NSW Centre for Road Safety

RTA

REDUCING TRAUMA AS A RESULT OF CRASHES INVOLVING UTILITY POLES

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To access electronic copies of these and other guidelines go to http://www.rta.nsw.gov.au

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Contents

Executive summary

The Roads and Traffic Authority is committed to reducing the level of road trauma associated with road crashes involving utility poles. In partnership with NSW public agencies, energy and telecommunications organisations, local government and the community, a reduction in road fatalities and injuries can be achieved. The aim of this document is to provide a safer travelling environment for the community.

There is a public and private interest to ensure that crashes and injuries are reduced. Between 2004 and 2008 there were 3,972 casualty crashes involving utility poles in NSW. 171 fatalities and 5,060 injuries occurred during this period as a result of crashes involving utility poles. This resulted in fatalities and injuries costing the community an average $178 million per year.

Utility pole crashes have consistently been a significant agent in single vehicle fatality crashes on urban roads in NSW. A multi-agency strategic response is necessary to reduce the number of crashes.

Utility poles link properties to telecommunications and/or power supply. Utility poles have frequently been closely placed behind the kerb on urban roads to allow lighting of the road reserve. The remainder of the footway is available for the installation of other utility services.

The RTA and utility organisations are addressing the safety issues of utility poles, however, more can be done to reduce road crashes involving these poles and to manage the risk presented by existing utility poles. The RTA recognises this is an ongoing issue and acknowledges the efforts of energy and telecommunications organisations. Local government is also a key stakeholder in addressing this issue.

The purpose of this document is to provide options to reduce the risk of injuries arising from crashes involving utility poles. The options contained in this document are a guide to assist utility organisations to safely place utility poles. This issue will continue to be addressed by the RTA. The RTA's role is to advise utility organisations of the appropriate placement of utility poles to improve road safety. In partnership with the utility organisations numbers of vehicle crashes and injuries will be reduced.

The most appropriate and safe option to reduce the incidence of vehicles colliding with utility poles is to provide Clear Zones adjacent to the road, and to adopt safe road design principles. If Clear Zones cannot be incorporated, other options to be considered include:

1. Relocating utility poles
2. Reducing the number of utility poles
3. Placing utility cables underground
4. Installing safety barriers
5. Installing frangible poles.

Clear Zones and these options are described in more detail later in this document.

The RTA has implemented a hazardous pole identification and relocation program to address road sections that demonstrate high numbers of utility pole crashes. The program identifies the at risk sites and determines options to reduce the occurrence and alleviate the severity of the crashes occurring. Utility organisations are also encouraged to use their pole replacement program to reduce the number of vehicles colliding with poles by replacing poles identified in high risk locations.

Further assistance in dealing with utility poles installations is available from the RTA. RTA personnel are available at a number of regional offices. Details to contact RTA are located at the end of this document.

Legislation

The *Roads Act 1993* (the Act) confers certain functions on the RTA and on other roads authorities and provides for the regulation of the carrying out of various activities on public roads in NSW.

The Act provides that the council of a local government area is the roads authority for all public roads within that area, with the exception of any freeway, Crown road, or any public road for which some other public authority is declared to be the roads authority.

The RTA is the roads authority for any freeway or other road for which it is declared to be the roads authority. The RTA may also exercise the functions of a roads authority with respect to any classified road, whether or not it is the roads authority for that road. The RTA is also conferred with specific powers including in relation to traffic management and traffic hazards.

The following provisions of the Act may have application in relation to utility poles:

- Section 98 provides that a roads authority may direct a person having control of any work or structure that is situated in, on or over a public road, to alter the work or structure or the location of the work or structure.

- Section 103 provides for a roads authority, or the RTA (section 104), to take action in relation to hazards on land that is not part of a road, such as premises which are a danger to persons on a road or a structure that is a traffic hazard.

- Section 107 provides that a roads authority may direct the removal of an obstruction or encroachment on a public road.

- Section 138 provides that a person must not erect a structure in, on or over a public road without the consent of the appropriate roads authority. Where the road is a classified road, consent may not be given except with the concurrence of the RTA.

- Section 142 provides that a person who has a right to the control, use or benefit of a structure in, on or over a public road must maintain that structure.

The above summary identifies certain provisions of the Act which may be relevant in relation to utility poles but does not consider the provisions of any other legislation, or any other law, which may be relevant to the topic.

