



Auckland Transport Code of Practice

Chapter 9

Roadside Restraint Devices



9 Roadside Restraint Devices

9.1 Scope

This chapter includes the following:

- Road Safety Barrier Systems
- Fences
- Railings
- Bollards
- Sight Rails

It excludes:

- Fences and restraints required within Parks and Recreational areas
- Restraints not within the road reserve

Where requirements within this document differ from existing standards or guidelines, the requirements of this document shall apply.

All references to reports, documents, standards, guidelines, acts and regulations in this standard are references to the latest versions complete with all amendments.

9.2 Road Safety Barrier Systems

The main purpose of roadside barriers is to improve the safety of people . It serves to reduce the severity of crashes by dissipating the kinetic energy of errant vehicles. Barriers, however, in themselves pose a hazard and the provision thereof needs to be balanced between the safety benefits they provide as opposed to the safety hazards they create. The design of road safety barrier systems must be compliant with 'crash tested design' or approved under Section 3: Approval of Road Safety Barrier Systems of NZTA standards for road safety. Changes to the crash tested, approved design configuration will render the barrier system non-compliant with the specification. All road barrier systems must be installed and maintained in accordance with the manufacturer's instructions.

AT requires Consultants and Contractors carrying out design and/or supervision work involving road safety barriers to have attained the 'Barrier Installation and Maintenance Inspections Qualification' (BIMIQ) by having attended the practical workshop and having attained competence through a practical assessment.

Timber faced guardrail barriers are not "pre-approved" by Auckland Transport (AT), but AT will consider them on a case-by-case basis depending on the context of their proposed application. Approval for their use must be obtained from the AT Road Corridor Operations Manager.



Road safety barrier systems must be designed and installed in accordance with the following:

- NZTA Geometric Design Manual, Section 7- Roadside Features
- NZTA Bridge Design Manual, Section B – Bridge Side Protection, June 2004
- NZTA, M23 – Specifications for Road Barrier Systems
- NZTA, M23 – Notes on Specifications
- NZTA, M23A – Approved Road Safety Barrier Systems
- NZTA Maintenance Specification 17: Barrier Repairs
- NZTA, RTS 11 – Urban Roadside Barriers and Alternative Treatments
- AS/NZS 3845:1999 Road Safety Barrier Systems
- NCHRP Report 350 – Recommended Procedures for the Safety Performance Evaluation of Highway Features, National Cooperative Highway Research Program, Transportation Research Board National Research Council, 1993
- AUSTRROADS Guide to Road Safety
- AASHTO – Roadside Design Guide, 4th Edition 2011
- The requirements of the road safety barrier (including end treatments/crash cushions etc.) Manufacturer's installation and maintenance instructions

9.3 Fences

The terms fences and railings are sometimes used interchangeably. For the purposes of ATCOP, there is a difference – as described in *sections 9.3 and 9.4*. Importantly, fences are road restraint devices but railings are not.

Fences along and within road reserves are used to control entry to road reserves or crossing of roadways by vehicles, cyclists or pedestrians. They are also used to safeguard people from injury caused by falling. In this context, such fences are often referred to as “barriers” (Clause F4 –Safety from Falling- New Zealand Building Code (NZBC)). A further use is to provide security and to restrict access to specific areas.

Simply put, fences comprise posts (vertical), supporting rails (horizontal) and a secure infill material between ground (or floor) and the uppermost rail. The nature and form of the infill material is a function of the primary purpose of the fence. For example, security and fall prevention fences must have an infill which is “non-penetrable” and “non-climbable” so that people cannot reasonably pass through it or climb over it. Fences for fall prevention have specific compliance criteria as described below. Fences solely for the prevention of vehicle access may have a different form of infill – one which can withstand reasonable vehicle impacts.

Fences normally provide most of the functionality of railings but generally the converse is not so. The differentiating feature of fences is the characteristic detailing to safeguard people from injury caused by falling, to prevent vehicle access, and to provide robust security. Railings do



not usually have adequate fall prevention capability, vehicle access prevention features or adequate security characteristics.

Fences can themselves present safety hazards e.g. when impacted by vehicles or cyclists. Therefore fences should only be erected with a clear purpose and when the safety benefits outweigh any safety “downsides”. Fences should be designed so as not to constitute a hazard for road users. Horizontal rails that could spear or snag vehicles, non-frangible or large posts, and fencing materials that could yield hazardous debris (e.g. splintered wood fragments) must not be used.

Where fences are installed alongside the edge of a carriageway and in the vicinity of a pedestrian crossing, then the fence must not obscure motorists’ visibility of pedestrians as they move toward and access the pedestrian crossing.

