DRIVEWAY SAFETY DESIGN GUIDELINES

How can home design improvements minimise the risk of children being hit or run over in residential driveway areas?

Background

The death or risk of serious injury to a child caused by a collision with a vehicle at home has understandably captured the attention of the broader Australian community in recent years. A series of tragic incidents involving small children prompted road safety and injury prevention specialists to examine the issues surrounding this problem and to consider potential solutions.

Driveway safety was a focus of the National Road Safety Forum convened last year by the Minister for Road Safety, the Hon Catherine King MP [1]. It was acknowledged that this is a complex issue with a number of contributing factors and no single solution. Discussions among participating experts highlighted several areas of current activity aiming to reduce the incidence of driveway-related trauma and emphasised the need for a range of measures including:

- vehicle safety technologies (to improve visibility and/or braking performance)
- driver education and awareness campaigns
- programs to promote greater parental awareness and closer supervision of children
- housing design measures.

All of these approaches are important. The Forum recognised that many organisations were already conducting public education and awareness programs in this area, and that research was being undertaken on promising vehicle technologies. However, it was concluded that very little attention had so far been given to the potential benefits of practical home design measures.

A key question arising from the Forum was whether there is scope to develop a guide to best practice design to encourage and assist home owners, designers and builders to implement appropriate safeguards.

In the related field of pool safety, behavioural change measures and the use of fences have dramatically reduced the incidence of toddler pool immersion in Australia over the last 30 years.

The pool safety example lends support to the inclusion of design features that seek to separate young children from vehicle areas in residential settings.
The purpose of this paper

The Department of Infrastructure and Transport has been working with a number of experts and building, design and planning peak groups to examine the factors involved in child driveway accidents and the implications for safer home design. This has led to the development of a proposed framework of design principles and measures, which could form the basis of a best practice design guide. [2]

It should be emphasised that the Department is not proposing to seek changes to existing building codes or other regulatory measures. [3] Rather, we are interested developing voluntary guidelines that could help home owners, builders and designers to make choices that reduce the risks to children.

Additionally, such guidelines could provide the basis for education messages for parents to help them identify and minimise risks to small children around the home.

At this stage, the Department would like to canvass the views of all interested parties about the proposed principles and measures set out in this paper on pages 4-6. In particular, we are interested in:

- Whether there is support for the development of voluntary guidelines in this area.
- Whether the proposed design principles and measures would be practical to implement.
- The extent and implications of any areas of conflict with other guidelines for housing design with different objectives, such as accessibility and environmental sustainability.
- The applicability of these proposed design guidelines and measures to different types of housing and different situations (new builds vs renovations, for example)

You can provide your feedback until 31 August 2013 by:

- Using our online feedback form at: www.infrastructure.gov.au/roads/safety/driveway_safety/, OR
- Emailing your feedback to: roadsafety@infrastructure.gov.au, OR
- Posting your feedback to: Driveway Safety Guidelines, GPO Box 594, CANBERRA, ACT, 2601
Research evidence

A national study by the Bureau of Infrastructure, Transport and Regional Economics (BITRE) found that, on average, seven children aged under 15 are killed each year and 60 are seriously injured due to being hit by a vehicle moving around the home. Very young children face the greatest risk in these incidents – 90% of children killed and 70% of those seriously injured are under five years of age. [4]

Analysis of Australian fatality data has shown that the peak age for low speed collisions is 0-5 years, and that over 80% of incidents in this age group occur in a residential setting. [5]

New Zealand research [6] into environmental risk factors has shown that the risk of low speed vehicle run-overs is increased by:

- Long driveways (longer than 12 metres)
- Cul-de-sac locations
- More than one parking area accessible from one driveway
- Driveways running along the property boundary

This evidence suggests that the risk of driveway-related trauma increases with the size of vehicle access areas (driveway length and number of parking spaces), the number of vehicles using the area, and vehicle speed (length of driveway and road exit speed).

Providing a separate pathway for pedestrians to access the residence independent of the vehicle area is a protective factor, whether or not that pedestrian access point is fenced from the driveway.

Proposed framework of design principles and measures

Driveway-related trauma is a complex issue involving many factors. However, the experience with improving pool safety in Australia has shown that design changes can be highly effective in both reducing the direct risk to children, and helping parents to more effectively supervise children.

These design principles and suggested measures have been developed by combining the available research evidence on driveway risk factors with principles (largely around hazard separation) extrapolated from the literature on prevention of immersion in residential swimming pools. It should be noted that these measures are not a substitute for active and close supervision of small children.
Design principles

The following six broad principles are proposed as a framework for minimising the risk to children from vehicles.