The Act can be viewed in full at www.legislation.nsw.gov.au.

Guidelines

The below listed publications will provide guidance and direction on road design and road environment safety as they relate to utility poles.

- *Brownfields Road Design Guide, RTA*
  (available from the RTA Library. Details at end of this document)
- *Guide to Codes & Practices for Streets Opening*, NSW Streets Opening Conference (section 6.5: Reducing Roadside Hazards).
  www.ipwea.org.au/streets
- *NSW Public Lighting Code*, NSW Department of Environment and Climate Change
  www.environment.nsw.gov.au/climateChange/nswreports.htm
- *Placement of frangible distribution poles along roads with speed limits exceeding 70 km/h*, Western Power
  http://www.wpcorp.com.au/documents/technicalDocumentation/placementDitributionPoles70KMH.pdf
- *Positioning of Poles and Lighting Columns*, Energy Australia
  www.energy.com.au/internet/pdfs/NS167-NSA1407.pdf
- *Road Design Guide, RTA*
  (available from the RTA Library. Details at end of this document)
- *Road Environment Safety Update 16 (Procedure to target run off the road to the left on right-hand curve crashes on undivided high speed rural roads*, Roads and Traffic Authority, Sydney)
  (available from the RTA Library. Details at end of this document)
- *Road Environment Safety Update 20: Fatal Roadside Object Study,* RTA
  (available from the RTA Library. Details at end of this document)
- *SNZ AS/NZS 1158.1.3 Road Lighting Part 1.3: Vehicular Traffic (Category V) Lighting - Guide to Design, Installation, Operation and Maintenance*
  (available from the SAI Global Workshop *www.saiglobal.com/shop)*

References

- Cleaver, M. A. & Levett, S., *Addressing the problem of vehicles crashing into utility poles on metropolitan and rural-urban roads in NSW 2008*
  (available from the RTA Library. Details at end of this document)

Background

Data from the NSW RTA's crash statistics have revealed the magnitude of the issue of vehicles crashing into utility poles on NSW metropolitan and rural-urban roads.

In NSW, over the five year period from 2004 to 2008 there were 100,068 casualty crashes resulting in 2,347 fatalities and 126,929 injuries. Of the 100,068 casualty crashes, 21,356 (21%) involved a collision with a fixed roadside object. During this period 3,972 casualty crashes involved an impact with a utility pole which is 19% of the casualty crashes with fixed objects. These crashes resulted in 171 deaths and 5,060 injuries.

Table 1 represents the proportion of casualty crashes into fixed objects which involved utility poles for the five year period 2004 to 2008. The data is separated into RTA Regions. The proportion is greatest in Sydney, Hunter and Southern Regions because of the density of poles in the Sydney, Newcastle and Wollongong metropolitan areas.

Table 1: Proportions of casualty crashes into fixed objects which involved a utility pole

RTA Region	Utility pole crashes	Total crashes into fixed object	%
Sydney	2,460	8,891	28%
Hunter	604	3,658	17%
Northern	340	2,902	12%
Southern	331	2,915	11%
Western	131	1,600	8%
South West	106	1,390	8%
State	3,972	21,356	19%

Source: RTA crash data (2008 data not final, extracted 24 June 2009)

Utility poles are common in populous areas rather than on high speed country roads. Table 2 represents the proportion which involved collision with utility poles of all fatalities for the five year period 2004 to 2008 in different areas of NSW.

Table 2: Proportions of all fatalities involving collision with utility poles

Area	Fatalities in collisions involving utility poles	Total fatalities	%
Sydney Metropolitan Area (Sydney RTA, except Blue Mountains & Hawkesbury)	71	632	11%
Newcastle Metropolitan Area (Newcastle & Lake Macquarie LGAs)	15	88	17%
Wollongong Metropolitan Area (Wollongong & Shellharbour LGAs)	7	73	10%
Rural-urban Elsewhere, if speed limit ≤ 80 km/h	51	588	9%
Non urban Non metropolitan and speed limit > 80 km/h	27	966	3%
State	171	2,347	7%

Source: RTA crash data (2008 data not final, extracted 24 June 2009)

Of the 171 fatalities involving a collision with a utility pole, 92 (54%) happened on bends. A relatively small proportion of the overall length of roads is curved. A vehicle left the road on the outside of the bend in at least 51 (55%) of the 92 pole fatalities on bends. Poles located on the outside of curves are associated with higher risk. To prevent death and serious injury involving utility poles, work should initially be concentrated on poles located on bends and particularly the outside of bends.

