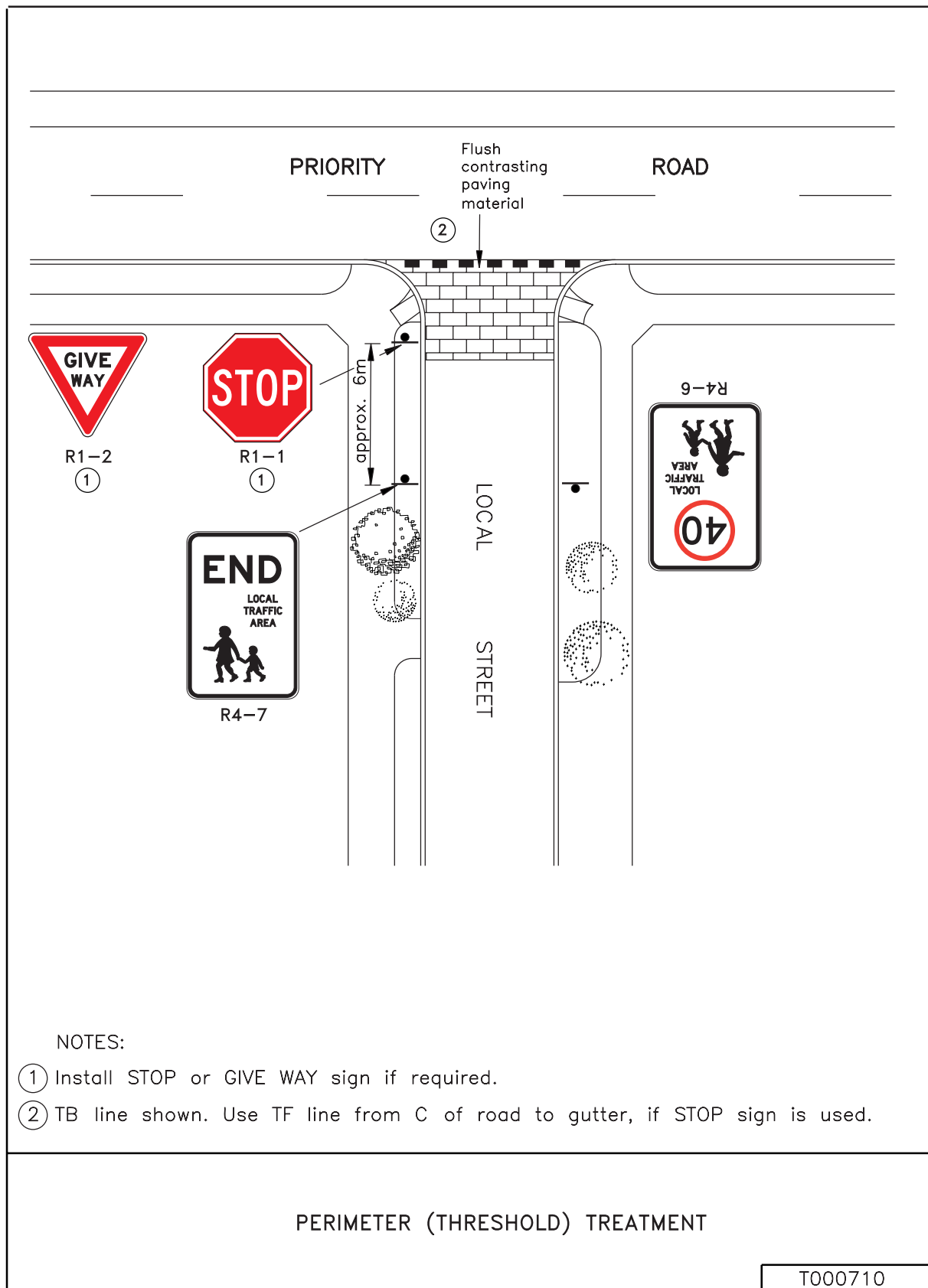


FIGURE 2



Additional note: In some locations, a continuous footpath treatment may be used instead of contrasting paving material at the threshold. Refer to TDT 2013/05 for details.