1. Recognise the vehicle areas on the property as a risk zone (garage to street).
2. Limit the size of vehicle areas, and the speed and number of vehicles accessing them.
3. Reduce unintended access to vehicle areas by young children.
4. Make vehicle areas and their surrounds clearly visible from inside the house.
5. Make vehicle areas and their surrounds clearly visible to drivers leaving and entering the property.
6. Increase visibility for both pedestrians and drivers at the junction between the driveway/garage and the footpath

Specific design considerations and measures

For each of the six design principles, a number of specific supporting measures have been proposed. When adopted either singly or in combination, these may reduce the risk of harm to children in residential settings. They have been developed with new builds and major renovations in mind, though some measures may be able to be applied to existing dwellings through retrofitting without excessive cost. Some measures may not be applicable or may be more difficult to apply to some types of dwellings.

1. Recognise the vehicle areas on the property as a risk zone (garage to street).
   a) Identify areas on a property where vehicles may travel, including extended driveways and access areas to sheds for farm vehicles.
   b) In designing access routes to a property, consider elements of the local environment including road conditions, neighbouring driveways, nearby vegetation, topography and visibility around the house site that may be a risk to small children.

2. Limit the size of vehicle areas, and the speed and number of vehicles accessing them.
   a) Place parking spaces and/or garages as close to the street as possible – to reduce driveway length and the potential for a driveway collision.
   b) Reduce the possibility of informal parking on the block – designated areas should be set aside for vehicle use.
c) Limit the number of parking spaces on the block to as few as necessary.

d) Adopt measures to limit speed and number of vehicles using a driveway.
   - This is a particular issue in housing complexes where access to multiple properties is provided through one driveway or access route.
   - Consider using physical devices to limit speed (e.g. speed bumps) in longer driveways.
   - Consider providing visitor parking close to the entrance of a complex.

3. **Reduce unintended access to vehicle areas by young children.**

   a) Where possible, establish separate access routes for pedestrians and vehicles.

   b) Where possible, use barriers to physically separate vehicle access pathways from the rest of the yard.
      - These would function in a similar manner to pool fencing, with self-closing and self-latching gates and latch devices at minimum 1500mm height.
      - This measure is dependent on context and the configuration of the property.

   c) Ensure young children are unable to gain unsupervised access to the vehicle area from inside the home:
      - Avoid having garage access doors in recreational or living rooms, or in other areas where children are likely to spend large amounts of time.
      - Where an access door exists between the home and the garage ensure that it:
        o pushes in toward the home
        o has a self-closer
        o is solid core rather than hollow-core (swings shut properly, too heavy for small fingers to pull open)
        o has the door handle placed at a minimum height of 1500mm above floor level.
      - In homes where doors may be left open for ventilation, install secure barriers that allow ventilation (security screen or slatted doors), which also push in towards the home, have self-closers, and have high door handles.

   d) Provide outdoor play areas that are separated from the vehicle area.
      - Use barriers as described under (b).

4. **Make vehicle areas and their surrounds clearly visible from inside the house.**

   a) Use windows, doors, partitions or glass panels to provide a clear line of sight from the home to the garage and vehicle access areas.
5. Make vehicle areas and their surrounds clearly visible to drivers leaving and entering the property.

   a) Consider treatments to improve the driver’s ability to see young children in the vehicle area:
      - Limit the slope, width and length of the driveway.
      - Install garage doors (e.g. slatted doors) that allow the driver to see into and out of the garage.

   b) Avoid plants and landscaping options along driveway areas that may block the driver’s view or interfere with reversing aides.

   c) Avoid having the vehicle access path crossing a pedestrian access path (e.g. between the home and the garage).

6. Increase visibility for both pedestrians and drivers at the junction between the driveway/garage and the footpath

   a) Enable vehicles entering or exiting the property to see and be seen and heard:
      - Use transparent barriers or slatted partitions rather than solid walls where a garage exits directly onto the footpath;
      - Ensuring that side boundary fencing does not interfere with a clear line of sight for vehicles leaving a garage or driveway.

   b) Consider installing external gates, fences and walls that allow pedestrians and drivers to see each other.

   c) Consider the use of appropriately placed outdoor mirrors.

   d) Avoid plants and landscaping options along the block frontage that may block either driver or pedestrian views.
References

1. National Road Safety Forum 2012. See:

2. Primary drafting assistance was provided by the Child Accident Prevention
   Foundation of Australia (Kidsafe) and the Queensland Injury Surveillance Unit.

3. The Australian Building Codes Board is responsible for amendments to the National
   Construction Code and has determined that in accordance with COAG Best Practice
   Principles, a non-regulatory approach should be taken to this issue.

   pedestrian safety: ‘driveway deaths’ and ‘low speed vehicle run-overs,’ Information
   Sheet 43, Canberra.

5. Anthikkat A, Page A, Barker R. Low-speed vehicle run over fatalities in Australian

6. Shepherd M, Austin P, Chambers J. Driveway runover, the influence of the built