

DESIGN STANDARDS
for
URBAN INFRASTRUCTURE
20 URBAN EDGE MANAGEMENT ZONES



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20.1 Introduction

The immediate boundary between areas of broad scale open space and urban development is a zone calling for special attention in planning, design, construction and management.

The urban edge zone needs to be planned and designed so as to ensure a sensitive and effective functional and visual transition between urban lands and broad scale open space at realistic capital cost. At the same time, planning and design shall ensure that economically realistic management practices can be applied in the zone to achieve the design objectives of the management authority, service access, the protection of life and property in the adjacent urban area and protection of the public utilities within the zone.

These needs apply both to urban edges which will be created as part of the future urban development of Canberra and also to existing edges.

20.2 Related codes of practice and guidelines

20.2.1 Policy and guidelines

Bushfire Fuel Management Plan, ACT Forests, Canberra Urban Parks and Environment ACT, Canberra, 2000.

TP64/73DO – Equestrian Trail System for Canberra

20.3 Planning and design objectives

The planning objective for the urban edge zone is to ensure an appropriate interface between the urban area and surrounding public and unleased land.

This requires the establishment of an adequate buffer strip containing:

- management fencing
- an adequate fire break
- access tracks for land management and other maintenance authorities
- public access
- catch and cut-off drains
- electricity and other services.

It is not possible to specify a uniform planning and design standard which will be applicable to all situations and each situation needs to be examined individually in consultation with Planning and Land Management, Environment ACT and City Management to ensure that the planning and design opportunities are optimised within the context of future management requirements.

Particular attention needs to be given to protecting any significant features such as ecologically significant habitats, cultural and heritage sites and geologic features when determining the location of the urban edge. Urban edge zones can be designed to be part of wildlife corridors. Environment ACT needs to be consulted at the planning and design stage to consider such issues.

City Management has two major requirements within the urban edge zone:

- access for authorised vehicles from the suburban road network to public land

- a management zone running along the boundary providing management access, fire breaks, a service easement, drainage, a wildlife buffer and other related requirements.

Managers need access to public land for a number of tasks including mowing, tree planting, flora and fauna management and law enforcement. The primary requirements for access, however, relate to fire management including prescribed burning.

The urban edge zone and the maintenance track in particular may also be used as an equestrian trail and for other recreational purposes.

20.4 General design requirements

The general maintenance and fire control design requirements for a basic management zone are to:

- provide direct access from cul de sacs and loop roads to the urban edge zone (vehicle access generally closed to public with ranger gate)
- provide collocated maintenance track and catch drain adjacent to property boundaries
- provide easements for overland stormwater flow through open space
- direct sewerage surcharge and water pipe bursts along food paths and away from habitable spaces
- provide secondary catch drain where the main drain departs from the property boundary
- retain existing trees and other native vegetation in the open space, while enabling tree cover breaks to be established in areas with continuous canopy cover
- provide an easily maintained and mowable strip of land along the fenceline of houses,
- establish fencing along the open space boundary
- avoid small, steep, difficult to maintain areas, particularly rocky outcrops.

It is emphasised that planning urban edge zones for new suburbs needs to be treated on a case by case basis and Environment ACT and City Management must be consulted about their requirements at the design concept stage.

20.5 Maintenance tracks

All weather access tracks are to be provided immediately adjacent to the back boundaries of the residential properties adjoining the urban edge zone.

Tracks shall have a nominal width of 5 metres and the minimum pavement width of 3.5 metres. In special circumstances where it is necessary for the track to be of less width, the issue needs to be discussed with City Management at the early planning stage. The effective width is not to be constrained by intermittent obstructions such as electricity poles located between back fences and the track. In the case of a minimum width track, and where the terrain does not provide a natural shoulder to allow trucks to pass, the design shall include pull over bays at a maximum of 250 metre spacings. Track design must also avoid producing

