



ACT
Government

FENCES, GUARDRAILS AND BARRIERS

MUNICIPAL
INFRASTRUCTURE
STANDARDS 10

Transport Canberra and
City Services

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AUS-SPEC Base Document

Revision Register

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1/0				
1/1	N/A	Acknowledgement of Country added		
	1.1.1.1	Reference to Aboriginal culture added		
	1.1.2.4	MIS 07 reference added		
	1.1.2.5	MITS 01 reference corrected		
	1.1.3.1	AS 1348 and AS 2890 added		
	1.1.3.3	AGRDR added		

ACKNOWLEDGEMENT OF COUNTRY

Transport Canberra and City Services (TCCS) acknowledge that Aboriginal people are the Traditional Owners of Australia. We acknowledge and pay respect to the Ngunnawal peoples as the custodians of the land and waters that we live and thrive on today here in the ACT.

TCCS acknowledges that Canberra’s cultural and natural heritage was maintained by the Ngunnawal people for many generations before colonial settlement on Australian soil. Aboriginal people’s management of the land preserved the natural balance of local plants and animals. This knowledge of the environment in which we live is critical to the protection and restoration of our land today.

It is our responsibility to preserve and encourage Ngunnawal, Aboriginal and Torres Strait Islander cultural integrity. When using this document, consider opportunities to incorporate Ngunnawal, Aboriginal and Torres Strait Islander culture into the fencing, guardrails and/or barriers.



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1 FENCES, GUARDRAILS AND BARRIERS

1.1 General

1.1.1 Responsibilities

1.1.1.1 Objective

General: Provide design and documentation for all classes of permanent safety barriers and fences in the public realm, including the following:

- > Ngunnawal and Aboriginal culture
- > Road safety barriers
- > Vehicle exclusion barriers
- > Path barriers
- > Public exclusion barriers
- > Gates

Bridges: For barriers associated with bridges, including safety screens, refer to *MIS 09 Bridges and related structures*.

Roadwork: For temporary barriers associated with roadwork, refer to *MITS 01 Traffic Management*.

Objectives: Where fences, guardrails or barriers are required, provide the following:

- > Convenient and safe access for maintenance functions.
- > Selection of standardised systems that allow rapid replacement with readily available components.
- > A durable system that minimises whole of life costs and exhibits high resistance to vandalism.
- > An appropriate response to climate, geology and topography, existing built fabric, heritage and cultural context of the area.
- > Consideration for safety in design, operation and demolition.

1.1.1.2 Precedence

Where any document except legislation or the *Territory Plan* issued in conjunction with this Design Standard includes technical requirements that conflict with this Design Standard, the requirements of this Design Standard take precedence.

1.1.2 Cross references

1.1.2.1 Commonwealth Legislation

The following Commonwealth Legislation is relevant to this Standard:

Australian Capital Territory (Planning and Land Management) Act

Environment Protection and Biodiversity Conservation Act

1.1.2.2 ACT Legislation

The following ACT Legislation is relevant to this Standard:

Environment Protection Act
Heritage Act
Planning and Development Act
Planning and Development Regulation
Public Roads Act
Public Unleased Land Act
Road Transport (General) Act
Road Transport (Safety and Traffic Management) Act
Road Transport (Safety and Traffic Management) Regulation
Territory Plan and related Codes
Work Health and Safety Act

1.1.2.3 ACT Government Strategic Documents

The following strategic documents prepared by various Directorates of the ACT Government are relevant to this Standard:

ACT Pest Animals Management Strategy 2012 – 2022
Nature Conservation Strategy 2013 – 2023

1.1.2.4 Design Standards

This Design Standard references the following component Standards

MIS 01 Street planning and design
MIS 05 Active travel facilities design
MIS 07 Driveways
MIS 09 Bridges and related structures
MIS 16 Urban open space

1.1.2.5 Specifications

The following specification is related to this Standard:

MITS 01 Traffic Management

1.1.2.6 TCCS Reference Documents

The following TCCS reference documents are related to this Standard:

Reference document 4 Protection of public landscape assets
Reference document 6 Design Acceptance submissions
Reference document 7 Operational acceptance submissions
Reference document 8 WAE quality records
Reference document 9 Final acceptance submissions
Reference document 10 Landscape consolidation

1.1.3 Referenced documents

1.1.3.1 Standards

The following documents are incorporated into this Design Standard by reference:

AS 1348 Glossary of terms – Roads and traffic engineering

AS 2890 Parking facilities

AS/NZS 3845 Road safety barrier systems

1.1.3.2 Standard drawings

ASD-0906 Barrier fence details

ASD-0907 Barrier railings

ASD-1003 Standard ranger gate

ASD-1004 Vehicle access gate (Heavy duty)

1.1.3.3 Other publications

National Construction Code

Roadside dining protection – a guideline for local authorities in South Australia, Transport SA.

Nature strip development application Form, TCCS Version 1.1.

Austroads

AGRD Austroads Guide to Road Design

AGRD03 Part 03: Geometric design

AGRD06 Part 06: Roadside design, safety and barriers

AGRD06A Part 6A: Pedestrian and cyclist paths

AGRD06B Part 6B: Roadside environment

AGRS Austroads Guide to Road Safety

AGRS09 Part 09: Roadside hazard management

1.1.4 Standards

1.1.4.1 General

Road Safety Barrier design: To AS 3845.

Proprietary products: To *TCCS Products previously considered for use list*

1.1.5 Interpretation

1.1.5.1 Abbreviations

General: For the purposes of this Design Standard the following abbreviations apply:

NCC: National Construction Code

TCCS: Transport Canberra and City Services, ACT Government and its successors.

1.1.5.2 Definitions

General: For the purpose of this Design Standard, the definitions of terms used to define the components of the road reserve are in conformance with *AS 1348, Glossary of Austroads Terms* and *AGRDO3*.

Definitions that pertain to this Design Standard are outlined below,

Clear zone: The area adjacent to the traffic lane that should be kept free from features that would be potentially hazardous to errant vehicles.

Frangible: Roadside furniture designed to collapse on impact. The severity of potential injuries to the occupants of an impacting vehicle is reduced, compared to those that could occur if the furniture was unyielding.

Public exclusion barriers: A physical barrier sufficient to provide separation between pedestrian areas and the road. This barrier is not rigid enough to become a hazard if struck by vehicles and is also not a road safety barrier.

Road safety barriers: A physical barrier provided to separate roadside hazards or opposing traffic. These barriers are designed to resist penetration by an errant or out of control vehicle and as far as practicable, to stop or redirect colliding vehicles. Road safety barriers in use within the ACT fall into 3 categories:

- > **Rigid barriers:** Concrete barriers.
- > **Semi-rigid barriers:** Metal guardrails such as W-Beam and Thrie Beam.
- > **Flexible barriers:** Wire rope barriers.

Vehicle exclusion barriers: A physical barrier sufficient to deter vehicles from accessing verge areas. This barrier is not rigid enough to become a hazard if struck by vehicles and is also not a road safety barrier.

Working width (road safety barrier): The minimum width that is required to prevent an impacting design vehicle from colliding with an object behind a road safety barrier system. This includes both the dynamic deflection of the road safety barrier (if any) and the extra width to allow for the roll (vertical rotation) of an impacting vehicle. This ensures that the system width can be accommodated between the deformed road safety barrier and the hazard during impact and that the top of a high heavy vehicle will not impact a high hazard during impact.

1.2 Pre-design planning

1.2.1 Consultation

1.2.1.1 TCCS and other Authorities

Requirements: Consult with TCCS and other relevant Authorities during the preparation of design. In addition to the requirements of this Design Standard, identify the specific design requirements of these authorities. Consult with TCCS to determine where fencing and access is required (including locks on gates) for public open space areas.