FIGURE 3

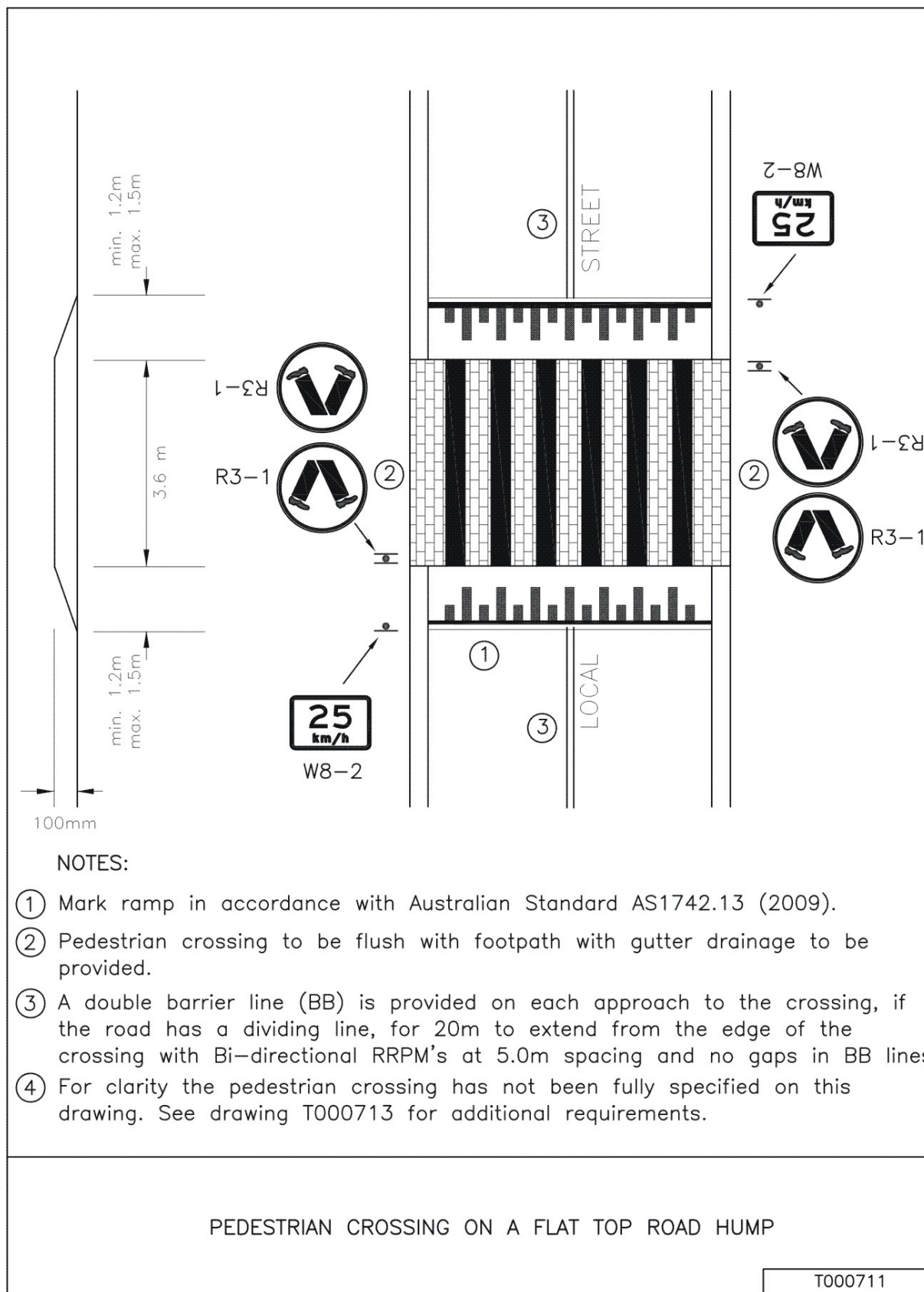