Casualty (fatal and injury) crashes into utility poles in NSW have cost the community, on average, $178 million per year over this five year period. This is based on human capital cost values of $1.64 million per fatality and $395,000 per serious injury and $16,000 for other injury. There has also been an extra $7 million per year in vehicle property damage from pole crashes (based on $7,500 per "property damage only" crash). This is a portion of the total property damage as many crashes, including those into poles, are not reported. These costs are reported crashes but many crashes including those into poles are not reported.

Options

Making a road safe requires a holistic approach. All agencies at a strategic and practitioner level are encouraged to work in partnership within and across agencies to implement evidence based strategies to improve road safety. Communities also need to be included in the partnership. The RTA promotes and encourages positive working relationships with all agencies with an interest in the road corridor with a commitment to reduce vehicle crashes involving utility poles.

The RTA is addressing this critical issue by:

- Promoting best practice installation for utility poles
- Identifying critical locations where existing poles are placed
- Requesting energy and telecommunication organisations to relocate or replace poles in safer locations, or place cables underground as a part of their works program
- Relocating utility poles as a part of its development program.

To effectively reduce the number of motor vehicle crashes involving utility poles, strategies are recommended to be concentrated on the left hand side of right hand curves. The removal, relocation or protection of poles on the outside of curves would reduce many off left on a right hand curve crashes as well as the added effect of reducing off right on a left hand curve crashes. These two crash types lead to 39% of all fatal crashes into poles. The left hand side of right hand curves make up only a small proportion of the overall urban road network. Any program of works to reduce hazardous pole crashes should be initially focused on the outside of right hand curves.

Clear Zones

Putting cables underground is the primary option to eliminate trauma as a result of crashes involving utility poles. However, great reductions in trauma can be achieved by provision of appropriate Clear Zones or barriers.

Clear Zones are identified in Section 3 in the RTA's *Road Design Guide*. The Clear Zone is a key safety concept used in road design. The Clear Zone is the area that begins at the edge of each travelled lane and is available for emergency use by errant vehicles that run off the road. This zone includes any adjoining lane/s, road shoulders, verges and batters.

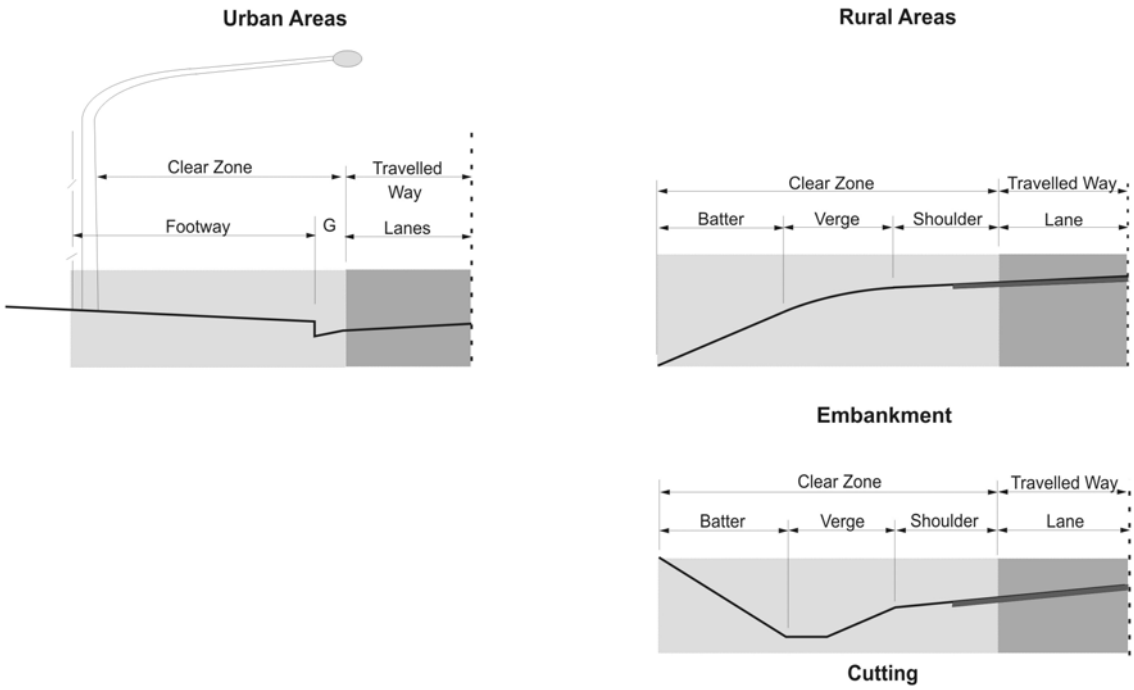
Urban areas have specific problems created by utility poles. They are expensive to relocate or to mitigate the likely crash impact outcomes. This does not negate the duty of care required by utility organisations, local government and / or public agencies. Section 6 of the *Road Design Guide* specifies different width clear zones for different speed environments, traffic volumes, the presence and slope of roadside embankments or cuttings. Generally, the width of the required clear zone increases as the design speed increases.