Verge works in brownfield areas: Refer to the *Nature strip development application form*.

1.2.1.2 Utilities services plans

Existing site conditions: Obtain service plans from all relevant utilities and other organisations whose services, trees, important ecological habitats or other assets exist within the area of the proposed development. Plot this information on the relevant drawings including the plan and cross-sectional views. As a minimum, designs should refer to 'Dial-before-you-dig' information that is readily available in most areas.

Responsibility: Confirm service plans accuracy with onsite inspection and also potholing if deemed necessary. Ensure that the working width is maintained between any proposed road safety barriers and existing above ground services.

Service authorities: Consult with relevant service authorities where underground services are located within or in close proximity to the clear zone. Provide consideration for safe access for maintenance functions.

1.2.1.3 Safety in design

Requirement: Implement safety in design processes in accordance with the *Work Health and Safety Act*.

Design to mitigate hazards: Adopt a risk management process in accordance with *AGRD06, Figure 4.1*.

1.2.1.4 Proposed new services

Requirement: Detail any new services proposed or relocated as part of the proposed works.

1.2.1.5 Hazard removal

Barrier or guardrail selection: Assess the whole of life cost for providing and maintaining barriers or guardrails against other hazard treatment options, including hazard removal. Options for hazard removal include the following:

- > Extend culverts beyond the clear zone.
- > Replace culvert inlets with plantation sumps.
- > Remove or relocate hazards such as trees, poles, signs and other roadside furniture.

2 DESIGN

2.1 Clear zone

General: Any non-frangible obstacle within the clear zone could pose a hazard to an errant vehicle. Common hazards include electrical poles, trees with elements greater than 150mm in diameter. The clear zone is a compromise between the recovery area for every errant vehicle, the cost of providing that area and the probability of an errant vehicle encountering a hazard.

Clear zone distances: Refer to *AGRD06 Clause 4.2*.

Requirement: The clear zone should be kept free of non-frangible hazards where economically and environmentally possible. Alternatively, hazards within the clear zone should be treated to make them safe or be shielded by an appropriate road safety barrier. Undertake a risk assessment for each situation where non-frangible hazards exist within a clear zone.

2.2 Road safety barriers

2.2.1 General

General: Road safety barriers are not commonly required in municipal streets due to the lower speed environment and fewer embankments. However, there may be specific situations where road safety barriers are warranted.

Design: To *AS 3845* and *AGRD06*.

Objective: Provide road safety barriers where the following conditions apply:

- > The consequences of impact with the unshielded hazard are greater than the consequence of impacting the barrier.
- > There is a high likelihood that vehicles will leave the carriageway.
- > There is a high level of consequence to the vehicle occupants, other road users or roadside features associated with vehicles leaving the carriageway.

Vehicle type: Select barriers with consideration for the type of vehicle likely to be involved.

2.2.1.1 Approved products

General: Transport Canberra require that all new safety barrier products must be accepted by Roads and Maritime Services (RMS) NSW for use on classified roads within NSW prior to use in the ACT.

2.2.1.2 Working width

Requirement: Maintain an area clear of non-frangible obstacles or maintenance access points for the full working width behind any road safety barrier.

Working width: To the manufacturer's instructions.

2.2.2 Vehicle – Pedestrian and cyclist separation

Objective: Provide priority to pedestrian and cyclist users in areas where there is a high potential for interaction. Consider geometric design and signalised intersection technology in conjunction with road safety barriers. Provide sufficient levels of storage capacity in high pedestrian areas.

Design for pedestrian and cyclists: Refer to *MIS 05 Active travel facilities design*.

Flexible barriers: Flexible barriers shall not be used to separate vehicles from pedestrians or cyclists.

2.2.3 Motorcycles and cyclists

General: Identify potential hazard areas for motorcycles or cyclists such as on the outside of horizontal curves. Adopt a risk based approach to design for motorcycles and cyclists, for example, straight sections of road are less likely to present a hazard to these user groups.