FIGURE 4

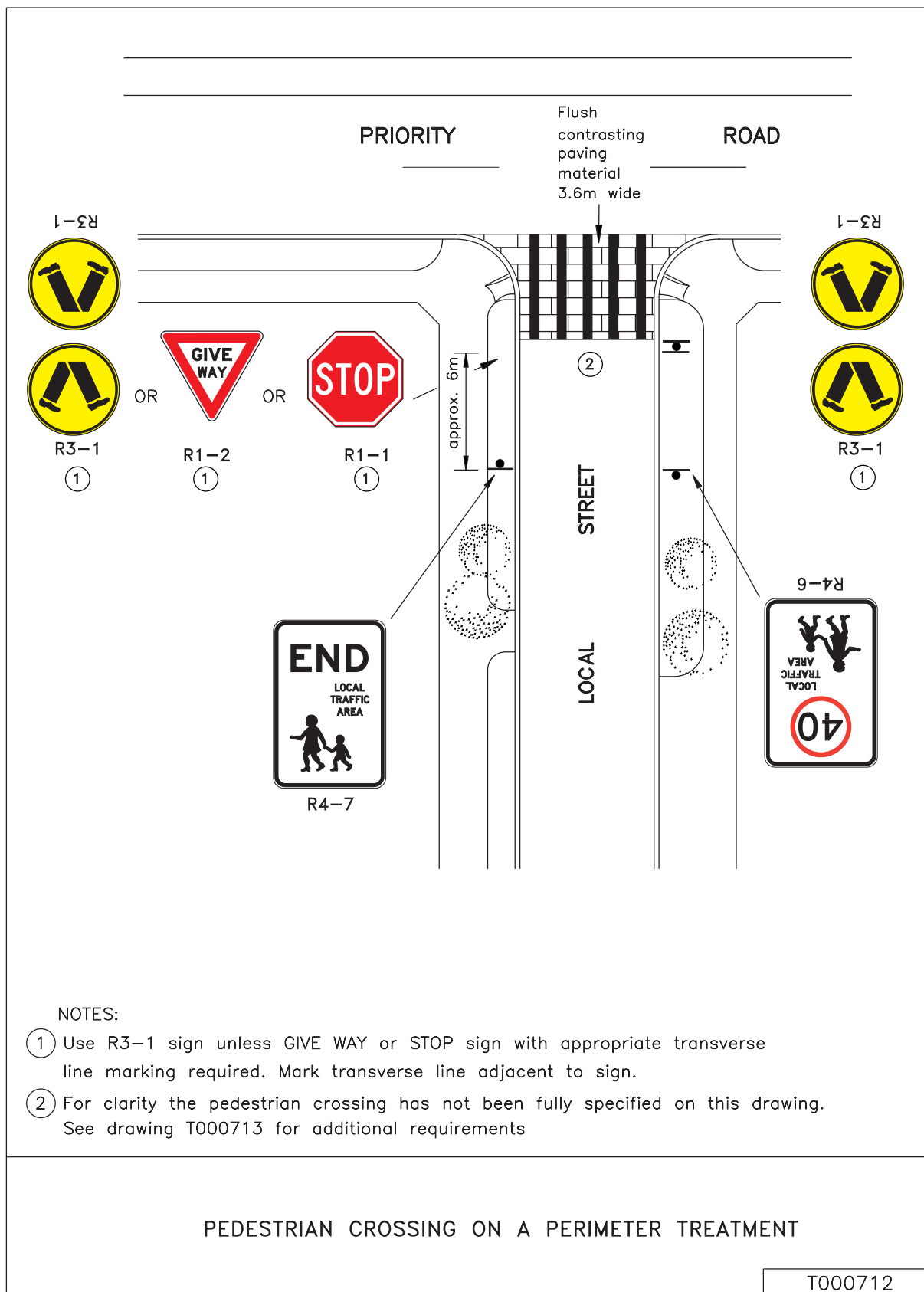