As an example, a 3.0 m clear zone is required for a 60 km/h zone where there are more than 3,000 vehicles/day in the adjacent traffic lane and where there is no cutting or embankment. Refer to nomograph at Appendix B.

The RTA makes substantial effort to ensure that the appropriate speed related Clear Zone is provided, especially on new construction. In urban areas, footways can provide an adequate clear zone, provided utility poles, sign supports and heavy structures are kept to the rear of this area, placed underground or made frangible.

The following diagram, Figure 1, shows Clear Zones in a rural and urban setting.

Figure 1: Clear Zones in urban and rural settings



Source: RTA Road Design Guide 2000

The Clear Zone is an area adjacent to the road that should be kept free of fixed, non-frangible hazards. It is measured from the outer edge of a traffic lane or from a kerb face. It is not always possible but all practical measures should be taken to provide a Clear Zone. Acceptable alternative options include safety barriers and physical measures to reduce travel speed. Less desirable alternatives include the use of narrower Clear Zones and compensatory measures such as delineation improvements.

Reducing the number of utility poles

In some places it may be possible to rationalise the number of poles along a road corridor. This can be achieved by combining the functions and services provided by several poles and accommodating them on a single pole. It is possible for traffic signals and signage to support power cables, telecommunication services and streetlights.

It is also possible to place all services on one side of the road, preferably the side which exhibits the better safety performance. There may be opportunities for the poles to alternate from each side of the road as the crash risk changes along a route. An example is a curvilinear road where the run-off-road crash risk depends on which way the road curves.

The number of utility poles can also be reduced by increasing the separation between the poles, providing the utility poles can carry the loading and the street lighting is not compromised.

Relocating utility cables

RTA has actively been relocating utility cables since 2003. In Sydney and Southern Region, RTA has been relocating utility cables at identified sites and will continue to identify utility cables to be relocated. Relocating cables also potentially minimises vehicle crashes with poles.

Putting utility cables underground

The removal of utility poles and relocating the cables underground negates any potential vehicle crash with poles.

Safety barrier systems

Safety barrier systems shield motorists from striking the poles. Devices such as guardrail, concrete barriers or crash cushions and wire rope safety barrier can be used. Safety barriers can also be a crash hazard. They have a greater likelihood of being impacted as they are inevitably longer than the original hazard and closer to the traffic. The costs and benefits in converting a small number of severe utility pole crashes into potentially a higher number of less severe crashes need to be considered before this option is adopted. A study by the RTA (2004) regarding the involvement of fixed roadside objects in fatal crashes showed that guardrails are the fourth most common roadside object impacted in a fatal crash after trees, utility poles and embankments. On urban roads there is likely to be a greater number of hazardously located poles and guardrails are the third most common road side object impacted.

Safety barriers are to be designed and installed in accordance with the RTA specifications. Safety barriers are to be designed so they don't restrict access to utility poles and their associated services for maintenance purposes. If there are existing safety barriers providing road user protection against other hazards, then new poles could be placed behind these existing safety barriers.