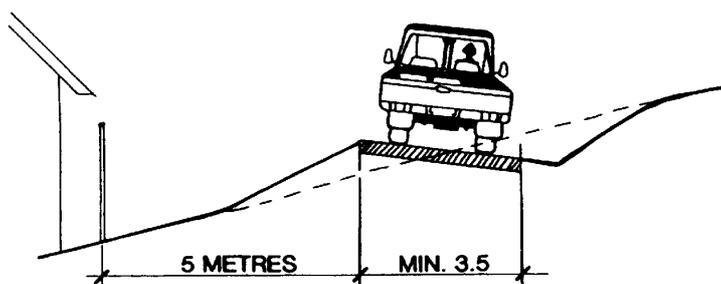
sharp turns and corners that would prevent or hinder the access of fire tankers or large maintenance machinery

Generally the track is to be designed with the crossfall into the slope. The crossfall is to be a minimum of 3 per cent and a maximum of 10 per cent. The advantages of this configuration are:

- runoff is controlled and not shed into adjacent residential blocks
- disturbance to the natural values of the urban edge are reduced by using the track as the cut off drain and avoiding the construction of a separate stormwater structure such as a levee bank or swale
- erosion and seepage across the track surface are reduced, improving long term maintenance requirements.

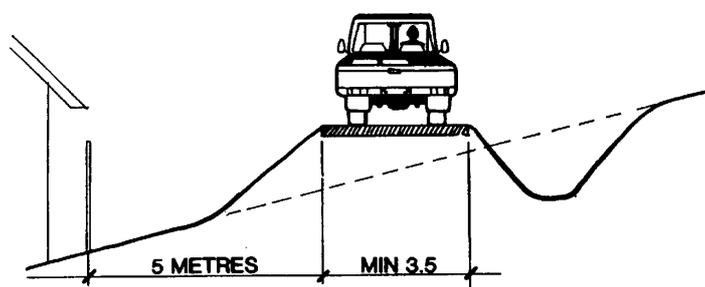
Note that the slope and ground condition of land between the track edge and fenceline must be designed to allow for fire fuel management practices in this area, including access by slashers and other mowing machinery. Specific design details are to be discussed with Urban Services at the early planning stage.

Stormwater inlets and outfalls must be designed to reduce their maintenance requirements.



Typical cross-section through a combined maintenance track and cut off drain

In some situations the cross-sectional area provided by a cambered track may be insufficient to protect properties from 100 years ARI flows. Such situations require the construction of larger cut off drains where the inclusion of the track along the top of the embankment should be considered.



Access track along the top of the embankment of a large cut off drain

20.5.1 Track alignment

As far as possible, the track (toe of the batter) is to run adjacent to the residential property boundaries while still retaining a reasonable horizontal alignment for the operation of large vehicles such as fire tankers and ActewAGL trucks.

Tracks should have at least a 0.5 per cent gradient to allow for surface drainage while the maximum gradient for the safe operation of emergency and other heavy vehicles is 20 per cent. However, gradients over 10 percent can pose access difficulties for tankers laden with water and specific design details are to be discussed with Urban Services at the early planning stage. Gradients between 10 and 20 percent also require special consideration with regard to track surfacing and stormwater control, in order to reduce erosion, provide traction and stability for heavy vehicles, and reduce maintenance.

20.5.2 Access points from the residential area

Access from the suburban road network using feeder roads, cul de sacs, pedestrian ways or floodways is to be provided at intervals not exceeding 500 metres. Cut off drain secondary spillways should be associated with these access points to reduce flooding of leases if the cut-off drain becomes blocked. The access points must have a minimum width of 3.5 metres (desirable width of 5 metres) to provide unconstrained access for fire tankers and similar large vehicles. No structures should be allowed to impinge on the access.

The provision of access points needs particular attention in cases where the bottom edge of the maintenance track is supported by a constructed retaining wall.

In order to control trail bikes and other unauthorized access, a stock proof gate, modified to include a step through stile is to be provided (see Design Standard 11 Guardrails, Fences and Barriers).

The following factors often mean that access points require high maintenance:

- they often occur on steeper grades, climbing up the slope to intersect the maintenance track running along the contour
- vehicles stop to allow gates to be opened, imposing increased dynamic wheel loads on the pavement as the vehicles regain forward motion.
- if part of a cut off drain secondary spillway discharges to the access point, the access track may require kerb and guttering to prevent the edge of the track being eroded or undermined.