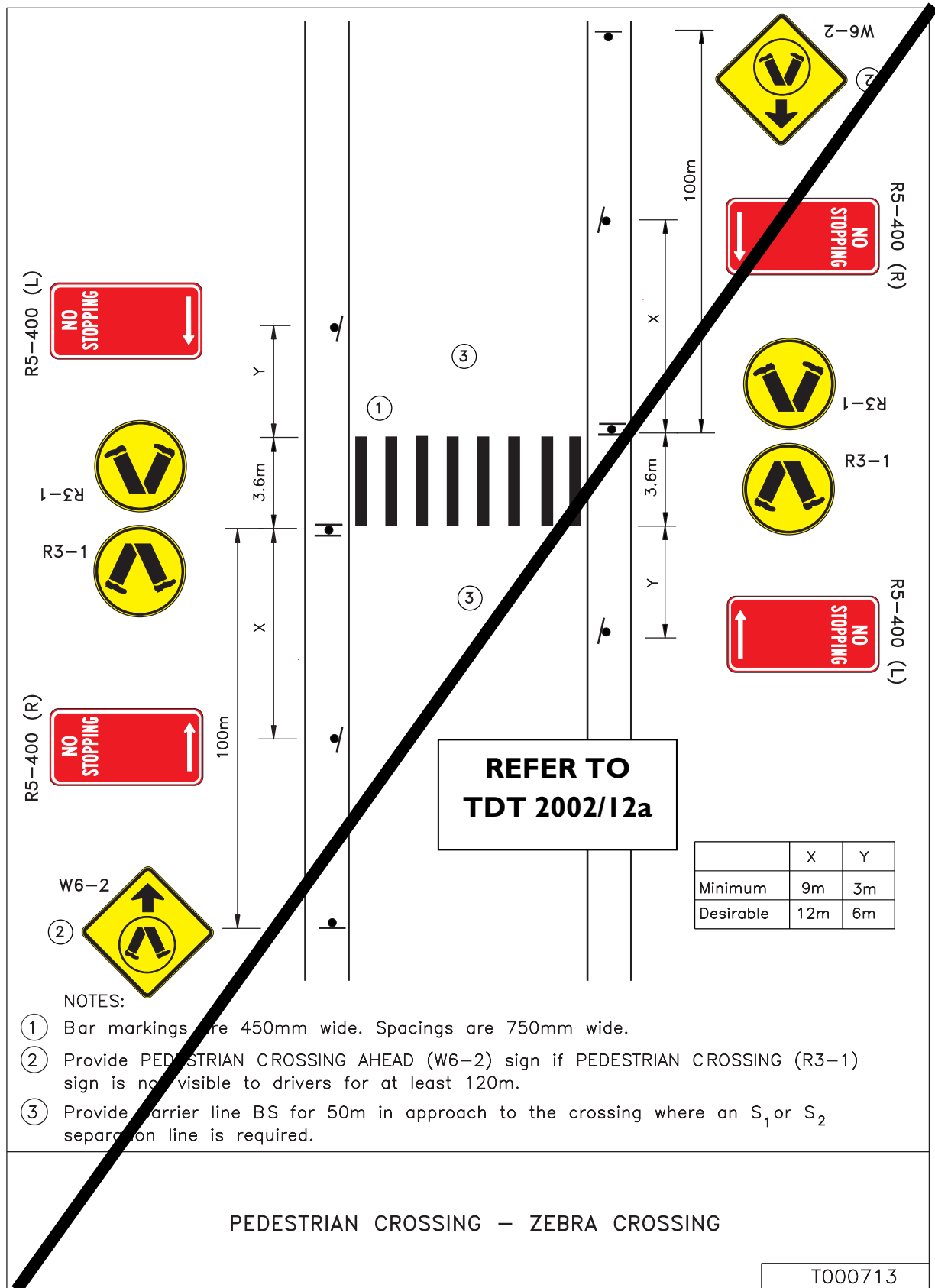