Frangible poles

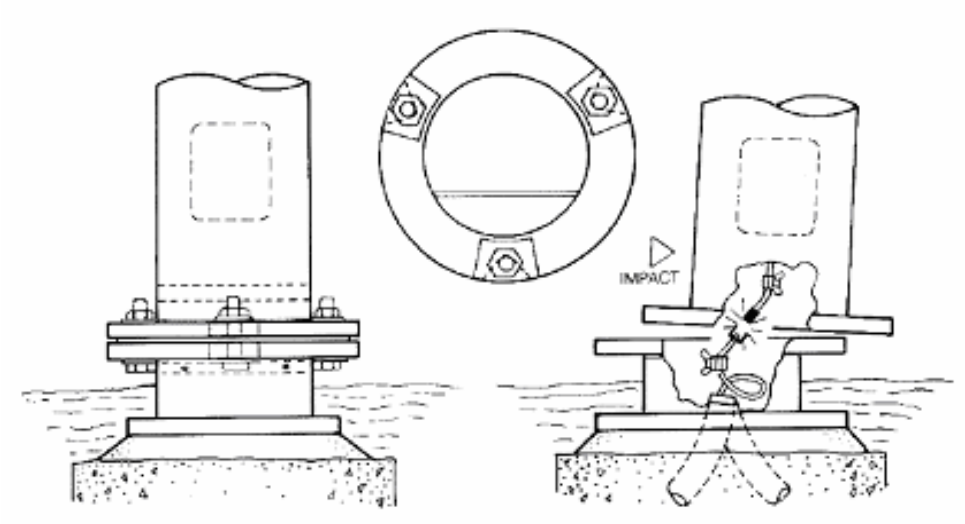
Frangible poles can be effective in reducing the severity of pole related crashes. These types of utility poles are specifically designed to collapse or break away on impact and reduce the severity of potential injuries. Two types of frangible lighting poles are currently used in Australia:

1. Slip-base type poles
2. Impact absorbent type poles.

Slip-base type poles

Slip-base poles are widely used on freeways and other high speed roads in many countries and they are becoming more widely used. The slip-base poles consist of a normal pole stem, catering for mounting heights up to approximately 15 m. The base involves two plates clamped together with three equally spaced bolts. These plates and bolts are released during an impact, allowing the pole stem to break away from its foundation with minimal impact on the vehicle (Refer Figures 2 and 3).

Figure 2: Slip-base poles



Source: Austroads 2004

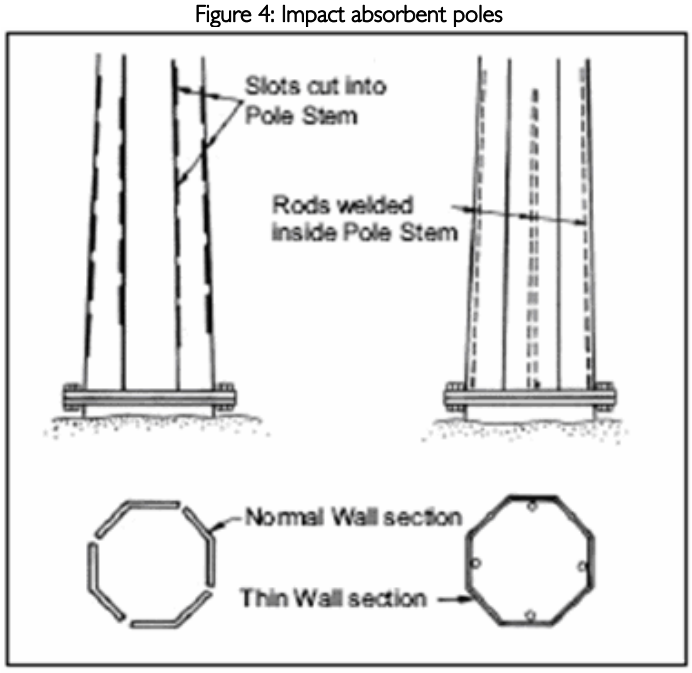
Figure 3: A good example of a slip-base pole that has performed as intended

Source: Austroads, 2002

Impact absorbing type poles

Impact absorbing poles provide a satisfactory degree of crash worthiness at lower vehicle impact speeds (ie up to 80 km/h). They are particularly suited to low vehicle speed and/or high pedestrian activity areas. Impact absorbing poles differ from slip-base type poles in that in a vehicle impact they remain attached to the base structure and absorb any impact energy. The deformation of the pole is controlled by designed weakening of the pole stem over the lower 4m to 5m length (refer Figure 4).