Objective: Provide road safety barriers that do not increase the risk to motorcycle riders or cyclists. Include consideration for the following:

- > Frangible, highly visible covers on all leading edge end terminals for rigid and semi-rigid road safety barriers.
- > Underrun barriers where road safety barriers are required on the outside of horizontal curves.
- > Stacked cushions for use with wire rope barriers to reduce the risk presented by rigid posts in these systems. Seek approval from TCCS for any deviation from standard barrier specifications.

Design: To *AGRD06*.

2.3 Vehicle exclusion barriers

2.3.1 General

General: Select the most appropriate vehicle exclusion treatments depending on the location and adjoining kerb treatment.

Hazard management: Provide minimum offsets to the carriageway as they relate to the site, consider factors including the following:

- > Speed environment and traffic volumes.
- > On-street parking and opening of passenger doors.
- > Sight lines to driveways and crossing locations.
- > Clear delineation of vehicle exclusion barriers.
- > Management of clear zones.

2.3.2 Landscape treatments

General: Design landscape treatments to achieve vehicle exclusion. Consider the following:

- > Location of raised garden beds, low wall seating and other edge treatments.
- > The provision of planting in conjunction with flush kerbs for Water Sensitive Urban Design features.
- > The spacing and delineation of castellated kerbs to reduce trip hazards.
- > Incorporate temporary fencing until landscape is established where appropriate.

Design: Refer to *MIS 16 Urban open space*.

2.3.3 Barriers for paths

Standard: To *AGRD6A* and *MIS 05 Active travel facilities design*.

General: Do not provide barriers that are pedestrian or cyclist hazards within paths. Provide bollards, landscape treatment or deflection rails (localised path narrowing) at entrances to paths where vehicles may attempt to access.

2.3.4 Bollards

Application: An effective means to control or prevent vehicular access to open space areas or verges. Consider vulnerable user groups and visibility within car parks or school zones.

Design: Seek approval from TCCS for any deviation from the standard bollard specifications.

Materials: Construct in concrete, steel, timber or plastic that is compatible with adjoining street furniture. Timber treated with CCA must not be used. Provide steel bollards where there is a higher likelihood for damage, such as at the leading bollard adjacent to kerbs and paths.

Standard drawing: *ASD-0503 Path Termination bollard details.*

Location:

- > Opening width: Desirable 1.4m, minimum 1.2m and maximum 1.5m to prevent vehicular access.
- > Lateral clearance from kerb lines:
- > To restrict access to verges: 1.2m.
- > To restrict access to open space: Minimum 1.8m.
- > Minimum lateral clearance from driveways: 1.2m, refer to *MIS 07 Driveways*.
- > Lateral clearance to paths: 0.3 to 1.0m; refer to *AGRD 6A Clause 7.7.1*. Consider the potential for vehicle access and type of path use.
- > Bollards must be conspicuous to motorists, pedestrians and cyclists.
- > Space between each bollard and a gutter or kerb shall allow for pedestrian movement (including people with disabilities) and for vehicle overhang and door openings.

Bollard dimensions:

- > Minimum 1.0m, maximum 1.5m high.
- > Timber bollards: Maximum 150mm in diameter where located within a clear zone.

Visibility:

- > Include a reflective panel with Class 1 Reflectivity to the full bollard circumference at a height of 1.3m if sited in a location that would require visibility for a reversing vehicle such as a car park, indented parking bays or near a driveway.
- > Provide a reflective panel on all faces within a pedestrian or cyclist's path of travel for any bollards adjacent to paths.
- > Provide an alternative material to tape for reflective marking on timber bollards.

Mowing strips:

- > Provide a 150mm wide mowing strip around bollards in grassed areas.

2.3.5 Kerb as a vehicle barrier

Application: Provide barrier kerb on straight sections of road to restrict vehicle access to urban open space or sportsgrounds.