FIGURE 5



- NOTES:
- ① Bar markings are 450mm wide. Spacings are 750mm wide.
 - ② Provide PEDESTRIAN CROSSING AHEAD (W6-2) sign if PEDESTRIAN CROSSING (R3-1) sign is not visible to drivers for at least 120m.
 - ③ Provide barrier line BS for 50m in approach to the crossing where an S₁ or S₂ separation line is required.

FIGURE 6

USE OF TRAFFIC CALMING DEVICES AS PEDESTRIAN CROSSINGS

RISK MANAGEMENT PROFORMA

ISSUE:

Technical Direction 2001/04 - *Use of Traffic Calming Devices as Pedestrian Crossings*.

BACKGROUND:

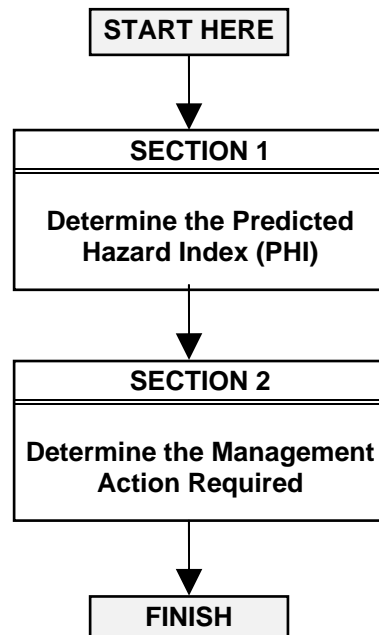
In response to the release of Technical Direction 98/6 - *Use of Traffic Calming Devices as Pedestrian Crossings* there is a need to:

- determine the risk associated with traffic calming devices which are also used as pedestrian crossings; and
- determine the most appropriate remedial measures.

To assist this process, a step by step Risk Analysis approach has been developed. Practitioners should be guided by their experience, expertise and site knowledge particularly when considering devices not covered by this technical direction.

RISK ANALYSIS STEPS:

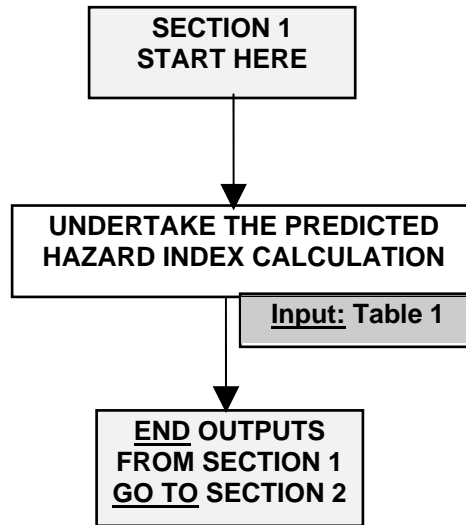
The Risk Analysis steps are detailed in the flow diagram below. The process utilises 2 Tables.



NOTES:

1. A Pedestrian Crossing (zebra crossing) cannot be provided on a Watts profile road hump.
2. If the device is not covered by Note 1 and was built:
 - after May 1998 it must satisfy the current RTA Pedestrian Crossing (zebra crossing) warrant
 - before May 1998 it does not have to satisfy the PV in the Pedestrian Crossing (zebra crossing) warrant but must satisfy the speed, sight distance and safety requirements.

**SECTION 1:
Determine the Predicted Hazard Index (PHI)**



INSTRUCTIONS

Predicted Hazard Index (PHI)?

- Use the Predicted Hazard Index (PHI) process, to calculate a PHI for the traffic calming device or the length of road that the devices is located within.
- Go to Section 2.

OUTPUT REQUIRED

- Value for Predicted Hazard Index (PHI) for the traffic calming device

Input Table I: Predicted Hazard Index (PHI) calculation

Predicted Hazard Index (PHI) - Elements (Note 1)	Initial Values	
	Input Value	Predicted Hazard Index
L = Length of crossing (m) Note 2		
S = 85th percentile speed of traffic (km/h)		
P = pedestrians per hour using the traffic calming device		
V = vehicles (pcu per hour) in both directions at the traffic calming device		
NWF = Net Weighting Factor (See Table Below)		

Net Weighting Factor (NWF) Calculations:

NWF Factors <small>(NWF = (SF x GF x VF x LUF x AF))</small>	Input Value	Predicted NWF
1. SF: <u>Input Table IB</u>		
2. GF: <u>Input Table IC</u>		
3. VF: <u>Input Table ID</u>		
4. LUF: <u>Input Table IE</u>		
5. AF: <u>Input Table IF</u>		

NOTES:

1. **Pedestrian Crossing (zebra) Warrant:**

Pedestrian and vehicle counts are required to determine if a pedestrian crossing is warranted on the Traffic Calming Device and does not contradict this Technical Direction.

2. 'L': - the full width of the roadway crossing.