Figure 4: Impact absorbent poles



Source: Austroads 2004

Future direction

There is a need for an ongoing multi-sector working relationship between organisations to reduce motor vehicle crashes with utility poles. It is imperative that utility poles are either relocated or protected to reduce crashes and injuries. The community must be provided with an appropriate roadside environment.

The RTA will continue to monitor statistics of road crashes involving utility poles to:

- Identify the types and locations of crashes involving utility poles so that action can be taken to avoid further incidents at problem locations
- Identify progress and achievement in the reduction of fatalities and injuries resulting from road crashes involving utility poles
- Raise the awareness of the problem with relevant utility organisations
- Provide a basis for the development of technical directions to manage the issue.

Appendix A

Examples of utility pole placement

Signposting is installed well away from traffic - providing an adequate Clear Zone.

Providing an adequate Clear Zone on this bend reduces the potential of a vehicle colliding into a utility pole.

This is an adequate Clear Zone with the utility pole placed well away from the road.

A number of utility poles were relocated to minimise a potential hazard.

These utility poles were relocated to minimise a potential hazard.

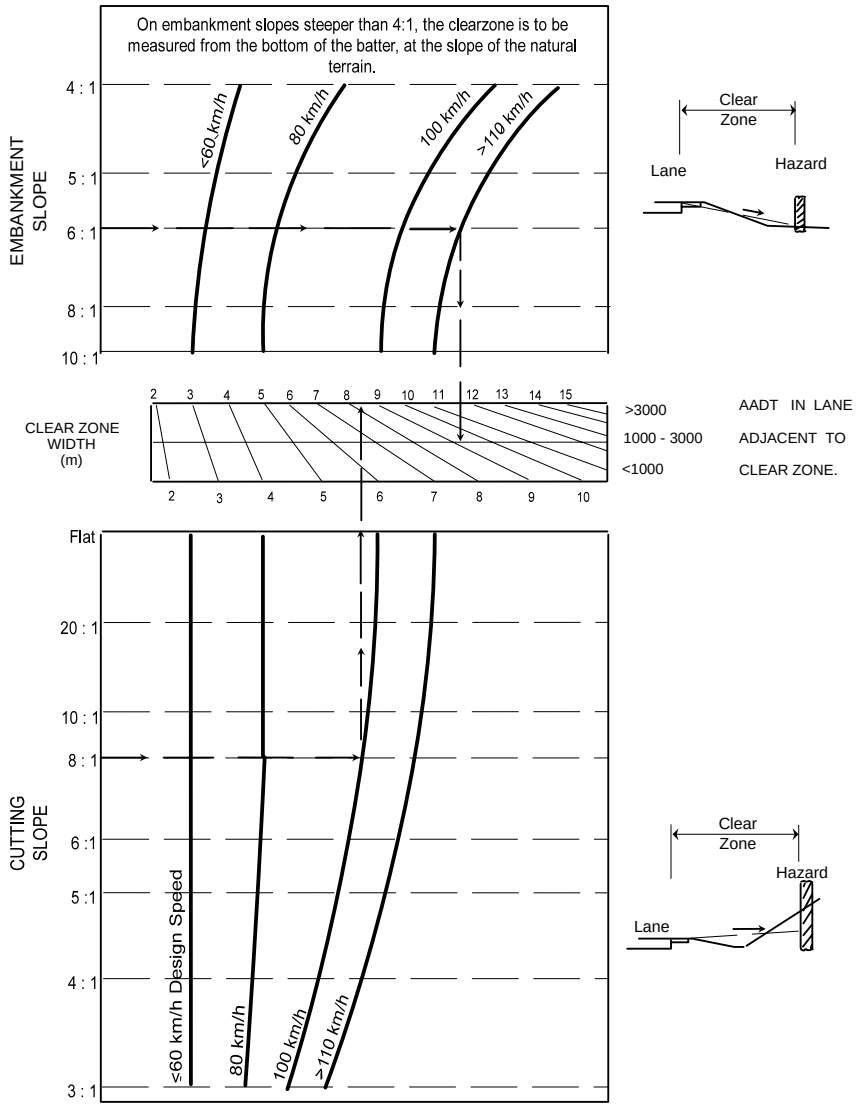
Appendix B

Clear Zone

As published in the RTA *Road Design Guide*, the Clear Zone is the width of roadside, beginning at the edge of the travelled way. It is available for the motorist to take corrective action in an emergency. The Clear Zone will depend on the location of the vehicle at any point along the road and is determined for both sides of the vehicle. The width of the Clear Zone is related to predicted traffic volumes and speed and takes into account the widths of adjacent lanes, shoulders, medians, verges, footways and traversable batters.