Design considerations:

- > Barrier kerb is unlikely to act as a vehicle barrier to some vehicles, such as 4WD's.
- > Barrier kerb should not be used along curves on bus routes or where on street parking is permitted. Provide bollards or other forms of barrier for the same purpose in these situations.
- > Limit use around high pedestrian activity areas, in particular where vulnerable user groups are likely to step off the kerb.
- > Provide non-standard crossings of barrier kerb at appropriate locations for maintenance vehicle access, pedestrians and disabled access.
- > Pedestrian kerb crossings: to *ASD-0515* and *0516 Kerb ramps*.
- > Vehicle crossings: to *AS 2890*.
- > Limit use where there is potential for water to shed off the road reserve into open space areas or provide castellated kerb in these areas.

2.3.6 Cycle rest rails and steel barriers

Application: May be an effective and durable means to control or prevent vehicular access adjacent to Main Community Routes.

Intersections: Prior to the design of bicycle rest rails at roundabouts and intersections, a risk assessment shall be performed in accordance with the *Austrroads Safe Systems Approach* to form the basis of a design recommendation to TCCS. A weighting shall be applied to Main Community Routes. For further discussion on the application of bicycle rest rails, refer to *MIS 05 Active travel facilities design*.

Materials: Steel.

Standard drawing: *ASD-0525 Cycle rest rail details*.

Location: Refer to **Bollards**.

2.3.7 Log barriers

Application: May be appropriate in urban open space areas with high pedestrian traffic and where sufficient offset from the carriageway is available. Log barriers should not be located within the clear zone, provide a minimum offset of 4.5m to the kerb line, and refer to **Clear Zone**.

Materials: 150mm diameter Tanalith treated pine (eco-wood). Timber treated with CCA must not be used.

Opening width: 1.2 to 1.5m.

Requirements: Seek approval for use from TCCS prior to use. Address the following safety and maintenance issues:

- > Safety hazard to pedestrians due to low height and resulting visibility.
- > Spearing hazard to vehicles when subject to end on impact.
- > Obstruction to mowing operations.

2.4 Public exclusion barriers

2.4.1 General

Standard: *NCC Vol 2*.

Design: To *AGRD6A* and *AGRD6B*.

General: Select the most appropriate public exclusion barriers to delineate hazards to all users:

- > Provide simple one or two rail fences, bollards, landscape planting, increased wall height or combinations of these.
- > Do not restrict pedestrians from leaving the carriageway. If exclusion barriers are proposed along the verge, provide means of emergency egress.
- > Do not place barriers in clear zones where they could become a spearing hazard to errant vehicles, e.g. pedestrian railings.
- > Consider visibility of retaining walls, stormwater drainage structures and level changes.
- > Consider additional hazards that may be introduced by the design, e.g. low walls or kerbs hidden in long grass.
- > Where possible, do not provide frangible barriers in high pedestrian areas.

2.5 Fences and gates

2.5.1 Fences

2.5.1.1 General

Design: To *AGRD6B*

Application: Plain wire fences can be an appropriate way of restricting access to urban open space for access management purposes. Provide pedestrian and vehicle accesses that are appropriate for the anticipated user groups and for maintenance functions.

Materials: Fences made from highly flammable materials shall not be used e.g. Brush fencing.

2.5.1.2 Hinged joint (boundary) fence

General: A permanent fence with a hinged joint fixed to three plain wires. This fence typically has a single barbed wire on top. TCCS may require the installation of an additional plain or barbed wire between the hinge joint and the top barb.

Materials: Galvanised CHS strainer posts and stays with star picket posts and high tensile wire.

Location:

- > Strainer posts: Maximum 200m centres or at each change of direction and at both sides of depressions where flood gates are erected.
- > Star picket posts: Maximum 4m spacing evenly positioned between strainer posts.

2.5.1.3 Other fences

Netting fence: A permanent fence similar to hinged joint (boundary) fence with netting fixed to three plain wires. This fence typically has twin barbed wires on top.

Steel post and rail: A permanent fence made from heavy gauge steel welded to form a partial barrier fence. Residential boundary fences: Conform to *Planning and Development Regulation*.