PREDICTED HAZARD INDEX CALCULATIONS AND SUPPORT INFORMATION:

The Predicted Hazard Index provides a basis for comparing the potential risk at one site with another by taking into account engineering and environmental factors. The Predicted Hazard Index formula is as follows:

$$\text{Predicted Hazard Index (PHI)} = \frac{LS^2PV}{10^9} \times \text{NWF}$$

where:

L = length of crossing (m)

S = 85th percentile speed of traffic (km/h)

P = pedestrians per hour, see below.

V = vehicles (pcu per hour), see below

NWF = net weighting factor, see below.

$10^9 = 1000000000$

Pedestrian and vehicle counts should be undertaken during peak pedestrian times.

To calculate:

- P – undertake a 1 hour count of all pedestrians who cross the road within 50 m of the site.
- V – undertake a (two way traffic) 1 hour vehicle count. Classify vehicles as light and heavy, see below. Convert to pcu, as follows:
 - ◆ 1 pcu = light vehicles (cars, motor cycles, etc)
 - ◆ 2 pcu = heavy vehicles (> 3 tonnes unladen).

The steps involved in calculating the Net Weighting Factor (NWF) are detailed in [Input Table IA](#)

$$\text{NWF formulae} = (\text{SF} \times \text{GF} \times \text{VF} \times \text{LUF} \times \text{AF})$$

where:

SF = School Factor. See Table IB, School factors

GF = Gradient Factor. See Table IC, Gradient factor

VF = Visibility Factor. See Table ID, Visibility factor

LUF = Land Use Factor. See Table IE, Land use factor

AF = Accident Factor. See Table IF, Accident factor

Input Table IA: Steps in NWF Calculation

1. SF: <u>Input</u> Table IB, look up the school type
2. GF: <u>Input</u> Table IC, look up the gradient. Note: GF = 1 for an uphill grade. Where a carriageway has opposite gradients in each direction, possibly a divided carriageway, take the worst case (highest) GF.
3. VF: <u>Input</u> Table ID, look up for the 85th percentile approach speed and stopping sight distance. If you don't know the stopping sight distance for a particular site, refer to Austroads (1989), Rural Road Design.
4. LUF: <u>Input</u> Table IE, look up the land use type
5. AF: <u>Input</u> Table IF, look up the accident factor
6. Finally calculate: NWF = (SF x GF x VF x LUF x AF) eg. (5x2x3x4x6) = 720

Input Table IB: School factor (SF)

School	SF
Infants	5
Infants & Primary	5
Primary	3
No school	1

Input Table IC: Gradient factor (GF)

Gradient (%)	GF
Downhill grade > 10% (1 in 10)	2
Downhill grade < 10% (1 in 10)	1
Uphill grade	1
Flat	1

NOTES:

1. A combination (two way road; uphill in one direction and downhill in the other) use the worst case GF for the site, that is the highest GF.

Input Table ID: Visibility factor (VF)

85th percentile speed (km/h)	Stopping sight distance (m)	VF
20-40	<40	3
	40-60	2
	>60	1
40-60	<60	3
	60-100	2
	>100	1
60-80	<100	3
	100-150	2
	>150	1

Input Table IE: Land use factor (LUF)

Adjacent land use	LUF
Industrial	4
Commercial & Retail	4
Residential (rural)	3
Residential (urban)	2

Input Table IF: Accident factor (AF)

Pedestrian & rear end accidents (Notes 1, 2 and 3)	AF
At least one fatal	6
At least one admitted injury	4
At least one treated injury	3
At least one non-treated injury	2
Equal to or at least one tow-away or no accidents	1

NOTES:

1. In the last 5 years within 50 m of the crossing.
2. **If possible** the actual or Predicted Degree of Accident (PDOA), for the traffic calming device or the length of road that the device is located within.
3. Confirm that the Predicted Degree of Accident (PDOA) will be the same if a Pedestrian Facility is placed on the Traffic Calming Device. If it will not be the same, then recalculate the Predicted Degree of Accident (PDOA).