The nomograph below shows the appropriate Clear Zone width. These widths represent a reasonable measure of the degree of safety appropriate for a particular road and must be balanced by comparing land use and costs. The widths given are approximate only and the nomograph should not be used to infer a degree of accuracy that does not exist.

Figure 4: Clear Zone nomograph



NOTE: 1. These distances (*) are the Weighted Average Distance when used on complex batter arrangements.
2. Design Speeds shown are the 85th percentile value, measured (or predicted) for the site being considered.

Source: Road Design Guide, RTA

Appendix C

Contacts

NSW Roads and Traffic Authority

The RTA is the NSW State Government agency responsible for: improving road safety; testing and licensing motorists and registering and inspecting vehicles; and managing the road network to achieve consistent travel times. The RTA provides financial assistance to local councils to manage 18,474 kilometres of regional roads and also provides some funding and support to the 144,750 kilometres of council-managed local access roads which are funded by local ratepayers and federal road assistance grants.

NSW Roads and Traffic Authority
101 Miller Street
NORTH SYDNEY NSW 2060

T: 132 213

www.rta.nsw.gov.au

NSW Centre for Road Safety

The NSW Centre for Road Safety is the peak body responsible for road safety in NSW. The primary objective of the Centre is to promote road safety as a core value and key influence on decision-making across the organisation and the road-using public. It leads the development and implementation of state-wide road safety strategies, policies and programs and promotes RTA leadership at state and national levels to reduce the trauma and cost of road casualties to the community.

NSW Centre for Road Safety
101 Miller Street
NORTH SYDNEY NSW 2060

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www.rta.nsw.gov.au/roadsafety/index.html

RTA Library

The RTA Library has information about road, traffic and structural engineering, transport, road safety, economics, management, human resources, registration, licensing, strategic planning, and environment. These subjects are covered by a variety of media including technical books, journals, reports, conference proceedings, CD ROMS, standards, annual reports and legislation. Members of the public are welcome to use the Library for reference purposes. To make an appointment please ring the library.

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27 Argyle Street,
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T: (02) 8849 2913
F: (02) 8849 2488
E: library@rta.nsw.gov.au

www.rta.nsw.gov.au/doingbusinesswithus/informationreference/index.html

Streets Opening Conference

The NSW Streets Opening Conference is a voluntary association of member organisations to provide useful information and guidance on managing street openings. The Streets Opening Conference agrees on space allocation within the road corridor for utility services and sets codes of practice or guidelines relating to these services.

NSW Streets Opening Conference Secretariat
Level 12, 447 Kent Street
SYDNEY NSW 2000

T: (02) 9267 6677
F: (02) 9283 5255
E: ipwea@ipwea.org.au

www.ipwea.org.au/AM/Template.cfm?Section=Streets_Opening_Conference&Template=/CM/HTMLDisplay.cfm&ContentID=5535

Austroads

Austroads is the association of Australian and New Zealand road transport and traffic authorities. Austroads members are the six Australian States and two Territory road transport and traffic authorities, the Department of Infrastructure, Transport, Regional Development and Local Government, the Australian Local Government Association, and the New Zealand Transport Agency.

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NSW Roadside Environment Committee

The NSW Roadside Environment Committee encourages better management of the roadside environment. The committee comprises of 12 organisations, including the RTA, with interests in roadside management. The RTA supports the committee by encouraging better management of roadside ecological, social and economic resources. The involvement and cooperation of public agencies and other groups within the community is essential for effective roadside management.

For contact details on the NSW Roadside Environment Committee, please telephone the Environment Branch, RTA on (02) 9218 6148

www.rta.nsw.gov.au/environment/roadsideenvironcommittee

Institute of Public Works Engineering Australia

The Institute of Public Works Engineering Australia is a professional organisation providing member services and advocacy for those involved in and delivering public works and engineering services to the community.

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