A hard surface should be considered for access points steeper than 10 per cent. The types of surfaces that may be appropriate on steeper gradients in poor soil types include bitumen, grass stabilisation methods and concrete with optional black oxide colouring.

20.5.3 Access from the track to adjacent publicly managed land

It is essential that access from the management track to adjoining publicly managed land is not impeded by drains, fences, rocks and other obstacles. Where the catch drains or cut batters prevent vehicles crossing from the maintenance track into the publicly managed land, then take off points at strategic locations are to be provided at 300 metre spacings where possible. These may involve culverts, kerb transitions or the laying back of cut batters to form a ramps with less than 20 per cent gradient.

20.5.4 Track surfacing

The selection of an appropriate track surface will be determined by a number of factors which include:

- soil type
- visual impact

- track gradient
- stormwater flows
- specific management requirements.

It may be that different pavements are applied along a length of track in response to changing site conditions. For example, access routes intersecting the contours and experiencing a concentration of run off may need to be finished with a hard surface while the bulk of the track which follows the contours through stable soils may be finished with a layer of compacted road base. In some situations the existing site materials may be suitable.

Provision of a well consolidated trafficable surface should be considered where the track gradient exceeds 10 per cent.

20.5.4.1 Two coat seal

In certain locations this is the best option from a long term maintenance point of view. However, it is expensive and may visually dominate the urban edge zone. It is also unsuitable as an equestrian trail.

20.5.4.2 Crushed rock

Crushed rock compacted to 95 per cent is the most commonly used pavement surface for maintenance trails. However, on slopes steeper than 10 per cent erosion will be a problem and cross banks that shed water off the track need to be included.

20.5.4.3 Grass stabilisation

Short lengths of track such as access points between residential blocks can be treated with grass stabilisation methods with grass infill to provide a functional yet visually unobtrusive surface.

20.5.4.4 Reinforced concrete

Concrete provides an easily constructed and low maintenance solution for short sections of track. Concrete can be visually disruptive although this can be partly overcome by the full depth colouring with black oxide.

20.6 Fencing

Where public land directly borders property fencelines, management fencing may be required along the lower boundary of the urban edge zone. Fencing is required to secure nature reserves and rural lands from such activities as unauthorised vehicle access including trail bikes and the illegal collection of firewood, rocks and native plants.

Brush fencing is highly flammable in a bush fire situation and it must not to be used along residential boundaries. Standard timber or wire mesh fencing are suitable. If fencing is to cross cut-off drains, the part of the fence within the drain is to have hinged flap to allow water and debris to flow under the fence without blocking.

20.7 Slashed grassed areas

The maintenance track generally defines the boundary between two different intensities of maintenance. The strip between the bottom edge of the track and the property boundary constitutes a service corridor and is generally maintained in much the same way as other urban open space with a prescribed mowing regime. The desirable width of this slashable zone is 5 metres, with a crossfall no steeper than 1:4. If for any reason, either the width or

grade can not be achieved, specific design details are to be discussed with Urban Services at the early planning stage. Within this zone rocks, boulders, irregularities in the ground surface and other impediments to slashing need to be eliminated. Disturbed areas should be reinstated with the localised grass type, generally native grasses if not urban open space.

An 8 metre wide zone immediately above the track is also to be developed to a slashable condition provided that the slope is no steeper than 1:4. Preparation for slashing may not be possible if areas are steeper than 1:4 or if large boulders or bedrock are exposed. In these circumstances the width of the zone may be reduced to 3 metres, with fire fuel reduction performed by hand held machinery such as mowers and brush cutters. However, each case will require consultation with Urban Services.

20.8 Fire management zone

The *Bushfire Fuel Management Plan*, prepared by ACT Forests, Canberra Urban Parks and Places and Environment ACT every two years, contains specific bushfire fuel management plans for all existing urban edge zones as well as general principles. These are designed to reduce the risk of fire moving from urban open spaces into residential areas.

Minimum standards for specifying an adequate bush fire protection zone for new urban edge zones are not possible, since the amount of land required varies according to aspect, slope vegetation and habitat values.