EXAMPLE:

Predicted Hazard Index (PHI) calculation		
Predicted Hazard Index (PHI) - Elements	Initial Values	
	Input Value	Predicted Hazard Index
L = Length of crossing (m)	10	158.40 (say 158) Note 1
S = 85th percentile speed of traffic (km/h)	50	
P = pedestrians per hour using the traffic calming device	44	
V = vehicles (pcu per hour) in both directions at the traffic calming device	200	
NWF = Net Weighting Factor (See Table Below)	720	

NOTES:

I. The calculation is as follows:

$$\text{PHI} = ((\text{LS}^2\text{PV}) / 10^9) \times \text{NWF} = ((10 \times (50)^2 \times 44 \times 200) / 1000000000) \times 720$$

$$= 158.40$$

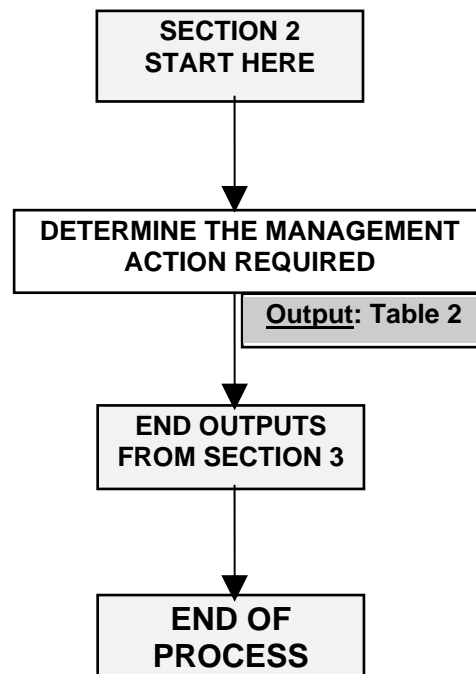
Net Weighting Factor (NWF) Calculations:

NWF Factors <small>(NWF = (SF x GF x VF x LUF x AF) -adjf)</small>	Input Value	Predicted NWF
1. SF: <u>Input</u> Table IB	5	720 (Note 1)
2. GF: <u>Input</u> Table IC	2	
3. VF: <u>Input</u> Table ID	3	
4. LUF: <u>Input</u> Table IE	4	
5. AF: <u>Input</u> Table IF	6	

NOTES:

I. The calculation is as follows: $\text{NWF} = (\text{SF} \times \text{GF} \times \text{VF} \times \text{LUF} \times \text{AF}) = (5 \times 2 \times 3 \times 4 \times 6) = 720$

SECTION 2:
Determine the Management Action Required



INSTRUCTIONS

Determine the Management Action Required
<ul style="list-style-type: none">• Use the Predicted Hazard Index (PHI) from Section 1.• Go to <u>Output Table 3</u>.• Determine the Management Actions and Plans by using the Predicted Hazard Index (PHI). eg: Predicted Hazard Index (PHI) = 158 suggests that if the device was put in prior to May 1998 , then “provide a Pedestrian Crossing (zebra crossing) and kerb ramps” etc
OUTPUT REQUIRED
<ul style="list-style-type: none">• Management Action Plan from <u>Output Table 2</u>.

MANAGEMENT ACTION REQUIRED

Output Table 2: Management Actions and Plans	
Predicted Hazard Index (PHI) <i>(Risk Priority Scale)</i>	Recommended Management Action and Plan
=>120 <i>(High (H) and Significant (S))</i>	<ul style="list-style-type: none"> • Provide a Pedestrian Crossing (zebra crossing) and kerb ramps. A Pedestrian Crossing can be placed on these facilities without reference to the Warrants if the traffic calming device was provided before May 1998 (Reference RTA Technical Direction 98/6). • If a traffic calming device has been provided after May 1998, the RTA's Pedestrian Crossing (zebra crossing) Warrants must be met. If the traffic calming device does not meet the pedestrian crossing warrants it should be removed.
=>50 <120 <i>(Medium (M))</i>	<ul style="list-style-type: none"> • Restrict pedestrian access across the facility by using fencing, and bollards, as well as remove kerb ramps etc.
<50 <i>(Low (L))</i>	<ul style="list-style-type: none"> • Monitor the device on an annual basis.

LEGEND:

- H = **High** risk - detailed research and management planning required at senior levels;
- S = **Significant** risk - senior management attention needed;
- M = **Moderate** risk - management responsibility must be specified;
- L = **Low** risk - manage by routine procedures.