

technical memorandum



road safety hardware series

Pipe Handrails and Fences TM-2011

May 2013

Purpose

To advise on the recommended practice for the mitigation of hazards associated with tubular handrails commonly installed for pedestrian/cyclist protection adjacent to roadways and on structures. This includes older tubular rail “barrier” systems on bridges with or without an adjacent footpath.

Background

A pedestrian/cyclist fence or barrier may be needed for a footpath, cycleway or shared facility in many circumstances, such as:

- running alongside a roadway to control pedestrian access;
- at the back of a footpath to safeguard pedestrians from steep batters, drop offs or other hazards;
- on top of a vehicle barrier to provide support for cyclists; or
- across a structure to protect pedestrians or cyclists from a fall or vehicle traffic.

Fences between a road and pedestrian route present a risk to both vehicle occupants and passing pedestrians/cyclists if the fences are struck by a vehicle. It is important to ensure sufficient distance between the fence and vehicles wherever possible to reduce this risk. If fences are beside a road, they must be collapsible or break away without causing injury to vehicle occupants.

Such fences should not be a hazard to pedestrians, cyclists or motorists. They should present a smooth surface that cannot snag a pedestrian or cyclist and avoid sharp edges that could cause injury. Particular attention should be paid to bolts and other fixings.

The fence/screen elements should also not pose a hazard to motorists through vehicle impacts. The structure should maintain sufficient integrity under vehicle impact that elements do not become dangerous projectiles. No horizontal components should be able to become dislodged and project into a vehicle if they are struck.

Many older installations have been fabricated using slip joints, threaded sections and/or hex screw fittings. These joints will generally fail under vehicle moderate impact creating dangerous projectiles. In New Zealand these have resulted in both serious injury and fatal crashes.

Figures 1 to 4 below show the site of a serious injury crash involving an un-welded tubular pedestrian handrail. The top rail passed completely through the vehicle, seriously injuring a passenger. The site is on a local road adjoining a State highway and has now been upgraded using a complaint road safety barrier system.



Figure 1: Typical pedestrian handrail



Figure 2: Entry point through front firewall



Figure 3: Exit point through rear bumper



Figure 4: Front passenger area penetration

Recommended Practice

Notwithstanding any other code compliance issues required by the road controlling authority (whether NZ Transport Agency or local authority), in all installations, the horizontal and vertical elements must be secured together by full strength welds around the entire circumference of all joints.

All welds must be complete penetration welds which conform to the requirements of AS/NZS 1554.1:2011, and damaged galvanizing repaired as recommended by AS/NZS 4680:2006 to prevent corrosion by the application of a zinc-rich primer.

A tack weld has insufficient strength to hold the elements together in a vehicle impact and therefore must not be used.

All end treatments to tubular section rails must be curved to a radius not less than 1000mm.

Endorsed by: National Manager Traffic & Safety