Where conditions permit, the planting of trees and shrubs (or the retention of existing vegetation) is possible in the urban edge zone. Some intervention may be necessary to remove species that increase the fire hazard. Trees and large shrubs should not be planted under or adjacent to powerlines where they may pose a threat to the electricity supply in the case of fire. Advice about species or trees suitable for planting near powerlines is available from ActewAGL.

Where bushland or plantations adjoin the urban edge it may be necessary to create and maintain a fire management zone. This is a zone where the crowns of the trees are spaced such that they will not support a crown fire, even under extreme conditions.

The spacing required to prevent crown fires is a complex matter depending on several factors such as the amount of ground fuel, species, slope and undergrowth. In the absence of adequate research the following measures should provide reasonable protection.

- Width of zone: approximately 60–100 metres on flat land, reducing on land that slopes up or down in the direction of the prevailing wind.
- Distance between trees: 1.5 to 2.0 times crown diameters depending on species. New plantings may need to be thinned as they develop to maturity.
- Species: smooth barked eucalypt species are preferable to fibrous or ribbon barked species; consideration should be given to less flammable species in these zones.

In circumstances where the potential for fire is particularly high such as where fibrous or ribbon barked trees occur to the north-west of urban development, consideration should be given to a road buffer located between any urban development and bushland.

20.9 Catch and cut-off drains design

The detailed requirements for catch and cut off drains are described in Design Standard 1 Stormwater.

Drains should be integrated with the maintenance track located below the drain to minimise water running onto the track and erosion of the track.

Drains can be formed by embankment building or by excavating into the hillside but designers and developers should ensure access is provided to areas above the drains for maintenance and fire fighting. Where the drain or a cut batter prevents this access then culverts or other crossing points are to be provided at intervals 300 metres where possible or according to maintenance requirements.

20.10 Overhead powerlines

The past practice of locating low voltage overhead lines at the rear of the block and high voltage lines in adjacent open space has largely been replaced by underground reticulation in the new residential estates. This trend, which is likely to continue, has the advantages of eliminating both visual intrusion and a major cause of fires.

Where overhead electricity reticulation is being proposed the situation should be discussed with the relevant officers of the Environment ACT and ActewAGL, to determine the most appropriate solution.

20.11 Service easements

All services such as electricity, stormwater, water, gas and telephone should be located within a service easement between the track and the property boundaries.

The location and placement of items should not hinder authorities to access routes to infrastructure or hinder excavation of services for maintenance or replacement services.

Further participation by service authorities in common trenching agreements is encouraged. From a land management point of view, the reduction in disturbance and in the width of the service corridor that can be achieved by common trenching is most desirable.

20.12 Equestrian trails

Urban edge zones may include equestrian trails which are managed by Environment ACT.

Objectives of equestrian facilities provision include the following.

- To provide safe routes for equestrian riding within and on the periphery of the city area, linked with agistment paddocks and equestrian activity areas, and connected to rural trails.
- To incorporate venues for equestrian recreation in the urban area, facilitating the keeping of horses and encouraging a healthy recreation activity.
- To identify existing and potential trail routes so that they can be incorporated into metropolitan planning.
- To create new trails in areas under development by ensuring continuous movement corridors for non-motorised recreational travel.
- To enable horse agistment and grazing to be used as a management tool for broad acre areas which may otherwise be difficult and costly to maintain.
- To provide facilities capable of maintenance at minimal cost to the residents of the ACT.

20.12.1 Planning background

The equestrian trail system should be continuous around the margins of the urban area, with some routes traversing the broad acre areas and forestry areas between new towns (generally accepted and depicted on plan *TP64/73DO – Equestrian Trail System for Canberra*).

Equestrian trails are located generally on the periphery of residential areas, along river corridors and through intertown buffer spaces. Trails are kept away from schools, sportsgrounds, shops and playgrounds. Equestrian trails are rarely single purpose; hikers, joggers and other recreationists use the corridors accommodating equestrian trails.

Three classes of equestrian trails make up the trail system: urban, rural and interstate. Priority has been given to urban trails in the initial stages of trail signposting.

Trails are signposted to identify them on the ground and to increase public awareness of the system. They need to be identified on developer's outline plans to ensure planning recognition.