The style of fencing selected must be closely aligned with the urban design and landscape requirements of the surrounding area. It should also be of a type that will minimise the risk of graffiti damage – refer to *ATCOP Chapter 6 Street Amenities*.

The provision of fences should take into account the principles of Crime Prevention Through Environmental Design (CPTED).

Fences must comply with the following:

Clause F4 Safety from Falling – New Zealand Building Code (NZBC).

NZTA Bridge Manual – Section B: Bridge Side Protection (in particular Clause B6.3 Pedestrian and Cycle Barrier).

Fences must be designed, constructed and maintained in accordance with the following general requirements:

- Where a pedestrian facility is at a height above ground of 1m or greater, then a fence (“barrier” in NZBC terminology) must be installed in compliance with Clause F4, NZBC. For pedestrians the fence height must be at least 1100mm.
- Where cyclists may use a path on a bridge and the bridge height above ground is greater than 2m, then a bridge fence (“barrier” in NZTA Bridge Manual terminology) must be installed in compliance with Section B of the NZTA Bridge Manual. The fence height must be at least 1400mm.

New fences must comply with standard drawings as follows (or “like for like” in the case of isolated repairs/replacements to existing fences):

- PLAN No. RR001 Fence Types A & B
- PLAN No. RR002 Fence Type D



- PLAN No. RR003 Fence Type E
- PLAN No. RR004 Fence Type F
- PLAN No. RR005 Fence Type G – Part One of Three
- PLAN No. RR006 Fence Type G – Part Two of Three
- PLAN No. RR007 Fence Type G – Part Three of Three
- PLAN No. RR008 Typical Picket Fence Detail
- PLAN No. RR009 Typical Wire Fence Detail A
- PLAN No. RR010 Typical Wire Fence Detail B

9.4 Railings

Simply put, railings have a typical form comprising posts (vertical) and rails (horizontal) but no infill material. For ATCOP, railings are not classified as a road restraint device. They generally provide support for people movement assistance and/or directional guidance.

The spacing of both posts and rails is usually of a composition to deter people movement through the railing but is not sufficient to provide fall prevention. Railings are used to provide support to, or assist the movement of a person e.g. cycle hold rails. They may also be used to guide pedestrians to more desirable routes or crossing points or entry/exit points, contain people for safety reasons – in situations where people are not exposed to a potential fall of greater than 1m. (Where people could fall 1m or more, then fences (“barriers” in NZBC terminology) must be installed. (Refer to above)). For example, railings to control approach speeds of cyclists before an at-grade rail crossing, railings to “contain” pedestrians on a pedestrian refuge island. They must not be used as a fall prevention device.

Handrails on bridges, parapets on bridges and elevated structures, handrails along retaining walls, handrails on stairs, handrails on elevated walkways are not fences, but their primary purposes are to prevent falls and provide assistance for the safe movement of people. All such handrails must comply with Clause D1 Handrails on Stairs – New Zealand Building Code (NZBC) and ATCOP Chapter 16 – Structures (in particular handrails/parapets on bridges and other structures).

Pedestrian Railings are covered in *ATCOP Chapter 12 – Footpaths and Pedestrian Facilities*.

Cycle Railings are covered in *ATCOP Chapter 13 – Cycling Infrastructure Design*.

9.5 Bollards

The function of bollards is generally to control vehicular access. The design of bollards is closely linked to urban design guidelines. Refer to *ATCOP Chapter 6 - Streetscape Amenities*.

For bollards on cycle paths or shared pedestrian cycle paths, refer to *ATCOP Chapter 13 Cycle Infrastructure Design*.



9.6 Sight Rails

Sight rails are sometimes mistakenly considered to be some form of road restraint. Sight rails do not form part of any approved roadside safety barrier system (refer to *section 9.2* above), and must not be used as such. Sight rails can address crashes such as vehicle collisions with roadside objects, loss of control and “over-shooting” intersections.

Sight rails have been used to highlight hazards such as curves, bridges, culverts and intersections. They are usually constructed of light timber and are painted white.

The use of sight rails to protect dangerous roadside hazards such as bridge abutments and steep banks is not an acceptable practice. In such instances, the provisions of *ATCOP section 9.2 – Roadside Safety Barrier Systems*, must be applied.

It is considered that, in most situations, the use of correctly installed conventional delineation devices as explained in NZTA, *RTS 5-Guidelines for Rural Road Marking and Delineation* (reprint 2002), would make the use of sight rails unnecessary. Also, refer to *ATCOP Chapter 10 – Traffic Signs and Road Markings*.

For those situations where sight rails are the “solution of last resort”, they must be designed, constructed and maintained in compliance with NZTA, *RTS 5* (reprint 2002).

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