Wildlife fencing: As approved by TCCS in consultation with the Conservator of Flora and Fauna.

2.5.2 Gates

2.5.2.1 General

General: Gates on all external boundaries, including personnel access gates, must be stopped and swing one way only as indicated in **Figure 10-1 Stopped gate opening figure** below. Personal access gates on external boundaries must also be sprung (self-closing).

Path design: Offset paths from gates where possible. Provide alternative means for crossing barrier such as step through panels or stiles.

Alternatives: Other styles of gate may be approved provided they are compatible with the surrounding landscape, constructed of durable materials, are frangible, lockable and vandal resistant.

Locks: Provide locks on all gates where required by PACS.

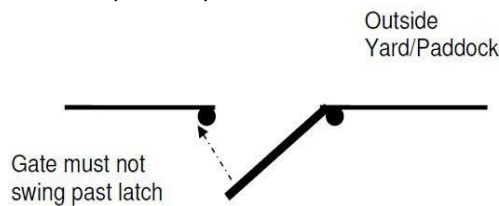


Figure 10-1 Stopped gate opening figure

2.5.2.2 Vehicle gates

Heavy duty gates: A heavy duty type gate designed to resist deliberate impact. This would be appropriate in isolated areas or where there is a history of damage to standard gates. Strainers and stay assemblies shall be designed in accordance with the requirements for boundary fencing

Urban boom (ranger) gates: All ranger gates are to be painted red in colour allowing for high visibility for emergency vehicles. Provide gate stoppers at 90 degrees from the hinged end of the boom inside the restricted area if required.

Super gates: Where continuing problems with access and vandalism have occurred Super gates may be required. Gates are to be constructed from steam pipe with a minimum width of 6m (comprising of two opening gates).

Flood gates: To be assessed with TCCS in each instance.

Signage: Provide signage for all ranger gates.

2.5.2.3 Pedestrian access gates

General: Provide pedestrian access through fenced areas with personal access gates, bollard gates, step-through vehicle gates and step-through panels.

Step-through vehicle gates: Standard rural farm gate construction, 4.2m wide and 1.15m high.

Personal access gates: Minimum 1.2m wide, 1.15m high galvanised CHS. This may be installed adjacent to a vehicle gate as an alternative to a step-through vehicle gate.

Cavalettis: Cavalettis will consist of a galvanised steel frame with treated pine logs.

3 DOCUMENTATION

Requirements: Comply with *Reference document 6 Design Acceptance submissions*.

APPENDIX A—LEVEL CHANGES

General

General: This section provides commentary to the interpretation of the *NCC* in Municipal areas within lease boundaries administered by the ACT Government. This section does not take precedence over any requirements in the *NCC*.

Verge works: For level changes outside lease boundaries (i.e. within the verge) refer to the remainder of this Design Standard.

Level changes

Paved areas or areas within 5m of a pedestrian path: Where changes in level are greater than 1m (or 5 risers in the case of a stairway) in any direction, provide the following:

- > Continuous protective balustrades; or
- > Embankment slopes with grades less than 1 in 2.

Consideration for children: In school zones, shopping centres, playgrounds and other areas where there is likely large numbers of children and where the lower level has a hard surface such as concrete or gravel, the following shall apply:

- > Barriers shall not have horizontal fence rails that can act as a ladder.
- > Barriers shall not have gaps wide enough to enable children to climb through or narrow enough to get their heads stuck.
- > The minimum acceptable level of protection uses vertical bars with maximum clear spacing of 110mm.
- > The use of horizontal members alone shall not be permitted.

Other areas: In areas more than 5 metres from a pedestrian path but which meet the other criteria outlined above for needing a barrier, assess the most appropriate form of protection.

Safety screens: Assess the need to prevent objects being thrown from the top of steep embankments by undertaking a site specific risk assessment in accordance with the *Bridge safety screen policy*.



Transport Canberra and
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