Road crossings are kept to the minimum and it should be possible to cover long distances with few road conflicts. (The corollary of this practice is that roads encountered tend to be arterial or higher standard, so that the acceptability of at-grade crossings is reduced).

Equestrian activity areas should be provided near agistment areas where possible, but in any case, should be accessible by horses from at least two agistment areas (preferably by a fairly direct route).

Agistment areas for horses should be provided such that no residence is more than five kilometres from an agistment area. Agistment paddocks should not directly abutt residential leases.

Agistment facilities comprise a feeding area and car park, a practice activity area, several agistment paddocks, entry roadway for vehicles and a safe entry/exit for horses. These are large enough to allow rotation of paddocks for management purposes, and are stocked at the rule-of-thumb stocking rate of one horse per hectare.

20.12.2 Equestrian facility design standards

20.12.2.1 Activity areas

Activity areas are in the range 3-5 hectares on reasonably level ground with good drainage. These areas are managed as public facilities and allocations for use are made in a manner similar to that for playing fields. Pony clubs using an activity area as a home ground are treated similarly to football or other field sport codes.

Activity areas are provided near agistment areas where possible. It is desirable to have competition areas slightly removed from agistment areas, to minimize the tendency of competing horses wanting to rejoin others in adjacent paddocks.

Where there is no activity area within 2 km of an agistment area, a small practice area of no more than 2 ha should be located on level ground at the agistment area. The practice area serves for daily practice and training.

20.12.2.2 Agistment areas

Agistment areas need to be at least 40 ha in area, and maximum use is normally made of existing fencing. Feeding areas are provided to serve the agistment paddocks; the feeding area is less than 0.4 ha with adequate gates and barriers to allow access for horses from each paddock. Hitching rails one metre in height should be provided in the feeding area.

At agistment paddocks provision should be made for the parking of up to twenty (20) cars, plus sufficient gravelled area for the turning of cars with horse floats attached. A loading bay, similar to that provided at Mount Taylor Agistment Paddocks may be constructed. The height of the loading bay should be not less than 0.5m and not more than 1.0m. A loading bay with varying height has greatest versatility. Provision and connection of a water supply to the feeding area is essential. One concrete drinking trough to be provided in each paddock.

Provision of shade and shelter should be considered (this could be provided by existing trees, new plantings, or encouraging regeneration with protective fencing).

Adequate provision of gates, grids, stiles and barriers should be considered to ensure the safe movement of equestrians, pedestrians and maintenance vehicles through the areas. Standard drawings are for 'Cavaletti' gates and for equestrian swinging gates are included at Appendix A. Vehicle gates to each paddock are essential.

20.12.2.3 Road crossings

Where major highways truncate the trail system provision must be made to allow equestrians to cross the road safely. This could be done by means of an underpass or by at-grade signal crossings. At lesser roads, sign posting and reduced speed limits suffice.

20.12.3 Trail width

Generally trails are planned for a horse-and-rider. There is also a need to provide trails where practicable for harness horses; such trails must be compatible with the management intentions of the areas adjacent to the trail. Provision for wheeled vehicles, including harness rigs, will not be possible in many areas since the 3 metre gate required by harness horses would allow access to motor cars and trail bikes. Clearance along equestrian routes from overhanging branches and similar obstructions should be 5 metres. At underpass and similar structures, where cost of provision is a major consideration, overhead clearance can be reduced to 3 metres.

Provision of a corridor at least 5 metres wide is a minimal requirement, and this width should be increased to a design width of 10 metres wherever possible. The 5 metre minimum should not be bordered by barbed-wire fencing or similarly hazardous obstacles. Entries to underpasses, low level crossing or other structures should be made as natural as possible, with no grids, gates or other unnatural obstacles which will spook horses. Natural materials should be used wherever possible for structures, signs and facilities associated with equestrian trails.

20.12.4 Trail surface

Equestrian trails do not require a surface pavement. Where the trail is at a grade of more than 1:4, or on a 1:6 side-slope, the surface must be free draining and firm. Muddy or gravelly surfaces at slopes greater than those quoted are more likely to cause horse and rider to fall, particularly in wet weather. Where usage is heavy, consideration may need to be given to stabilising the surface against erosion.

Low level crossings of watercourses are acceptable on equestrian routes, provided the bottom of the crossing is firm, and ramps leading to the crossing do not exceed slopes of 1:4. Warning signs and depth indicators should be provided on signed equestrian routes. Horizontal bridges will be required over some watercourses. Ideally they should be 2.0 metres wide, or 1.5 metres as an absolute minimum, and should have a wooden hand-rail at 1.0 metre. Asphalt surfacing promotes a natural appearance, and safety wings should be

provided to guide users onto and off the bridge. When planning equestrian trails priority should be given to:

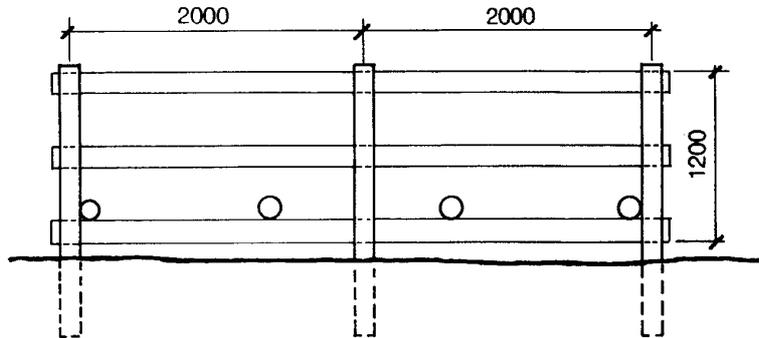
- providing trails near existing equestrian establishments and activity areas
- the provision of long unbroken sections of trail where no substantial road crossing costs are involved.

20.13 Further reading

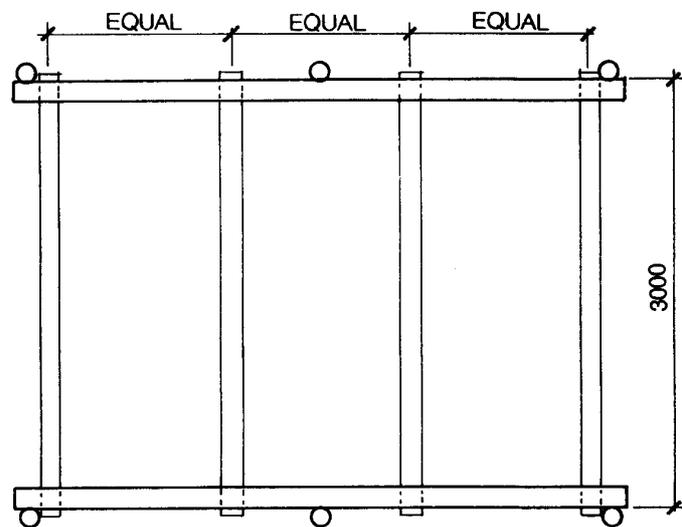
Bushfire Fuel Management Plan, ACT Forests, Canberra Urban Parks, Environment ACT, Canberra, 2000-2002.

Appendix A Equestrian trails

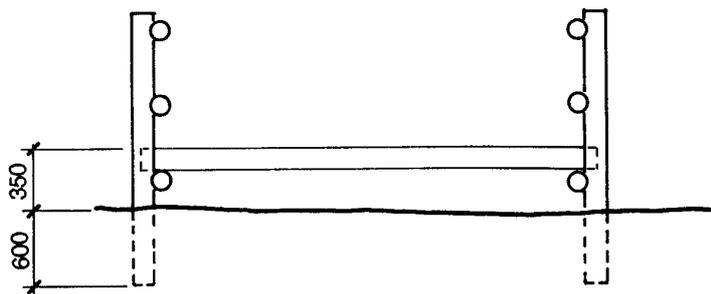
Fence crossing of 'cavaletti'



SIDE ELEVATION



PLAN



END ELEVATION

NOTES.

1. TIMBER TO BE 125–150mm DIA. CCA TREATED PINE.
2. CONNECTIONS TO BE 12mm DIA. GALVANISED BOLTS.
3. BACKFILL AROUND POLES TO BE COMPACTED IN MAX. 150mm LAYERS.

Equestrian trail signs.

